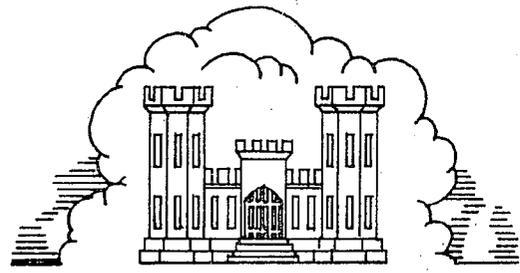


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OPERATION AND MAINTENANCE MANUAL  
FOR  
KINGS RIVER CHANNEL IMPROVEMENT  
  
PINE FLAT LAKE AND  
KINGS RIVER PROJECT  
  
KINGS AND FRESNO COUNTIES, CALIFORNIA



DEPARTMENT OF THE ARMY  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
SACRAMENTO, CALIFORNIA

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CORPS OF ENGINEERS  
US ARMY

OPERATION AND MAINTENANCE MANUAL  
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PINE FLAT LAKE AND KINGS RIVER PROJECT  
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CALIFORNIA

US ARMY ENGINEER DISTRICT  
Corps of Engineers  
Sacramento, California

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OPERATION AND MAINTENANCE MANUAL  
FOR KINGS RIVER CHANNEL IMPROVEMENT  
FRESNO AND KINGS COUNTY, CALIFORNIA

SECTION I

INTRODUCTION

1-01. Authorization. The Kings River channel improvement work was authorized under the provisions of the Flood Control Act of 1944, House Document (Public Law 534, 78th Congress, 2nd Session), in accordance with the plans contained in House Document No. 630, 76th Congress, 3rd Session, which provided for channel improvement work on the main Kings River and its tributaries downstream from Pine Flat Reservoir.

1-02. Location. The Kings River and tributaries are located in central California. Kings River North joins the San Joaquin River just north of Mendota, California and Kings River South terminates in Tulare Lake. The flood control project works extends from Pine Flat Dam westerly to Mendota and southerly to Stratford near Tulare Lake and is within the confines of Fresno and Kings County. The project location is generally as shown on the Location Map, EXHIBIT A-1.

1-03. Description of Project Works. The flood control project covered by this manual consists of work extending from Lemoore Weir on the main Kings River, downstream to James Weir on Kings River North, and to Empire Weir No. 2 on Kings River South. Work consisted of levee construction, enlargement, setback and shaping along the right and left bank on the Kings River; channel clearing and down timber removal in the Kings River, Clarks Fork, Crescent Bypass and Kings River South. Limited channel improvement work on Cole Slough and clearing and snagging in the Centerville Bottoms area near Sanger are also included in this manual. The work mentioned above is described in more detail in subsequent paragraphs.

1-04. Protection Provided. The Kings River channel improvements were designed to protect the adjacent lands, railroads, highways and towns from floods expected to occur less frequently than once in 100 years, and to safely pass to Tulare Lake and San Joaquin River the stream flows as regulated by the operation of Pine Flat Dam.

1-05. Construction Data and Contractor. The construction contracts required by the Corps of Engineers to complete the channel improvement work for this project was accomplished under the following contracts:

a. Channel Improvement, Kings River in Fresno and Kings Counties, California, was accomplished under contract No. DACW-05-68-0056 by R. & D. Watson, Inc. during the period from 12 April 1968 to 25 July 1969. Specification No. 3187 and Drawing No. KI-6-55 (42 sheets).

b. Levee Repair, Lemoore Weir to Stinson Weir and Cole Slough was accomplished under contract No. DACW-05-70-C-0044 by R. & D. Watson, Inc. during the period from 1 November 1969 to 26 November 1969. Specification No. 3719 and Drawing No. KI-4-64 (3 sheets).

c. Emergency Repairs, Stinson Weir, were accomplished under contract No. DACW-05-70-C-0040 by Kaweah Construction Company during the period from 7 November 1969 to 12 January 1970. Specification No. 3720 and Drawing No. KI-4-65 (2 sheets).

d. Channel Restoration and Debris Removal, Centerville Bottoms Area near Sanger, was accomplished under equipment rental contract No. DACW-05-71-C-0054 during the period from 1 October 1970 to 6 January 1971 by R. G. Weir.

1-06. Floodflows. For the purpose of this manual the term "floodflows" or "high water period" refers to flows when the water surface in the streams reaches or exceeds a reading given in the following table:

FLOODFLOW TABLE

<u>Stream</u>	<u>Reach</u>	<u>Flow c.f.s.</u>	<u>Gage Location</u>	<u>Gage Height-Ft.</u>
Kings River	Lemoore Weir to Island Weir	7,500	Downstream from Lemoore Weir	12.4
Kings River	Island Weir to Crescent Weir	5,000	Downstream from Island Weir	10.1
Kings River	Downstream from Crescent Weir	3,500	Downstream from Crescent Weir	10.0
Clarks Fork	All	2,000	Downstream from Army Weir	7.8
Crescent Bypass	All	1500	(No gage)	-

## SECTION II

### LOCAL COOPERATION REQUIREMENTS

2-01. Requirements for Local Cooperation. Construction of the improvement was undertaken by the United States subject to the conditions specified in the law that local interests would: (a) provide without cost to the United States all lands, easements and right-of-way necessary for construction of the channel improvement project, including all necessary utility relocations; (b) hold and save the United States free from damages due to the construction works; and (c) maintain and operate all the works after completion in accordance with the regulations prescribed by the Secretary of Army. (Project works, insofar as local interest responsibilities for maintenance and operation are concerned, include all main flood channels in the Kings River system downstream from Pine Flat Dam.) Capacities to which project channels within the limits of the channel improvement work are to be maintained as listed in paragraph 4-01.

2-02. Assurances Provided by Local Interests. The Kings River Conservation District, (KRCD) Fresno, California, is the sponsor of this project. By letter dated 4 November 1959 the President of the Board of Directors forwarded a copy of the Motion by the Board of Directors providing assurances which meet the requirements of local cooperation. The assurances were formally accepted by the District Engineer on 20 November 1959.

2-03. Acceptance by Kings River Conservation District. Responsibility for operating and maintaining the Kings River Project was officially transferred to the Kings River Conservation District by SPK letters dated 28 May 1969 and 11 Feb 1971. KRCD by letter dated 14 May 1971, accepted work accomplished in Centerville Bottoms near Sanger, see EXHIBIT F. KRCD by letter dated 8 July 1969, advised that they were withholding written acceptance of work downstream from Lemoore Weir until responsibility for deficiencies is determined.

## SECTION III

### MAINTENANCE AND OPERATION - GENERAL PROCEDURE

3-01. Reference to Approved Regulations. This manual is submitted in accordance with provisions of Title 33 - Navigation and Navigable Waters, as of 1 January 1962, Chapter II, Corps of Engineers, Department of the Army, Part 208 - Flood Control Regulations, Maintenance and Operation of Flood Control Works, a copy of which is included as EXHIBIT A, sheets 1 and 2.

3-02. Intent of Regulations. The general intent of the regulations approved by the Secretary of the Army is stated in paragraph 208.10(a)(1) as follows: "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."

The principle mission of the Corps of Engineers, during flood emergencies, is to insure that flood control works are properly operated and maintained and offer technical advice to enable local interests to obtain maximum flood protection. All other matters become secondary and will yield precedence to the accomplishment of the above-stated missions. During flood periods local interests maintain close liaison with the office of the District Engineer, Corps of Engineers. However, in the event it is evident that all available county and local resources are insufficient to cope with the situation and the necessity for an emergency proclamation is anticipated, requests for State assistance in flood fighting should properly be made direct to the Department of Water Resources, which is the agency designated by the State Legislature, to receive requests from local agencies for assistance in flood fighting. This agency is authorized to request Federal assistance from the Corps of Engineers when State and local resources are insufficient to cope with the situation. Therefore, it is desired to emphasize that requests for Federal assistance in flood fighting should be made only when it is evident that County, State and/or other local equipment and manpower will be exhausted and local resources are insufficient to cope with the flood emergency situation.

3-03. Purpose of this Manual. In view of the large number of local flood protection projects authorized by Congress and the repetitious nature of regulations to govern maintenance and operation of each individual project, and in order that local interests may be fully aware of the extent of the obligations assumed by them in furnishing assurances of local cooperation for projects to be constructed in the future, the general regulations described above were established by the Secretary of the Army. The general regulations approved by the Secretary of the Army, August 1944, were intended to be sufficiently broad in scope and general in nature as to be applicable to all flood protection projects for which such regulations are required by law.

Section 208.10(a)(10) of the regulations read as follows: "The Department of the Army 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 this part." This manual has, therefore, been prepared to furnish local interests with information on the project works and advise as to the details of the operation and maintenance requirements applicable to this particular project, to state procedure required by the Department of the Army, and to indicate satisfactory methods of floodfighting operations and emergency repairs. The project works are to be maintained and operated in accordance with the Flood Control Regulations referred to above and interpretations thereof contained herein.

3-04. Definitions. Kings River Conservation District is the local interest agency which provided the assurances for the project. The KRCD shall designate a local agent to act for the assurer and implement the instructions contained herein; This agent shall hereinafter be designated as the "Superintendent." The term "District Engineer" shall be defined to mean the District Engineer of the US Army Engineer District, Sacramento, or his authorized representative. The term "flood" shall mean any flow in Kings River Project when the water surface reaches or exceeds the readings given in the Floodflow Table Section I, Para. 1-06. The term "right bank" or "left bank" shall be defined to mean the right or left bank or side, respectively, of a stream or channel when facing downstream.

3-05. General Provisions of Regulation. In addition to that quoted in paragraph 3-02 above, the general provisions of the Flood Control Regulations, contained in paragraphs 208.10(a)(2), to 208.10(a)(9), both inclusive, are quoted as follows:

"(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 the 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 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 rights-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 Department of the Army or his authorized representative that such improvements, 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 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 works.

(6) 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.

(7) The District Engineer or his authorized representative 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."

3-06. Assistance to be Furnished by the District Engineer. The District Engineer will:

- a. Furnish Kings River Conservation District "As Constructed" drawings of the project works at the time they are transferred.
- b. Make periodic inspections of the project works and notify Kings River Conservation District of any repairs or maintenance measures which the District Engineer deems necessary in addition to measures taken by the Superintendent.
- c. Submit to the Office, Chief of Engineers, all cases of noncompliance with full details thereof for determination of corrective measures to be taken.
- d. Make prior determination that any proposed encroachment, improvement, excavation, or construction within the right-of-way, or alteration of the project works, will not adversely affect the functioning of the protective facilities.
- e. Assist local interests as may be practicable, in their duties of ascertaining storm developments having flood-producing potentialities, assembling flood-fighting forces and materials, and initiating and carrying out flood-fighting operations to the extent permitted by existing laws and regulations.

3-07. Responsibilities of the Superintendent. In line with the provisions of the Flood Control Regulations, the general duties of the Superintendent include the following:

- a. Training of Key Personnel. Key personnel shall be trained in order that regular maintenance work may be performed efficiently and to insure that unexpected problems related to flood control may be handled in an expeditious and orderly manner. The Superintendent should have available the names, addresses, and telephone numbers of all his key men and a reasonable number of substitutes. These key men should, in turn, have similar data on all of the men who will assist them in the discharge of their duties. The organization of key men should include the following:

- (1) An assistant to act in the place of the Superintendent in case of his absence or indisposition.

- (2) Sector foreman in sufficient number to lead maintenance patrol work of the levee, inspect the channel, and operate the gate structures properly during flood periods. High qualities of leadership and responsibility are necessary for their positions.

- b. Files and Records. The Superintendent shall maintain a file of reports, records, and drawings concerning the project works, readily available at all times to the District Engineer.

X

c. Encroachment or Trespass on Right-of-way. In accordance with the provisions of Flood Control Regulations 208.10(a)(4), no encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted on the rights-of-way for the protective facilities. The Superintendent will, therefore, cause notices to be posted at conspicuous places along the project right-of-way directing public attention to this regulation. Certain levees existing on the water-side of the project levees at the time of project construction were permitted to remain within the limits of the project rights-of-way. These levees are not to have crown elevations more than three feet above the natural ground or higher than 1 foot below the project design flood plane. (The Superintendent shall take whatever action is necessary under his own authority to remove any unauthorized encroachment or to prosecute the trespassers.)

d. Permits for Right-of-entry or Use of Portion of Right-of-way. Permits for temporary right-of-entry or use of portion of the right-of-way shall not be issued without prior determination by the maintaining agency sufficiently in advance of issuance to permit adequate study and consideration and determination of conditions to be embodied in the permit document. See EXHIBIT G for sample permit of right-of-entry, right-of-way or installation of improvements.

e. Permits for Improvements or Construction within the Project Right-of-way. All requests for permits for construction of any improvements of any nature within the limits of the project right-of-way shall be referred to the District Engineer through the maintaining agency for determination that such construction will not adversely affect the stability, safety, and functioning of the protective facilities, and for definition of conditions under which permit should be granted. These conditions will include, among others, the following items:

(1) That all work shall be performed:

(a) In accordance with standard engineering practice; drawings or prints of proposed improvements or alterations to the existing flood control works must be submitted for approval to the District Engineer sufficiently in advance of the proposed construction to permit adequate study and consideration of the work.

(b) To the satisfaction of the District Engineer.

(2) After completion of the work, "As Constructed" drawings of prints, in duplicate, showing such improvements as finally constructed shall be furnished the District Engineer.

f. Coordination of Local Activities. In accordance with the provisions of Flood Control Regulations, paragraph 208.10(a)(9), the Superintendent will, during periods of floodflow, coordinate the functions of all

agencies, both public and private, that are connected with the protective works. Arrangements shall be made with the local law enforcement agencies, street departments, and railroad and utility companies for developing a coordinated flood-fighting program; and an outline of this program shall be filed with the District Engineer.

g. Inspection.

(1) Flood Control Regulations, paragraph 208.10(b)(1) are quoted in part as follows:

"(b) Levees (1) Maintenance . . . Periodic inspections shall be made by the Superintendent to insure that . . . maintenance measures are being effectively carried out . . . 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."

(2) For sake of uniformity, and to the extent practicable, the dates of inspection shall be as follows: 1 November, 1 May, and immediately following each floodflow in excess of readings listed in the Floodflow Table Section I, Para. 1-06.

(3) The suggested check lists and instructions shown in EXHIBIT E, Sheets 1 to 7 inclusive, should be followed in each inspection to insure that no features of the protective system are overlooked. Check lists locally typed or printed in conformity with sheets 2, 4, and 6 shall have printed on the reverse side of the applicable instructions shown on sheets 3, 5 and 7 EXHIBIT E. Carbon copy of the inspector's original field notes as recorded on the check list shall be transmitted to the District Engineer immediately following each inspection, and one copy included as an inclosure to the semi-annual report as provided in paragraph 3-07(i)(1) of this manual.

h. Maintenance.

(1) Flood Control Regulations, paragraph 208.10(b)(1) are quoted in part as follows:

"(b)(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 as required, . . . exterminate burrowing animals, and to provide for . . . removal of wild growth and

drift deposits, and repair of damage caused by erosion or other forces . . . 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) Full responsibility for making the repairs and the methods used is placed on the Superintendent but the experience and facilities of the District Engineer will be available to him for advice and consultation.

(3) All repairs shall be made in accordance with standard engineering practice, to line and grade and in accordance with details shown on the construction drawings for the project works, copies of which are included in EXHIBIT B. No change or alteration shall be made in any feature of the project works without prior determination by the District Engineer that such alteration will not adversely affect the stability and functioning of the protective facilities. Plans and specifications of all changes or alterations that may be proposed by the Superintendent shall be submitted to the District Engineer for investigation and approval before prosecution of the work.

1. Reports.

(1) Semi-Annual Report. In accordance with the provisions of the Flood Control Regulations, paragraph 208.10(a)(6) the local agency providing the assurances shall submit within a 10-day period following 1 December and 1 June of each year, a semi-annual report to the District Engineer covering inspection, maintenance, and operation of the protective works. This report will present a statement of:

(a) The physical conditions of the protective works as summarized from the logs of inspection.

(b) Flood occurrences and behavior of the protective works, and flood-fighting activities during the period.

(c) Prosecutions for encroachment or trespass.

(d) Permits issued for right-of-way or use of right-of-way.

(e) Permits issued for improvements or construction within the project right-of-way.

(f) Maintenance measures taken; nature, date of construction, and date of removal of temporary repairs; date of permanent repairs.

(g) Fiscal statement of cost of maintenance and operation for the period.

A suggested form for submission of the semi-annual report is included as EXHIBIT D, sheets 1 and 2.

3-08. Environment Protection. In order to insure that channel maintenance is accomplished in a manner which minimizes any adverse environmental impact, any proposed plans for clearing of more than 1,500 feet of channel and/or removal of live trees with diameters greater than 3 inches will be reviewed by the District Engineer who will coordinate the proposed work, if considered appropriate, with concerned environmental agencies. The proposed work shall not be initiated until concurrence is received by the District Engineer. It is also the responsibility of the maintaining agency to comply with all State and Federal laws concerning environmental protection as related to any proposed maintenance work.

SECTION IV

FEATURES OF THE PROJECT SUBJECT  
TO FLOOD CONTROL REGULATIONS

4-01. Project Works. Construction on Kings River Project generally consists of channel improvement and levee construction. The project area lies in the delta reaches of the Kings River which extends from near Pine Flat Dam westerly along Kings River, southerly along Kings River South to Tulare Lake, and northwesterly along Kings River North to Mendota. The channel improvement work provided channel capacities as follows:

Main Kings River	
Lemore Weir to Island Weir	9,100 c.f.s.
Island Weir to Crescent Weir	6,300 c.f.s.
Kings River North (Fresno Slough)	4,750 c.f.s.
Kings River South	3,200 c.f.s.
Clarks Fork	2,500 c.f.s. (a)
Crescent Bypass	1,500 c.f.s. (a)

(a) Most flows are through Clarks Fork with Crescent Bypass used for final proportioning.

For further details of project work see the drawings of EXHIBIT B.

4-02. Levees.

a. Description. A total of 30.3 miles of levee was constructed and improved between river mile 35 on Kings River North and river mile 53 on Kings River. To provide adequate height and levee section, the left levee between river miles 37.3 and 41.5 was completely reconstructed with a 60-foot minimum berm. In addition, 25.7 miles of levees on both banks were enlarged to meet established minimum design standards and for placement of patrol road surfacing, consisting of 4 inches of crushed mineral aggregate 10 feet in width. Surfaced access ramps and the necessary turnouts and turnarounds have been provided. For more complete details of items included in construction of the above-mentioned levee, refer to the "As Constructed" drawings of EXHIBIT B. Regulations regarding inspection, maintenance and operation will be found in paragraphs 4-02b, 4-02c and 4-02d of this manual.

b. Inspection.

