



STANDARD  
OPERATION AND MAINTENANCE  
MANUAL

FOR THE  
LOWER SAN JOAQUIN RIVER LEVEES  
LOWER SAN JOAQUIN RIVER AND  
TRIBUTARIES PROJECT, CALIFORNIA



U. S. ARMY ENGINEER DISTRICT  
CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

CORPS OF ENGINEERS

U. S. ARMY

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Prepared by the Sacramento District  
Corps of Engineers, U. S. Army  
Sacramento, California dated April, 1959

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<u>Exhibit</u>	<u>Description</u>
A	Flood Control Regulations, Maintenance and Operation of Flood Control Works
B	"As Constructed" drawings Unattached (to be contained in supplements)
C	Control of Sand Boils, caving and bank protection, etc. Plates 1 to 10, incl.
D	Levee Inspection Report, Check List No. 1
E	Check Lists of Levees, Channel and Structures Unattached (to be contained in supplements)
F	Letter of Transfer to State Reclamation Board Unattached (to be contained in supplements)
G	Suggested Semi-annual Report Form Unattached (to be contained in supplements)

STANDARD OPERATION AND MAINTENANCE MANUAL

for the

LOWER SAN JOAQUIN RIVER LEVEES PROJECT

SECTION I

INTRODUCTION

1-01. Authority. The Lower San Joaquin River and Tributaries Project, of which the Lower San Joaquin River Levees Project is a unit, was authorized by the Flood Control Act of 22 December 1944, Public Law 534, 78th Congress, 2nd Session, Section 10.

1-02. Purpose of the Manual. The purpose of this manual is to present general information for use by local interests who maintain and operate the various geographical units of the Lower San Joaquin River Levees Project, California. This general information applies to all units of the project and conforms with Section 208.10, Title 33 of the Code of Federal Regulations as approved by the Acting Secretary of Army on 9 August 1944, and published in the Federal Register of 17 August 1944. A copy of the approved regulations is bound in this volume as Exhibit A. Detailed information for each separate unit will be furnished under a separate Supplement Manual to be prepared when each unit is completed.

1-03. Location and Description. The Lower San Joaquin River Levees Project lies in the San Joaquin Valley, California, and extends about 80 miles upstream from the junction of the San Joaquin River with the Stockton Deep Water Channel near Stockton, to the mouth of the Merced River in Merced County. It includes the distributaries of the San Joaquin River in the Upper Delta, i.e., Paradise Cut, the upper part of Middle River, Old River, and the lower reaches of the Stanislaus and Tuolumne River within backwater limits of the San Joaquin River. In general, the Project includes construction or reconstruction of levees, channel improvement and the provision for bank protection along the Lower San Joaquin River from the mouth of the Merced River to the Delta. The combined total length is about 100 miles. A map showing the location of the features of the project is included in the front of this manual.

1-04. Protection Provided. The Lower San Joaquin River and Tributaries Project, including the levee and channel work of the Lower San Joaquin River Levees Project, when completed, will provide protection from all floods of record to about 120,000 acres of fertile agricultural lands; to a suburban area south of the City of Stockton and about four smaller communities; to other areas developed for residential and industrial purposes; to two

transcontinental highway and other State and County highways. It will make possible the reclamation of areas that can be developed to a higher degree when protection against flood hazard is assured.

1-05. Construction History. Prior to authorization of the Lower San Joaquin River and Tributaries Project in December 1944, levees were first constructed on delta islands and along the San Joaquin River by individual landowners and local reclamation districts. Levees constructed since 1850 by local interests have provided partial protection. In recent years some help has been extended by the State of California in the form of bank and levee repairs. Prior to December 1944 the only repair of levees by Federal funds was done with emergency authority.

## SECTION II

### LOCAL COOPERATION

2-01. Federal Requirements. The recommendation of the Chief of Engineers contained in House Flood Control Committee Document No. 2, 78th Congress, 2nd Session, provides in part that:

"(c) Construction of channel improvement works and levee construction and reconstruction on San Joaquin River and tributary channels, subject to the condition that the State of California or other responsible local agencies give assurances satisfactory to the Secretary of War that they will (1) furnish flowage rights to overflow certain lands along the main San Joaquin River and all alls, easements, and rights-of-way necessary for construction of levees; (2) hold and save the United States free from damages due to the construction works and their subsequent maintenance and operation; and (3) maintain all levees and channel improvements after completion in accordance with regulations prescribed by the Secretary of War."

### 2-02. State Legislation.

a. Adoption of Federal Policy in accordance with the State Water Code is hereby quoted in part:

"12651. The plan of improvement for flood control and other purposes on the Lower San Joaquin River and tributaries, including Tuolumne and Stanislaus Rivers, is adopted and authorized in accordance with the recommendations of the Chief of Engineers in Flood Control Committee Document Numbered 2, Seventy-eighth Congress, Second Session . . ."

"12657. Except as otherwise provided in Chapters 1 and 2 of this part, the Reclamation Board shall give assurances satisfactory to the Secretary of War that the local cooperation, required by Section 3 of the act of Congress approved December 22, 1944 (Public, Numbered 534, Seventy-eighth Congress, Second Session), will be furnished by the State in connection with the flood control projects authorized and adopted in Sections 12648, 12648.1, 12650, 12651, 12652, 12654 and 21656.5 and on any flood control projects on any stream flowing into or in the Sacramento Valley or in the San Joaquin Valley heretofore or hereafter approved and authorized by Congress."

"12658. Except as otherwise provided in Chapters 1 and 2 of this part, the Reclamation Board, in conjunction with the War Department, shall execute the plans and projects referred to in Section 12657 and exercise all powers granted to it in Part

4, Division 5 of this code. The Reclamation Board may make such modifications and amendments to the plans as may be necessary to execute them for the purposes stated in Chapters 1 and 2 of this part."

b. Establishment of Maintenance Areas. Sections 12878 to 12878.21, inclusive of the 1957 California State Water Code sets forth a procedure, available when necessary, whereby adequate and uniform maintenance of flood control projects may be secured. In substance, when the State Engineer finds that there is a failure on the part of local agencies to properly maintain project works or that a local agency no longer desires to carry out project maintenance, a report to that effect is made to the State Reclamation Board, which is empowered, after hearing, to form a "maintenance area" and thereafter the Department of Public Works maintains that particular unit of project works, and the Reclamation Board apportions the cost thereof upon the property benefited within the "maintenance area" on an advalorem basis and the assessment is extended for collection together with county taxes on the county assessment roll.

### SECTION III

#### GENERAL

3-01. General Rules and Procedures. The general rules for maintenance and operation of local flood-control works are as follows:

a. The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

b. The State of California, the responsible local agency, which furnished assurance that it will maintain and operate flood control works of the Lower San Joaquin River Levees Project in accordance with regulations prescribed by the Secretary of Army as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent," who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States.

c. A reserve supply of materials needed during a flood emergency shall be kept on hand at all times.

d. No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities.

e. No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer, Corps of Engineers, or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the

District Engineer, or if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

f. It shall be the duty of the superintendent to submit a semi-annual report to the District Engineer covering inspection, maintenance and operation of the protective works.

g. The District Engineer or his authorized representative shall have access at all times to all portions of the protective works.

h. Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made.

i. Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods.

j. The District Engineer will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations. When special conditions do not permit full compliance with the general provisions of the Federal Control Regulations, or when conditions peculiar to a unit require additional care or attention, such supplement instructions will be contained in the Supplement Manual concerned.

3-02. Clarification of Duties. Most of the general duties outlined above are self-explanatory; however, amplification of items b, e, f and i, is considered advisable to insure common interpretation. Therefore, the remainder of this section of the manual furnished suggestions for complying with those requirements.

3-03. Duties of Superintendent. Details of the duties of the Superintendent will be developed in other portions of the manual. The general duties should include the training of key personnel in such a manner that all contingencies may be handled in an expeditious manner. The Superintendent should ascertain that all of his key men have read those portions of the operation and maintenance manual pertaining to their duties. The Superintendent should have available the names, addresses and telephone numbers of all his key men and a reasonable number of substitutes therefor. These key men should, in turn, have similar data on all of the men necessary for assistance in the discharge of their duties. The key men should include the following:

a. An assistant to act for and in the absence of the Superintendent.

b. Section leaders in sufficient number to lead maintenance patrol work of the entire levee during flood fights. High qualities of leadership and responsibility are necessary for these positions.

The name and address of the Superintendent appointed by local interests to be responsible for the continuous inspection, operation and maintenance of the project works shall be furnished the District Engineer, and in case of any change of Superintendent, the District Engineer shall be so notified.

3-04. Proposed Improvements or Alterations. Drawings or prints or proposed improvements or alterations to the existing Flood Control Works must be submitted for approval to the District Engineer, Sacramento District, Corps of Engineers, Sacramento, California, sufficiently in advance of the proposed construction to permit adequate study and consideration of the work. Drawings or prints, in duplicate, showing any improvements or alterations as finally constructed should be furnished to the Corps of Engineers after completion of the work.

3-05. Semi-annual Report. The semi-annual reports required under Paragraph 208.10(a)(6) of the regulations should be submitted within a ten day period prior to 1 June and 1 December of each year and should include all dated copies of reports of inspections made during the period of report. Also, the nature, date of construction, and date of removal of all temporary repairs and the dates of permanent repairs should be included in this report. Other items and suggestions relative to public cooperation, public sentiment on the protection obtained, and other allied subjects are considered pertinent and desirable data for inclusion in the report, but are not required. A suggested form for the Semi-annual Report is included as Exhibit G of the Supplement Manuals.

3-06. Coordination with Operation of Public and Private Facilities. The Superintendent should have specific knowledge of all pertinent public utilities and private facilities located within the unit for which he is responsible in order to coordinate all phases of the flood fighting activities. Such knowledge should be extended to include the names, telephone numbers and addresses of all persons who might necessarily be contacted in case of damage to highway roads and bridges, railroads, power lines, telephone lines, gas lines or structures.

3-07. Safety Requirements. Since patrolling of levees, maintenance of channels and operation of irrigation or drainage structures will expose operating personal to certain hazards, it is suggested that all pertinent safety codes be incorporated into operating procedures and that permanent operating personnel or temporarily employed personnel be given the necessary protective equipment and apparel together with instructions to conduct their work without undue exposure to existing hazards. Watchmen or patrols employed during flood periods should consist of teams of not less than two men.

3-08. Stream Flow Stages. Permanent arrangements should be made by the Superintendent with the Corps of Engineers at Sacramento, California, to secure stream flow stages and forecasts of stream flow stages and weather conditions of effected streams and drainage areas to properly plan adequate measures of protection.

3-09. Periodic Inspections. Inspections should be made by the Superintendent at the times specified below:

- a. During the month of October, which is prior to the beginning of the flood season.
- b. Immediately following each major high water period.
- c. In the absence of high water, at periods not exceeding 90 days.
- d. At intermediate times as necessary.

3-10. Check Lists. The check lists shown in Exhibit D and E, should be used in each inspection to insure that no features of the protective system are overlooked. Items requiring maintenance should be noted thereon; if items are satisfactory they should be so indicated by a check. Exhibit E will be furnished by the Sacramento District Engineer as provided under paragraphs 4-03, 5-03, 6-03 and 7-03 of this manual.

3-11. Drawings. Detailed "As Constructed" record drawings and data necessary for the operation and maintenance of the protective works are included as Exhibit B of the supplement manuals.

## SECTION IV

### LEVEES

4-01. Description. The Lower San Joaquin River Levees Project has been divided into geographical units for ease of reference. These units usually conform to political subdivisions which are responsible for operation and maintenance of the project units within their boundaries. Levees of the various units are described in detail in the applicable Supplement Manuals which are prepared after completion of the construction work within the units. The extent of the levee system of the Lower San Joaquin River and Tributaries Project is shown on the map in the front of this manual. The levees of the Project are constructed generally with a crown width of 20 feet, with landside slopes of 1 on 2 and riverside slopes of 1 on 3. Some bypass levees and some river levees do not have the standard slopes or crown widths. On the Lower San Joaquin River and tributaries the levee grade provides for a freeboard of 3 feet above adopted flood plane profile. Patrol roads, earthen ramps, road crossings and turn-outs have been constructed at intervals or wherever necessary throughout the length of the levees.

4-02. Maintenance. Applicable portions of the Flood Control Regulations, paragraph 208.10(b)(1), pertaining to maintenance are quoted as follows:

"(b) Levees - (1) Maintenance. The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. \*\*\*\* Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being carried out and further, to be certain that:

- (i) No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;
- (ii) No caving has occurred on either the landside or the river side of the levee which might affect the stability of the levee section;

- (iii) No seepage, saturated areas, or sand boils are occurring;
- (iv) Toe drainage systems and pressure relief walls are in good working condition, and that such facilities are not becoming clogged;
- (v) Drains through the levees and gates on said drains are in good working condition;
- (vi) No revetment work or riprap has been displaced, washed out, or removed; (see also paragraph 4-05 a)
- (vii) No action is being taken; such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod; (see paragraph 4-05 b)
- (viii) Access roads to and on the levee are being properly maintained;
- (ix) Cattle guards and gates are in good condition;
- (x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;
- (xi) There is no unauthorized grazing or vehicular traffic on the levees;
- (xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days, and such intermediate times as may be necessary to insure the best possible care of the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent."

4-03. Check Lists. A suggested check list form for reporting inspections of the levee is contained in this manual as Exhibit D. Additional check lists are contained in the Supplement Manuals as Exhibit E. As many copies of the form as are necessary to record all needed maintenance should be used for reporting such inspections.

4-04. Operation. Applicable portions of the Flood Control Regulations, paragraph 208.10(b)(2), are quoted as follows:

"(2) Operation. During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

- (i) There are no indications of slides or sloughs developing;
- (ii) Wave wash or scouring action is not occurring;
- (iii) No low reaches of levee exist which may be overtopped;
- (iv) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section."

4-05. Special Instructions.

a. Revetment work. Due to the fact that many reaches of levees with their contiguous banks have been constructed with stone protection work consisting of quarry stone or cobbles, the provisions of paragraph 4-02(b)(vi) are expanded to include the following:

1. Where scour, wash, settlement or failure of a portion of the originally provided stone protection has been noted, or where inspection indicates that such damage may result during the next flood or high water period, the scour or wash shall be filled with earth free from

brush, roots, sod or other unsuitable material and additional stone shall be placed upon the earth fill to bring the stone protection to its original section. In case of emergency and when stone is not available, sand bags or bags filled with gravel may be used for temporary repair measures.

2. When permanent repair of the stone protection is made, the stone used shall, as far as possible, be similar to the kind and gradation as originally used, and shall be placed to the thickness as shown on the drawings of Exhibit B. Along reaches of the San Joaquin River and tributaries where the levees are subject to excessive wave wash and at other locations where filter was originally placed or where it may be required, repair of stone protection will include the placement of a properly graded six inch filter layer under the stone protection.
  3. In the event an inspection reveals that due to scour, settlement or other causes, stone protection on the levee or bank is required beyond the limits of the original construction or in reaches of the levee or bank not originally provided with such protection, local interests will provide additional sloping of the bank and placement of stone protection as needed to protect completed work. The work shall be done in a manner acceptable under a standard engineering practice. Drawings or prints showing such improvements or alterations shall be furnished the District Engineer after completion of the work.
- b. Care of vegetation on levee. Due to conditions peculiar to this area, the growth of sod on the levee slope is not practicable. Accordingly, the following special instructions are furnished in lieu of paragraph 4-02(b)(vii) of the prescribed general regulations:
1. The Superintendent shall provide for clearing of brush, trees, and other wild growth from the levee crown and slopes. Brush and small trees may be retained on the waterward slope where desirable for the prevention of erosion and wave wash.

2. Weeds, grasses, and debris on the levee may be burned during appropriate seasons, where not dangerous or impracticable, in order to permit the detection of cracks, holes, burrows, slips, and other damage and to permit the detection and extermination of burrowing animals. Grass and weeds on levee slopes should be mowed where removal by burning is dangerous or impracticable, such as on peat levees or where burning would constitute a hazard."
- c. Repairs to Levee Embankment. Methods used for repair or reconstruction of the levee fill will depend on the extent of the damaged section. If of small extent, the most suitable method will be to bring the levee back to line and grade by a fill made in 6-inch layers of earth free from brush, roots, sod or other unsuitable matter. If of larger extent, the fill should be made in the same manner as the original construction, of selected material from borrow pits approved for the project, placed in uniform layers of loose material and not more than 6 inches in depth and compacted in accordance with the specifications under which the work was completed or compacted according to approved construction practices.
- d. Depredations of Burrowing Animals. Dens and runways formed within the levee by burrowing animals are frequently the causes of levee failures during flood stages. Burrowing animals such as muskrats, ground hogs, ground squirrels, moles and gophers, found in the levee should be exterminated. The dens and runways should be opened up and thoroughly compacted as they are backfilled. Levees kept properly cleared are not seriously menaced by burrowing animals as they prefer areas where a protective cover, such as high grass, weeds, and brush is found. Several methods of extermination are found effective, such as trapping, baiting, and poison gases, depending on the type of animal present and the time of year the work is done. Advice concerning the best methods in each locality can be obtained from the County Agricultural Agent.