(1) Pertinent Requirements of the Code of Federal Regulations. Flood Control Regulations, paragraph 208.10(b)(1), are quoted in part as follows:

"(b) Levees (1) Maintenance . . . Periodic inspection shall be made by the Superintendent . . . 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 riverside 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 drains 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 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 . . ."

(2) To insure the taking of such maintenance measures as will be required for proper functioning of the levee, the following items shall be specifically covered in each inspection:

- (a) Aggradation or degradation of the streambed along the toe.
- (b) Settlement of levee fill.
- (c) Erosion of levee slopes; both sides of levees.
- (d) Presence of seepage; saturated areas, or sand boils back of levee.
- (e) Condition of access roads and roadway on levee.

c. Maintenance.

(1) 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 material. 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. The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the levees in time of flood.

(2) Depredations of Burrowing Animals. Dens and runways formed within the levee by burrowing animals are frequently the causes of levee failure 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.

(3) Access Roads. Access roads to the levee 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.

d. Operation.

(1) Pertinent Requirements of the Code of Federal Regulations. Flood Control Regulations, paragraph 208.10(b)(2) are quoted in part 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 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 structures.

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."

(2) It shall be the duty of the Superintendent to keep in contact with the State Department of Water Resources' Flood Operation Center during all periods of flood danger as necessary to take advantage of its forecasts and maintain a patrol of the project works in their area during periods of flood in excess of readings listed in the Floodflow Table, Section I, paragraph 1-06.

The Flood Operations Center is responsible for data collection and issuance of a joint stream forecast with the U. S. Weather Service and coordinates with the Sacramento District Engineer and other agencies to keep apprised of the current situation in accordance with terms of the Memorandum of Understanding dated 1 November 1956, between the Division Engineer, U. S. Army Engineer Division, South Pacific, and the Director, Department of Water Resources, State of California, for cooperative action during flood emergencies.

4-03. Channels and Floodways.

a. Description. Project channel improvements have been completed from Lemoore Weir on the main Kings River near Laton to Crescent Weir at

the head of Crescent Bypass; from Crescent Weir to James Weir along Kings River North (Fresno Slough); and from main Kings River to Empire Weir No. 2 on Kings River South. The principal item of channel work consists of floodway clearing. However, some channel enlargement such as removing sandbars in the main river channel was accomplished. Regulations regarding inspection, maintenance, and operation of channels and floodways will be found in paragraph 4-03b, 4-03c and 4-03d of this manual.

b. Inspection.

(1) Pertinent Requirements of the Code of Federal Regulations. Flood Control Regulations, paragraph 208.10(g)(1) are quoted in part as follows:

"(g) Channels and floodways . . . (1) Maintenance. Periodic inspections . . . 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 by the Superintendent 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. ."

(2) The purpose of the floodflow channels inspection is to insure that conditions which affect the channel capacity will remain the same, as

far as possible, as those considered in the design assumptions and that no new conditions develop that may effect the stability of the project structures. At each inspection required by paragraph 208.10(g)(1) of the Flood Control Regulations, particular attention will, therefore, be given the following:

- (a) Location, extent and size of vegetal growth.
- (b) Unauthorized operations within the floodflow channel right-of-way, such as excavations, buildings and other structures, levees, bank protection, or training dikes.
- (c) Rubbish and industrial waste disposal.
- (d) Changes in the channel bed such as aggradation or degradation, which would interfere with free-flow from side drainage structures or induce local meanders that would scour the banks.
- (e) Operations of any nature upstream from the project that would affect flow conditions within the limits of the flood control project.
- (f) Condition of project structure.
  1. Channel walls:
    - a. Deviation from alignment and grade.
    - b. Development of cracks and spalls.
    - c. Mechanical injuries.
  2. Fencing:
    - a. Injuries to post, fencing or barbed wire.
    - b. Damage to galvanizing.
  3. Earth fills:
    - a. Settlement.
    - b. Erosion of both slopes.
    - c. Excessive seepage or saturation area back of fills.
    - d. Condition of bank protection - concrete or stone blanket.

4. Right-of-way:

- a. Presence of dumped refuse.
- b. Encroachment or trespass.

(3) The intent of these inspections is to disclose all conditions which in any way affect the stability of the structures and their functioning for the control of floods. Each inspection report should note and comment on any repair measures that have been taken since the last inspection. In making these inspections, the check sheets included as EXHIBIT E shall be explicitly followed.

c. Maintenance.

(1) Pertinent Requirements of the Code of Federal Regulations. Flood Control Regulations, paragraph 208.10(g)(1) are quoted in part as follows:

" . . . Immediate steps will be taken to remedy any adverse conditions disclosed by such inspection . . . "

(2) 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 open and unobstructed at all times.

(3) 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.

(4) Sediment and 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.

(5) The channel and right-of-way shall be kept reasonably clear of debris, refuse matter, or industrial wastes in accordance with criteria of the California State Water Control Boards.

(6) Weed growth in the channel shall be cut in advance of flood season and together with all debris, removed from the channel.

(7) All eroded concrete shall be repaired as soon as any reinforcing steel is exposed or erosion approaches a depth of 4 inches. For this purpose, it is recommended that the repair be made by thoroughly clearing the surface by sandblasting and building up the section with pneumatically-placed Portland cement mortar. All evidence of settlement, uplift, or failure of concrete structures shall be given special attention.

(8) All damage to fencing, 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.

(9) No excavation within the limits of this unit of the Kings River Project will be permitted unless an excavation permit has been approved by the State Reclamation Board and the District Engineer.

(10) If any work is done to improve flow conditions in the Kings River Project Streams an excavation permit must be obtained from the Superintendent and approved by the District Engineer.

(11) Trees with diameters in excess of 3 inches and other vegetation and ground cover that does not seriously interfere with the passage of floodflows shall not be removed as a part of normal maintenance.

d. Operation.

(1) Pertinent Requirements of the Code of Federal Regulations, paragraph 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."

e. Special Features, Diversion Dams and Weirs. There are six weirs within the limits of the channel improvement work. Operation and maintenance of these weirs will be the responsibility of the agency providing the assurances for the project with the exception of the Army Weir which will be maintained by the Sacramento District. The agency providing the assurances for the project (KRCD) may enter into separate agreements with the irrigation districts who own the weirs for the purpose of maintaining and operating these structures. The project design flood plane at these weirs was established based on the following conditions:

<u>Weir</u>	<u>Location</u>	<u>Condition - Elevation of crest - feet - USGS Datum</u>
James	Kings River North, Mi. 25.7	Closed-Flashboards to 185.8
Stinson	Kings River North, Mi. 35.5	Open-Fixed crest at 191.0
Crescent	Kings River, Mi. 45.0	Flashboards closed to 215.2
Crescent Bypass	Crescent Bypass, Mi. 45.1	As necessary to divert required flow to Tulare Lake
Island	Kings River, Mi. 50.5	Gates closed-Flashboards to 229.9
Army	Clarks Fork, Mi. 50.7	As necessary to divert required flow to Tulare Lake

The operation of these weirs during periods of high water will be coordinated with the releases from Pine Flat Reservoir and subject to the approval of the District Engineer.

#### 4-04. Drainage and Irrigation Structures.

a. Description. There are numerous drainage and irrigation structures which extend through the levee on the various streams. Sufficient surveys of these structures were not made prior to or during the construction period to compile a listing of locations or invert elevation below the levee crown.

b. Inspection.

(1) Pertinent Requirements of the Code of Federal Regulation. Flood Control Regulations, paragraph 208.10(d)(1), are quoted in part 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.

Flapgates 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 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) At each inspection the following items, if applicable, shall be particularly noted:

- (a) Debris or other obstructions to flow.
- (b) Condition of pipes and gates.
- (c) Damage or settlement of pipe.
- (d) 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. For this

purpose it is recommended that the repair be made by thoroughly cleaning the surface by sandblasting and building up the concrete to its original section with pneumatically-placed Portland cement mortar.

(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 Reclamation Board for approval before such work is started.

d. Operation.

(1) Pertinent Requirements of the Code of Federal Regulations. Flood Control Regulations, paragraph 208.10(d)(2) are quoted in part 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 objects 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 . . . All drainage structures in the levee 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 conditions."

(2) The outlets of the side drainage structures inundate at relatively low river stages. They should, therefore, be inspected at the first sign of a rise in the river to make certain that the gates are not jammed in an open position and thus allow flood waters to enter behind the levee.

4-05. Miscellaneous Facilities.

a. Description. Miscellaneous structures or facilities which were constructed as a part of, or existed in conjunction with, the protective works, and which might affect their functioning, include the following:

(1) Bridges.

Stream	:	Name of Road
Kings River North		S.P.R.R. (Mendota)
" " "		Highway 180
" " "		S.P.R.R. (Tranquility)
" " "		James Avenue
" " "		Placer Avenue
" " "		Manning Avenue
" " "		McMullen Grade
" " "		S.P.R.R. (Helms)
" " "		Elkhorn Avenue
" " "		Mt. Whitney Avenue
" " "		Parkhurst Avenue
Kings River (Main)		Marks Avenue
" " "		State Highway 41
" " "		Excelsior Avenue
Clarks Fork		State Highway 41
" " "		21st Avenue
" " "		Marks Avenue
" " "		Grangeville Blvd.
" " "		Lacy Boulevard
Kings River South Fork		Grangeville Blvd.
" " " "		21st Avenue
" " " "		Marks Avenue
" " " "		Hanford-Armona Road
" " " "		S.P.R.R.
" " " "		State Highway 198
Crescent Bypass		Elgin Avenue
" " "		21st Avenue
" " "		Grangeville Avenue

(2) Utility Relocations. Because of the nature of the construction of the utilities by local interests, records of utility relocations are not available.

(3) Hydrologic Facilities. There are at present 13 stream gaging stations located on the various channels of the Kings River system. These stations are equipped with water stage recorders and are maintained and operated by various agencies. Continuous operation of these stations will be required for adequate division of floodflows. The location and present operating agency are as follows:

<u>No.</u>	<u>Stream</u>	<u>Location</u>	<u>Operating Agency</u>
1.	Mill Creek	above mouth	U.S. Geological Survey & Kings River Water Assoc.
2.	Kings River	below Pine Flat Dam	"
3.	" "	at Piedra	"
4.	" "	at Reedley Narrows	Kings River Water Assoc.
5.	" "	at Peoples Weir	"
6.	" "	below Lemoore Weir	"
7.	" "	below Island Weir	"
8.	Kings R. North	below Crescent Weir	"
9.	" " "	below Stinson Weir	"
10.	" " "	in Fresno Sl. Bypass	U.S. Bureau of Reclamation
11.	Kings R. South	in Clarks Fork	Kings River Water Assoc.
12.	" " "	in Sand Slough	"
		(Crescent Bypass)	"
13.	" " "	below Empire Weir No. 2	Tulare Lake Basin Water Storage Dist. & Kings River Water Assoc.

b. Inspection and Maintenance.

(1) Pertinent Requirements of the Code of Federal Regulations. Flood Control Regulations, paragraph 208.10(h)(1) are quoted in part 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. . ."

(2) Inspection of the miscellaneous facilities 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 No. 3, sheet No. 4 of EXHIBIT E.

(3) The interest of the Corps of Engineers and the responsibility of the local interests in the existing highway and railroad bridges is confined to their effect on the safety and functioning of the flood control channel, but 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 agencies maintaining and operating them. 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. A suggested report form is included as EXHIBIT D of this manual.

(4) The purpose of maintenance work is to insure continuous satisfactory operation of equipment. It is, therefore, important in such work that all possible causes of future trouble be found and corrected. Particular attention should be given to minor weaknesses which may be an indication of future trouble.

c. Operation.

(1) Pertinent Requirements of the Code of Federal Regulations. Flood Control Regulations, paragraph 208.10(h)(2) is 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 therefore."

(2) The weir and flashboard structures listed in paragraph 4-03e shall be operated in such a manner as to prevent bank caving and sloughing by reason of rapid drawdown. All flashboards shall normally be removed during the 15 October to 15 April rainflood period except those required to distribute high flows to the various distributary channels.

## SECTION V

### SUGGESTED METHODS OF COMBATING FLOOD CONDITIONS

5-01. Methods Suggested. 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 State Department of Water Resources, and 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 were 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.

5-02. Earthen Levees. An earthen levee is in danger whenever there is water against it. This danger is directly proportional to the height of the water, the duration of the flood stage, and the intensity of either the current or wave action. The danger is inversely proportional to the cross-sectional area of the levee, the levee's height, and the degree of maintenance. A well constructed levee of proper section should, if maintained and not overtopped, hold through any major flood. However, serious damages and loss of life may result from a break. Foundation troubles result in sand boils or a sinking levee, and the local use of unsatisfactory materials causes slides and sloughs. However, such threatened failures can be met if prompt action is taken and proper methods of treatment are used. Wave wash is to be expected whenever the levee is exposed to a wide stretch of open water and is serious if permitted to continue over a considerable length of time.

5-03. Premeditated Damage. Local interests should continually guard against premeditated damage to the levee. In the event of an extraordinary flood requiring a fight over long stretches of levee on both sides of the river, there is a natural temptation to relieve the strain by premeditated breaking of the opposite levee.

5-04. 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 rests with the local interests through local and State Governmental agencies.

5-05. Inspection of Flood Control Works. Immediately upon receipt of information that high water is imminent, local interests responsible for maintenance should form a skeleton organization, capable of quick expansion,

and assign individuals (Sector Foremen) 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, flapgates, 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.

5-06. 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, trucks, 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 landside berms. Where new construction has been completed during the year, rain washes and deep gullies may have developed. While 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 the 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.
- c. Repair and close all flapgates 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.

5-07. Disaster Relief. It is the responsibility of local, state, municipal authorities, supported by and/or working in connection with the American Red Cross to adopt measures for the relief of flood disaster victims. Relief measures can be undertaken by the Department of the Army through its Army Area Commander under existing Army Regulations, but such measures will be undertaken only as a last resort, in extreme cases and under compelling circumstances where local resources are clearly inadequate to cope with the situation.

5-08. Flood Fight. After the above preliminary organization and precautions have been completed, the "flood fight" itself commences. The methods of combating various defects in the earthen levee described in the following paragraphs have been proved effective during many years of use by the Corps of Engineers.

a. Drainage of slopes. This work can be done economically while awaiting developments and will serve to make the levees more efficient. Crews should be organized to cut seep drains at all places on the levee and berm when seepage appears. The drains should be V-shaped, no deeper than necessary, and never more than 6" deep. Care must be taken not to cut the sod unnecessarily. In all instances, drains should be cut straight down the levee slope or nearly so. Near the toe of the slope the small drains should be Y'd together and led into larger drains, which, in general, should lead straight across the landside berm into the landside pits or nearest natural or artificial drain.

b. Sand Boils. These danger spots are serious if discharging material. The common method of controlling sand boils consists of walling up a water-tight sack ring around the boil up to a height necessary to reduce the

velocity of flow to a point at which material is no longer discharged from the boil. See EXHIBIT C, Plate 1. The sack ring around the boil should be large enough to protect the defective area immediately surrounding the boil. If several boils of sufficient force to displace sand are observed a sack sublevee may be built around the entire nest of boils, rising to such a height that none of the boils will discharge with enough force to displace sand.

c. Wave Wash. The Supervisor for local interests and Sector Foreman 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 polyethylene sheeting or canvas 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 canvas or polyethylene sheeting 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 be rapidly built at any convenient place and easily set in place on the job.

d. 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, or where profiles show a high water slope of two feet per mile or greater. Trouble may be looked for at the ends of old levee dikes, road-crossing ramps, old traverses, 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 approved 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, lumber, or driving stakes and wiring together, and filling in between with brush and filled sacks or stone.

e. Caving Bank Protection. As protection against active caving of river-banks, 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.

5-09. Topping. Immediate consideration should be given the grade line of each levee section by comparison of existing grades with those shown on the drawings, EXHIBIT B. 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 of the U. S. Army Engineer District, Sacramento, as follows:

a. Sack Topping. Sack topping may be used to raise the crown of the levee about three feet. The sacks should be laid stretcher-wise or along the levee for the first layer, crosswise for the second layer, and so on. Sacks should be lapped at least  $\frac{1}{3}$  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 toppings, 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 as shown on the drawing, EXHIBIT C, Plate 5.

5-10. 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 communication should be provided along dangerous stretches of the levee when travel or other satisfactory means of communication cannot be maintained.

5-11. Use of Government Plant. The District Engineer is authorized to use or loan Government property and plant in cases of emergency where life is in danger and there is no opportunity to secure prior authority for such use. The authority also extends to saving of property where no suitable private equipment is available, provided such use is without detriment to the Government.

EXHIBIT A

FEDERAL FLOOD CONTROL REGULATIONS

EXHIBIT A

CODE OF FEDERAL REGULATIONS (EXTRACT)

**TITLE 33—NAVIGATION AND  
NAVIGABLE WATERS**

**Chapter II—Corps of Engineers,  
Department of the Army**

**PART 208—FLOOD CONTROL REGULATIONS**

**AUTHORITY:** § 208.10 issued under Sec. 7, 58 Stat. 890; 33 U.S.C. 709.

§ 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 the 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.

(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 rights-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 Department of the Army 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 ac-

cess 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 Department of the Army 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 this part.

(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 drains 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 accom-

plished 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 anchor 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

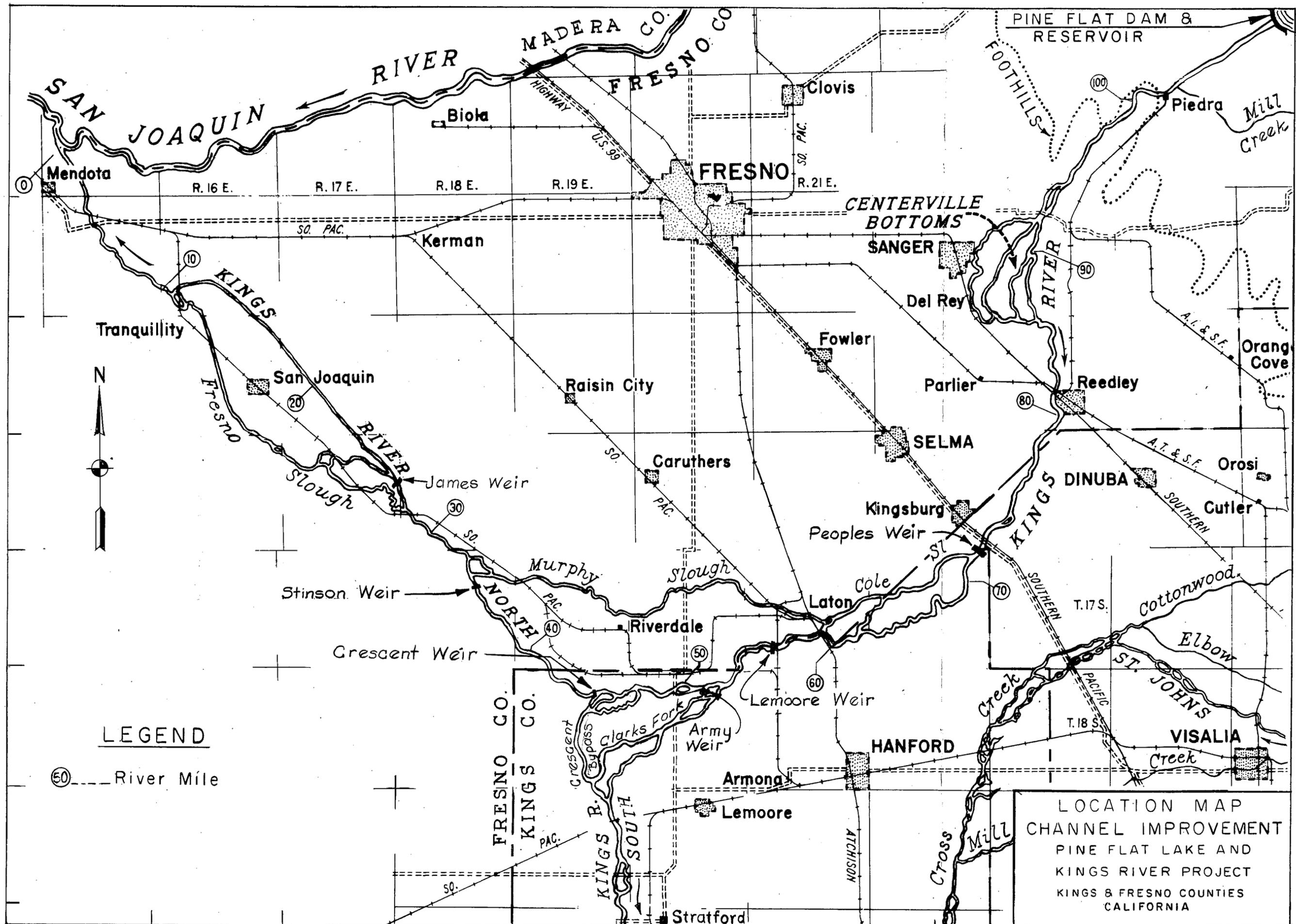
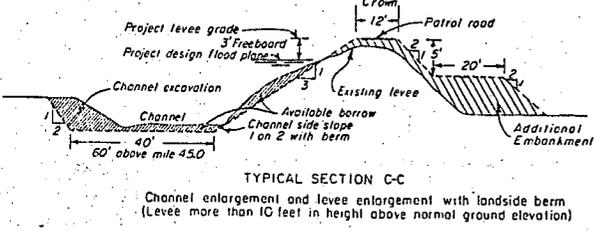
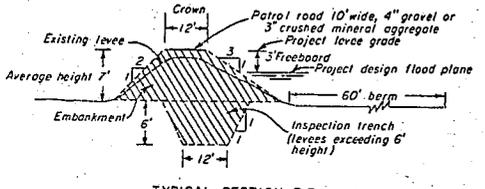
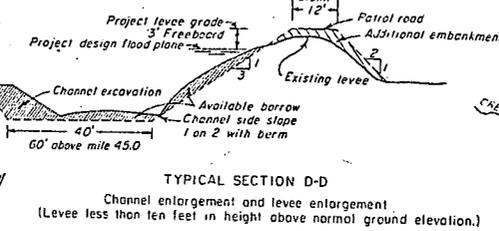
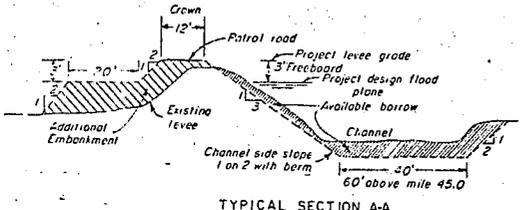
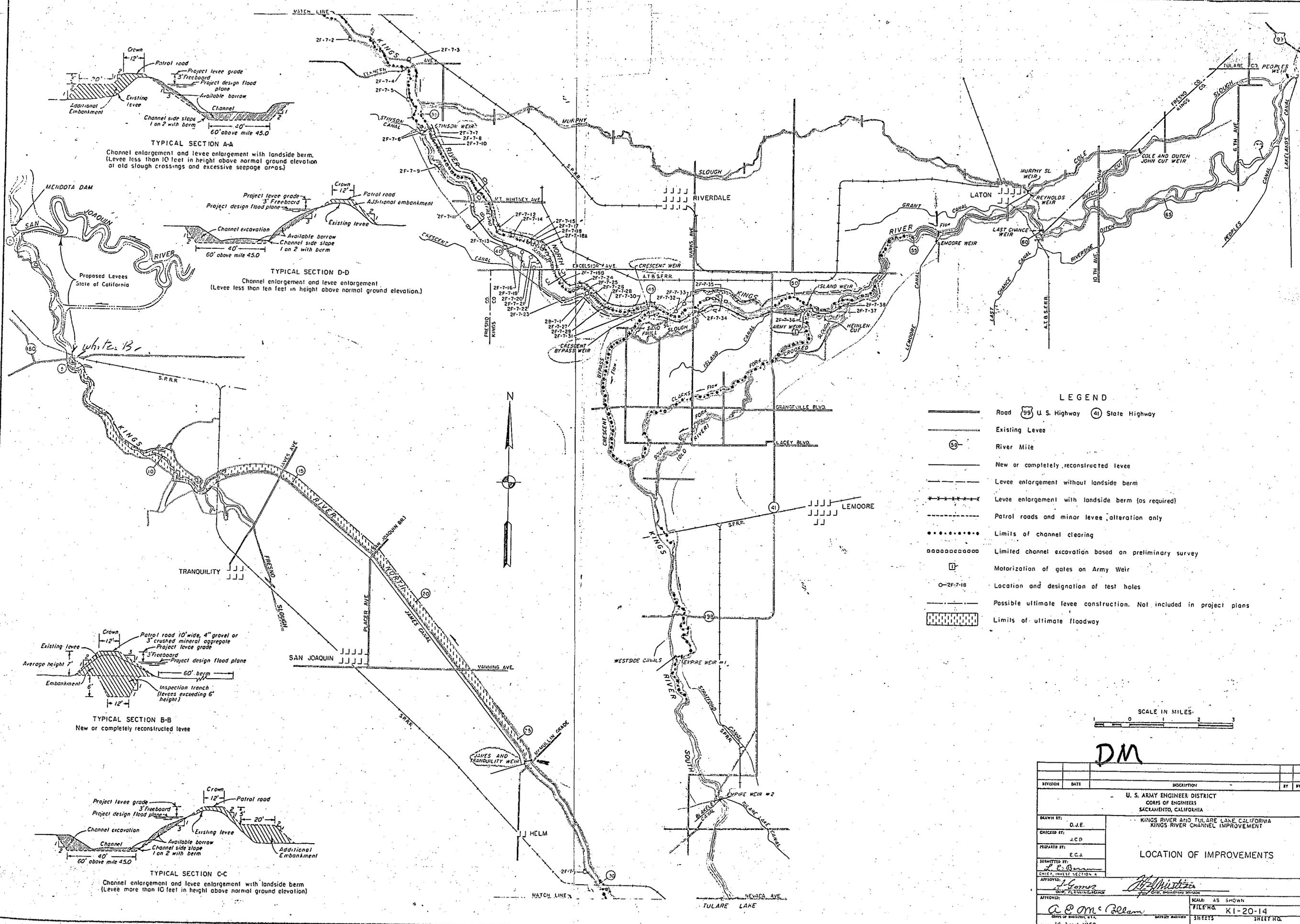
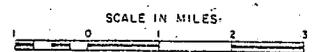


EXHIBIT AI



- LEGEND**
- Road 99 U.S. Highway 41 State Highway
  - Existing Levee
  - ⊙ River Mile
  - New or completely reconstructed levee
  - Levee enlargement without landside berm
  - Levee enlargement with landside berm (as required)
  - Patrol roads and minor levee alteration only
  - Limits of channel clearing
  - ▭ Limited channel excavation based on preliminary survey
  - Motorization of gates on Army Weir
  - 2F-7-18 Location and designation of test holes
  - Possible ultimate levee construction. Not included in project plans
  - ▨ Limits of ultimate floodway



DM

REVISION	DATE	DESCRIPTION	BY	NO.
U. S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA				
KINGS RIVER AND TULARE LAKE, CALIFORNIA KINGS RIVER CHANNEL IMPROVEMENT				
<b>LOCATION OF IMPROVEMENTS</b>				
DRAWN BY:	D. J. E.			
CHECKED BY:	J. C. D.			
PREPARED BY:	E. G. J.			
SUBMITTED BY:	<i>[Signature]</i>			
APPROVED:	<i>[Signature]</i>			
APPROVED:		SCALE: AS SHOWN		
<i>[Signature]</i>		FILE NO. KI-20-14		
DATE: 14 April 1959		SHEET NO. SHEET NO. SHEET NO.		

EXHIBIT B

"AS CONSTRUCTED"  
DRAWINGS

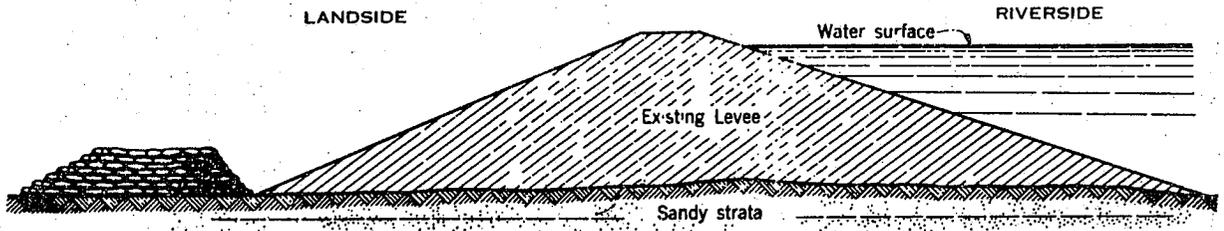
<u>File No.</u>	<u>Title</u>
KI-6-55	Channel Improvement, Kings River, Excelsior Avenue to Stinson Weir in 42 sheets
KI-4-64	Levee Repair, Lemoore Weir to Stinson Weir and Cole Slough in 3 sheets
KI-4-65	Emergency Repairs, Stinson Weir, in 2 sheets

EXHIBIT B  
Unattached

EXHIBIT C

PLATES OF SUGGESTED FLOOD FIGHTING METHODS

EXHIBIT C

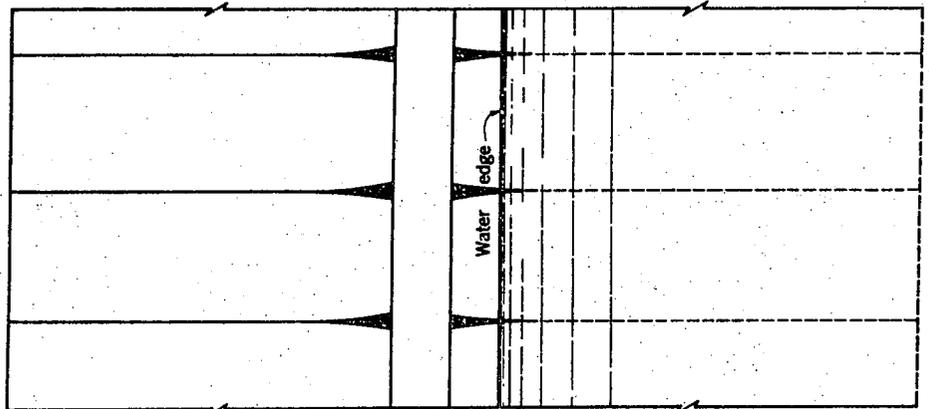
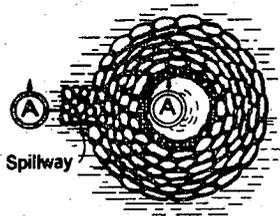


Note:  
 Bottom width to be no less than 1½ times height.  
 Be sure to clear sand discharge.  
 Tie into levee if boil is near toe.

ELEVATION



SECTION A-A



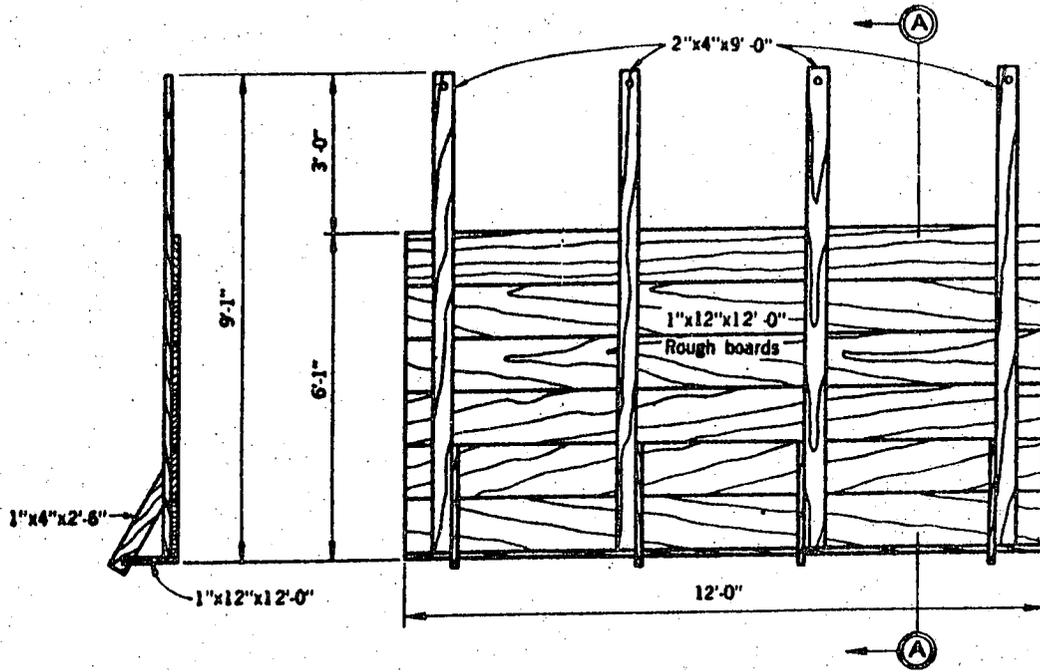
PLAN

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 boii so that no more material is displaced and boii uns clear.  
 Never attempt to completely stop flow through boii.

KINGS RIVER  
 FRESNO AND KINGS COUNTY  
 FLOOD CONTROL PROJECT

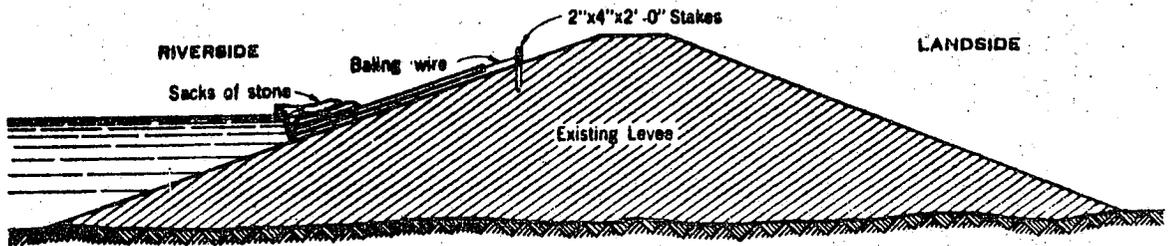
**CONTROL OF SAND BOILS**

U.S. ENGINEER DIST., SACRAMENTO, CALIF.