- e. Access Roads. Access roads to the levees shall be maintained in such condition that they will be accessible at all times to trucks used to transport equipment and supplies for maintenance of flood fighting.

Compliance with the provisions prescribed in the general regulations quoted in paragraph 4-02 above and with the special instructions is essential for the efficient maintenance of the levee system covered by this manual and for the successful operation of the entire Lower San Joaquin River Levees Project.

## SECTION V

### IRRIGATION AND DRAINAGE STRUCTURES

5-01. Description. This section of the manual deals with the numerous irrigation and drainage structures which pass through, under or over the levees to provide for the passage of water from the waterway to the protected area for irrigation or other usage or from the protected area to the waterway for drainage purposes. In general, these structures are constructed of corrugated metal pipes, steel pipes or reinforced concrete pipes or culverts all controlled on the riverside with positive closure devices accessible during high water or with automatic flap gates. Detailed descriptions of the individual structures are contained in the applicable Supplement Manuals.

5-02. Maintenance.

a. Flood Control Regulations. Applicable portions of the Flood Control Regulations, paragraph 208.10(d)(1) pertaining to maintenance of irrigation or drainage structures are quoted as follows:

"(d) Drainage Structures (1) Maintenance. Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash drift or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on drainage structures shall be examined, oiled and trial operated at least once every 90 days. \* \* \* Periodic inspections shall be made by the Superintendent to be certain that:

- (i) Pipes, gates, operating mechanism, riprap and headwalls are in good condition;
- (ii) Inlet and outlet channels are open;
- (iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;
- (iv) Erosion is not occurring adjacent to the structures which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspection."

b. At each inspection as required above, the following items, if applicable, shall be particularly noted:

- (1) Debris or other obstructions to flow.
- (2) Damage or settlement of pipe.
- (3) Condition of concrete-cracks, spalls, erosion.

c. Maintenance.

(1) All eroded concrete shall be repaired as soon as erosion reaches a depth of 4 inches or any reinforcing steel is exposed. All evidences of settlement, uplift, or failure of concrete should be referred to the State Engineer for analysis and recommendation of remedial measures.

(2) If the inspection shows that the automatic drainage structures have been jammed in an open position by debris or other obstructions, they shall be thoroughly cleaned so that they swing freely to a true closure. If any parts of the gates have been damaged or broken, they shall be replaced by new parts.

(3) Compliance with the provisions prescribed above pertaining to drainage structures is essential for proper maintenance of the levee system covered by this manual. Levee failures caused by neglected drainage structures are of common occurrence; it is, therefore, of utmost importance that these structures always be kept in perfect working condition in accordance with the regulations.

(4) Care should be taken not to bury any of the side drainage inlets in the event that it becomes necessary to fill any of the lowlying pockets in back of the levee. Plans for the maintenance of drainage facilities at any such points should be submitted to the State Engineer for approval before such work is started.

5-03. Check Lists. A form suggested as a check list for reporting inspections of drainage structures will be found in the Supplement Manuals, Exhibit B. As many copies of the form as necessary to record all needed maintenance should be used for reporting such inspections.

5-04. Operation. Applicable portions of the Flood Control Regulations, paragraph 208.10(d)(2), are quoted as follows:

"(2) Operation. Whenever high water conditions impend, all gates will be inspected a short time

before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition."

5-05. Additional Requirements.

a. Inspection. Periodic inspections should be made to insure that all facilities are in good operating condition as follows:

- (1) Since the outlets of pipes crossing under the levee are inundated at relatively low river stages, all pipes crossing under the levee should be inspected considerably in advance of the beginning of the flood season. The gates on these pipes should be checked at the same time.
- (2) Inspection of all drainage structures should also be made following each major high water period.
- (3) Otherwise at periods not exceeding 90 days.

b. Check Lists for Inspection of Drainage Structures.

Check lists suggested under Exhibit E of the Supplemental Manuals should be used in each inspection to insure that structures are kept in working condition at all times. Exhibit E will be furnished by the Sacramento District Engineer as provided under paragraph 5-03 of this manual.

c. Positive Closure Devices. It is essential that the prime function of the flood protection works cannot be nullified by back flow through irrigation and drainage structures. Accordingly, a reliable means of closure of conduits must be provided on the riverside of the protective works. Conduits through the flood protection works fall into two categories and the requirements for each are as follows:

- (1) Those located through the levee above the project flood plane. Emergency closure devices will not be required on those structures where

they connect canals and drains which have ample capacity to handle any flow which might pass through the pipe during floods. Where such outlets are not connected to canals or drains of ample capacity an accessible closure device will be required on the river side.

- (2) Those located through the levee below the project flood plane. All structures installed by the Federal government and all new structures, or modification of existing structures by local interests under permit will be required to have an acceptable closure device on the riverside of the levee. Pipes which discharge into the floodway by gravity are required to have an automatic flap gate on the riverside of each outlet. Pipes which discharge water from the floodway through the levee are required to have an acceptable closure device (slide gate) on the riverside of the levee. This gate may be located in a riser unit on or at the river slope of the levee intake end of the pipe. Controls for closing the gate must be above the design flood plane and accessible at all times.

5-06. Safety Requirements. In removing large objects which have lodged against gate structures during periods of high water, exposed workmen should be provided with life vests and, if necessary, should have a safety line attached to their person attended by another worker. Similar hazardous work in the vicinity of structures should not be attempted unless two or more persons are present.

Compliance with the maintenance provisions prescribed in Paragraph 5-02 above pertaining to drainage structures is essential for proper maintenance of the levee system covered by this manual. Levee failures caused by neglected drainage structures are of common occurrence; it is therefore of utmost importance that these structures always be kept in perfect working condition in accordance with the regulations.

## SECTION VI

### CHANNELS

6-01. Description. The channels of the Project constitute that part of the waterway which lies between the levees of the San Joaquin River from its junction with the Stockton Deep Water Channel to the mouth of the Merced River. Also between the levees of the distributaries of the San Joaquin River in the Upper Delta, i.e. Paradise Cut, the upper part of Middle River, Old River and the lower reaches of the Stanislaus and Tuolumne Rivers within backwater limits of the San Joaquin River. The area in general is shown on the map located near the front of this manual. More complete detailed descriptions and limits of channels are contained in the Supplement Manuals.

#### 6-02. Maintenance.

a. Flood Control Regulations. Applicable portions of the Federal Flood Control Regulations, Paragraph 208.10(g)(1), pertaining to maintenance of channels are quoted as follows:

##### "(g) Channels and Floodways--- (1) Maintenance.

Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

- (i) The channel or floodway is clear of debris, weeds, and wild growth;
- (ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;
- (iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;
- (iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;
- (v) Riprap sections and deflection dikes and walls are in good condition;
- (vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit

proper functioning of the project works.

Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections..."

b. Other Maintenance Requirements. The purpose of the floodflow channels inspection and maintenance is to insure that conditions which affect the channel capacity will remain substantially the same as those considered in the design assumptions and that no new conditions develop that may affect the stability of the project structures. Channel maintenance along navigable waterways relates to such maintenance as is required for flood control and is not to be confused with the snagging, clearing and dredging operations carried on by the United States in conjunction with maintenance of Federal navigation projects. Maintenance along channels which are not navigable waterways are the sole responsibility of local interests when such channels must be maintained to a certain capacity for flood control. Particular attention will, therefore, be given the following:

(1) Weeds and other vegetal growth in the channel shall be cut in advance of the flood season and, together with all debris, removed from the channel.

(2) Operations of any nature upstream from the project that would affect flow conditions.

(3) Shoaling or aggradation at the inlets or outlets of side drainage structures may render them inoperative. It is, therefore, imperative that all drains be kept cleaned out and unobstructed at all times.

(4) Dumped rock or other suitable types of protection should be placed at locations found by experience to be critical trouble points, with a view to stabilizing the channel alignment and preserving the general uniformity of the bank lines.

(5) Sediment, rubbish, industrial waste or any debris plugs or other obstructions should be removed from the channel to prevent any tendency for the flows to be deflected within the channel. The heavy material likely to accumulate in the new channel at the mouths of tributaries should be removed to keep the channel clear.

(6) All eroded concrete shall be repaired as soon as reinforcing steel is exposed or erosion reaches a depth of 4 inches. For this purpose, it is recommended that the repair be made by thoroughly cleaning the surface by sandblasting and building up the section with pneumatically placed Portland cement mortar. All evidence of settlement, deviation from grade, uplift, or failure of concrete structures shall be referred to the State Engineer for analysis and remedial measures.

(7) All damage to fencing, posts, barbed wire or galvanizing whether resulting from accidental or willful injuries or from corrosion, shall be promptly repaired with new material in order to maintain satisfactory protection to the public.

(8) Earth fills should be checked for settlement, erosion of levee slopes, excessive seepage or saturation area back of fills and condition of bank protection - concrete or stone blanket.

(9) Right-of-way should be checked for presence of dumped refuse and encroachment of trespass.

6-03. Check Lists. A form suggested as a check list for reporting inspections of the channel will be found in the Supplement Manual, Exhibit E. As many copies of the form as necessary to record all needed maintenance should be used for reporting such inspections.

6-04. Operation.

a. Pertinent Requirements of the Code of Federal Regulations, Par. 208.10(g)(2), are quoted in part as follows:

"(g) Channels and floodways.....(2) Operation. Both banks of the channel shall be patrolled during periods of high water .... Appropriate measures shall be taken to prevent the formation of jams .... of debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter all snags and other debris shall be removed and all damage to .... walls, drainage outlets or other flood control structures repaired."

6-05. Safety Requirements.

a. Clearing of channels present hazards which, unless foreseen and guarded against, may result in serious consequences.

Clearing the channel of growing vegetal matter involves the use of axes, brushhooks or other sharp edged hand tools. In order that the work may be accomplished with a minimum of exposure, the following precautions should be observed:

- (1) Instruct employees in proper use of tools and equipment.
- (2) Keep tools sharp and inspect tools for possible loose or warped handles or lack of proper wedges.
- (3) Allow sufficient distance between workers.
- (4) Clear area of branches or vines which might deflect swing of axe.
- (5) When clearing channel of debris, workmen should be cautioned to keep a sharp lookout for poisonous snakes.
- (6) Extra care should be taken to prevent exposure of susceptible workmen to poison oak.
- (7) Should it become necessary to remove large objects which have lodged against the bank or which are causing an obstruction to the flow, during the period of high water, workmen who may be exposed to water hazards should be provided with life vests and, if necessary, should have a safety line attached to their person, attended by another worker.

## SECTION VII

### MISCELLANEOUS FACILITIES

7-01. Description. Miscellaneous structures or facilities which are constructed as a part of, or exist in conjunction with the protective works, and which might affect their functioning, include bridges, utility crossings, hydrographic facilities, road crossings and other structures not classified as drainage or irrigation facilities. Detailed description of individual structures or facilities pertinent to each unit will be contained in the supplement manual.

7-02. Maintenance.

a. Applicable portions of the Federal Regulations, paragraph 208.10(h)(1), are quoted as follows:

"(h) Miscellaneous Facilities. (1) Maintenance. Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be replaced without delay. . ."

b. Inspection of the miscellaneous facilities and maintenance requirements shall be made at the same time that the inspection of the other features of the project are made, and shall be reported on check list Exhibit E, as shown in the Supplement Manuals.

c. The interest of the Corps of Engineers and the responsibility of the local interests in the existing highway and railroad bridges is primarily confined to their effect on the safety and functioning of the flood control works. However, any conditions noted in the inspections that may affect them in any way should, as a matter of courtesy, be brought to the attention of the responsible agencies. If the inspection of any miscellaneous structure (either existent or constructed in the future under permit) discloses any condition that indicates the probability of failure during periods of high water, the Superintendent shall address a letter to the owner of the structure, quoting this manual as authority and inviting attention to the conditions observed and requesting that immediate steps be taken to correct them. A copy of such letter shall

be forwarded to the District Engineer for his information. A report on the action taken by the owner shall be submitted to the District Engineer to accompany the next semi-annual report.

7-03. Check Lists. A check list for miscellaneous structures has not been prepared. A check list similar to that found in the Supplement Manual, Exhibit E, may be used by local interests.

7-04. Operation.

a. Flood Control Regulations. Applicable portions of the Federal Flood Control Regulations, paragraph 208.10(h)(2), are quoted as follows:

"(2) Operation. Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor."

## SECTION VIII

### SUGGESTED METHODS OF COMBATING FLOOD CONDITIONS

8-01. General. Most of the methods described herein have been developed during years of experience with the various problems that often come up during periods of high water, and they are not intended to restrict the Superintendent, or others concerned, to a rigid set of rules for every condition that may arise. The remarks are primarily concerned with the earthen portions of the levee system. If problems not covered by these suggestions arise, where the Superintendent is in doubt as to the procedure to be taken, he will be expected to consult the District Engineer, U.S. Corps of Engineers, Sacramento, California, and subsequently to follow standard engineering practices in meeting the situation. It should be noted that it is much better to be over-prepared for a "flood fight" than to find at the last moment that preparations are incomplete or unsatisfactory. Confidence of the protected persons and firms is a valuable asset that should not be carelessly lost through inefficient operation of the protection system in time of emergency.

8-02. Earthen Levees. An earthen levee is in danger whenever there is water against it. This danger increases with the height of the water, the duration of the flood stage, and the intensity of either the current or wave action. A well-constructed levee of correct cross section should, if properly maintained and not overtopped, hold throughout any major flood. Threatened failures, such as sand boils, sinking levees, slides, or sloughing can be met if prompt action is taken and proper methods of treatment are used.

8-03. Premeditated Damage. In the event of an extraordinary flood requiring a fight over long stretches of levee on both sides of a river, there is a natural temptation to attempt some relief from the strain by breaking the opposite levee. The Superintendent should continually guard against premeditated damage to the levee, and when the situation demands, immediate action should be taken to establish adequate protective forces.

8-04. Security. Personnel of the Corps of Engineers, whether military or civilian, are not vested with any civil police authority in the performance of their engineering duties, and they will not attempt to exercise any such authority. The responsibility for protecting flood control works against sabotage, acts of depredation, or other unlawful acts vests with the local interests through local and State Governmental agencies.

8-05. Inspection of Flood Control Works. Immediately upon receipt of information that a high water is imminent, the Reclamation Districts through their Superintendents, should form a skeleton organization, capable of quick expansion, and assign individuals (Sector Foreman) to have charge of definite sections of levees. As his initial activity, each Sector Foreman should go over his entire sector and parts of adjacent sectors, making a detailed inspection, particularly with reference to the following matters:

- a. Sector limits; ascertain that the dividing line between sectors is plainly determined and, if necessary, marked.
- b. Condition of new levees and recent repairs.
- c. Condition of culverts, flap gates, and sluice gates.
- d. Transportation facilities; roads, rail and water communications.
- e. Material supply; quantity, location, and condition.
- f. Communications; locate and check all necessary telephones in the sector.

8-06. Preliminary Repair Work. After the initial inspection has been made, each Sector Foreman should recruit a labor crew and provide it with tools such as shovels, axes, wheelbarrows, etc. In addition, bulldozers, scrapers, truckes, etc., should be located and made ready for use in case of emergency. Then immediate action should be taken to perform the following work:

- a. Fill up holes or washes in the levee crown, slopes, and landslide berms. Where new construction has been completed during the year, rain washes and deep gullies may have developed. When the levee is new, preparations should be made in advance to combat wave wash along the exposed reaches.
- b. Repair gaps where road crossings have been worn down and the levee is below grade. In filling the road crossings, it may be necessary to obtain material from landside borrow pits, in which case excavation for the material should be kept at least 50 feet from the toe of levee. Any filling done in this connection should be tamped in place and, if in an exposed reach, subject to wave wash, the new section should be faced with bags of sand.