SECTION A-A

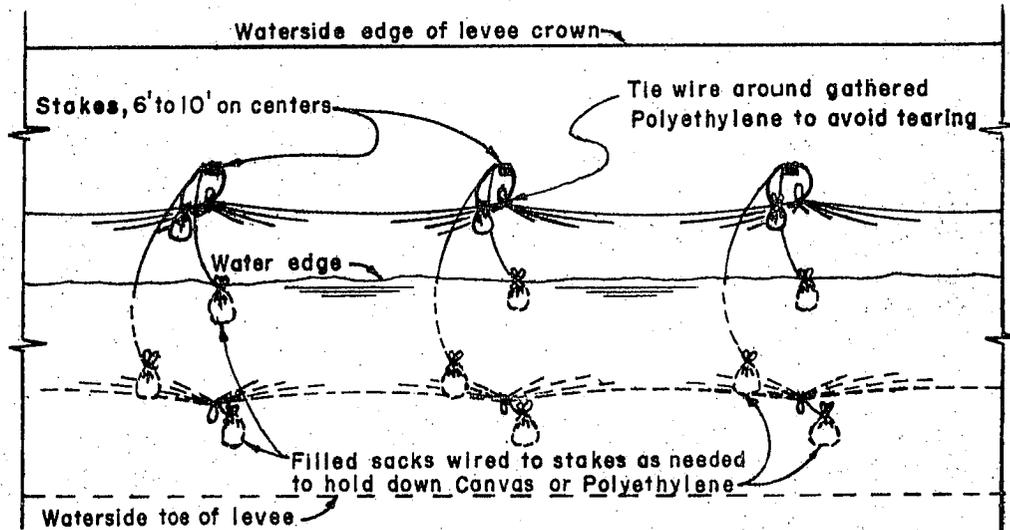
PLAN



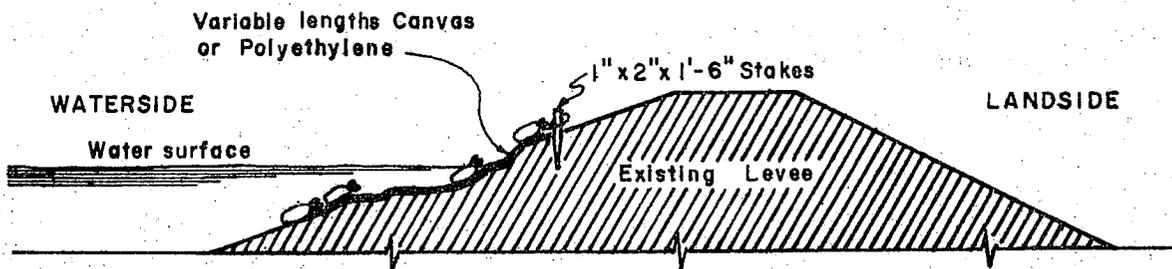
SECTION

BILL OF MATERIAL FOR 100 FEET	
LUMBER	
56 pieces	1" x 12" x 12'-0"
32 pieces	1" x 4" x 2'-6"
32 pieces	2" x 4" x 9'-0"
• 32 pieces	2" x 4" x 2'-0"
•	(Sharpened)
WIRE	
200'	baling wire
NAILS	
4)	lbs. 8d nails

KINGS RIVER  
 FRESNO AND KINGS COUNTY  
**FLOOD CONTROL PROJECT**  
  
**MOVABLE**  
**WAVE WASH PROTECTION**  
 U.S. ENGINEER DIST., SACRAMENTO, CALIF.



PLAN



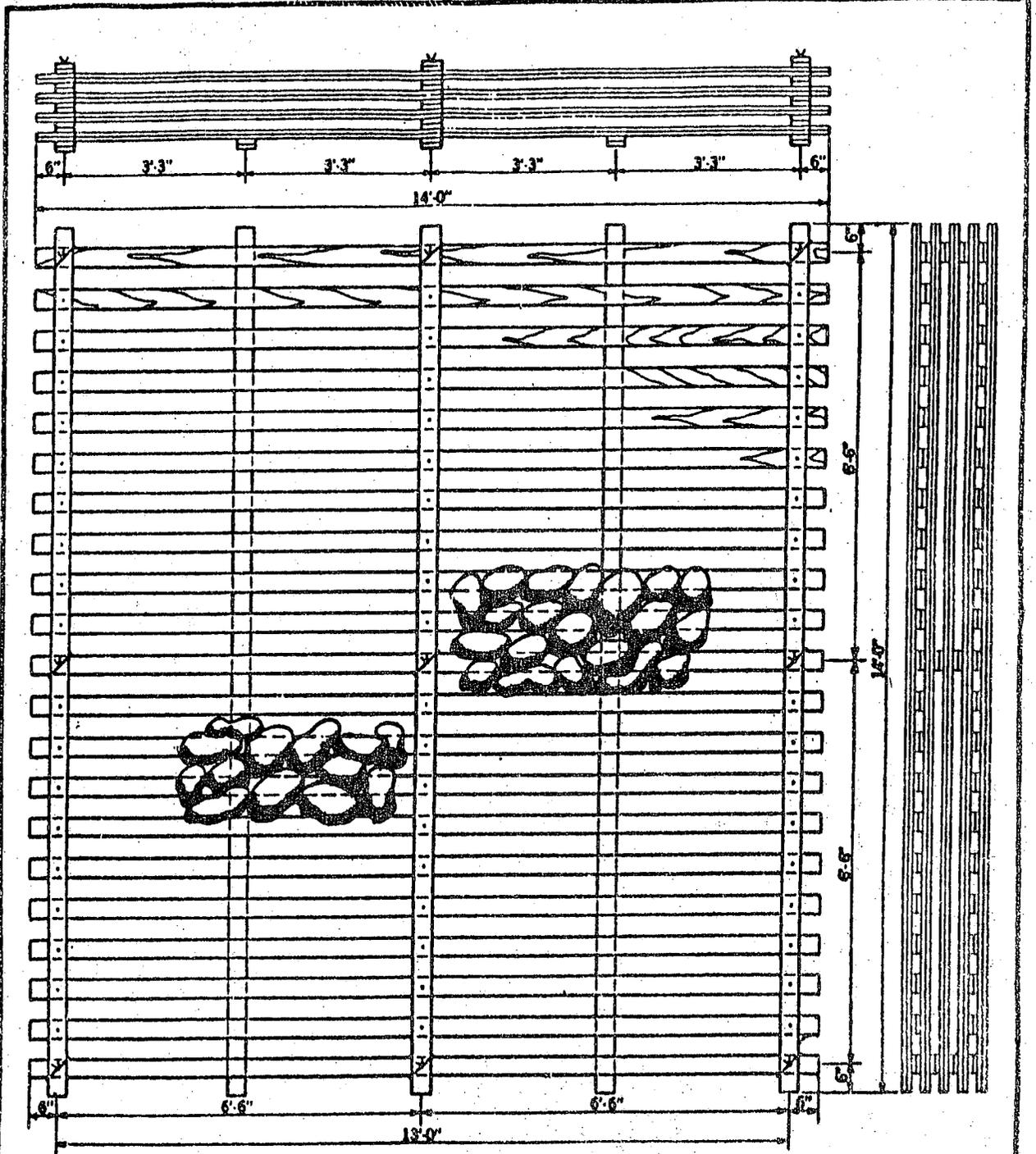
SECTION

NOTE:

Use Polyethylene sheets, preferably 16' to 20' wide available in std. 100' long rolls, approx. 6 mil thickness, or canvas as available. Lay chosen length of Polyethylene sheeting or canvas parallel with levee slope, tie upper edge to stakes, tie sacks to bottom edge. Crew will then toss all bottom sacks over damaged slope at the same time to avoid tearing. Intermediate filled sacks will be immediately placed to hold down canvas or plastic. HAVE ALL ITEMS PREPARED BEFOREHAND.

<b>MATERIAL REQUIRED FOR 100 LINEAR FEET OF LEVEE</b>
<b>LUMBER</b>
<ul style="list-style-type: none"> <li>• 30 Stakes 1"x2"x1'-6"</li> <li>• (Sharpened)</li> </ul>
<b>SANDBAGS</b>
120 sandbags Canvas or Polyethylene sheeting as required

KINGS RIVER  
 FRESNO AND KINGS COUNTY  
**FLOOD CONTROL PROJECT**  
**WAVE WASH PROTECTION**  
 US Army Engineer District  
 Sacramento, California



**Note:**

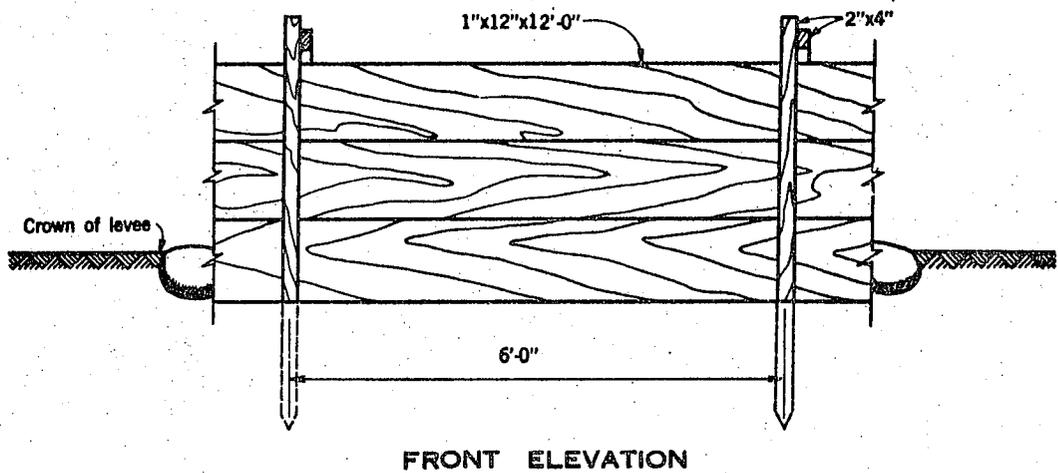
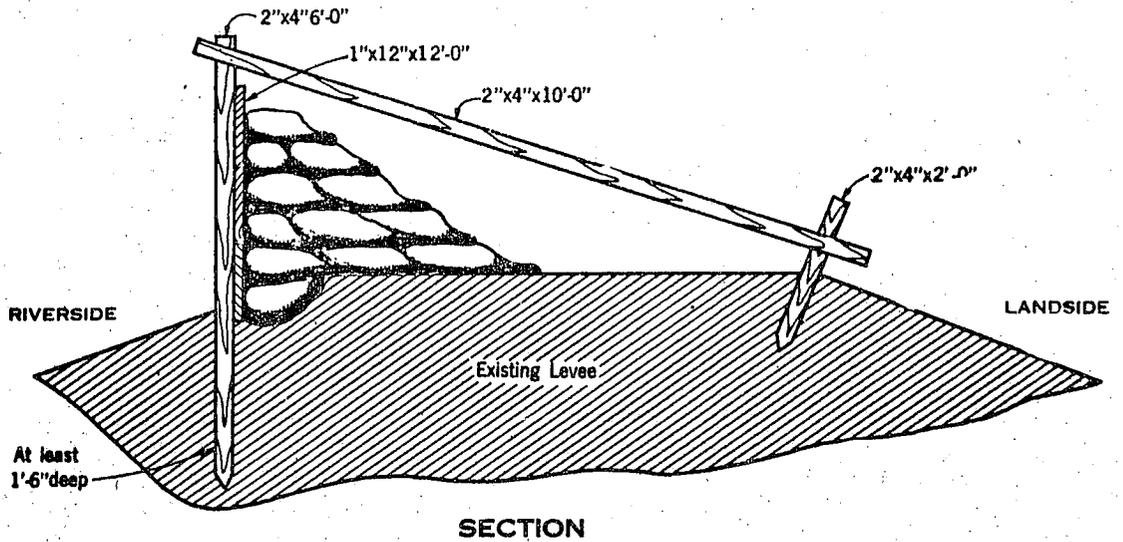
Cribs constructed of double thickness of 1"x4"x14'-0" lumber. Nail all intersections with 1-20d nail. Each intersection of walls securely fastened by a loop of No. 9 wire, tightly twisted.

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

KINGS RIVER  
 FRESNO AND KINGS COUNTY  
 FLOOD CONTROL PROJECT

**CAVING BANK PROTECTION**

U. S. ENGINEER DIST., SACRAMENTO, CALIF.



BILL OF MATERIAL FOR 100 LINEAR FEET OF LEVEE	
LUMBER	
25 pieces	1" x 12" x 12'-0"
17 pieces	2" x 4" x 10'-0"
* 17 pieces	2" x 4" x 6'-0"
* 17 pieces	2" x 4" x 2'-0"
* (Sharpened)	
NAILS	
1 lb.	.8d nails
2 lbs.	.16d nails
SANDBAGS	
1100	bags

KINGS RIVER  
 FRESNO AND KINGS COUNTY  
 FLOOD CONTROL PROJECT

**LUMBER AND SACK TOPPING**

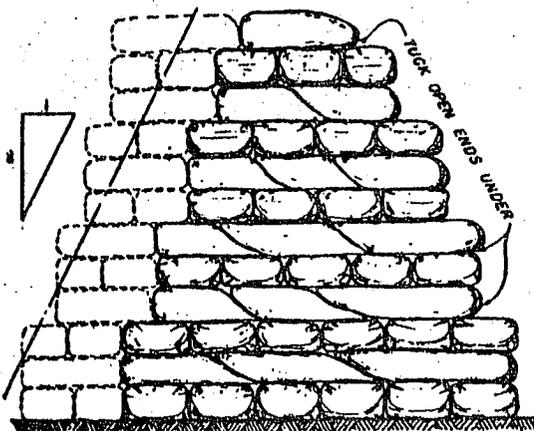
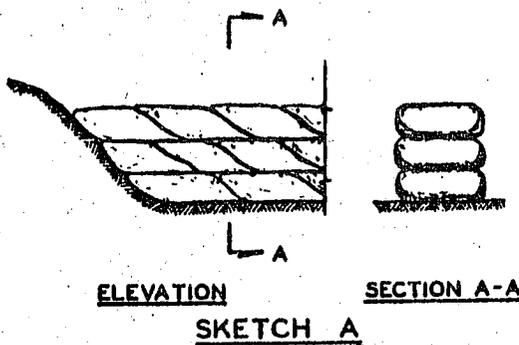
U. S. ENGINEER DIST., SACRAMENTO, CALIF.

**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 BAGS 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 KEYS TOGETHER MAY RESULT IN FAILURE AND CAUSE SERIOUS DAMAGE.



**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 B**

**ESTIMATING DATA:**

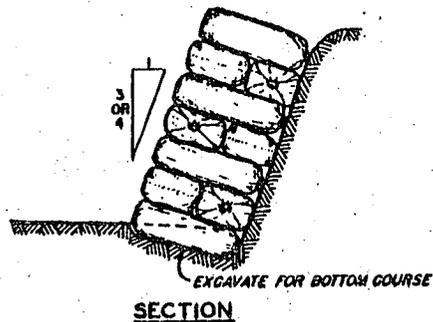
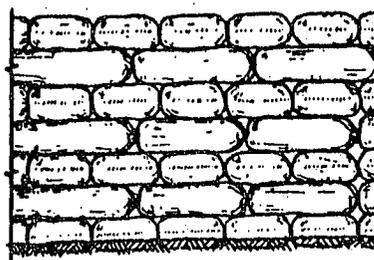
1. AVERAGE WEIGHT OF EACH FILLED SANDBAG, APPROX. 50 LBS.
2. APPROXIMATELY 1000 SANDBAGS ARE REQUIRED FOR EACH 100 SQ. FT. OF SURFACE (HEIGHT MULTIPLIED BY DISTANCE).

**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 BEAMS IN; THUS:-



**ESTIMATING DATA:**

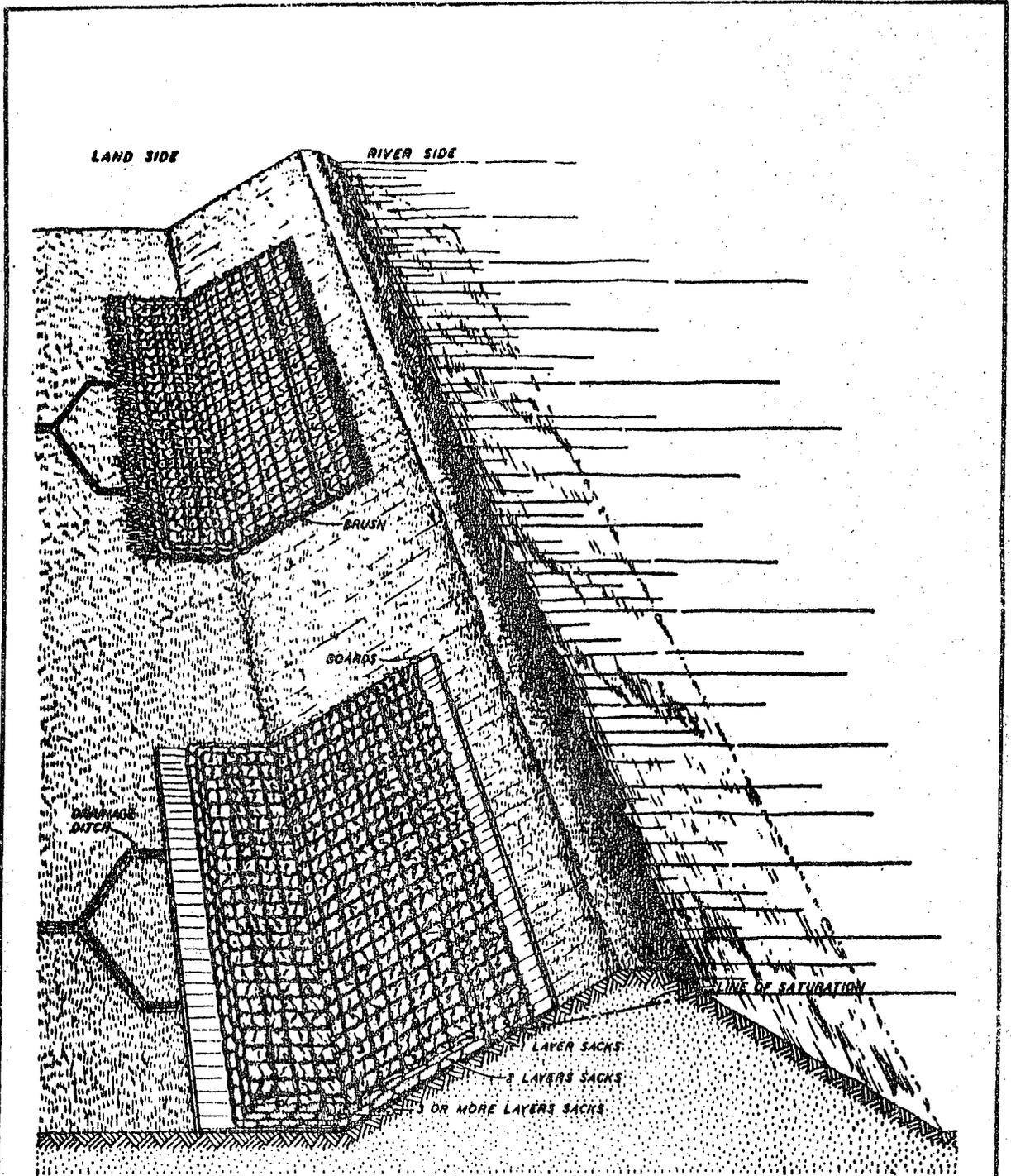
1. AVERAGE WEIGHT OF EACH FILLED SANDBAG APPROXIMATELY 65 LBS.
2. APPROXIMATELY 320 SANDBAGS ARE REQUIRED FOR EACH 100 SQ. FT. OF SURFACE TO BE REVETED.

**FILL MATERIAL:**

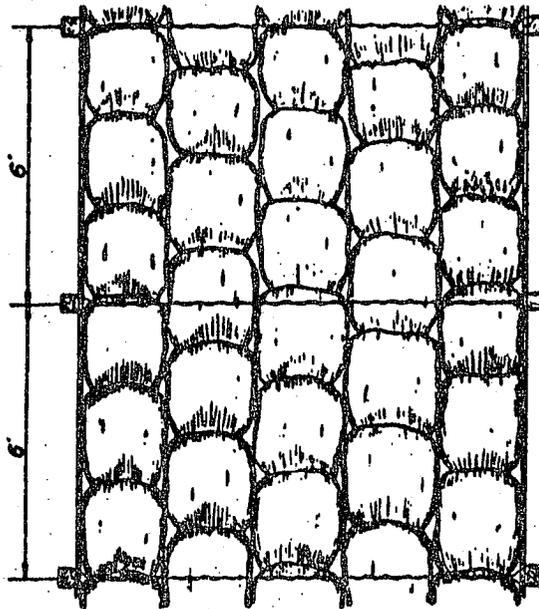
THE IDEAL MATERIAL FOR FILLING SAND BAGS IS A FINE SAND OR COARSE SILT. AVOID, AS MUCH AS POSSIBLE, THE USE OF COARSE GRAVEL AND HEAVY CLAYS.