Repair and close all flap gates on culverts and see that they are seated properly before they are covered with flood waters.

d. Ascertain that all roads to and along the levee are in a good state of repair. The Superintendent should obtain assistance from the county road forces to have all roads put in first-class condition.

e. Locate necessary tools and materials (sacks, sandbags, brush, lumber, lights, etc.), and distribute and store the same at points where active maintenance is anticipated.

f. Check and obtain repair of all telephone lines necessary for operation, obtain lists of all team forces, motorboats, motor cars, and truck transportation that can be made available.

g. Make thorough arrangements with reliable citizens of the community for the supply, transportation, subsistence, and shelter for the necessary labor.

h. Communicate directly with owners of all stock pastured on the levee and direct that all stock be removed from the levee right-of-way. Cut all fences crossing the levee that do not have gates provided.

i. Investigate all drainage ditches on the landside of the levee and open these drains when obstructions exist. Prepare to cut the necessary seep drainage ditches; however, no attempt should be made to drain the levee slope until actual seepage takes place.

j. Remove all dynamite and explosives of any kind from the vicinity of the levee.

8-07. Disaster Relief. It is the primary responsibility of local, State, and municipal authorities, supported by or working in connection with the American Red Cross to adopt measures for the relief of flood disaster victims. The primary mission of this District is to maintain the integrity of flood control works. However, relief measures may be undertaken by the Sacramento District in extreme cases and under compelling circumstances where local resources are clearly inadequate to cope with the situation.

8-08. General Methods of Treatment. After the above preliminary organization and precautions have been completed, the "flood-fight" itself commences. The methods of combating various defects in an earthen levee as described in the following paragraphs have been proved effective during many years of use by the Corps of Engineers. The time, manpower, and materials expended on the corrective measures

shown below have an equal importance as attending the details of the closure structures, and other portions of the system as described elsewhere within this manual.

#### 8-09. Sand Boils.

a. General. A sand boil is the result of a transfer of pressure head and seepage from the river through a pervious stratum near or at the surface of the landside of the levee. This seepage under pressure tends to push its way to the surface and actually floats the material through which it flows. If the weight of the more impervious soil overlying the pervious stratum, in which the flow under pressure is occurring, is sufficient to counterbalance this pressure, no harmful effects results. When the soil stratum overlying the pervious layer fails to counterbalance the upward pressure, or when no such stratum exists, boils break through the landward surface. The sandboil may discharge relatively clear water or the discharge may contain quantities of sand and silt, depending upon the magnitude of the pressure and the size of the boil.

b. Effects of Sand Boils. Sand boils can produce three distinctly different effects on the levee, as illustrated on Plate 6, Exhibit C. In Figure 1, the seepage flow develops a very definite pipe or tube under the levee which breaks out at the landward toe in the form of one or more large sand boils. Unless checked, a cavern is created under the levee, causing subsidence and subsequent overtopping. Slumping of the levee will identify this type. Figure 2 illustrates how pressurized seepage water flows under the levee without following a well-defined path, and results in one or more boils outcropping at or near the landward toe. The flow from these boils tends to produce sloughing of the slope, and is evidenced by cutting and ravelling at the landward toe. Figure 3 shows a third type of effect of a sand boil, wherein numerous small boils, many of which are scarcely noticeable, outcrop at or near the toe. While no boil may appear to be dangerous in itself, a group of boils causes flotation of the soil, erosion of the toe, and ultimate failure of the slope through sliding.

#### c. Method of Treatment.

(1) The accepted method of treating sand boils is to construct a ring of sandbags around the boil, building up a head of water within the ring sufficient to prevent further movement of sand and silt (see Plate 1, Exhibit C). The usual practice of ringing a sand boil is, as follows:

(a) The entire base for the sack ring is cleared of debris, in order to provide a watertight bond between the natural ground and the sack ring.

(b) The sacks are then laid in a ring around the boil, with joints staggered, and with loose earth between all sacks.

(c) The ring is carried only to a height sufficient to prevent material from being discharged. The ring should not entirely stop the flow of water, because of the probability of the excessive local pressure head causing additional ruptures of impervious strata and boils nearby.

(d) A V-shaped drain constructed of two boards, or a piece of sheet metal, is then placed near the top of the ring to carry off the water.

(2) Actual conditions at each sand boil will determine the exact dimensions of the ring. The necessary diameter and height of the ring will depend upon the size of the boil, and the flow of water from it. In general, the following considerations should govern:

(a) The base width should not be less than 1-1/2 times the contemplated height.

(b) "Weak" ground near the boil should be included within the ring, thereby preventing a break-through later.

(c) The ring should be of sufficient diameter to permit sacking operations to keep ahead of the flow of water.

(3) Where many boils are found to exist in a given area, a ring levee of sandbags should be constructed around the entire area and, if necessary, water should be pumped into the area to provide sufficient weight to counterbalance the upward pressure.

8-10. Sub-levees or Bow Levees. Sub-levees are smaller levees built to the landside of the main levee in order to form pools to reduce the effective water pressure on the landside and consequently prevent the formation of boils and movement of foundation material. If sub-levees in certain locations prove advisable, the following treatment is recommended: (a) siphons should be available for filling all sub-levees, and (b) when deemed necessary, the siphons should be put into operation and kept running until each sub-levee basin is filled. The siphons, of course, need not be run if the basin fills of its own accord from normal seepage.

8-11. Sloughs. If any sloughs develop in the levees, all soft areas should be thoroughly drained by excavating shallow ditches (see Plate No. 7, Exhibit C), after which a single layer of willow brush, if obtainable, or any small trees or limbs should be laid up and down the slope, laying the butts up and tops down, and weighted with sacks (see Plate No. 10, Exhibit C). If the slope begins to slough down, a buttress of sacks should be built on the toe and extending up the slope. The buttress on the toe should be built in the shape of a small berm. No sacks or weight other than necessary to hold the brush in place should extend up the slope more than two-thirds of the distance from toe of slope to the fault.

8-12. Wave Wash. The Superintendent and Sector Foremen should study the levee beforehand to determine the possibility of wave wash. All such reaches will be located well in advance and for use in emergency, a reserve supply of filled sacks and rolls of cotton bagging will be kept on board flats. If the slope is well sodded, a storm of an hour's duration should cause very little damage. During periods of high wind and high water, ample labor should stand by and experienced personnel should observe where the washouts are beginning by sounding or by actually wading along the submerged slope. Sections of cotton bagging should be placed over the washed areas, as shown on Exhibit C, Plate 3. As an alternative, filled sacks should be placed in the cut in an effective manner and as soon as possible. The filled sacks should be laid in sections of sufficient length to give protection well above the anticipated rise. Bagging so laid must be thoroughly weighted down to be effective. Plate 2, Exhibit C shows a movable type of wave wash protection, also used with good results. Its advantage is that it can rapidly be built at any convenient place and easily set in place on the job.

8-13. Scours. A careful observation should be made of the riverside of the levee at all localities where a current of more than two feet per second is observed. Trouble may be looked for at the ends of old levee dikes, road-crossing ramps, old traverse, and places where pipes, sewers and other structures penetrate the levee. If any sign of scour is observed in the pits or at the ends of the dikes, soundings should be taken to observe the amount and progress of the scour. The usual method of construction to check scour in the pits, on the slopes, or at the ends of dikes will be to construct deflection dikes using brush, treetops, or lumber, driving stakes and wiring together, and filling in between with brush and filled sacks or stone.

8-14. Topping. Immediate consideration should be given the grade line of each levee section by comparison of existing grades with those shown on the drawings, "As Constructed", Exhibit B of

Supplement Manuals. If any reaches show a grade below the previous highest water, emergency topping should be undertaken at once to such a grade as may be established by the District Engineer, U. S. Engineer Office, Sacramento, California, as follows:

a. Sack topping. If lumber is not available, a sack topping may be used to raise the crown of the levee about three feet. The sacks should be laid stretcherwise or along the levee for the first layer, crosswise for the second layer, and so on. Sacks should be lapped at least  $1/3$  either way and well mauled into place. When properly sacked and tamped, one sack will give about three to four inches of topping. If gravel is available, it should be used for the front facing so as to avoid washing out.

b. Lumber and sack topping. This is the most commonly used method of raising low reaches in emergencies. In putting on this topping, as well as other topping, a careful line of levels should be run and grade stakes set in advance. 2" x 4" x 6' stakes should then be driven on the riverside of the crown six feet apart, and 1" x 12" boards nailed to the landside of the stakes. This wall, backed with a single tier of sacks, will hold out at least one foot of water. If a second foot is necessary, the layers of sacks will have to be increased in number and reinforced. The stakes should be driven three feet in the ground, and should project out three feet, thus providing, in extreme cases, a three-foot topping if properly braced behind with sacks and earth. In some instances, it may be practicable to back up the planking with tamped earth obtained in the vicinity in lieu of the sacks shown in the drawing, Exhibit C, Plate 5.

c. Mud Box. Two types of mud box levees are shown on Plates No. 8 and 9, Exhibit C. The size of box is controlled by the conditions under which the box will function, available materials, method of placing the dirt, and the time element.

d. Cut-Crown Topping. This form of work should never be resorted to except in extreme emergency, when filled sacks and lumber cannot be secured.

8-15. Caving Bank Protection. As protection against active caving of riverbanks, rock-filled cribs are very effective if properly placed. Cribs are usually 14 by 14 feet in plan by 10 to 14 inches in inside depth. The cribs are constructed on a double thickness of 1" x 4" x 14' lumber, equivalent to 2" x 4" pieces, lapped rail fence fashion at all corners and intersections. They are divided into four compartments of about equal area by two perpendicular

cross walls constructed in the same manner as the side walls. The floors and covers are built up of double 1" x 4" boards spaced about 9" center-to-center. Under the floor and perpendicular to the direction of the floor boards are five equally spaced pairs of 1" x 4" boards about 3 feet center-to-center. On top of the cover, perpendicular to the direction of the cover boards, are three pairs of top boards, one over each of the side walls and one over the central division wall. All intersections are nailed with one 20d nail. The compartments are filled with rock before covering. Each wall intersection of the fabricated cribs is securely fastened by a loop of No. 9 wire. See Exhibit C, Plate 4.

8-16. Transportation. In instances where it is necessary to send equipment over roads that are impassable due to mud or sand, their passage may be provided by the use of a plank road or by means of steel or wire mats. Telephone or "walkie-talkie" communication should be provided along dangerous stretches of the levee when travel or other satisfactory means of communication cannot be maintained.

8-17. Check Lists. The check lists shown in Exhibits D and E are furnished for reproduction and use by the local interests. These lists should be used in each inspection to insure that no features of the protective system are overlooked. Items requiring repairs should be noted thereon; if items are satisfactory, they should be indicated by a check mark.

8-18. Use of Government Plant. The District Engineer is authorized (EM 1125-2-305) to use or loan Government plant in sudden emergencies when life is in danger. The use of such plant is also permitted to save private property provided that no suitable private plant is available and that the plant can be spared without detriment to Government works.

## TITLE 33—NAVIGATION AND NAVIGABLE WATERS

### Chapter II—Corps of Engineers, War Department

#### PART 208—FLOOD CONTROL REGULATIONS MAINTENANCE AND OPERATION OF FLOOD CONTROL WORKS

Pursuant to the provisions of section 3 of the Act of Congress approved June 23, 1936, as amended and supplemented (49 Stat. 1571; 50 Stat. 877; and 55 Stat. 636; 33 U. S. C. 701c; 701c-1), the following regulations are hereby prescribed to govern the maintenance and operation of flood control works:

§ 208.10 *Local flood protection works; maintenance and operation of structures and facilities*—(a) *General.* (1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent," who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States.

(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times.

(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the right-of-way for the protective facilities.

(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the War Department or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

(6) It shall be the duty of the superintendent to submit a semiannual report to the District Engineer covering inspection, maintenance, and operation of the protective works.

(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works.

(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made.

(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods.

(10) The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations.

(b) *Levees*—(1) *Maintenance.* The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

(i) No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;

(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section;

(iii) No seepage, saturated areas, or sand boils are occurring;

(iv) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

(v) Drains through the levees and gates on said drafts are in good working condition;

(vi) No revetment work or riprap has been displaced, washed out, or removed;

(vii) No action is being taken; such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod;

(viii) Access roads to and on the levee are being properly maintained;

(ix) Cattle guards and gates are in good condition;

(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;

(xi) There is no unauthorized grazing or vehicular traffic on the levees;

(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days, and such intermediate times as may be necessary to insure the best possible care of

the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent.

(2) *Operation.* During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

(i) There are no indications of slides or sloughs developing;

(ii) Wave wash or scouring action is not occurring;

(iii) No low reaches of levee exist which may be overtopped;

(iv) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

(c) *Flood walls*—(1) *Maintenance.* Periodic inspections shall be made by the Superintendent to be certain that:

(i) No seepage, saturated areas, or sand boils are occurring;

(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

(iii) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

(vii) No bank caving conditions exist riverward of the wall which might endanger its stability;

(viii) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.

Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice.

(2) *Operation.* Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass and/or cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall.

(d) *Drainage structures*—(1) *Maintenance.* Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on

drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

(i) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

(ii) Inlet and outlet channels are open;

(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

(iv) Erosion is not occurring adjacent to the structure which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections.

(2) *Operation.* Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition.

(e) *Closure structures*—(1) *Maintenance.* Closure structures for traffic openings shall be inspected by the superintendent every 90 days to be certain that:

(i) No parts are missing;

(ii) Metal parts are adequately covered with paint;

(iii) All movable parts are in satisfactory working order,

(iv) Proper closure can be made promptly when necessary;

(v) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency.

Tools and parts shall not be removed for other use. Trial erections of one or more closure structures shall be made once each year, alternating the structures chosen so that each gate will be erected at least once in each 3-year period. Trial erection of all closure structures shall be made whenever a change is made in key operating personnel. Where railroad operation makes trial erection of a closure structure infeasible, rigorous inspection and drill of operating personnel may be substituted therefor. Trial erection of sand bag closures is not required. Closure materials will be carefully checked prior to and following flood periods, and damaged or missing parts shall be repaired or replaced immediately.

(2) *Operation.* Erection of each movable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given

in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them.

(f) *Pumping plants*—(1) *Maintenance.* Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubricants for all types of machines, fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

(2) *Operation.* Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturers' instructions and drawings and with the "Operating Instructions" for each station. The equipment shall be operated in accordance with the above-mentioned "Operating Instructions" and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pump house sumps flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the District Engineer following each flood.

(g) *Channels and floodways*—(1) *Maintenance.* Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

(i) The channel or floodway is clear of debris, weeds, and wild growth;

(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;

(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;

(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;

(v) Riprap sections and deflection dikes and walls are in good condition;

(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works.

Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary.

(2) *Operation.* Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired.

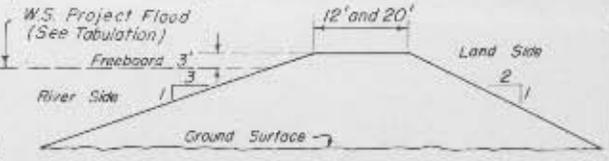
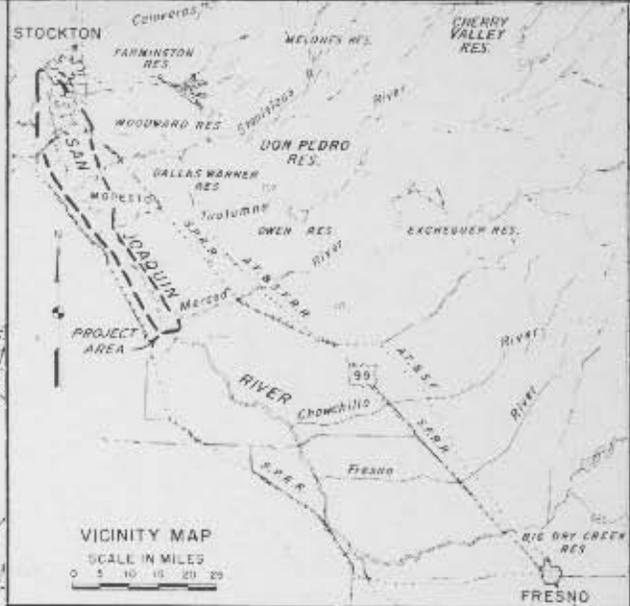
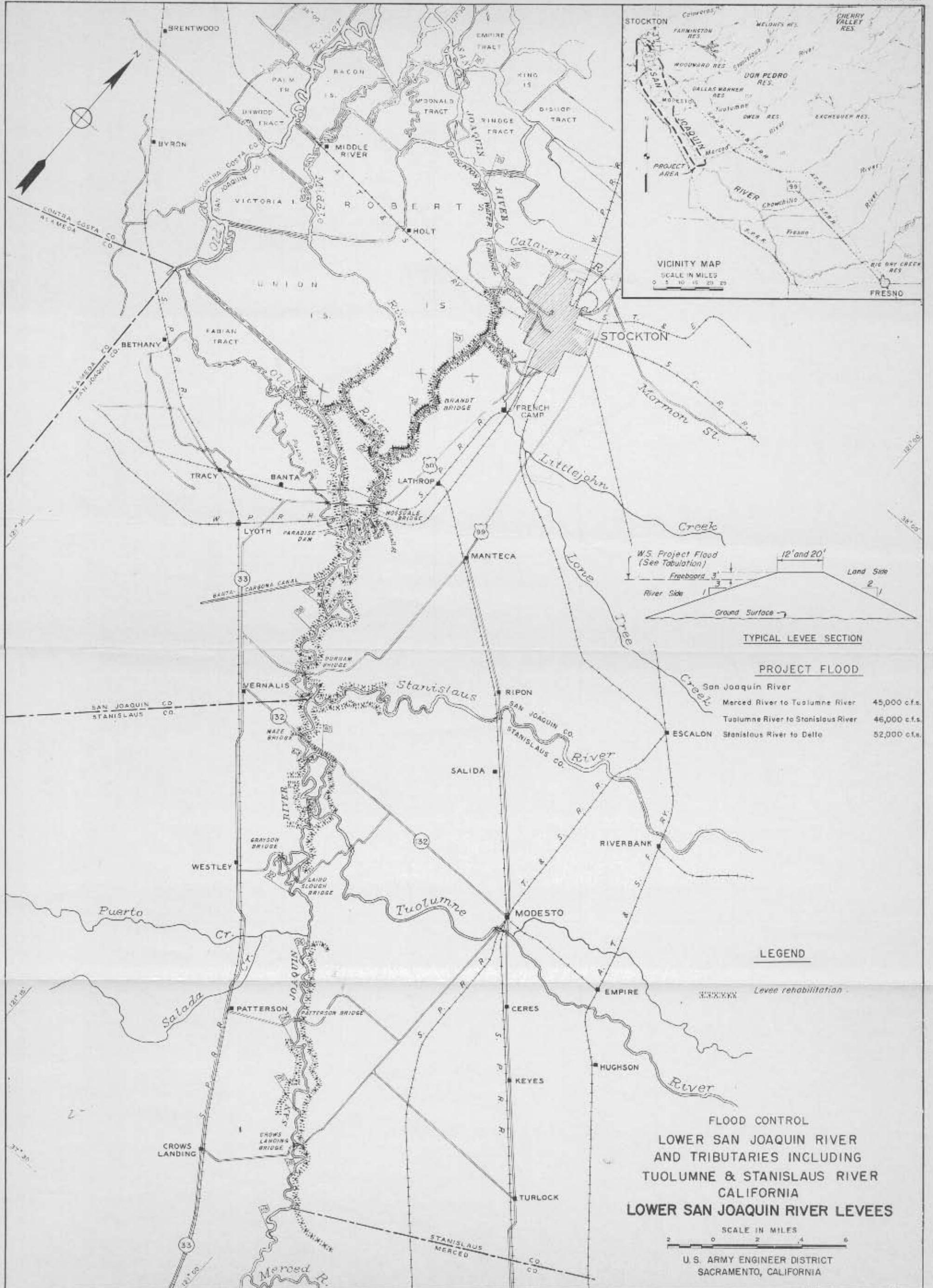
(h) *Miscellaneous facilities*—(1) *Maintenance.* Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior run-off during flood periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows.

(2) *Operation.* Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor. (49 Stat. 1571, 50 Stat. 877; and 55 Stat. 638; 33 U.S.C. 701c; 701c-1) (Regs. 9 August 1944, CE SPEWFP)

[SEAL] J. A. ULIO,  
Major General,  
The Adjutant General.

[P. R. Doc. 44-12286; Filed, August 16, 1944;  
9:44 a. m.]

EXHIBIT "A" Sheet 2 of 2



**PROJECT FLOOD**

Location	Flow (c.f.s.)
San Joaquin River	
Merced River to Tuolumne River	45,000 c.f.s.
Tuolumne River to Stanislaus River	46,000 c.f.s.
Stanislaus River to Delta	52,000 c.f.s.

**LEGEND**

**FLOOD CONTROL  
LOWER SAN JOAQUIN RIVER  
AND TRIBUTARIES INCLUDING  
TUOLUMNE & STANISLAUS RIVER  
CALIFORNIA  
LOWER SAN JOAQUIN RIVER LEVEES**



U. S. ARMY ENGINEER DISTRICT  
SACRAMENTO, CALIFORNIA

## A G R E E M E N T

This agreement made and entered into by and between THE RECLAMATION BOARD of the State of California, hereinafter referred to as the "Board" and the LOWER SAN JOAQUIN LEVEE DISTRICT, hereinafter referred to as the "District", on the 31st day of March, 1956, in view of the following circumstances:

WHEREAS, the Federal Flood Control Act of 1944 (58 Stat. 887) authorized construction by the United States of a project of flood control for the San Joaquin River as described in House Document No. 2, 78th Congress, Second Session; and

WHEREAS, the State of California in 1945 authorized the same project of flood control, Section 12651 of the Water Code, and authorized The Reclamation Board to give satisfactory assurances to the Secretary of the Army that the required local cooperation be furnished by the State in connection with the aforesaid project; and

WHEREAS, the State Legislature has authorized the State Reclamation Board to acquire the land easements and rights of way necessary for construction of the project, in accordance with the authorized plan of flood control, and has appropriated funds to commence acquisition of said lands, easements and rights of way; and

WHEREAS, The Reclamation Board is not authorized to expend any funds upon this project until some other public agency has assumed the obligation of maintenance and operation of the works and the obligation to hold the United States harmless from damages due to the construction of the works; and

WHEREAS, Congress has appropriated funds necessary to commence construction of the project by the Corps of Engineers, United States Army, and the Corps of Engineers has requested that the State fulfill its obligation in the acquisition of lands, easements and rights of way; and

WHEREAS, the proposed project for the San Joaquin River will be beneficial to the lands and properties located within the Lower San Joaquin Levee District and the flood control works presently maintained and operated by said District;

NOW, THEREFORE, IT IS HEREBY AGREED:

(1) The Board, as funds become available to it for expenditure, will acquire, without cost to the District, such lands, easements and rights of way as may be necessary for the construction of the project of flood control for the Lower San Joaquin River and its tributaries as authorized by Section 12651 of the Water Code of the State of California, or as subsequently modified; provided, however, that lands, easements and rights of way presently utilized for or occupied by levee and channel improvements or other flood control project works shall be conveyed, without charge, by the District to the Sacramento and San Joaquin Drainage District for joint use by the latter agency and the District for flood control and reclamation purposes.

(2) In consideration therefor the District agrees:

(a) To hold and save the United States free from damages due to the construction works

which lie within the boundaries or jurisdiction of the Lower San Joaquin Levee District, and also from damages due to their subsequent maintenance and operation;

(b) To maintain and operate, in accordance with the regulations prescribed by the Secretary of the Army, all levee and channel improvements together with all other project works within the jurisdiction or boundaries of the Lower San Joaquin Levee District. Maintenance and operation of these works shall commence immediately, but shall not include the performance of work to be accomplished in connection with the initial construction of the project;

(c) To hold and save the State of California, the Sacramento and San Joaquin Drainage District and The Reclamation Board, their successors or assigns, free and harmless from any and all claims arising out of or in connection with the aforesaid obligations assumed by the Lower San Joaquin Levee District.

IN WITNESS WHEREOF, the parties hereto have executed this agreement on the date first hereinabove mentioned.

LOWER SAN JOAQUIN LEVEE DISTRICT

THE RECLAMATION BOARD

By /s/ H. B. Wolfe  
Chairman President

By /s/ A. R. Gallaway, Jr.  
President

By /s/ A. R. Cocke  
Secretary

By /s/ George H. Holmes  
Secretary

A G R E E M E N T

This agreement made and entered into by and between THE RECLAMATION BOARD of the State of California, hereinafter referred to as the "Board", and the LOWER SAN JOAQUIN LEVEE DISTRICT, hereinafter referred to as "District", on the 7th day of October, 1958, in view of the following circumstances:

WHEREAS, the Federal Flood Control Act of 1944 (58 Stat. 887) authorized construction by the United States of a project of flood control for the San Joaquin River as described in House Document No. 2, 78th Congress, Second Session; and

WHEREAS, the State of California in 1945 authorized the Board to give satisfactory assurances to the Secretary of the Army that the required local cooperation be furnished by the State in connection with the aforesaid project; and

WHEREAS, the State Legislature in 1955 authorized the Board to adopt a modified project of flood control for the area lying within the boundaries of District, by the amendment of Section 8621 of the Water Code; and

WHEREAS, the Board did on December 12, 1955, adopt a modified plan of flood control for this area and did on March 26, 1958, modify the said plan subject to certain conditions; and

WHEREAS, the State Legislature has appropriated funds to the Board for the commencement of the acquisition of lands, easements and rights of way for this project and for the commencement of its construction; and

WHEREAS, the Board is not authorized to expend these funds upon the project until some other public agency has assumed

the obligation of maintaining and operating the project works and the obligation to hold and save the United States and the State free and harmless from damages as set forth below; and

WHEREAS, "District" has the authority to assume these obligations; and

WHEREAS, the proposed project for this area will be beneficial to the lands and properties located within District;

NOW, THEREFORE, IT IS HEREBY AGREED:

(1) That District hereby agrees:

(a) To hold and save the United States free from damages due to the construction works;

(b) To, upon completion of the construction by the Board of any portion of the above project and receipt of written notice from the Board of such completion, thereafter hold and save the State of California and the Board harmless from all claims, damages, or liability due or incident to the design, construction, operation, repair, and maintenance of such portion of the said plan of improvement for flood control, whether the same be caused by the negligence of the State of California, or the Board, or of their officers, agents or employees, or otherwise.

(c) To, upon completion of the construction by the Board of any portion of the above project and receipt of written notice from the

Board of such completion, thereafter maintain and operate, in accordance with the regulations prescribed by the Board or the United States, all of such portion of the said plan of improvement for flood control.

(2) That upon final execution and approval of this agreement that certain agreement between the parties hereto dated March 31, 1956, shall terminate.

IN WITNESS WHEREOF, the parties hereto have executed this agreement on the date first hereinabove mentioned.

THE RECLAMATION BOARD

LOWER SAN JOAQUIN LEVEE DISTRICT

By /s/ A. R. Gallaway, Jr.  
President

By /s/ H. B. Wolfson  
President

By /s/ George H. Holmes  
Secretary

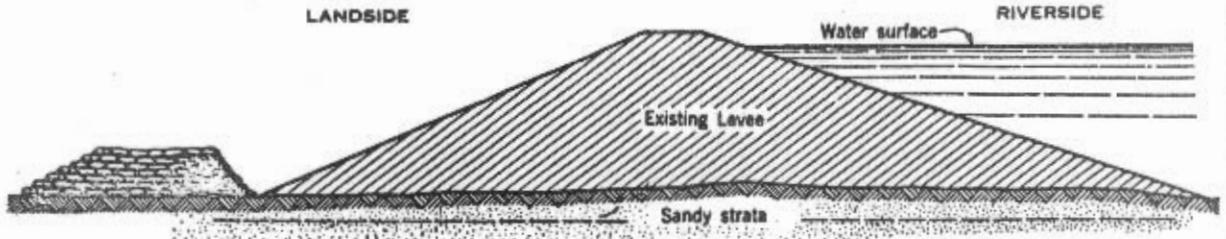
By /s/ A. R. Cocke  
Secretary

EXHIBIT B  
"AS CONSTRUCTED" DRAWINGS  
(See Supplement Manuals)

EXHIBIT B  
Unattached

**EXHIBIT C**

**PLATES OF SUGGESTED FLOOD FIGHTING METHODS**

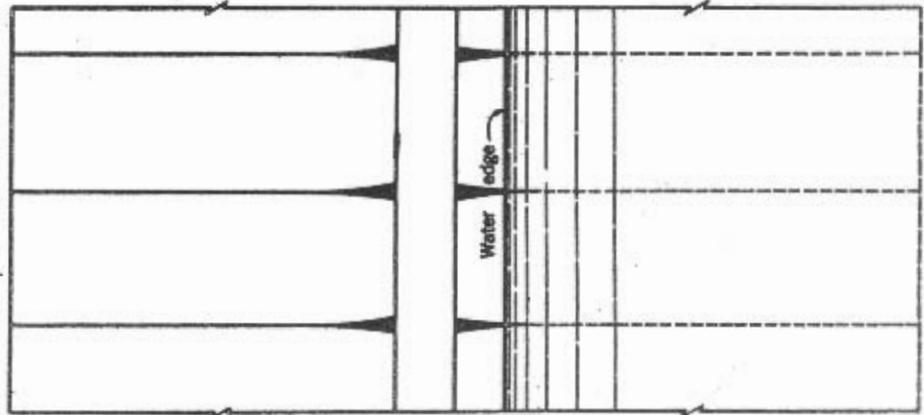
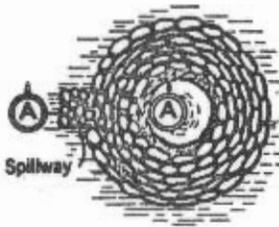


**Note:**  
 Bottom width to be no less than 1½ times height.  
 Be sure to clear sand discharge.  
 Tie into levee if boil is near toe.

**ELEVATION**



**SECTION A-A**



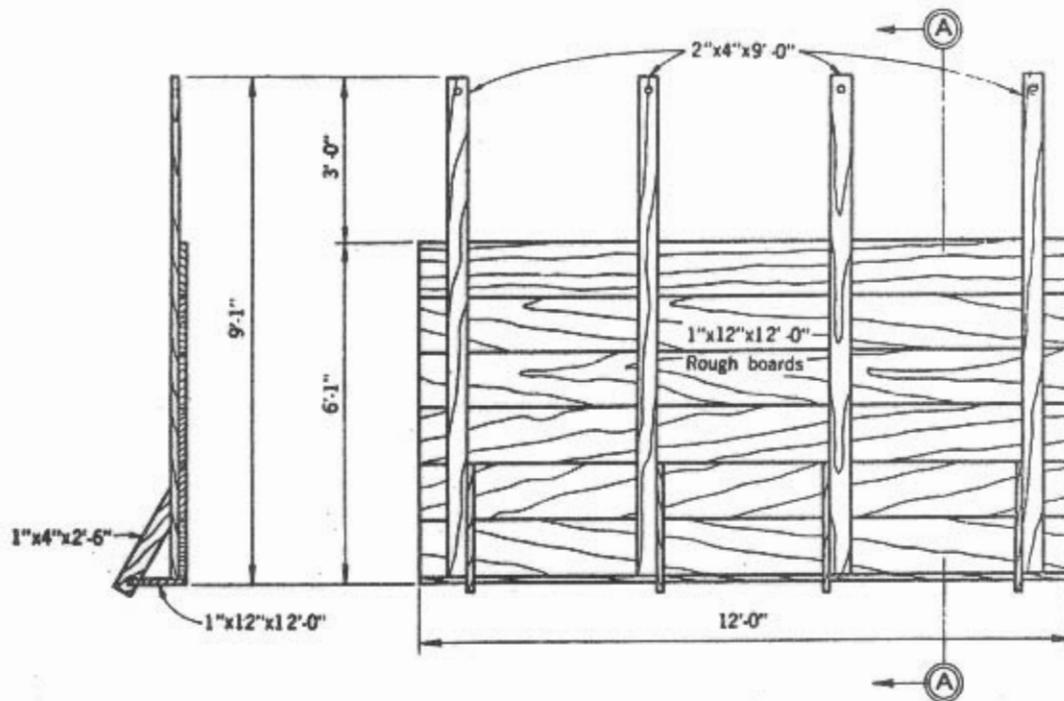
**PLAN**

**Note:**  
 Do not sack boil which does not put out material.  
 Height of sack loop or ring should be only sufficient to create enough head to slow down flow through boil so that no more material is displaced and boil runs clear.  
 Never attempt to completely stop flow through boil.