KINGS RIVER  
 FRESNO AND KINGS COUNTY  
**FLOOD CONTROL PROJECT**  
**INSTRUCTIONS FOR**  
**PLACING SANDBAGS**

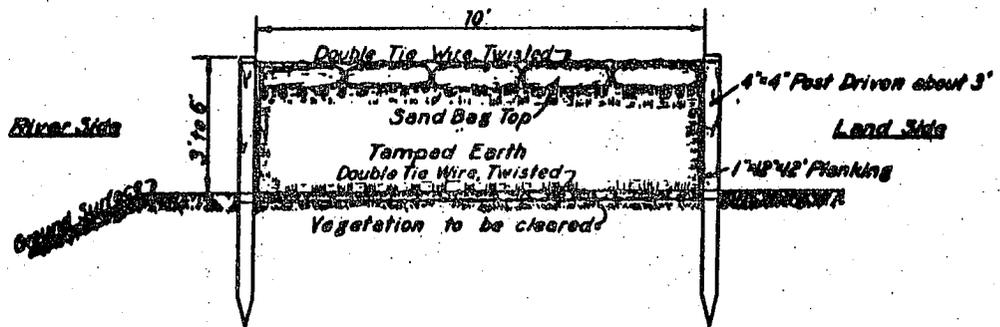
U. S. ENGINEER DIST., SACRAMENTO, CALIF.



KINGS RIVER  
FRESNO AND KINGS COUNTY  
FLOOD CONTROL PROJECT  
**BRUSHING AND SACKING  
THE LANDSIDE SLOPE**  
US Army Engineer District  
Sacramento, California



PLAN

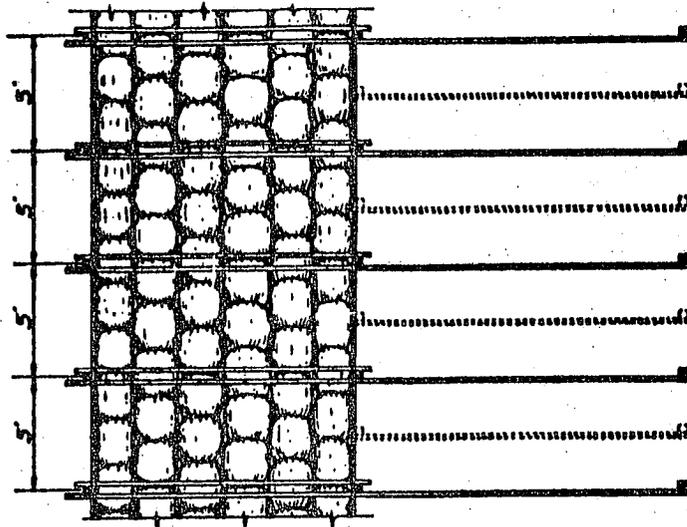


END ELEVATION

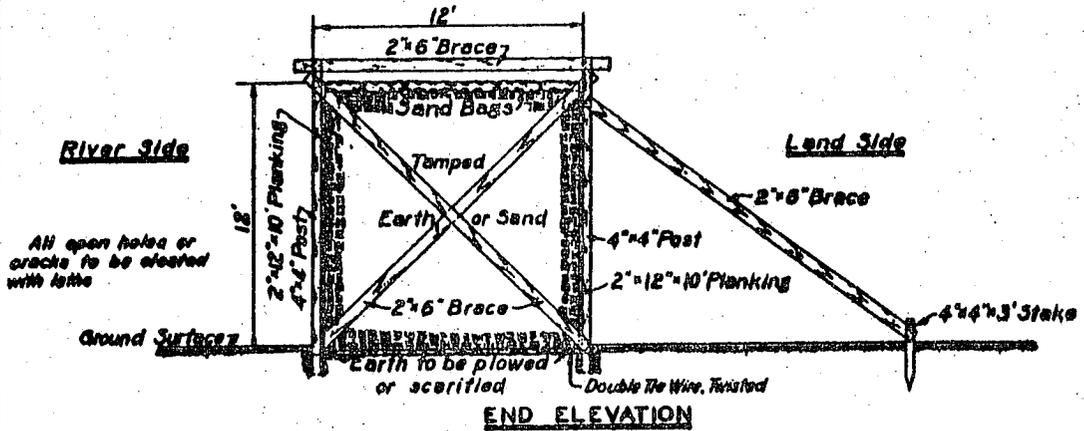
MATERIAL REQUIRED FOR 100 LINEAR FEET OF LEVEE		
4 FT HIGH	5 FT HIGH	6 FT HIGH
34 pieces 4"x4"x7' (sharpened) 1122	34 pieces 4"x4"x8' (sharpened) 1371	34 pieces 4"x4"x9' (sharpened) 1608
87 pieces 1"x12"x12' board feet	84 pieces 1"x12"x12' board feet	100 pieces 1"x12"x12' board feet
25 lbs wire #12 gage	25 lbs wire #12 gage	25 lbs wire #12 gage
15 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

KINGS RIVER  
 FRESNO AND KINGS COUNTY  
**FLOOD CONTROL PROJECT**  
**3-6FT. MUD BOX LEVEE**  
**CONSTRUCTION DETAILS**

US Army Engineer District  
 Sacramento, California



PLAN



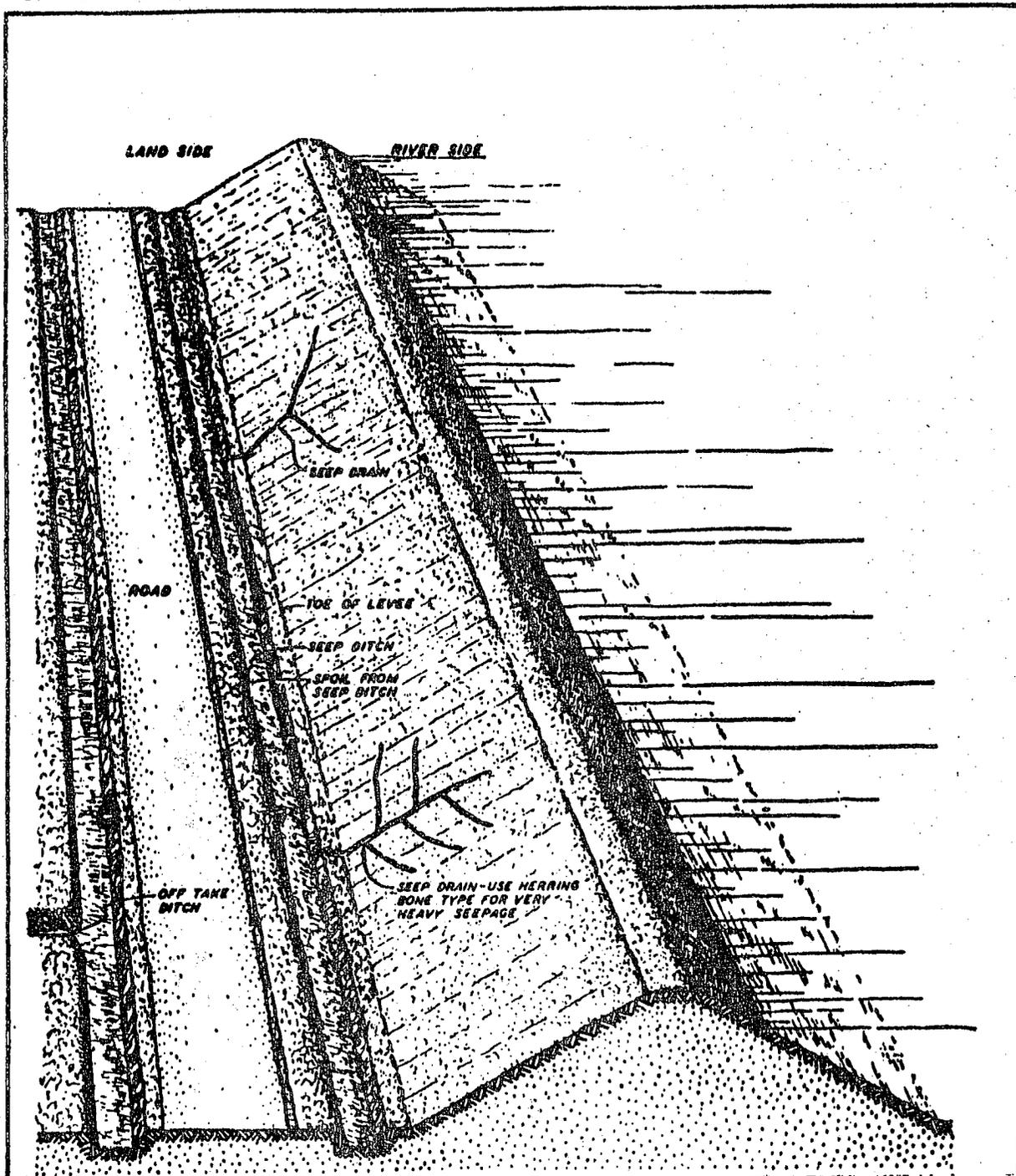
END ELEVATION

MATERIAL REQUIRED FOR 100 LINEAR FEET OF LEVEE			
LUMBER	SAND BAGS	NAILS	EARTH or SAND
40 Posts 4"x4"x14'	700	180 lbs. 20d	534 cu yds.
248 Planks 2"x12"x14'		4 lbs. 3d fine	
20 Braces 2"x6"x14'		WIRE	
60 Braces 2"x6"x14'		20 lbs. 9/12 gage	
# 20 Stakes 4"x4"x3'			
5 bundles lime			
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"x14'			
# 20 Stakes 4"x4"x3'			
Total Lumber 443 board feet			

# Sharpened

KINGS RIVER  
 FRESNO AND KINGS COUNTY  
 FLOOD CONTROL PROJECT  
**MUD BOX BULKHEAD LEVEE  
 CONSTRUCTION DETAILS**  
 US Army Engineer District  
 Sacramento, California



KINGS RIVER  
FRESNO AND KINGS COUNTY  
FLOOD CONTROL PROJECT

**METHOD OF  
DRAINING LEVEE SLOPE**

US Army Engineer District  
Sacramento, California

EXHIBIT D

SUGGESTED SEMI-ANNUAL REPORT FORM

EXHIBIT D

TO: The District Engineer  
U.S. Army Engineer District, Sacramento  
650 Capitol Avenue  
Sacramento, California

(1 May 19\_\_)  
(1 Nov 19\_\_)

Dear Sir:

The semi-annual report for the period (1 May 19\_\_ to 31 October 19\_\_)  
(1 November 19\_\_ to 30 April 19\_\_) Kings River Project, levees and channels  
Kings and Fresno Counties is as follows:

a. The physical condition of the protective works is indicated by  
the Inspector's Report, copies of which are inclosed, and may be summarized  
as follows:

(Superintendent's summary of conditions)

It is our intention to perform the following maintenance work in order  
to repair or correct the conditions indicated:

(Outline the anticipated maintenance operations for the following  
6 months.)

b. During this report period, major high water periods (water surface  
in the Kings River reached or exceeded the reading indicated on the  
table, paragraph 1-06, page 2) occurred on the following dates:

<u>Dates</u>	<u>Maximum Elevation</u>
_____	_____
_____	_____
_____	_____

Comments on the behavior of the protective works during such high water periods are as follows:

(Superintendent's log of flood observations)

During the high water stages when the water level reached a height of \_\_\_\_\_, on the gage or excess thereof (dates) \_\_\_\_\_, it was necessary to organize and carry out flood operations as follows:

(See Maintenance Manual \_\_\_\_\_.)

c. The inspections have indicated (no) or (the following) encroachments or trespasses upon the project right-of-way.

d. (No) (\_\_\_\_\_) permits have been issued for (the following improvements) or (construction within) the project right-of-way.

Executed copies of the permit documents issued are transmitted for your files.

e. The status of maintenance measures, indicated in the previous semi-annual report as being required or as suggested by the representatives of the District Engineer, is as follows:

(Statement of maintenance operations, item by item with percent completion.)

f. The fiscal statement of the Superintendent's operations for the current report period is as follows:

	<u>Labor</u>	<u>Material</u>	<u>Equipment</u>	<u>Overhead</u>	<u>Total</u>
1. Inspection					
2. Maintenance					
3. Flood fighting Operations					
TOTAL					

Respectfully submitted,

\_\_\_\_\_  
Superintendent of Works

EXHIBIT E

SUGGESTED CHECK LISTS OF LEVEES, CHANNELS AND STRUCTURES

For definition of "flood" or "high water period" see paragraph 3-04 of this manual.

CHECK LIST NO. 2

KINGS RIVER

LEVEES AND CHANNELS

Inspector's Report Sheet No. \_\_\_\_\_ Inspector \_\_\_\_\_  
Date \_\_\_\_\_ Superintendent \_\_\_\_\_

Item	Remarks
(a) Location by Station	
(b) Settlement, sloughing, or loss of grade	
(c) Erosion of levee slopes	
(d) Condition of roadways, including ramps	
(e) Evidence of seepage	
(f) Condition of farm gates and fencing	
(g) Maintenance measures taken since last inspection	
(h) Comments	

INSTRUCTIONS FOR COMPLETING SHEET 2, EXHIBIT E

- Item (a) Indicate levee station of observance, obtained by pacing from nearest reference point; indicate right or left bank.
- Item (b) If sufficient settlement of earthwork has taken place to be noticeable by visual observation, indicate amount of settlement in tenths of a foot. If sloughing has caused a change in slope of the embankment sections, determine the new slope. Note areas where erosion or gulying of the section has occurred.
- Item (c) If sufficient erosion or gulying of back face of back toe of levee has taken place to be noticeable by visual inspection, indicate area affected and depth.
- Item (d) Note any natural change in any section of roadway or ramps. Indicate any inadequacy in surface drainage system.
- Item (e) Indicate any evidence of seepage through the embankment section.
- Item (f) Indicate the serviceability of all farm gates across the embankments and roadway, and indicate if repainting is required.
- Item (g) Indicate maintenance measures that have been performed since last inspection and their condition at the time of this inspection.
- Item (h) Record opinion, if any, of contributory causes for conditions observed and also any observations not covered under other columns.

NOTE: One copy of the Inspector's Report is to be mailed to the District Engineer immediately on completion, and one copy is to be attached to and submitted with the Superintendent's semi-annual report.

CHECK LIST NO. 3

CHANNEL AND RIGHT-OF-WAY

KINGS RIVER

Inspector's Report Sheet No. \_\_\_\_\_ Inspector \_\_\_\_\_

Date \_\_\_\_\_ Superintendent \_\_\_\_\_

Item	Remarks
(a) Name of channel and location by stations	
(b) Vegetal growth in channel	
(c) Debris and refuse in channel	
(d) New construction within right-of-way	
(e) Extent of aggradation or degradation	
(f) Condition of riprapped section	
(g) Condition of bridges	
(h) Measures taken since last inspection	
(i) Comments	

INSTRUCTIONS FOR COMPLETING SHEET 4, EXHIBIT E

- Item (a) Indicate station of observation obtained by pacing from nearest reference point.
- Item (b) Note nature, extent, and size of vegetal growth within the limits of flood flow channel.
- Item (c) Note nature and extent of debris and refuse that might cause clogging of the conduits of the irrigation intake works, fouling of the tainter gates, or the bridges over the channel.
- Item (d) Report any construction along the diversion channel or above the diversion channel or above the diversion works that has come to the attention of the inspector and that might affect the functioning of the project.
- Item (e) Indicate any change in grade or alignment of the channels, either by deposition of sediment or scour, that is noticeable by visual inspection. Estimate amount and extent.
- Item (f) Indicate any change that has taken place in the riprap such as disintegration of the rock, erosion, or movement of the rock. Note the presence of vegetal growth through the riprap.
- Item (g) Note any damage or settlement of the footings of the bridges. Indicate condition of wooden structures and if repainting is required. Indicate condition of bridge approaches, headwalls, and other appurtenances.
- Item (h) Indicate maintenance measures that have been performed since the last inspection and their condition at time of this inspection.
- Item (i) Record opinion, if any, of contributory causes for conditions observed, also any observations not covered under other columns.

NOTE: One copy of the Inspector's Report is to be mailed to the District Engineer immediately on completion, and one copy is to be attached to and submitted with the Superintendent's semi-annual report.

SUGGESTED CHECK LIST NO. 4

DRAINAGE AND IRRIGATION STRUCTURES

KINGS RIVER

Inspector's Report Sheet No. \_\_\_\_\_ Inspector \_\_\_\_\_

Date \_\_\_\_\_ Superintendent \_\_\_\_\_

(a)	Location by Levee Mile	
(b)	Bank	
(c)	Debris or other obstruction to flow	
(d)	Damage or settlement of pipe or conduit	Location of pipes as shown under paragraph 4-04
(e)	Condition of concrete headwall or invert paving	
(f)	Condition of right-of-way adjacent to structure	
(g)	Repair measures taken since last inspection	
(h)	Comments	

INSTRUCTIONS FOR COMPLETING SHEET 6, EXHIBIT E

- (1) Enter station of all structures under Column (a) for check list.
- (2) Inspect inlet, barrel, and outlet for accumulation of sediment, rubbish, and vegetal matter. Note condition under Column (c).
- (3) If any settlement or damage to the pipe, barrel, or invert of the drain has occurred, estimate the location and amount. Note particularly if any backfill has come into the pipe or been disturbed. Record observations under Column (d).
- (4) Inspect the concrete portions of the structures for evidence of settlement, cracks, "pop-outs", spaces, abrasive wear, or other deterioration. Record conditions under Column (e).
- (5) Inspect backfill area adjacent to structure for evidence of erosion caused by overflow of the drainage structure and note conditions in Column (f).
- (6) Under Column (g) indicate physical measures that have been taken to correct conditions reported in last inspection, and their condition at time of this inspection.
- (7) Under Column (h) record opinion, if any, of contributory causes for conditions observed, also any observations not covered under other columns.
- (8) A copy of the Inspector's Report is to be mailed to the District Engineer immediately on completion, and a record copy shall be attached to the Superintendent's semi-annual report.

EXHIBIT F

LETTERS OF ACCEPTANCE OR TRANSFER BY  
THE KINGS RIVER CONSERVATION DISTRICT

EXHIBIT F



DEPARTMENT OF THE ARMY  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
650 CAPITOL MALL  
SACRAMENTO, CALIFORNIA 95814

SPKCO-0

28 May 1969

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Kings River Conservation District  
4886 East Jensen Avenue  
Fresno, California 93725

Gentlemen:

Reference is made to the joint inspection of 22 May 1969, on the Kings River Channel Improvement Project, held for the purpose of reviewing and transferring the completed contract work to your District in accordance with the assurance agreement signed by your District on 4 November 1959. This work was authorized and constructed under the Flood Control Act of 1944, House Document 4630, Public Law S34, 76th Congress, 3rd Session.