**LOWER SAN JOAQUIN  
 RIVER LEVEES**

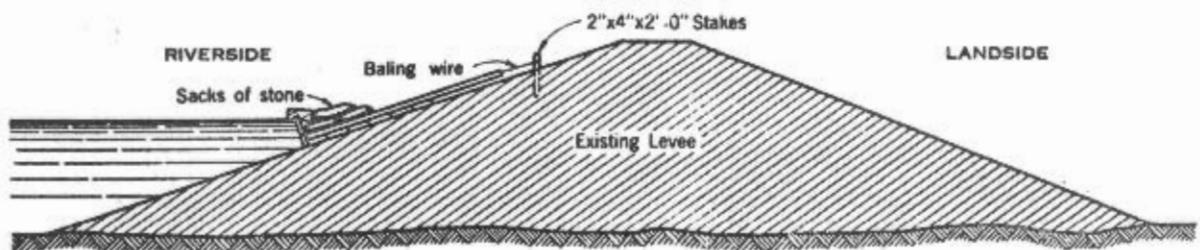
**CONTROL OF SAND BOILS**

U.S. ENGINEER OFFICE, SACRAMENTO, CALIF.



SECTION A-A

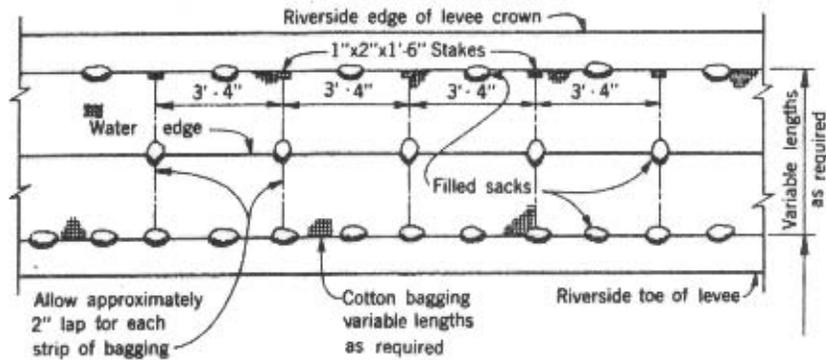
PLAN



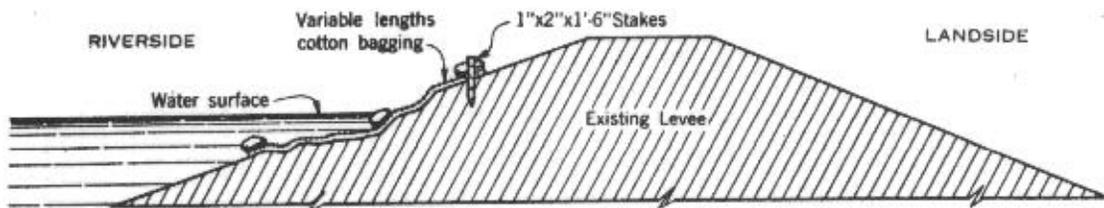
SECTION

BILL OF MATERIAL FOR 100 FEET	
LUMBER	
56 pieces	1"x12"x12'-0"
32 pieces	1"x4"x2'-5"
32 pieces	2"x4"x9'-0"
• 32 pieces	2"x4"x2'-0"
•	(Sharpened)
WIRE	
200'	baling wire
NAILS	
4½ lbs.	.8d nails

**LOWER SAN JOAQUIN  
 RIVER LEVEES**  
  
**MOVABLE  
 WAVE WASH PROTECTION**  
 U. S. ENGINEER OFFICE, SACRAMENTO, CALIF.



PLAN



SECTION

Note:

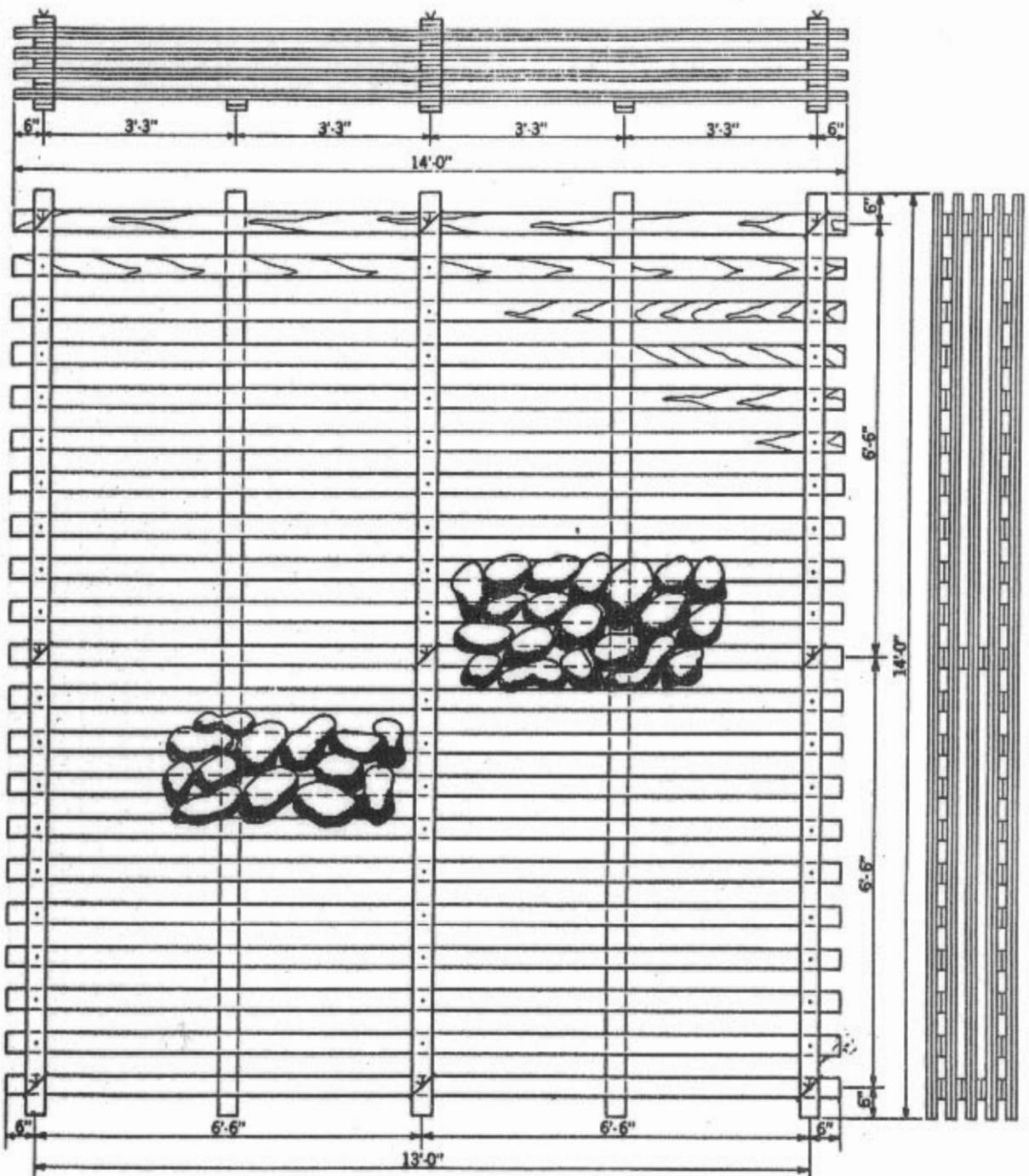
Lay lengths as required of cotton bagging approximately parallel with levee slope and across damaged section. Weight top and edges of bagging with filled sacks as shown above. The filled sacks should be wired or tied to each strip before laying in place. Stake the corners of each strip above water surface. Where cotton bagging is not available burlap sacking may be substituted.

MATERIAL REQUIRED FOR 100 LINEAR FEET OF LEVEE	
LUMBER	
* 30 Stakes 1"x2"x1'-6"	
* (Sharpened)	
SANDBAGS	
120 sand bags	
Cotton bagging	
as required	

**LOWER SAN JOAQUIN  
RIVER LEVEES**

**WAVE WASH PROTECTION**

U. S. ENGINEER OFFICE, SACRAMENTO, CALIF.



**Note:**

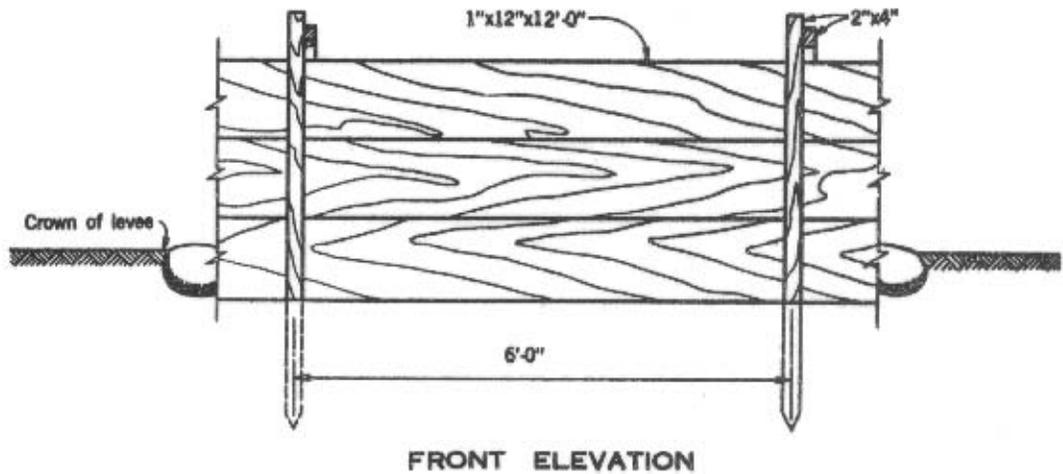
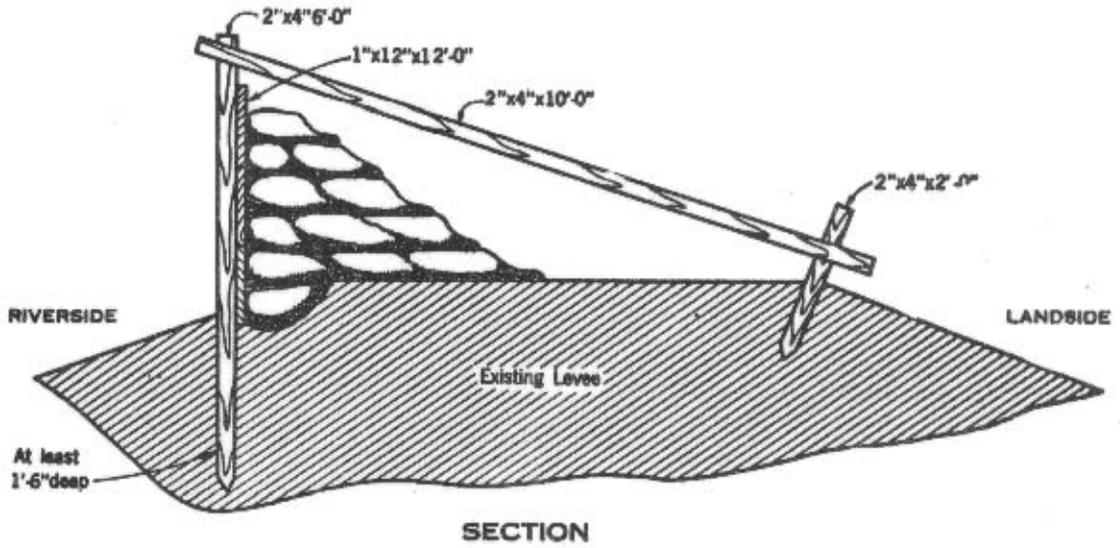
Cribs constructed of double thickness of 1"x4"x14'-0" lumber. Nail all intersections with 1-20d nail. Each intersection of walls securely fastened by a loop of No. 9 wire, tightly twisted.

BILL OF MATERIAL FOR ONE CRIB 13'-0"	
LUMBER	
130 pieces	1"x4"x14'-0"
WIRE	
30'	No. 9 wire
NAILS	
12½ lbs.	20d nails

**LOWER SAN JOAQUIN  
RIVER LEVEES**

**CAVING BANK PROTECTION**

U. S. ENGINEER OFFICE, SACRAMENTO, CALIF.



BILL OF MATERIAL FOR 100 LINEAR FEET OF LEVEE	
LUMBER	
25 pieces	1"x12"x12'-0"
17 pieces	2"x4"x10'-0"
• 17 pieces	2"x4"x6'-0"
• 17 pieces	2"x4"x2'-0"
•	(Sharpened)
NAILS	
1 lb.	-8d nails
2 lbs.	-16d nails
SANDBAGS	
1100	bags

LOWER SAN JOAQUIN  
RIVER LEVEES

**LUMBER AND SACK TOPPING**

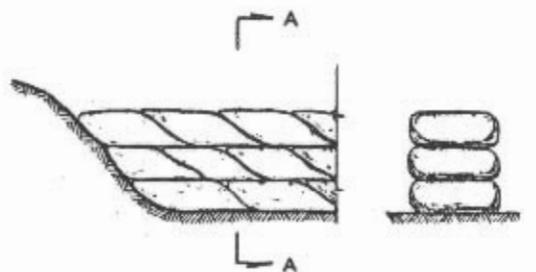
U. S. ENGINEER OFFICE, SACRAMENTO, CALIF.

LEVEE CONSTRUCTION

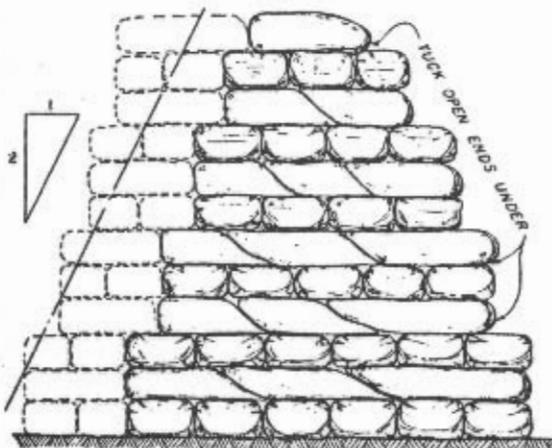
SANDBAGGING USED TO PREVENT OVERTOPPING OF EXISTING LEVEES AND FOR RETAINING FLOOD WATERS WHERE NO BACK-UP MATERIAL IS AVAILABLE.

INSTRUCTIONS:

1. FILL SANDBAGS 1/2 TO 2/3 FULL BUT LEAVE ENOUGH FLAP TO TURN UNDER. DO NOT TIE, LEAVE ENDS OPEN.
2. FOR HEIGHTS OF 1 FOOT AND LESS, LAY 3 SINGLE COURSES WITH SACKS LENGTHWISE AS SHOWN IN SKETCH "A" BELOW.
3. FOR HEIGHTS GREATER THAN 1 FOOT, PLACE AS INDICATED IN SKETCH "B" BELOW.
4. WHEN BAGS ARE PLACED FLATTEN OUT AND FILL VOIDS BY MASHING BAGS WITH FEET AND VIGOROUSLY TRAMP EACH COURSE OF THE LEVEE SECTION. THIS IS AN EXTREMELY IMPORTANT OPERATION FOR PROVIDING A LEVEE WHICH WILL BE AS IMPERVIOUS TO WATER AS POSSIBLE AND TO INSURE STABILITY OF SECTION. LOOSELY PLACED SANDBAGS IMPROPERLY KEED TOGETHER MAY RESULT IN FAILURE AND CAUSE SERIOUS DAMAGE.



ELEVATION                      SECTION A-A  
SKETCH A

LEVEE SECTION

FOR HEIGHTS IN EXCESS OF THE ABOVE (APPROX. 3'-6") HOLD SAME BATTER AND BUILD ON THE SIDE AS INDICATED BY DASHED LINES ABOVE. ALTERNATE HEADER COURSES (BAGS PLACED CROSSWISE) AND STRETCHER COURSES (BAGS PLACED LENGTHWISE).

SKETCH BESTIMATING DATA:

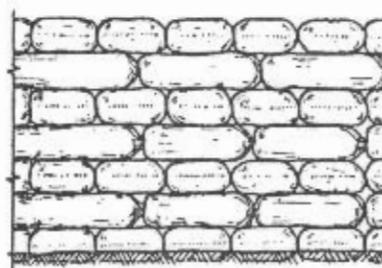
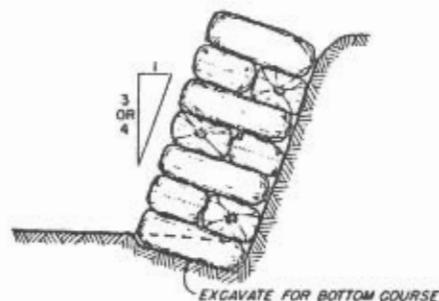
1. AVERAGE WEIGHT OF EACH FILLED SANDBAG, APPROX. 50 LBS.
2. APPROXIMATELY 1000 SANDBAGS ARE REQUIRED FOR EACH 100 SQ. FT. OF SURFACE (HEIGHT MULTIPLIED BY DISTANCE).

REVETMENTS

USED FOR EMERGENCY BANK PROTECTION TO PREVENT UNDER CUTTING AND CONTROL OF COURSE OF FLOOD CHANNELS.

INSTRUCTIONS:

1. FILL SANDBAGS 2/3 FULL AND TIE OPEN END.
2. TUCK IN BOTTOM CORNERS OF BAG AFTER FILLING.
3. PLACE BAGS PERPENDICULAR TO SLOPE.
4. LAY STRETCHER AND HEADER COURSES WITH CHOKE AND SIDE SEAMS IN: THUS:-

ELEVATIONSECTIONESTIMATING DATA:

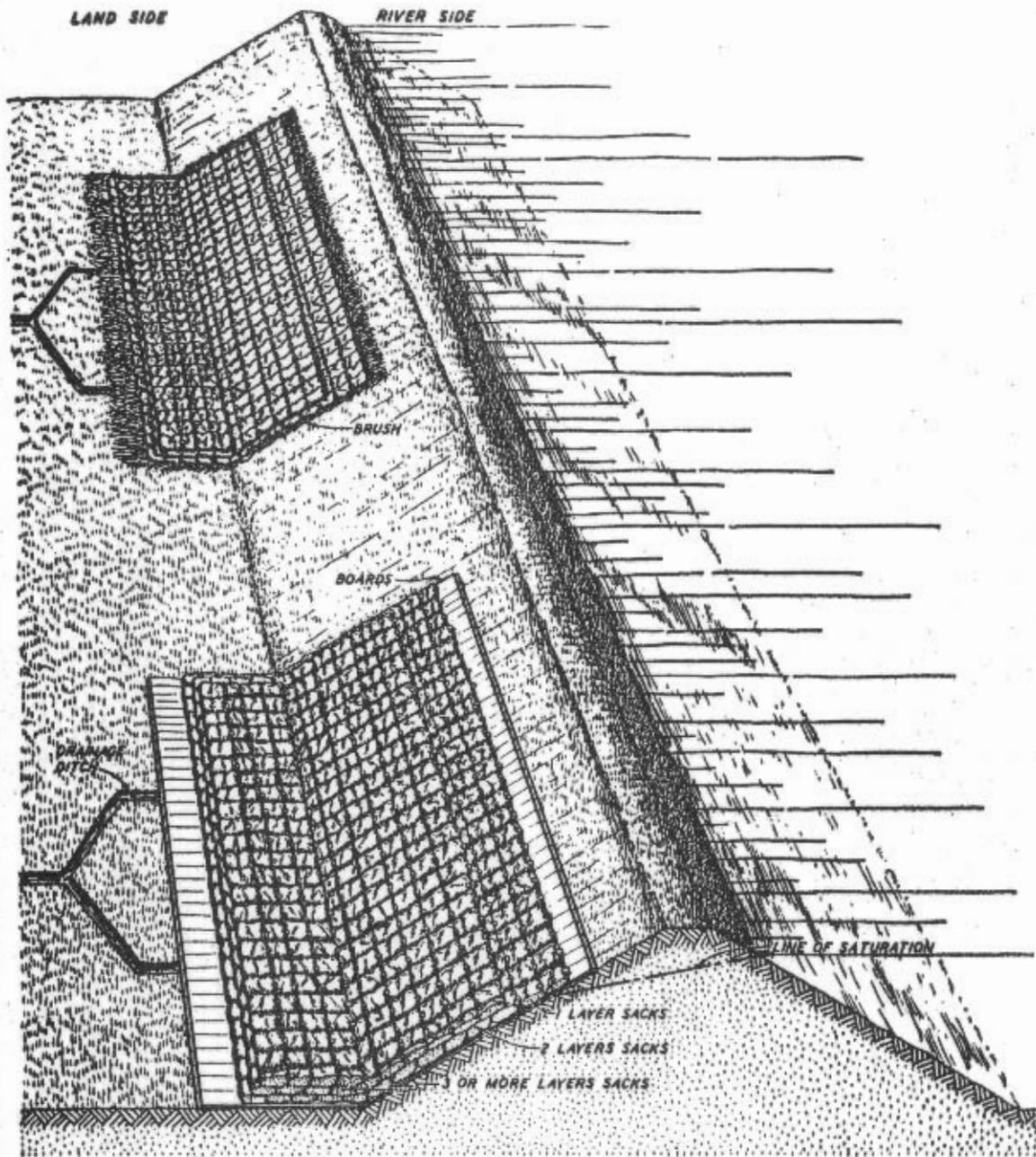
1. AVERAGE WEIGHT OF EACH FILLED SANDBAG APPROXIMATELY 65 LBS.
2. APPROXIMATELY 320 SANDBAGS ARE REQUIRED FOR EACH 100 SQ. FT. OF SURFACE TO BE REVETED.

FILL MATERIAL:

THE IDEAL MATERIAL FOR FILLING SAND BAGS IS A FINE SAND OR COARSE SILT. AVOID, AS MUCH AS POSSIBLE, THE USE OF COARSE GRAVEL AND HEAVY CLAYS.

LOWER SAN JOAQUIN  
RIVER LEVEES  
INSTRUCTIONS FOR  
PLACING SANDBAGS

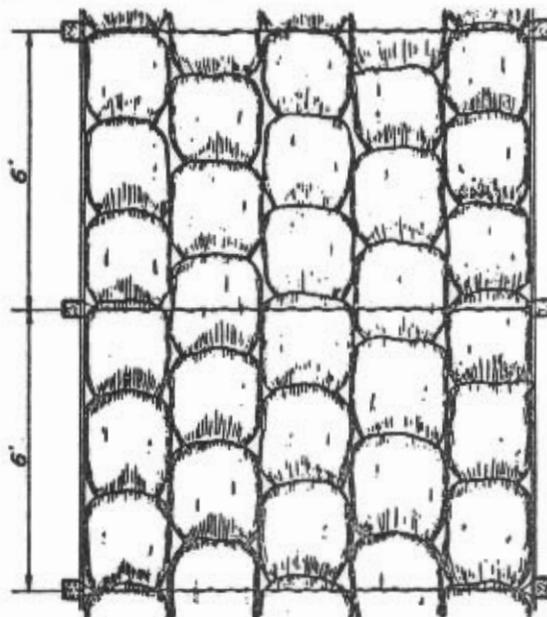
U. S. ENGINEER OFFICE, SACRAMENTO, CALIF.



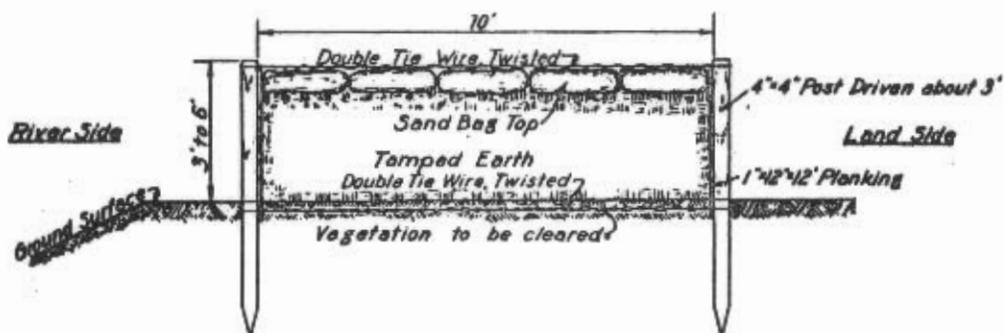
LOWER SAN JOAQUIN  
RIVER LEVEES

BRUSHING AND SACKING  
THE LANDSIDE SLOPE

U.S. CORPS OF ENGINEERS, SACRAMENTO, CALIF.



PLAN



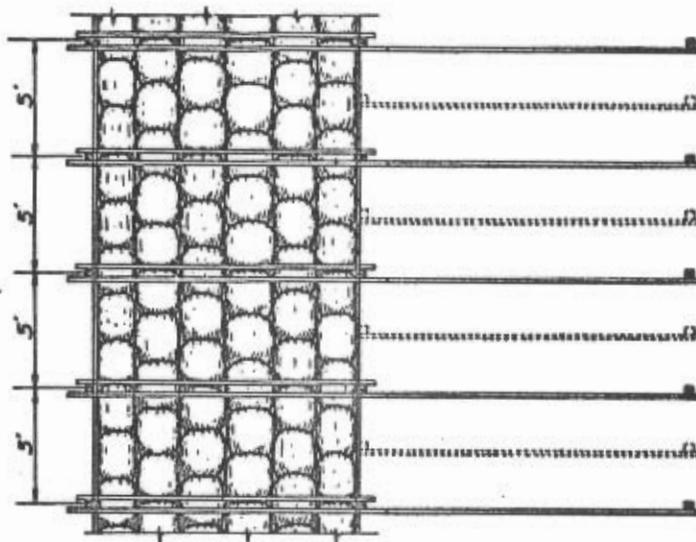
END ELEVATION

MATERIAL REQUIRED FOR 100 LINEAR FEET OF LEVEE		
4 FT HIGH	5 FT HIGH	6 FT HIGH
34 pieces 4"x4"x7' (sharpened)	34 pieces 4"x4"x8' (sharpened)	34 pieces 4"x4"x9' (sharpened)
67 pieces 1"x12"x12' board feet	84 pieces 1"x12"x12' board feet	100 pieces 1"x12"x12' board feet
25 lbs. wire #12 gage	25 lbs. wire #12 gage	25 lbs. wire #12 gage
13 lbs. 10d nails	15 lbs. 10d nails	17 lbs. 10d nails
600 sand bags	600 sand bags	600 sand bags
148 cu. yds. earth	185 cu. yds. earth	222 cu. yds. earth

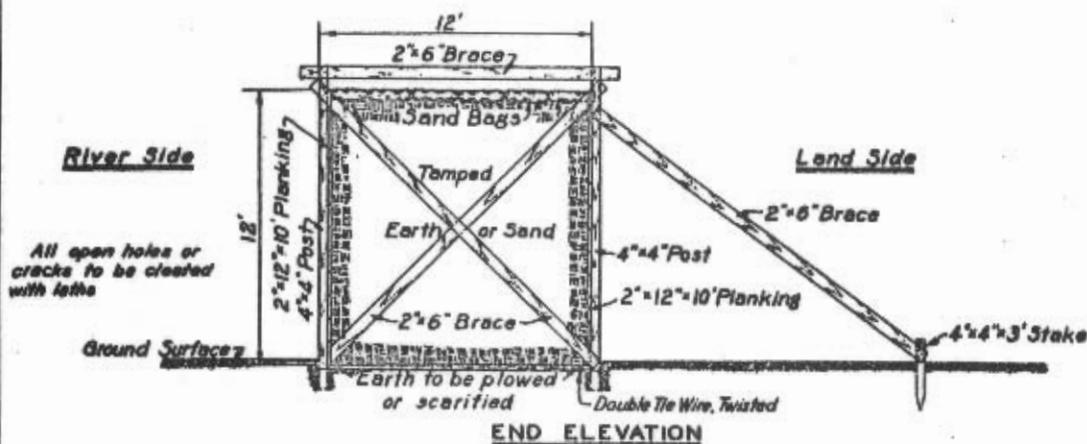
LOWER SAN JOAQUIN  
RIVER LEVEES

3-6FT. MUD BOX LEVEE  
CONSTRUCTION DETAILS

U.S. CORPS OF ENGINEERS, SACRAMENTO, CALIF.



PLAN



END ELEVATION

MATERIAL REQUIRED FOR 100 LINEAR FEET OF LEVEE			
LUMBER	SAND BAGS	NAILS	EARTH or SAND
40 Posts 4"x4"x14'	700	120 lbs.-20d	534 cu. yds.
240 Planks 2"x12"x10'		4 lbs.-3d fine	
20 Braces 2"x6"x14'		WIRE	
60 Braces 2"x6"x10'		20 lbs. #2 gage	
# 20 Stakes 4"x4"x3'			
5 bundles lethe			

Total Lumber 6967 board feet.

ADDITIONAL MATERIAL FOR BRACING BACK SIDE IN BETWEEN BENTS			
LUMBER	SAND BAGS	NAILS	EARTH or SAND
20 Posts 4"x4"x14'		6 lbs.-20d	
20 Braces 2"x6"x10'			
# 20 Stakes 4"x4"x3'			

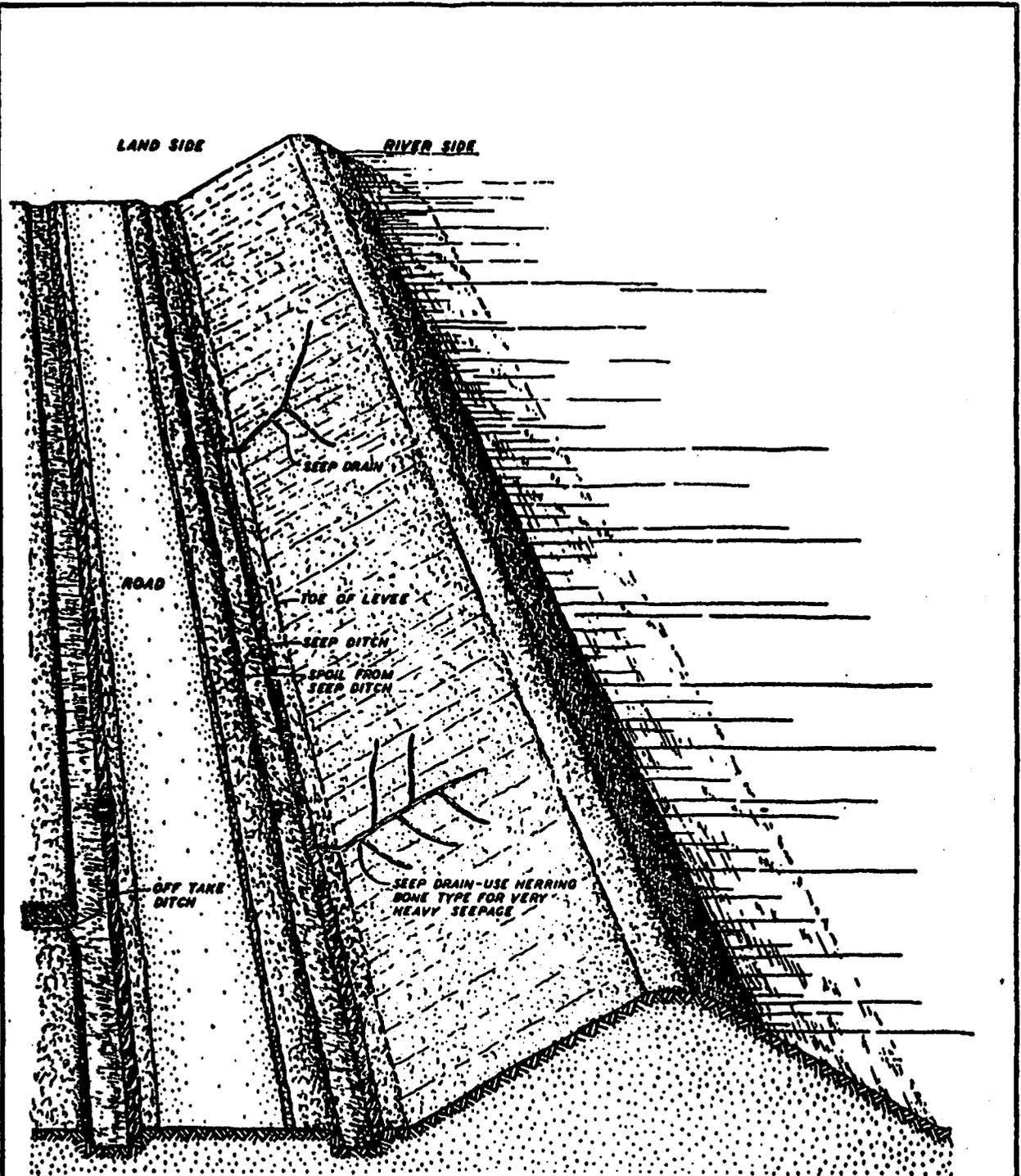
Total Lumber 613 board feet

# Sharpened

## LOWER SAN JOAQUIN RIVER LEVEES

### MUDBOX BULKHEAD LEVEE CONSTRUCTION DETAILS

U. S. CORPS OF ENGINEERS, SACRAMENTO, CALIF.



LOWER SAN JOAQUIN  
RIVER LEVEES

METHOD OF  
DRAINING LEVEE SLOPE

U.S. CORPS OF ENGINEERS, SACRAMENTO, CALIF.