The flood control project consists of levee construction, enlargement, set-back, and shaping along the right and left banks of the Kings River; channel clearing in the Kings River and Crescent Bypass; down timber removal in the Kings River, Clarks Fork, Crescent Bypass and Kings River South as listed on the attachment. The work was completed on 22 May 1969, in accordance with Contract No. DACW05-68-C-0056, Specification No. 3187 and Drawing No. KI-6-55.

The above work has been completed in accordance with the requirements of the contract. Therefore, said work together with the waterway banks contiguous thereto is transferred to the Kings River Conservation District for operation and maintenance. Maintenance work required shall be performed in accordance with existing flood control regulations inclosed herewith, which have been prescribed by the Secretary of the Army pursuant to Section 3 of the Act of Congress approved 22 June 1936, as amended and supplemented.

The damaged right bank levee between Stations 554+50 to 555+50, together with any pronounced waterside damage resulting from the 1969 snowmelt runoff, will be repaired by this office under a follow-on contract to be let when flow conditions are propitious.

EXHIBIT F  
Sheet 1 of 3

SPKCO-0  
Kings River Conservation District

28 May 1969

An Operation and Maintenance Manual is being prepared and will be furnished to your office at a later date. Written acceptance of the completed work is requested.

Sincerely yours,

/s/ George B. Fink  
GEORGE B. FINK  
Colonel, CE  
District Engineer

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KINGS RIVER CONSERVATION DISTRICT

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May 14, 1971

Colonel James C. Donovan, District Engineer  
Corps of Engineers, Sacramento District  
650 Capitol Mall  
Sacramento, California 95814

Dear Colonel Donovan:

Reference is made to your letter, dated February 11, 1971, File No.: SPKCO-0, transferring to the Kings River Conservation District for operation and maintenance of approximately 9.8 miles of intermittent channel restoration and debris removal in the Centerville Bottoms Area of the Kings River.

A final tour of inspection of this project area was made by the Board of Directors of the District on March 17, 1971, and report of the inspection was made at the regular meeting of the Board on April 12, 1971, with action on acceptance set for the next meeting.

At the regular meeting of the Board on May 11, 1971, upon motion duly made, seconded and carried unanimously, the authorized construction work completed on January 6, 1971, in accordance with Specification No. 988C and Rental Contract No. DACWO 5-71-C-0054 was accepted for operation and maintenance in accordance with flood control regulations as prescribed by the Secretary of the Army.

Very truly yours,

KINGS RIVER CONSERVATION DISTRICT

/s/ Ralph A. Macdonald  
Ralph A. Macdonald, General Manager

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KINGS RIVER CONSERVATION DISTRICT  
FRESNO, CALIFORNIA

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June 12, 1972

Colonel James C. Donovan, District Engineer  
Corps of Engineers, Sacramento District  
650 Capitol Mall  
Sacramento, California 95814

Dear Colonel Donovan:

Reference is made to the letter from Colonel George B. Fink, District Engineer, Sacramento District, File No. SPLCO-0, dated May 28, 1969, advising of the completion of work on May 22, 1969 in accordance with Contract No. DACW05-68-C-0056, Specification No. 3187 and Drawing No. KI-6-55, and transferring the work to the Kings River Conservation District for operation and maintenance.

By letter dated July 8, 1969 this District deferred formal written acceptance of the completed work until certain deficiencies and other items necessary to complete and/or restore flood damaged facilities on the Kings River Channel Improvement Project have been completed. With the completion of Contract No. DACW05-72-C-0056 all such deficiencies have now been corrected.

At the regular meeting of the Board of Directors held on June 12, 1972, upon motion duly made, seconded and carried unanimously, the authorized construction work completed in accordance with Contract No. DACW05-68-C-0056, Specification No. 3187 and Drawing No. KI-6-55, was accepted for operation and maintenance in accordance with flood control regulations as prescribed by the Secretary of the Army.

The "Operation and Maintenance Manual for Kings River Channel Improvement", transmitted by your letter dated January 4, 1972, File No. SPKED-DL, is under review and we have found certain provisions therein which we believe are not consistent (sic) with the terms of assurances given by this District and apparently in conflict with the Code of Federal Regulations, Part 208 - Flood Control Regulations. For this reason acceptance of the completed work shall not be deemed to be acceptance of the operation and maintenance manual. When we

EXHIBIT F  
Sheet 1 of 2

have completed our review of the latest draft of the manual our  
comments will be transmitted for review by your staff.

Sincerely yours,

KINGS RIVER CONSERVATION DISTRICT

/s/ Ralph A. Macdonald  
Ralph A. Macdonald  
General Manager

EXHIBIT G  
SAMPLE PERMIT  
for use of  
RIGHT-OF-ENTRY

EXHIBIT G

EXHIBIT G

PERMIT

\_\_\_\_\_  
(Name of Levee Commission or City)

\_\_\_\_\_  
(Location)

Permission is hereby granted to:

\_\_\_\_\_  
(Name of Firm or Individual)

\_\_\_\_\_  
(Address)

TO: (Describe in these spaces the proposal, including kind and type of construction, purpose intended, location by stationing. Indicate passageway provided by means of gates, etc. Use separate sheets if necessary, identifying each by reference herein.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PROVIDED THAT:

Upon termination or expiration of this permit (whether by voluntary relinquishment by the grantee, by revocation by the grantor or otherwise) the grantee shall remove all structures, improvements, or appurtenances which may have been erected or constructed under this permit, and shall repair or replace any portion of the flood protection structure or right-of-way which may have been damaged by his operations (including grading and seeding, or sodding, if necessary), to the satisfaction of the grantor.

The structure or operation for which this permit is issued shall be maintained by the grantee in such manner as shall not injure or damage the flood protection structure, or interfere with its operation and maintenance in accordance with regulations of the Secretary of the Army.

The structure or operation covered by this permit may be damaged, removed or destroyed by the grantor in time of flood emergency if such action is determined by the grantor to be necessary in order to preserve life or

property or prevent damage or impairment to the use of safety of the flood protection structure, and the grantor shall not be liable to the grantee for such damage or destruction.

Unless otherwise specifically provided herein, this permit may be cancelled at anytime by the grantor upon 10 days written notice mailed to the address shown above. During such 10 day period, (or such other period as may be provided herein), the grantee will be permitted to remove any property or improvements installed under this permit, and to repair or replace any damage to the flood protection right-of-way or structures resulting from his use or operations. At the end of such period, the grantor shall have the right to possess and dispose of any such property or improvements remaining upon its right-of-way, and may proceed to repair or replace any such damage, and the grantee herein shall be liable to the grantor for the full cost of such repairs or replacements.

The construction, installation and maintenance of the structure or structures covered by this permit shall be subject to inspection by representatives of the grantor and the United States at all reasonable times.

In the event the work covered by this permit consists of or includes major construction, the cost of inspection thereof by the grantor and/or the United States shall be paid by the applicant.

Grantee agrees that it will not use the area or facilities covered by this permit, or permit such area to be used, for any purpose other than is specifically covered by this permit.

(Use these spaces for special conditions applicable to this permit.)

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THIS PERMIT SHALL NOT BE VALID UNTIL APPROVED BY THE DISTRICT ENGINEER OF THE U. S. ARMY ENGINEER DISTRICT, SACRAMENTO, OR HIS AUTHORIZED REPRESENTATIVE.

Terms of this permit  
are hereby accepted

\_\_\_\_\_  
Signature (Grantor) (Title) (Date)

Approved:

\_\_\_\_\_  
Signature (Grantee) (Date) \_\_\_\_\_ (Date)

District Engineer

REGULATIONS GOVERNING ISSUANCE OF PERMITS FOR USE OF  
RIGHTS-OF-WAY FOR FLOOD PROTECTION PROJECTS

As the flood protection works and rights-of-way are owned by the Local Interests and will be operated and maintained by them in accordance with the Regulations of the Secretary of the Army, and issuance of any permits to use the restriction that no such permits may be issued without the approval of the District Engineer, as stated in Paragraph No. 208.10 (a) General, (5) of the Regulations, a copy of which is attached hereto.

Applications for use of the rights-of-way should be addressed to the City or Levee Commission having jurisdiction over the local flood protection project. The City or Levee Commission will then forward the application to the District Engineer, of the U. S. Army Engineer District, Sacramento, California, with its recommendation, with reasons for such recommendation. It is suggested that the application and recommendations be forwarded with a draft copy of the permit, in order that all objectionable features may be eliminated prior to its proffer to the applicant as this may prevent misunderstandings and arguments. If for any reason it is desired to forward the permit itself without this intervening step, five copies of the proposed permit should be included on which is stated the exact use of the rights-of-way, for which permission is being requested, together with any condition or restriction of the permit. The permit should be signed by the applicant and an official of the Local Interests. A drawing, sketch or detail plans as may be required to show the exact location, nature of work and proposed method of construction should be attached to each copy of the permit. If the permit is approved by the District Engineer, three copies will be returned. This will enable each party concerned to have a copy of the approved permit.

In any case where a permit is requested for any purpose which might cause disfigurement or damage to the flood protection rights-of-way or structure in its erection, use, or removal, it is suggested that the applicant be required to post a bond of sufficient amount to protect the Local Interests from any cost of repair or removal, and to guarantee faithful performance of the permit conditions. In such cases the permit should state the amount and conditions of the bond.

In cases involving major construction or other work which may directly affect the flood protection structure, it will be necessary that the United States inspect the work and the Local Interests may also desire to inspect it. As stated in the permit form, such inspection will be at the expense of the grantee, and this should be called to his attention. Except in cases of known financial security, arrangements should be made with the grantee for an advance deposit or bond to cover such costs.

There is attached hereto a copy of a permit form which has been successfully used by a number of cities and levee committees.

OPERATION AND MAINTENANCE MANUAL  
FOR  
KINGS RIVER  
PINE FLAT LAKE AND KINGS RIVER PROJECTS

REVISIONS OR ADDITIONS	DATE
Paragraph 1-05 - - - - - Add subparagraph f	June 1977
Paragraph 3-08 - - - - - Revised	June 1977
EXHIBIT B - - - - - Add Drawing No. KI 1-4-40	June 1977
EXHIBIT F - - - - - Add copy of letter of acceptance dated 14 April 1976	June 1977

SECTION I

1-05 Construction data and contractor

f. Patrol road surfacing, bank protection and appurtenances and levee construction from Lemoore Weir to 8th Avenue were accomplished under Contract No. DACW05-76-C-0018 by Carl J. Woods during the periods from 11 September 1975 to 17 March 1976. Specification No. 4709, Drawing No. KI 1-4-40.

EXHIBIT B

File No.

Title

KI 1-4-40

Channel Improvement, Lemoore Weir to 8th Avenue, in  
24 sheets.

3-08. Environment Protection. In order to insure that channel maintenance is accomplished in a manner which minimizes any adverse environmental impact, removal of healthy, large diameter trees within the floodway should be avoided where practical. It is also the responsibility of the maintaining agency to comply with all State and Federal laws concerning environmental protection as related to any proposed maintenance work.

Vegetation preserved as a part of selected clearing on the waterside berm, channel bank or levee slope during prosecution of the contract shall not be removed as a part of normal maintenance. Dead trees with wildlife value will be retained except where they constitute a hazard to existing flood control works.

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KINGS RIVER CONSERVATION DISTRICT

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April 14, 1976

Colonel F. G. Rockwell, Jr.  
District Engineer  
Department of the Army  
Sacramento District, Corps of Engineers  
650 Capitol Mall  
Sacramento, California 95814

RE: Kings River Channel Improvement Project

Dear Colonel Rockwell:

Reference is made to your letter, dated March 19, 1976 (SPKCO-0), advising of the completion of the Lemoore Weir to 8th Avenue segment of the Kings River Channel Improvement Project on March 18, 1976 in accordance with Contract No. DACW05-76-C-0018, Specification No. 4709, and Drawing No. KI-1-4-40.

Your letter transfers the completed work to this District for operation and maintenance and requests written acceptance by the District.

At the regular meeting of the Board of Directors held on April 13, 1976, upon motion duly made, seconded and carried unanimously, the authorized construction work completed in accordance with Contract No. DACW05-76-C-0018, Specification No. 4709, and Drawing No. KI-1-4-40, was accepted for operation and maintenance in accordance with flood control regulations as prescribed by the Secretary of The Army.

Please furnish to this office as soon as possible, the actual total "Federal First Cost" for this segment of the project. This information will be needed by our auditors in order to add the project features to the District's capitalized assets.

Sincerely yours,

/s/ Jeff L. Taylor  
Jeff L. Taylor  
General Manager-Chief Engineer

EXHIBIT F

7 June 74

~~Jeff Taylor~~  
~~John~~  
jk.

W. D. ...  
C. H. ...  
Coleman  
file

SPKED-F

31 May 1974

Mr. Jeff L. Taylor  
General Manager-Chief Engineer  
Kings River Conservation District  
4886 East Jensen Avenue  
Fresno, California 93725

Dear Mr. Taylor:

This is in further reply to your 13 February 1974 letter (File 700.16; 500.02) in which you requested clarification of Kings River Conservation District's maintenance responsibilities in connection with the Pine Flat Lake and Kings River project.

In the design of the Pine Flat Lake and Kings River project, it was determined that certain modifications would be required to the downstream channels of Kings River to safely pass project objective flood releases. These modifications consisted of altering certain weirs and diversion structures; clearing and enlarging certain channel reaches; and constructing levees between Leavors Weir and Stinson Weir on Kings River North. It was determined that a clearing and snagging type of modification in the channel on Kings River South was sufficient to provide the design capacity for that reach.

On 13 October 1969, the Kings River Conservation District provided the assurances of local cooperation for the channel improvement work on Kings River and distributaries downstream from Pine Flat Dam. At the Assembly Water Committee hearing on Kings River flood operations held on 15 December 1969, Kings River Conservation District in a statement of policy affirmed that,

"... this District will assume its responsibility and will maintain the channels within the project limits extending from Pine Flat Dam to McMullen Grade on the North Fork and to Empire Weir No. 2 on the South Fork."

SPICED-F

31 May 1974

Mr. Jeff L. Taylor

In addition, the district further declared that,

"After improvement of the flood channels, or certification by the Corps of Engineers that the flood channel reach has sufficient carrying capacity as of the date of certification to safely transport the design flood flows, the responsibility for maintenance of the said channel capacity will be accepted by the Kings River Conservation District. It is contemplated that periodic inspections of the channel conditions will be made by the Corps of Engineers and that annual channel maintenance operations will be performed by the Kings River Conservation District to maintain the required channel capacity. The Kings River Conservation District is prepared to and will assume this responsibility for channel maintenance."

Except for the currently proposed work on Cole Slough, the channels of the Kings River system in conjunction with the completed work provide the design capacities required for operation of Pine Flat Dam as outlined in the Reservoir Regulation Manual. These capacities are given in the following listings and are considered as established capacities.

<u>Stream and Reach</u>	<u>Design Flow (cfs)</u>
Main Kings River	
Centerville Bottoms	13,000
Peoples Weir to Ision	11,000
Lemoore Weir to Island Weir	9,100
Cole Slough	4,700
Island Weir to Crescent Weir	6,300
Kings River North	4,750
Kings River South	3,200
Clarks Fork	2,500
Crescent Bypass	1,500

The work accomplished on Kings River South consisted of selective channel clearing. The channel clearing work, together with the existing levees, was considered sufficient to provide the project design capacity in that reach. Although these levees may be substandard in accordance with current Corps' design criteria, they are nevertheless considered adequate

*Smart, L. L. Taylor*  
*has been approved*  
*11/10/74*

SPKED-F

Mr. Jeff L. Taylor

31 May 1974

to contain the project design flow. With regard to your question as to which levees in this reach are to be considered as project levees, they would be those levees which contained the 1967 snowmelt floodflows. Maintenance of these levees would be that required to preserve or restore them to the condition existing in 1969.

With the completion of the proposed work between 6th Avenue and Lemore Weir, the Pine Flat Lake and Kings River project will be completed, and the downstream channels will have the design capacities to allow for operation of Pine Flat Dam as intended. To facilitate your maintenance responsibilities for the Kings River, the operation and maintenance manual for the project is being revised to reflect inclusion of the entire river, and copies will be furnished to you after revisions are completed.

Sincerely yours,

CHRIST F. POTAMOS  
Lieutenant Colonel, CE  
Acting District Engineer

JANSSEN/

CLARKE

cc:  
Levees + Betow  
Engr Div  
Water Res Plng  
C-Ops ✓

SCIANDRO

WEDDELL

POTAMOS

*Kus*

January 17, 1979

1. Gene Anderson
2. Eldon Rinehart

Lee W. Carter, Chief  
Data and Operations Branch  
Central District

Unauthorized Reloca-  
tion of Right Levee, Kings  
River

You received a copy of a December 5, 1978 letter from Jeff Taylor (General Manager-Chief Engineer of the Kings River Conservation District) to the Corps concerning the subject unauthorized levee (see Attachment No. 1). On the route slip forwarding this letter to me you wrote, "Please prepare suggested action including a reply to Taylor".

Attachment No. 2 of this memo is a copy of the response letter from the Corps to Jeff Taylor. After reading this response letter, I do not believe any further formal action is needed on our part at this time. The Kings River Conservation District gave the assurances for this project; therefore, the State is not directly involved but we will continue to monitor the activities related to the relocated levee.

Attachments

cc: S. Makis

RFranson:mmm

Kings River Conservation District

4886 E. Jensen Avenue • Fresno, California 93725  
Telephone: (209) 237-5567

File: 700.01

April 20, 1981

Britz Farms  
Box 366  
Five Points, California 93624

Attention: Mr. Cal Marshall

Gentlemen:

The Kings River Conservation District is the agency responsible for maintenance of flood control levees on the Kings River.

On a recent inspection of the Kings River North Fork adjacent to Britz Farms' property, District staff observed a section of the left bank flood control levee eroded by grazing sheep, just downstream from the Southern Pacific Railroad river crossing.

I am requesting that you restore this eroded levee section to its original condition no later than November 1, 1981. If you have any questions regarding this matter please call me.

Thank you for your cooperation in helping us maintain the Kings River Designated Floodway.

Sincerely,



*for* Robert B. Mount, Chief  
Channels and Levees Section

RBM/cb

cc: Paul Scott, Chief  
Inspection Unit  
Department of Water Resources  
Central District  
P.O. Box 160088  
Sacramento, California 95816



**Kings River Conservation District**

4886 E. Jensen Avenue • Fresno, California 93725-1899  
Telephone: (209) 237-5567

File: 700.15.01

August 30, 1993

VIA FAX/MAIL

Mr. Raymond E. Barsch  
General Manager  
The Reclamation Board  
1419 Ninth Street, Room 455-6  
Sacramento, California 95814-5594

Dear Mr. Barsch:

This is in reference to your letter dated August 16, 1993 regarding what your office considers several deficiencies in the maintenance program for the Kings River Channels and Levees.