CHECK LIST NO. 1

LEVEE INSPECTION REPORT

Date \_\_\_\_\_

Inspected by \_\_\_\_\_

Report number of places requiring maintenance work opposite each item listed below. A separate report should be submitted describing the necessary maintenance work for each location.

Reference Manual No. \_\_\_\_\_

Item No. :	Description	Number of Places
1	: Settlement, sloughing, or loss of grade . . . . .	_____
2	: Caving, (either side of levee). . . . .	_____
3	: Seepage, saturated. . . . .	_____
4	: Rip-rap . . . . .	_____
5	: Sod . . . . .	_____
6	: Access roads and road ramps . . . . .	_____
7	: Cattle guards and gates . . . . .	_____
8	: Crown of levee. . . . .	_____
9	: Unauthorized grazing or traffic . . . . .	_____
10	: Unauthorized encroachment on rights-of-way. . . . .	_____
11	: Unauthorized excavation and loose backfill. . . . .	_____
12	: Accumulations of drift, trash or debris . . . . .	_____
13	: Weed or undesirable vegetation. . . . .	_____
14	: Miscellaneous pipe crossings. . . . .	_____
15	: Inappropriate burning of grass. . . . .	_____
16	: Other items not included above. . . . .	_____

Inspected by \_\_\_\_\_

Exhibit D

EXHIBIT E  
CHECK LISTS OF LEVEES,  
CHANNEL AND STRUCTURES  
(See Supplement Manuals)

EXHIBIT E  
Unattached

EXHIBIT F  
LETTER OF TRANSFER  
TO STATE RECLAMATION BOARD  
(See Supplement Manuals)

EXHIBIT F  
Unattached

**EXHIBIT G**  
**SUGGESTED SEMI - ANNUAL REPORT FORM**  
**(See Supplement Manuals)**

**EXHIBIT G**  
**Unattached**

ADDENDUM

to: Standard Operation and Maintenance Manual

For The  
 LOWER SAN JOAQUIN RIVER LEVEES  
 LOWER SAN JOAQUIN RIVER AND  
 TRIBUTARIES PROJECT, CALIFORNIA

Dated April 1959

Prepared by: U.S. Army Engineer District  
 Sacramento, California

1-01 Reference. Lower San Joaquin River Flood Control Project, Operation and Maintenance Manual for Levees, Irrigation and Drainage Structures, Channels and Miscellaneous Facilities. Part 1, the Reclamation Board 1967 (Amended in 1978).

*This is a  
 DUR O&M  
 Manual  
 Filed in  
 binder*

1-02 Location. The improvement covered by this addendum is a part of the San Joaquin River and Tributaries project. The improvement is in the Eastside Bypass near Sand Slough. The area lies about 13 miles south-westerly from Merced and 5 miles westerly from El Nido, California. The area is located in the Lower San Joaquin River Levee District, see Exhibit A.

1-03 Construction Data. Removal of sand deposits was accomplished to bring the East Side Bypass back to project standards. This work was completed under Contract No. DACW05-84-B-0004 during the period of time from 15 November 1984 to 14 February 1985. Specification 7305 Drawing No. 7-6-1846. The channels and floodways were excavated in two sections from left bank levee station 552+00 to 592+00 and 617+00 to 667+00. The channel bottom width is 100 feet wide with 1V to 3H side slopes.

1-04 Channel. The channel will be maintained as specified in the manual referenced in 1-01. The low flow channel bottom width will be 100 feet, with 1V on 3H side slopes; and the invert is set 6 feet below the floodway berm. Elevation of the flood way berm is set to the design elevation of the left levee landward toe.

1-05 Maintenance. The low flow channel will be kept clear of all sediment and debris. Any floatable debris will be burned to ash or removed outside the floodway before the advent of the spring floods.

1-06 Intergovernmental Agreements. Assurance of cooperation by local interests is provided by the State of California in accordance with Section 221 of Public Law 91-611, Exhibit B.

*Encl*

# DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL

SUBJECT

SP-ED-D

LOWER San Joaquin River and Tributaries Project, California  
Addendum to Standard Operation and Maintenance Manual

TO Ch, Con Ops Div

FROM Ch, Engineering Div DATE 24 May 1985  
BELL/sc/3336

CMT 1

1. Enclosed are two copies to the Standard Operation and Maintenance Manual for the Lower San Joaquin River and Tributaries Project, California. The additions reflect completed construction work for the Eastside Bypass Excavation near Sand Slough.
2. A copy of the additions has been furnished to the Division Engineer. Copies of the additions have been furnished to the Reclamation Board and the Department of Water Resources.

Encl. (dup)

GEORGE C. WEDDELL  
Chief, Engineering Division

cc: (w/o encl)  
Civ Des Br  
Civ Des Sec C  
Civ Des Sec D

# DISPOSITION FORM

For use of this form, see AR 340-15, the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL

SUBJECT

Lower San Joaquin River and Tributaries Project,  
California, Correction to Addendum to Standard Operation and  
Maintenance Manual

PKED-D

TO Chief, Const Ops Div

FROM Chief, Engr Div

DATE 27 June 1985

CMT 1

BELL/gv/3336

1. Enclosed are two copies of corrections to the addendum to Standard Operation and Maintenance Manual for the Lower San Joaquin River and Tributaries Project, California. This page should replace the Addendum front page that was sent to you by DF dated 24 May 1985. The copy that you have may have the last line in Paragraph 1-06 inadvertently omitted.
2. A copy of the corrections has been furnished to the Division Engineer. Copies have also been furnished to the Reclamation Board and the Department of Water Resources.

Encl (dup)

GEORGE C. WEDDELL  
Chief, Engineering Division

cc: (w/o Encl)  
Civ Des Br  
Civ Des Sec C  
Civ Des Sec D

---

**DESIGN MEMORANDUM NO. 5**

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**LOWER SAN JOAQUIN RIVER AND  
TRIBUTARIES PROJECT, CALIFORNIA**

**EASTSIDE BYPASS AT SAN JOAQUIN  
RIVER**



**US Army Corps  
of Engineers**

Sacramento District

**SEPTEMBER 1984**

*Rev. 1*

Other lands which have been identified as available are within the bypass at the confluence with San Joaquin River. These lands occupy an area not required for the effective passage of floodflows through the confluence. Further, disposal in that area would not involve the taking of highly productive farmlands. Plate 3 shows the potential limits of disposal on approximately 48 acres at two locations in this area. Because of the readily available nonproductive agricultural lands, expressed desire of The Reclamation Board, and high probability to accomplish the disposal in a manner to resist erosion of the material, disposal of the removed sediment at the confluence site was selected. The estimated first cost of each plan with disposal at the confluence is shown in Table 2.

TABLE 2  
FIRST COST OF ALTERNATIVE PLANS  
(\$1,000)

Item	Plan		
	A	B	C
Federal	1,951	1,027	1,360
Non-Federal	<u>30</u>	<u>15</u>	<u>20</u>
TOTAL	1,981	1,042	1,380

c. Plan selection. - Plans B and C would be less costly than Plan A. Plan B was eliminated from consideration due to the relatively low potential to help restore channel capacity. Because Plan A could produce a significantly greater beneficial impact on channel flow than Plan C and because of the advantages in returning the channel to conditions similar to those existing upon completion of construction, Plan A was selected for implementation.

7. Selected plan description. - As indicated above, the plan selected for implementation consists of retaining a 2.2-mile reach of the Eastside Bypass immediately downstream of the confluence with San Joaquin River to a configuration similar to that existing upon completion of construction. It

includes approximately 650,000 cubic yards of sand primarily from two deposits with a low flow channel approximately 100 feet wide and 4 feet deep reconstructed through the entire reach. Plate 4 shows a plan drawing and typical profile of the work area. Ground water is not expected to be encountered during material removal.

Disposal of the excavated material will be north of and adjacent to Washington Road between the main channel of the Eastside Bypass and San Joaquin River in a primarily noneffective flow area. The surface of the entire disposal area will be provided with mulch and grass seeding to prevent wind erosion and sloughing of sand into riparian/wetland corridor described below. It is possible that some backwater may exist between the excavation area and disposal area (see plate 2). Consequently, several low water crossings may be required during construction. Inflow from San Joaquin River, should any occur during construction, up to about 1,000 cfs is expected to be diverted into the historical river (see Plate 4) by LSJLD. The depth of material will be about 10 feet. The slope of the disposal on the bypass and river sides will be a maximum of 20 percent (one on five). The slope will be capped with approximately 4 feet of native soil obtained from the disposal area prior to sediment removal. The reduced side slopes and soil cap are for the purpose of reducing erosion of the disposal material. As mentioned, mean channel velocities at about 12,000 cfs in the bypass under existing conditions are estimated at approximately 3.3 fps. Following placement of the material, this velocity could approach approximately 4.7 fps. Even with the stabilization measures mentioned, some erosion/suspension and redeposition of the material during high flow conditions is expected. Given the complex hydrodynamic conditions in the confluence area and the extent of this disposal area, loss can only be accurately assessed through monitoring of the completed work. Should it be determined that the loss is excessive, alternative disposal sites for material removed from the bypass during maintenance by the non-Federal sponsor will need to be considered. Consideration will be given prior to construction to increasing the depth of material in the disposal area to lessen encroachment into the bypass channel.

To compensate for potential adverse impacts on wildlife resources, a 200-foot-wide strip generally 100 feet from the center (extending on each side) of an existing slough for a length of 0.5 miles in the disposal area will be maintained in a natural state. This 12-acre riparian/wetland corridor will be fenced, precluding livestock grazing. Additional information on this project feature is included in paragraph 8.

Maintenance of the completed work would consist of periodic surveys and removal as required of the accumulated sediments and flow restrictive vegetation (large trees, etc.) from the area of work by the non-Federal sponsor and disposal of the sediments either in areas of the initial work or other areas designated at that time by the maintaining entity. Requirements of local cooperation for this project are presented in Paragraph 11. The objective of the maintenance requirement would be to maintain the project area to the design geometry existing upon completion of construction. The amount of accumulated sediment to be removed periodically is not known at this time. It is estimated that a minimum long-term average annual rate would be in excess of about 35,000 cubic yards. This is based on the estimated accumulation of material (650,000 cubic yards) divided by the 19-year operational period (1965 through 1984) of the bypass and assuming no major sand removal from the area during that period.

In addition to the periodic maintenance which will be described in a maintenance and operation manual to be prepared by the Corps, the local project sponsor will be required to remove, prior to the start of each flood season, any low water vehicle crossing which may be periodically constructed in connection with farming operations. Such crossings will be removed to the elevation of the finished channel invert, or a permanent solution to providing a full capacity channel will be provided in lieu of this action. ~~Also as a part of the project operation, local interests will be required to redesign and reconstruct the irrigation canal channel crossing to remove the embankments that protrude into the channel cross section. These requirements of the project will also be described in the maintenance and operation manual. The local sponsor will also be required to maintain to design grade, the bypass levees, if and when they are improved to that grade.~~

## 8. Environmental analysis.

a. General. - The material to be removed is sand with little vegetation growing on it. The vegetation which is present on the sand is upland with common species including cocklebur and various annual grasses. The vegetated areas appear to be 1 to 2 years of age and include about 180 acres. During floodflows the vegetation is subject to prolonged inundation and some scour; consequently, other successional vegetation stages have not developed within the bypass channel. Also, grazing by cattle and sheep in the bypass area has further discouraged vegetative growth.

The disposal area at the confluence has two small sloughs that flow through it, one of which is maintained. Adjacent to these sloughs is a mixture of riparian and wetland habitat. Common species include willows, bulrush, salt grass, sedge, and cattails. The riparian/wetland complex includes about 12 acres. The remainder of the habitat is upland and includes about 50 acres. Common species within the upland habitat include perennial rye, knotweed, cocklebur, and sunflower. The combination of these habitat types provides a diverse wildlife habitat complex. Common species found in the upland areas include California quail, ringneck pheasant dove, various raptors, raccoon, coyote, blacktail jack rabbit, and striped skunk. Within riparian areas great blue herons, snowy egret, red-winged blackbird, beaver, and muskrat are common species. Upland habitat, which is associated with riparian habitat, provides added diversity and value for wildlife.

Disposal would occur on 48 acres of upland habitat (Plate 3). The riparian and wetland areas would be avoided. Wildlife mitigation measures were recommended by the Fish and Wildlife Service (FWS) and adopted by the Corps, as described in paragraph 8.b.

Work would be performed before the flood season when little if any water is within the bypass, thus reducing the potential for water quality impacts. The disposal would be on an upland site, avoiding any wetlands; therefore, a 404(b)(1) evaluation for this portion of the work will not be necessary. As mentioned, however, depending on conditions in the San Joaquin River, several low flow vehicle crossings may be needed between the removal and disposal areas during the construction period. The Department of the Army has issued

a nationwide permit which allows for placement of up to 200 cubic yards of fill material in waters of the United States for construction of minor road crossings. The proposed haul roads would require less than 200 cubic yards of material and therefore can be included under the nationwide permit. No individual authorization will be required.

A list of endangered and threatened species was requested from FWS. FWS responded on 24 February 1984 that the threatened valley elderberry/longhorn beetle may be present. Field surveys and informal consultation with FWS representatives indicated that the species is not present at the construction areas or the disposal sites. In a letter dated 21 September 1984 (see Appendix A), FWS was requested to provide additional information on whether endangered or threatened species may be present in the confluence area. Consultations will continue, and no work will be initiated until the requirements of the Endangered Species Act have been fully satisfied in close coordination with FWS.

A cultural resources field survey has been completed, and no sites were found. Many sites have been previously recorded along the river from Stockton to Friant Dam; however, none of these sites were within the construction area. Draft copies of a report on the survey and its findings were submitted to the State Historic Preservation Officer (SHPO), National Park Service (NPS), and interested professionals. No comments were received. The SHPO and NPS verbally concurred with the findings. Copies of the correspondence to SHPO and NPS are included in Appendix A.

b. Coordination of environmental analysis: - Coordination with FWS and Department of Fish and Game (DFG) has provided input to this analysis. DFG staff informally advised there would be no significant impacts within the proposed project modification. A copy of a Planning Aid Letter from FWS on this project modification is included in Appendix A. Five mitigation measures were recommended by FWS to offset potential losses of wildlife habitat due to deposition of sand at the Washington Road disposal site. These were adopted by the Corps and will be implemented as follows (see FWS letter dated 28 August 1984 in Appendix A for exact wording of recommendations -- numbers below correspond to those in the FWS recommendations).

(1) - The 200-foot-wide strip, generally 100 feet from the center of the existing slough extended on each side for a length of 0.5 miles, would not be disposed on during construction or subsequent maintenance operations.

(2) - This 12-acre riparian/wetland area will be fenced, and livestock grazing will be precluded so that habitat values will be increased, thus offsetting the impacts to the 48-acre upland disposed on.

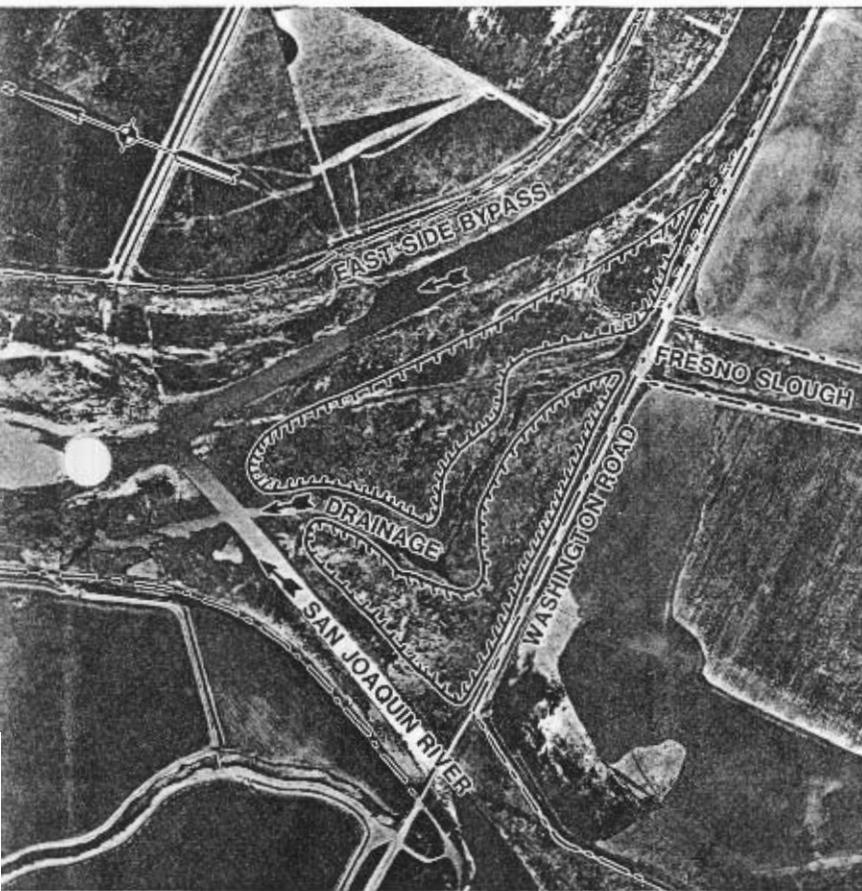
(3) - If sand deposition occurs from flows in the 12-acre channel corridor, any necessary maintenance removal will be limited through the channel center and deposited outside the corridor.

(4) - No vegetation will be removed from the vegetation corridor.

(5) - The Operation and Maintenance Manual will include provisions to insure that the mitigation corridor remains in a natural condition, as described in the foregoing.

The above findings will be circulated for information to concerned agencies and interested individuals. The proposed emergency work is expected to be initiated in the fall of 1984. The Reclamation Board has filed for exemption under the California Environmental Quality Act. A copy of the Notice Of Exemption is contained in Appendix A.

A Notice of Intent to prepare draft environmental impact statement (DEIS) was published in the Federal Register of 11 May 1984 concerning the overall clearing and snagging work authorized for the Lower San Joaquin. This will be modified in another Federal Register notice. The notice will describe that due to the emergency nature of the work, the requirements for environmental documentation of the National Environmental Policy Act have been waived pursuant to 40 CFR 1506.11 and 33 CFR 230.8. The notice will also describe that the emergency bypass work, its mitigation and that the remainder of project work and impacts will be discussed in the forthcoming DEIS.



LEGEND

-  SPOIL AREA
-  LEVEES
-  BERM

SCALE: 1" = 600'

LOWER SAN JOAQUIN RIVER  
AND TRIBUTARIES

CONFLUENCE DISPOSAL SITE

SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
AUGUST 1984

PLATE 3

AGREEMENT

THE UNITED STATES OF AMERICA

AND

THE STATE OF CALIFORNIA

FOR LOCAL COOPERATION AT EASTSIDE BYPASS

AT SAN JOAQUIN RIVER

THIS AGREEMENT entered into this 17th day of October 1984, by and between the UNITED STATES OF AMERICA (hereinafter called the "Government"), represented by the Contracting Officer executing this agreement, and the STATE OF CALIFORNIA (hereinafter called the "State") represented by the California State Reclamation Board, WITNESSETH THAT:

WHEREAS, construction of Lower San Joaquin River and Tributaries Project (hereinafter called the "Project") was authorized by the Flood Control Act of 22 December 1944 and modified by Section 205 of the 1983 Supplemental Appropriations Act (Public Law 98-63); and

WHEREAS, the State hereby represents that it has the authority and capability to furnish the non-Federal cooperation required by the Federal legislation authorizing the Project and by other applicable law for participation in a Project modification within the Eastside Bypass;

NOW, THEREFORE, the parties agree as follows:

1. The State agrees that, upon notification that the Government will commence construction of modifications to the Lower San Joaquin River and Tributaries Project consisting of the removal of sand deposition from within

EXHIBIT B

the Eastside Bypass at the confluence with the San Joaquin River as described in Design Memorandum No. 5 for the Project, and such modification is to be substantially in accordance with the authorized Project, the State shall, in consideration of the Government commencing this modification of such project, fulfill the requirements of non-Federal cooperation specified in such legislation, to wit:

Page 11

a. Provide, without cost to the United States, all lands, easements, and rights-of-way necessary for the modifications;

b. Hold and save the United States free from damages due to construction, operation, and maintenance of the Project modification not including damages due to the fault or negligence of the Government or its contractors;

c. Maintain and operate after completion, the Project modification works in accordance with rules and regulations prescribed by the Department of the Army;

d. Undertake all relocations and alterations of roads, bridges, (except railroad bridges), buildings, irrigation facilities, and other utilities which are necessary for the construction and operation of the Project modification;

e. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (P.L. 88-352) that no person shall be excluded from participation in, denied the benefit of, or be subjected to discrimination in connection with the Project modification on the grounds of race, creed, or national origin.

f. Assure that, in conjunction with acquiring rights-of-way, affected persons will be adequately informed of the benefits, policies, and procedures described in the Uniform Relocation Assistance and Real Property

Acquisition Policies Act of 1970 (Public Law 91-646), and in accordance with Section 210 and 305 of said Act and implementing regulations, assure that:

(1) Fair and reasonable relocation payments and assistance shall be provided for or for displaced persons, as are required to be provided by a Federal agency under Sections 202, 203 and 204 of the Act;

(2) Relocation assistance programs offering the services described in Section 205 of said Act shall be provided to such displaced persons;

(3) Within a reasonable period of time prior to displacement, decent, safe, and sanitary replacement dwellings will be available to displaced persons in accordance with Section 205(c)(3) of said Act;

(4) In acquiring real property, it will be guided, to the greatest extent practicable under State Law, by the land acquisition policies in Section 301 and the provisions of Section 302 of said Act; and

h. Assume responsibility and pay damages, if necessary, in the event there is a failure to perform in accordance with the terms of this agreement and any other applicable provisions of Section 221 of Public Law 91-611.

2. The State hereby gives the Government a right to enter at reasonable times and in a reasonable manner, upon lands which it owns or controls, for access to the modifications for the purpose of inspection. If such inspection shows that the State for any reason is failing to repair and maintain the modifications in accordance with the assurances hereunder and has persisted in such failure after a reasonable notice in writing by the Government delivered to the Assistant Secretary of the Board, the Government

shall have the further right, as stated above, to enter upon the land for the purpose of operating, repairing, and maintaining the modifications.

Operation, repair, and maintenance by the Government in such event shall not operate to relieve the State of responsibility to meet its obligations as set forth in paragraph 1 of this Agreement, or to preclude the Government from pursuing any other remedy at law or equity.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

THE STATE OF CALIFORNIA

By: *[Signature]*

*Army*  
Colonel, Corps of Engineers  
District Engineer  
Contracting Officer

By: *[Signature]*

The Reclamation Board

FOR THE SECRETARY OF THE ARMY

Date: October 7, 1984

Date: 17 October 1984

CERTIFICATE OF APPROVAL

I, the undersigned Attorney at Law, as attorney for the State of California, which said State has undertaken to act as local sponsor of a modification to the Lower San Joaquin River and Tributaries Project, consisting of the removal of sand deposition from within the Eastside Bypass at the confluence of San Joaquin River, hereby certify that I have reviewed the Agreement dated this \_\_\_\_\_ day of \_\_\_\_\_, 1984, between the United States of America and the State of California, represented by the California State Reclamation Board, and have approved said Agreement and the provisions contained therein, both as to form and substance, including, but not limited to, those provisions whereby the Board has agreed to pay damages, if necessary, in the event of failure to perform in accordance with Section 221 of Public Law 91-611.

IN WITNESS WHEREOF, I have made and executed this Certificate this

9<sup>th</sup> day of October, 1984.

John K. Van de Kamp

Attorney General,  
State of California

BY:

William D. Cunningham

TITLE:

Deputy Attorney General

CERTIFICATE OF APPROVAL

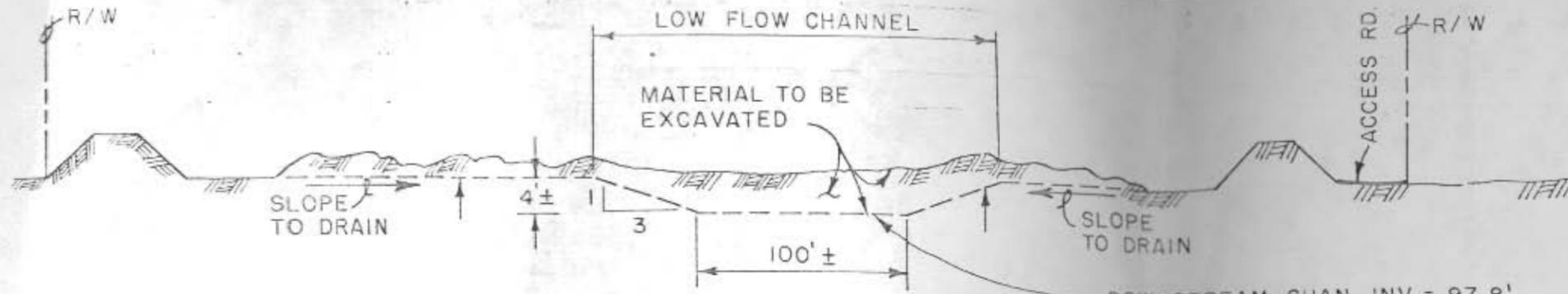
I, the undersigned Attorney at Law, as legal counsel for The Reclamation Board which has undertaken to act as local sponsor of a modification to the lower San Joaquin River and Tributaries Project consisting of the removal of sand deposition from within the Eastside Bypass at the confluence of San Joaquin River, hereby certify that I have reviewed the Agreement dated the \_\_\_\_\_ day of \_\_\_\_\_, 1984, between the United States of America and the State of California and have approved said Agreement and the provisions contained therein, both as to form and substance, including, but not limited to, those provisions whereby the State of California has agreed to pay damages, if necessary, in the event of failure to perform in accordance with Section 221 of Public Law 91-611.

IN WITNESS WHEREOF, I have made and executed this Certificate this \_\_\_\_\_

9<sup>th</sup> day of October 1984.

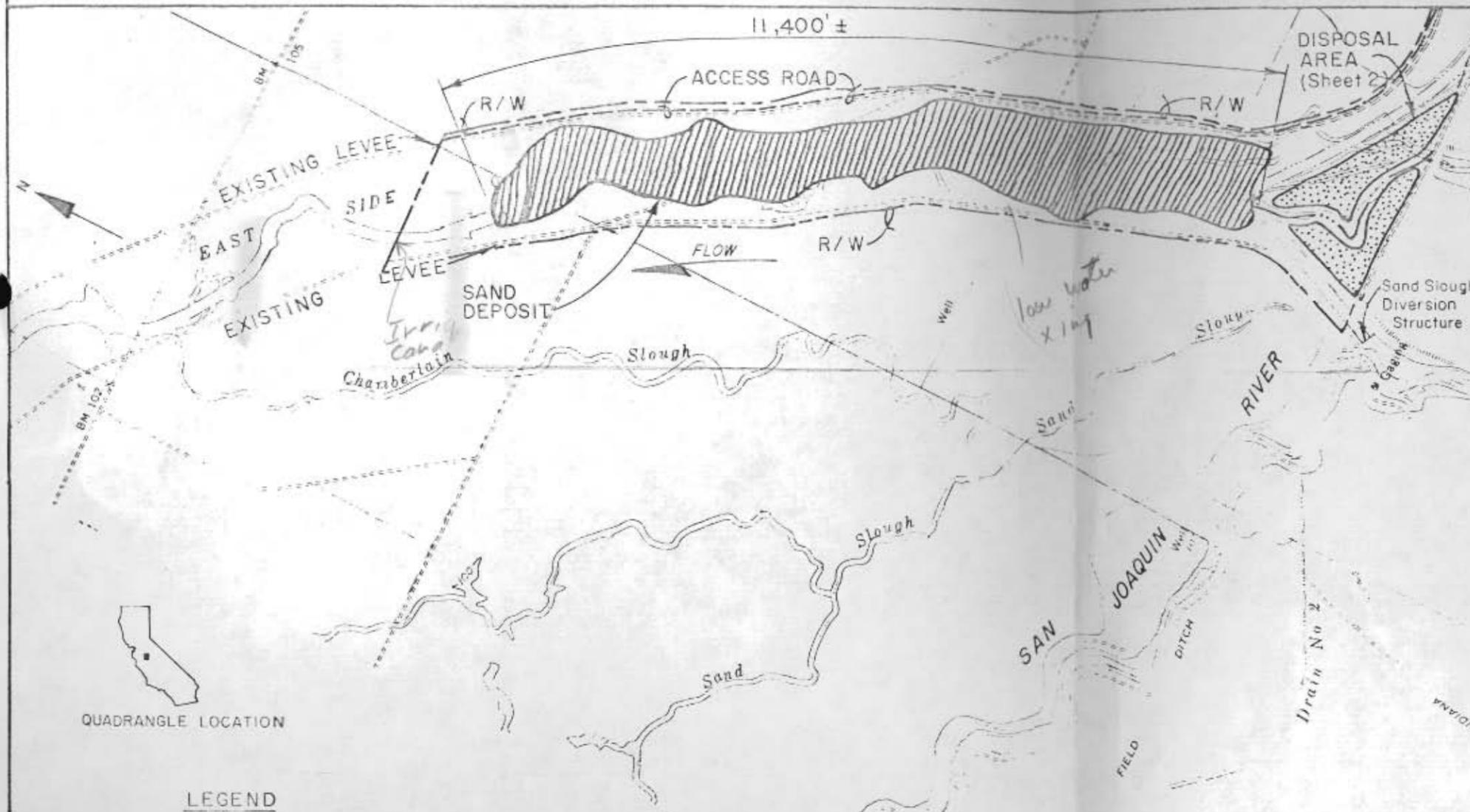
BY: \_\_\_\_\_

Attorney for The Reclamation Board



**TYPICAL CROSS SECTION**

NO SCALE



**PLAN**

SCALE 1" = 2000' 0 2000 4000 FEET



QUADRANGLE LOCATION

**LEGEND**

- APPROXIMATE LIMITS OF MATERIAL TO BE EXCAVATED
- DISPOSAL AREA



**VICINITY MAP**

SCALE: 1" = 5 mi. 0 5 10 MILES

REVISION	DATE	DESCRIPTION	BY
DEPARTMENT OF THE ARMY SACRAMENTO DISTRICT, OFFICE OF ENGINEERS SACRAMENTO, CALIFORNIA			
DESIGNED <i>C. Bjork / M. Rice</i>		<b>LOWER SAN JOAQUIN RIVER &amp; TRIBUTARIES PROJECT EASTSIDE BYPASS EXCAVATION NEAR SAND SLOUGH PLAN &amp; SECTION</b>	
DRAWN <i>L. Copeland</i>			
CHECKED <i>L. Dixon</i>			
SUBMITTED <i>[Signature]</i> CHIEF CIVIL ENGR. SECT. C.			
SIGNATURES AFFIXED BELOW INDICATE OFFICIAL RECOMMENDATION AND APPROVAL OF ALL DRAWINGS IN THIS SET AS INDEXED ON THIS SHEET			
APPROVAL RECOMMENDED <i>[Signature]</i> CHIEF CIVIL ENGINEER		APPROVED <i>[Signature]</i> DISTRICT ENGINEER	
DATE: 2 OCT. 1984		SCALE AS SHOWN SPEC No 7305	
COL. ARTHUR E. WILLIAMS DISTRICT ENGINEER		SHEET 1 FILE No 7-6-1846	

February 25, 1985

Navigation and Flood Control Unit

The Reclamation Board  
State of California  
1416 - 9th Street, Room 455-6  
Sacramento, California 95814



Members of the Board:

This is in regard to the agreement of October 17, 1984, providing assurances for local cooperation by your Board and to the joint inspection of February 20, 1985, held for the purpose of transferring the completed project modification work on the lower San Joaquin River and tributaries project to the State of California for operation and maintenance.

The work was performed under the general authority of the Flood Control Act of 1944, 78th Congress, 2nd session, as amended by Section 205 of House Resolution 7245 in the 1983 Supplemental Appropriations Act (PL 98-63).

The authorized work was completed on February 14, 1985, in accordance with Contract Number DACW05-85-C-0009, Specification Number 7305 and Drawing Number 7-6-1846. The project modification work consisted of removal of sand deposits within the Westside Bypass below the confluence of the San Joaquin River. Therefore, said flood control work with the waterway banks contiguous thereto, are transferred as of February 20, 1985, to the State of California for operation and maintenance. Operation and maintenance shall be in accordance with Title 32, Part 208, Flood Control Regulations, attached.

Operation and maintenance instructions for the completed modification work to supplement instructions contained in Design Memorandum Number 5 for the project, will be furnished your Board at a later date. Written acceptance of the completed work is requested.

Sincerely,

Arthur E. Williams  
Colonel, Corps of Engineers  
District Engineer

Attachment

20314