Please be advised that your inspector is not knowledgeable of the situation regarding the Kings River Channels and Levees that were turned over to the Kings River Conservation District for maintenance by the U.S. Army Corps of Engineers. Therefore, it is suggested that my staff meet with you to discuss your letter dated August 16, 1993. Mr. Jack Sinor, Assistant Manager of the District, has been trying for several days to reach you by telephone. Please contact Mr. Sinor at this office so arrangements can be made to meet with you and your staff.

Sincerely yours,

Jeff L. Taylor

General Manager-Chief Engineer

JLT/ar

L93-0227.L2

cc: Mr. Robert Kelly  
Sacramento District  
U.S. Army Corps of Engineers  
1325 J Street  
Sacramento, CA 95814-2922

Mr. Gene Snow, DWR

BOARD OF DIRECTORS

Division I, NORMAN B. WALDNER, Dinuba • Division II, MASARU YOSHIMOTO, Fowler  
Division III, ALVIN J. QUIST, Fresno • Division IV, GEORGE D. McKEAN, Riverdale  
Division V, HUGH V. JOHNS, Hanford • Division VI, EDWIN H. HOWE, Stratford

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MASARU YOSHIMOTO, President • NORMAN B. WALDNER, Vice President  
JEFF L. TAYLOR, General Manager-Chief Engineer, Secretary  
KEVIN W. VOGT, Auditor Controller  
EDWARD J. TIEDEMANN, Attorney-At-Law

K.R.C.D.

March 3, 1994

Mr. Jeff L. Taylor  
General Manager-Chief Engineer  
Kings River Conservation District  
4886 East Jensen Avenue  
Fresno, California 93725

Dear Mr. Taylor:

This letter is a follow-up to the September 9, 1993 meeting at your office and our fall joint inspection of the Kings River Flood Control Project. We apologize for the delay, but it was necessary in order to verify the gravel crown roadway mileage discussed below.

One of the questions that arose during the meeting was the nature of The Reclamation Board's role and authority to control encroachments and conduct inspections of the Kings River Flood Control Project since the Board is not a project sponsor. We surmised at that meeting that the Board may have become involved in these activities as a result of a three-party "gentlemen's agreement" with the U.S. Army Corps of Engineers and Kings River Conservation District. Our review of the Board's and Corps' records seems to confirm this hypothesis. It appears that the first inspection by the State took place in 1973. As a practical matter, because it already was necessary for State inspectors to inspect the Kings River Designated Floodway, it seems that we agreed inspect the adjacent project levees, issue permits for encroachments on the levees, and transmit the inspection reports and permits to the Corps.

KRCD staff has informally requested the State to continue in its permitting and inspection roles. Corps staff has also indicated a desire to continue this arrangement. We have no objection to continuing this arrangement, provided that it becomes more formalized. This will prevent future misunderstandings and document that the State has no liability from its permitting and inspection roles. Please inform us if this is acceptable.

We have also followed up on the issue of gravel crown roadways. We agree that providing gravel on the 48.6 miles of levee crown mentioned in our August 16, 1993 letter goes beyond required maintenance. These levee crowns were not graveled during construction by the Corps. The Corps is not requiring KRCD to gravel these levee crowns and we can only advise on this issue. It has been our experience that all-weather crown

Mr. Jeff L. Taylor  
March 3, 1994  
Page Two

roadways are necessary to assure the safety of project levees. We recognize that the Kings River Flood Control Project was designed primarily for snowmelt floods (April-July). Even so, there is a very real possibility of heavy rainfall occurring concurrently with high water. In such a circumstance, vehicular travel along the levees necessary for inspection and flood fighting would be severely limited and also somewhat destructive to the levees.

We understand that you have made significant progress in resolving the maintenance deficiencies identified in the August 16, 1993 letter. We request that you provide us a plan to address any outstanding items.

If you have any questions, please contact me or Rodney Mayer at (916) 653-5434.

Sincerely,

Original signed by  
Raymond E. Barsch

Raymond E. Barsch  
General Manager

cc: Mr. Robert Kelly  
Sacramento District  
U.S. Army Corps of Engineers  
1325 J Street, 14th Floor  
Sacramento, California 95814-2922

bcc: Gene Snow ✓  
Neil Gould

RGMayer:pva

Text Area:Mayer/TAYLOR.LET



**Kings River Conservation District**  
4886 East Jensen Avenue • Fresno, California 93725

March 1974

## THE KINGS RIVER CONSERVATION DISTRICT

The Kings River Conservation District (KRCD) is a political subdivision of the State of California covering an area of 1,100,000 acres in Fresno, Kings and Tulare Counties and including within its boundaries the entire service area of the Kings River. The District was formed by the California Legislature in 1951 with the passage of the "Kings River Conservation District Act" (Stats. 1951, c. 931, p. 2463). The certificate of the Secretary of State of the State of California setting forth incorporation of the District contains the following concise description of the KRCD Act:

"An act creating a district to be called 'Kings River Conservation District'; providing for its organization, operation, maintenance and government, for the inclusion of lands therein and the exclusion of lands therefrom; providing for the acquisition, construction, maintenance and operation of works and property for the purposes of the district, including the *storage, conservation, distribution and sale of water, the development, distribution and sale of electric power, the drainage, reclamation and protection of land and prescribing and defining the powers, duties, purposes and responsibilities of said district.*"

There were three principal purposes behind the formation of the District and these were:

1. An overall public district was needed to safeguard local water rights for the entire service area.
2. An overall public district was needed to negotiate and sign a contract with the United States for the use of storage space in Pine Flat Reservoir for irrigation purposes.
3. An overall public district was needed with the ability to plan, finance, construct and operate hydroelectric power plants on the Kings River.

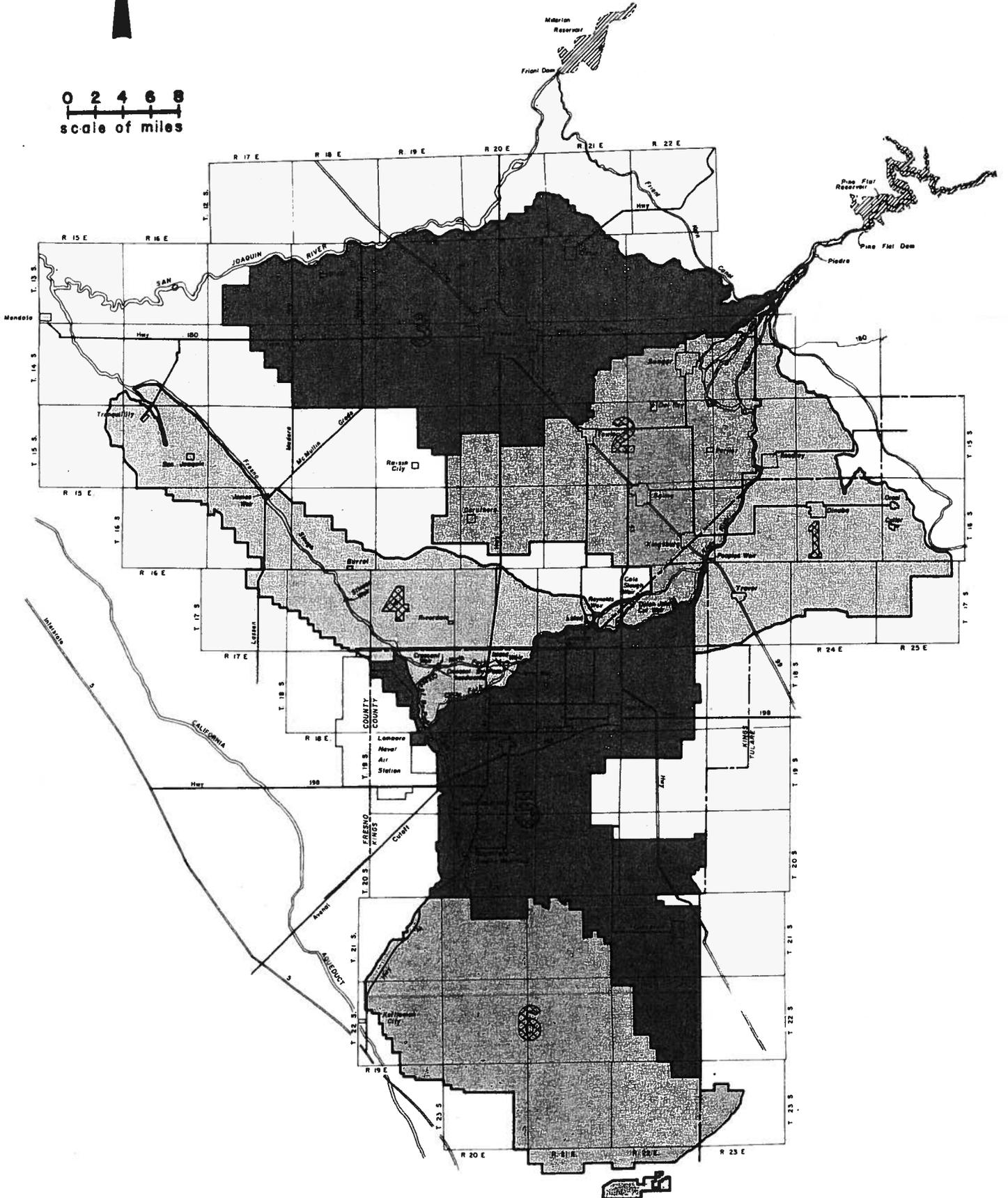
In short, the single overriding and most important reason for the Kings River Conservation District was the need for one public agency to act for the whole Kings River service area.

In general, the administrative structure and method of operation of the KRCD are similar to those of irrigation districts. The District is governed by a board of seven directors elected by the people. The District itself is divided into six divisions (See Plate 1.), each of which elects one director. The seventh director is elected at large from the KRCD as a whole. Directors who represent divisions must be voters, landowners and residents in their respective divisions.

# KINGS RIVER CONSERVATION DISTRICT BOUNDARY AND DIRECTORS' DIVISIONS



0 2 4 6 8  
scale of miles



The Director-at-large must be a voter, landowner and resident of the District; he may live in any of its six divisions.

All registered voters, resident within the District, may vote in District elections.

The procedure for the nomination and election of directors is much the same as in irrigation districts. Directors are subject to recall under the general provisions of the California Elections Code. All legislative sessions of the Board of Directors are public. Regular elections are held on the first Tuesday in November of each odd numbered year. Three of the directors elected at the first regular election served for two years; the other four, including the Director at large, served for four years. Thereafter, all directors serve four-year terms. The current Board of Directors of the KRCD are:

<u>Division</u>	<u>Directors</u>
1	William P. Boone (Dinuba)
2	M. K. Mirigian (Fowler)
3	Raymond W. Lambrecht (Kerman)
4	George D. McKean (Riverdale)
5	Hugh V. Johns, President (Hanford)
6	Ed H. Howe, Vice President (Stratford)
At Large	Garvin H. White (Fresno)

The Board of Directors meets on the second Tuesday of each month. The policies of the Board of Directors are administered by a General Manager, assisted by a staff of engineering, administrative and field personnel.

The directors of the KRCD are empowered to levy a tax for the operation and maintenance of the District which shall not exceed 25 cents on each \$100 of assessed valuation of lands within the District. They may issue bonds only after the approval of the voters has been obtained at a bond election. They may exclude lands from the District after it has been shown that such lands will not be substantially benefited by remaining within the District. The Department of Water Resources of the State of California is required by the KRCD Act to determine, whether or not, lands it is sought to exclude from the District are, or are not, substantially benefited. The directors also may take land into the District after the voters, in the area it is proposed to annex, have signified their approval at an election.

## **KINGS RIVER CHANNEL IMPROVEMENT PROJECT**

The Federal Flood Control Act of 1944, which authorized the construction of Pine Flat Dam, also authorized certain channel improvements along the Kings River downstream from Pine Flat Dam. These improvements include enlargements and rectification of existing levees and channels to the extent necessary to safely pass to Tulare Lake and the San Joaquin River the stream flows as regulated by the operation of Pine Flat Dam.

Federal law requires that a local agency assume sponsorship of the project and provide certain assurances to the United States before the expenditure of Federal funds in construction. The local sponsor is required to (a) provide without cost to the United States all lands, easements and rights-of-way necessary for construction of the channel improvement project, including all necessary utility relocations; (b) hold and save the United States free from damages due to the construction works; (c) maintain and operate all of the works after completion in accordance with regulations prescribed by the Secretary of the Army.

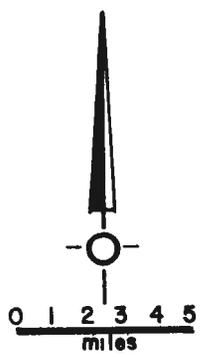
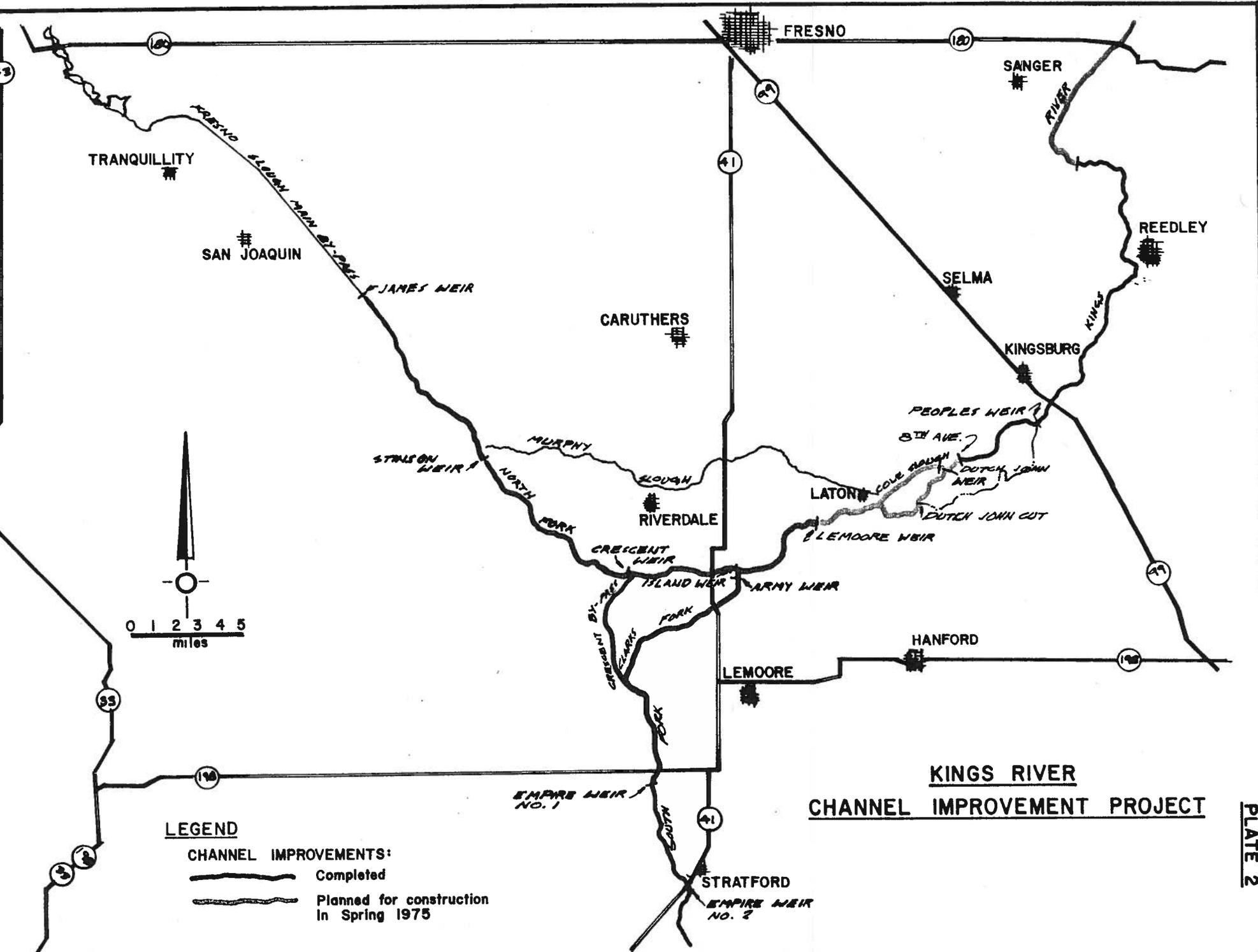
On November 4, 1959 the Kings River Conservation District, at the urging of all irrigation districts and reclamation

districts in the area, undertook the sponsorship of the channel improvements and formally gave the necessary assurances to the United States. The first segment of the project covering that area of the Main Kings River and North Fork from Lemoore Weir to James Weir and the South Fork and Crescent By-Pass to Empire Weir No. 2 (See Plate 2) was completed in 1969. The District acquired the rights of way, in the form of easement deeds, for the first segment of the project during the period 1959 through 1968. The right-of-way acquisition involved 300 parcels of private property plus the properties owned by 10 large reclamation districts.

Following the 1969 flood, selective channel clearing and sand bar removal was accomplished along a six mile reach of the Kings River near Centerville.

The next segment of the channel improvement project includes the construction of a new levee along the north side of Cole Slough and the rectification of existing levees along the Main Kings River, Dutch John Cut and Cole Slough from Lemoore Weir upstream to 8th Avenue (See Plate 2). Construction by the U. S. Army, Corps of Engineers, is planned to start in the Spring of 1975.

As each segment of the channel improvement project is completed the KRCD assumes the full responsibility of mainten-



**LEGEND**

CHANNEL IMPROVEMENTS:

————— Completed

- - - - - Planned for construction  
In Spring 1975

**KINGS RIVER  
CHANNEL IMPROVEMENT PROJECT**

## **FLOOD CONTROL**

In addition to its implementation of the Kings River Channel Improvement Project, KRCD is involved in other specific activities to minimize threats of flooding in the service area.

Appropriations have been made, as required, to do emergency channel clearing in badly choked areas of the Kings River so that damage to property owners would be lessened and flood criteria at Pine Flat Reservoir would not be changed. The amount of water permitted to be stored in Pine Flat Reservoir is based on the ability of the downstream channels to carry the design floodflows.

An important feature of the Kings River flood control scheme is the Designated Floodway Program by The Reclamation Board, State of California. Following a series of public hearings that started in 1971, The Reclamation Board adopted the final portions of the Kings River designated floodway in February, 1974. The purpose of this designation is to delineate the primary floodway and to preserve the flood carrying capacity of the channel. Any works of improvement within the floodway area are subject to approval of The Reclamation Board. Under the terms of a letter of understanding between the KRCD and The Reclamation Board, applications for encroachment in the floodway are screened by the KRCD before going to The Reclamation Board in Sacramento for final action.

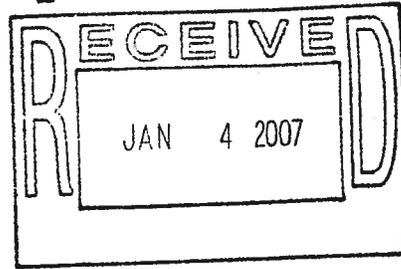
Maps showing the floodway lines have been filed for recording in the respective county recorders' offices. Maps showing the entire designated floodway through Fresno, Kings and Tulare Counties are available at the KRCD office.

This joint flood control program has the advantage of combining the KRCD's local knowledge of the Kings River with the broader experience in controlling encroachments possessed by the state agency, which also has policing powers necessary to enforce its decisions.

As a result of the heavy flooding by most of the small streams in the area northeast of Fresno in 1969, the KRCD assisted in clearing the choked portions of Holland Creek, Alluvial Drain and Fancher Creek.

There is a severe threat of flooding to the Fresno-Clovis metropolitan area and surrounding agricultural lands from Redbank, Fancher and Big Dry Creeks. At the urging of the Fresno Metropolitan Flood Control District, the City of Fresno, the County of Fresno, the City of Clovis, the Fresno Irrigation District and the KRCD, the U. S. Army, Corps of Engineers, has undertaken a program of investigation and has identified an array of alternative plans for solving the flood and related problems of the study area and detailed feasibility studies are in progress. For several years the KRCD Board of Directors has authorized the General Manager of the District to appear before the congressional committees in support of the appropriation of funds to continue with the studies.

COPY



4886 East Jensen Avenue  
Fresno, California 93725

Tel: 559-237-5567  
Fax: 559-237-5560

www.krcd.org

December 27, 2006

The District Engineer  
Department of the Army  
Sacramento District, Corps of Engineers  
1325 "J" Street  
Sacramento, California 95814-2922

Re: Semi-Annual Report - Kings River Channel Improvements

Gentlemen:

The following provides the semi-annual report for the Kings River Channel Improvement Project, Kings and Fresno Counties, for the period May 1, 2006 through October 31, 2006

a) Condition of Physical Works

Based upon inspections made during the past six months, the overall physical condition of the project works is satisfactory. Inspection logs for the period covered under this semi-annual report are attached.

b) Anticipated Maintenance

Anticipated maintenance during the next six (6) months is as follows:

Rodent Control: A continuous rodent control program consisting of the dispersal of Chlorpphacinone poisoned grain, poison gas cartridges and Fumitoxin pellets will be carried out on all project levees along the Kings River from 8th Avenue to McMullin Grade Road (State Highway 145), along the Crescent Bypass, Clarks Fork, and on the South Fork downstream to Empire Weir No. 2. In addition, rodent activity on all project levees will be continuously monitored and open rodent burrows destroyed. Bait stations located in areas of heavy rodent infestation will be stocked with anticoagulant rodenticide on a continuous basis.

Weed and Brush Control: Project levee slopes and berms will be sprayed, mowed, drag graded and disced to control unwanted weed growth. Hand removal and mechanical shredding of brush and debris along project levee slopes and berms will be undertaken as necessary throughout the system.

BOARD OF DIRECTORS

Division I, NORMAN B. WALDNER, Dinuba • Division II, MASARU YOSHIMOTO, Fowler • Division III, GILDO NONINI, Fresno • Division IV, MARK McKEAN, Riverdale • Division V, BRENT L. GRAHAM, Hanford  
Division VI, CEIL W. HOWE, JR., Stratford • At Large, ALVIN J. QUIST, Fresno

OFFICERS

CEIL W. HOWE, JR., President • MARK McKEAN, Vice President • DAVID ORTH, General Manager-Secretary • RANDY SHILLING, Auditor • EDWARD J. TIEDEMANN, Attorney-At-Law

Levee Improvements and Repairs: Project levee roadways along portions of the Main Kings River and South Fork will be graded to remove ruts and localized dips. Due to maximum flood waters flows through the North Fork of the Kings River, an all weather (class II aggregate base rock ¾ inch) surface which was planned for construction along the left bank of the South Fork immediately downstream of Southern Pacific Railroad Crossing to State Highway 198, has been rescheduled for the next reporting period. During this reporting period, work included the removal of localized dips and surface grading of the tops of project levees along the following locations:

Reach	Location	Bank
North Fork	22 <sup>nd</sup> Avenue to Kamm Aveune	R
North Fork	22 <sup>nd</sup> Avenue to Crescent By-Pass Weir	L
Crescent By-Pass	Crescent By-Pass Weir to South Fork	R/L

Also due to excessive seepage during high-water a levee-strengthening project was constructed along the right bank immediately upstream of Bryant Avenue to approximately 400 feet downstream. Using a long reach excavator, 3-foot wide keyway was cut approximately 18 feet deep along the center of the levee for a distance of approximately 700 feet. The existing material (sand and silt) was removed and replaced with a heavy clay material. A sheep foot roller compactor was then used to compact the keyway. In addition to control erosion, approximately 300 cubic yards of concrete rubble were placed along a 100-foot section on the waterside located on the right bank of the North Fork approximately 0.25 mile upstream of Mt. Whitney Avenue.

Also, 10,500 feet of the Zalda tile pipe was cleaned of silt and sand and 40 feet of collapsed tile pipe was repaired. In addition repairs were made to three (3) of the nine (9) Zalda interceptor drain pumps.

Bank Protection: As conditions permit, concrete rubble will be placed on eroded banks of the project levees as needed throughout the system. During this reporting period, concrete rubble was placed at the following locations:

Reach	Location	Bank	CY (cubic yards)
North Fork	0.25 mile upstream of MtWhitney Ave.	R	300 CY

Channel Maintenance: As conditions permit, brush control work during the next six months will include the removal of overhanging brush, limbs and bamboo, and unwanted vegetation along various sections of the flood channel listed below:

Reach	Location	Bank
Dutch John Cut	Dutch John Cut Weir to Last Chance Weir	R/L
Main Kings River	Lemoore Weir to Army Weir	R/L
North Fork	Crescent Weir to Excelsior Avenue	R/L
North Fork	Stinson Weir to State Highway 145	R/L
South Fork	Jackson Avenue to Empire Weir No. 1	L

Channel maintenance work performed during this reporting period included the removal of downed trees, overhanging limbs, brush and bamboo in several areas throughout the project system. The specific locations where this work was performed are listed below:

Reach	Location	Bank
Cole Slough	Cole Slough Weir to Reynolds Weir	R/L
Clarks Fork	Army Weir to Lacey Avenue	R/L
North Fork	Crescent Weir to Excelsior Avenue	R/L

Additional channel clearing work performed during this reporting period included previously stockpiled material consisting of sand deposits and other accumulated sediments were removed from the floodway along the Main Kings River. The specific location and approximate quantity of the materials removed is listed below:

Reach	Location	Quantity
Main Kings River	Maple Avenue and Excelsior Avenue	4500 CY
North Fork	Immediately upstream of Excelsior Avenue	3000 CY

Levee Access Control: No new gates were installed during this reporting period; however, repairs were made to eleven (11) gates. The specific location and repairs of these gates were as follows:

Reach	Location	Gate No.	Repairs
Cole Slough	Reynolds Weir	306	Replaced lock
Main Kings River	Excelsior Avenue	1	Replaced lock
North Fork	Stinson Weir	12	Repaired gates wing and replaced lock
North Fork	22 Avenue	4	Repaired gate hinges
North Fork	Mt. Whitney Avenue	10-A	Repaired gate wing
Clarks Fork	22 Avenue	226	Repaired gate wing
Clarks Fork	Fremont Avenue	216-A	Repaired gate hinges
Clarks Fork	Lacey Avenue	232	Repaired gate hinges and wings
Clarks Fork	20 ½ Avenue	218	Repaired gate hinges
South Fork	Four miles upstream from State High-Way 198	236-A	Repaired gate and replaced lock
Crescent Bypass	Crescent Bypass Weir	112-A	Repaired gates hinges and wing and replaced lock twice

c) High Water Periods

Due to several major storms at the beginning of April and an above average snow pack conditions in the Kings River Watershed the Corps of Engineers initiated a flood release from Pine Flat Reservoir on April 2<sup>nd</sup> beginning with a target flood flow of 250 cfs for the channel below Crescent Weir. Target flood flows in the North Fork below Crescent and Army Weir during May and June were as follows:

Date	Crescent Weir	Army Weir
May 1 - 5	4750 cfs	500 cfs
May 6 - 9	4750 cfs	500 cfs
May 10 - 13	4750 cfs	1150 cfs
May 14 - 23	4900 cfs	1150 cfs
May 24 - 31	4750 cfs	1000 cfs
June 1 - 2	4750 cfs	600 cfs
June 3 - 8	4600 cfs	600 cfs
June 9 - 13	4200 cfs	600 cfs
June 14 - 16	3700 cfs	600 cfs
June 16 - 25	3000 cfs	No flood flows

June 25 - 27	2000 cfs	No flood flows
June 28 - 30	600 cfs	No flood flows
July 1	500 cfs	No flood flows
July 2	No flood flows	No flood flows

d) Encroachment Permits

There was no encroachment applications submitted to the Reclamation Board during this reporting period.

e) Right-of-Entry Permits

There were no right-of-entry permits issued by the District during this reporting period.

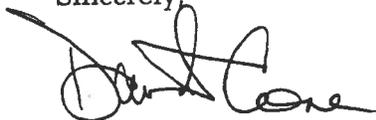
f) Fiscal Statement of Costs

The fiscal statement of the District's operation and maintenance costs expended for the period May 1, 2006 through October 31, 2006 is as follows:

Labour	Materials & Equipment, etc	Overhead	Total
\$ 235,978.97	\$ 141,668.81	\$ 94,309.96	\$ 471,957.74

\* Includes payroll burden and administrative overhead at the combined rate of 118.57 percent.

Sincerely,



David Cone  
Director of Water Resources

DC/KS/dp

Enclosures: Inspection Logs

cc: The Reclamation Board  
1416 Ninth Street, Room 1601  
Sacramento, California 95814  
Attention: Chief Engineer

# KINGS RIVER CONSERVATION DISTRICT



## KINGS RIVER CHANNEL IMPROVEMENT PROJECT KINGS AND FRESNO COUNTIES

### Inspection Logs

for the period of

May 1, 2006 through October 31, 2006

#### **Contents**

<u>Tab</u>	<u>Description</u>
1	Flood Control Project Maintenance Levee Inspection (Sheet 1 - 18)
2	Drainage and Irrigation Structures - Kings River (Sheet 1 - 18)
3	Inspection of Weirs - Kings River (Sheet 1 of 1)
4	Inspection of Bridges - Kings River (Sheet 1 of 2)

**KINGS RIVER CONSERVATION DISTRICT**  
**Flood Control Project Maintenance Levee Inspection**

Date of Inspection: Spring: Fall: 26, October 2006  
 Unit No. 1 Length: 5.04 Miles Reach: Main Kings River - Lemoore Weir to Army Weir - R/B Sheet: 1 of 18  
 Maintenance and/or repairs are required at the following levee miles (L.M.)

Item	Inspection	Maintenance and/or repairs are required at the following levee miles (L.M.)
Control of Wild Growth on Levee	L.S. Spring W.S.	
	L.S. Fall W.S.	Needs to be mowed 0.00 to 0.30 L.S. Levee slopes need to be drag-graded 0.00 to 5.04 L. & W.S.
(Continued) Control of wild Growth on Levee	L.S. Spring W.S.	
	L.S. Fall W.S.	
Control of Growth in Rock Revetment	Spring	
	Fall	
Exterminate Rodents and Fill Burrows	L.S. Spring W.S.	
	L.S. Fall W.S.	0.00 to 3.10 L. & W. S.
Repair Crown Roadways	Spring	
	Fall	Needs grading 0.00 to 2.00 and 2.80 to 5.04 Needs gravel 0.10 to 1.10
Trim Trees	Spring	
	Fall	
Repair Gates	Spring	
	Fall	Gate # 1 needs a KRCD lock 2.80
Unauthorized Encroachment	Spring	
	Fall	Land-owners burn pile 1.70 W.S. E - 0.90 W.S, 1.70 L.S and 3.07 to 3.80 L. & W.S.
Pipes Abandon or in Poor Condition	Spring	
	Fall	
Erosin on Bank or Slope	Spring	
	Fall	
Other (Describe)	Spring	
	Fall	Burn piles in high water channel need to be burned 4.40 to 5.02
Remarks	Spring	
	Fall	

Date: 26, October 2006

Inspected By: David Kuma & Nic Rivas

Encroachment Symbols

A Signs	L.S. Landside	W.S. Waterside	+ F.P. Above Flood Plain	- F.P. Below Flood Plain	P Prunings
B Buildings	C Landscape	E Equipment	G Garbage	T Tank	
D Stairways	F. Fences	H Poles	L Tree Limbs		

**DRAINAGE AND IRRIGATION STRUCTURES  
KINGS RIVER**

Inspector: David Kuma and Nic Rivas

of 26. October 2006  
ig

2006

<b>No. 1</b>	<b>Length 5.04 miles</b>	<b>Waterway: R/B Main Kings River</b>	<b>from Lemoore Weir to Army Weir</b>	<b>Sheet 1 of 18</b>
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ileage	Description	Debris or Other Obstruction	Damage or Settlement of Pipe or Conduit	Condition of Concrete Headwall or Invert Paving	Condition of Right-of-Way Adjacent to Structure	Repair Measures Taken Since Last Inspection	Comments
	10" diameter pipe through levee - concrete standpipe on levee toe	No	No	Good	Good	None	
	6" diameter pipe through levee - 24" riser L/S (old lift pump W/S)	No	No	Good	Good	None	
	18" diameter pipe through levee - 10" pipe sleeved through 18" pipe (old lift pump W/S)		No	Good	Good	None	
	4" diameter communication line	N/A	No	N/A	Good	None	Reclamation Application No. 12756 KRCD No. 700.05-115 Pacific Telephone
	8" diameter steel pipe through levee - pump on W/S	No	No	Good	Good	None	
	10" steel pipe through levee for irrigation in flood plane	No	No	Good	Good	None	
	Unknown pipe through levee air vent pipe W/S alfalfa valve on L/S irrigation in flood plane	No	No	Good	Good	None	
	(2) 60" diameter pipes through levee - concrete headwall (Grant Canal)	No	No	Good	Good	None	
	7" diameter steel pipe through levee (pump W/S)	No	No	Good	Good	None	

**INSPECTION OF WEIRS  
KINGS RIVER**

Date of Inspection: 26, October 2006  
 Spring:  
 Fall: 2006

Inspector: Keith Seligman

Reach	Name of Weir	Condition of Approach	Condition of Head walls and Sidewalks	Condition of Floor	Condition of Roadway	Condition of Buttress Flash Boards and Gates	Comments
				Good	Good	Fair	Boards are in Weir
<b>Cole Slough</b>	Cole Slough Weir	Good	Fair				
				Fair	No access left side Right side good	Good	Boards are in Weir
<b>Dutch John Cut</b>	Dutch John Cut Weir	Good	Fair				
				Good	Good	Good	Boards are in Weir
	Reynolds Weir	Good	Good	Good	Good	Good	Boards are in Weir
	Last Chance Weir	Good	Good	Good	No access right side Left side Good	Good	Boards are in Weir
	Lemoore Weir	Good	Good	Good	Good	Good	Boards are in Weir
<b>Main Kings River</b>				Good	Good	Fair	Boards are in Weir. Gates need to be fixed
	Island Weir	Good	Good	Good	Good	Good	Boards are in Weir. Gates need to be fixed
	Crescent Weir	Good	Good	Good	Good	Good	Boards are in Weir. Gates need to be fixed
	Stinson Weir	Good	Good	Good	Good	Fair	Boards are in Weirs. Gates need to be fixed
<b>North Fork</b>				Good	Good	Good	
<b>Clarks Fork</b>	Army Weir	Good	Good	Good	Good	Good	Boards are in the Weirs. The boards are in fair condition
	Empire Weir No. 1	Good	Fair	Good	Fair	Good	
	Empire Weir No. 2	Good	Good	Good	Good	Good	
<b>South Fork</b>				Some seepage	Good	Good	Checked 9 gate in September they are in good working order
<b>Crescent By-pass</b>	Crescent Bypass Weir	Dam U/S. Need to control wild growth	Good				

**INSPECTION OF BRIDGES  
KINGS RIVER**

Date of Inspection: 25 & 26, October 2006  
Inspector: Keith Seligman

Spring  
Fall 2006

Reach	Name of Road	Damage or Settlement of Footings	Condition of Bridge Approaches	Condition of Headwalls	Condition of Roadway	Maintenance Measures Performed Since Last Inspection	Comments
Cole Slough	State Highway 43	None	Good	Good	Good	None	
	DeWoody Avenue	None	Good	Good	Good	None	
Dutch John Cut	State Highway 43	None	Good	Good	Good	None	
Main Kings River	Santa Fe Railroad	None	Good	Good	Good	None	
	13th Avenue	None	Good	Good	Good	None	
	Excelsior Avenue	None	Good	Good	Good	None	
North Fork	State Highway 41	None	Good	Good	Good	None	
	22nd Avenue	None	Good	Good	Good	None	Need to cut and stake debris next to the bridge
	Excelsior Avenue	None	Good	Good	Good	None	
	Mt. Whitney Avenue	None	Good	Good	Good	None	
	Elkhorn Avenue	None	Good	Good	Good	None	
	Southern Pacific Railroad	None	Fair	Fair	Fair	None	Need to clear debris from under the tracks
	Kamm Avenue	None	Good	Good	Good	Fresno Co. put new railing on the Bridges	Fresno Co. are still working on the railings
	State Highway 145	None	Good	Good	Good	None	Need to cut and stake debris next to the bridge
Clarks Fork	Fremont Avenue	None	Good	Good	Good	None	
	State Highway 41	None	Good	Good	Good	None	
	21st Avenue	None	Good	Good	Good	None	
	22nd Avenue	None	Good	Good	Good	Removed wood and debris	
	Grangeville Boulevard	None	Good	Good	Good	None	
	Lacey Boulevard	None	Good	Good	Good	None	