KINGS RIVER, CALIFORNIA

MAINTENANCE MANUAL

KINGS RIVER CHANNEL IMPROVEMENT PROJECT

(STRUCTURES)

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

MAINTENANCE MANUAL

FOR

KINGS RIVER CHANNEL IMPROVEMENT PROJECT

KINGS RIVER, CALIFORNIA

TABLE OF CONTENTS

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

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

e. Patrol road surfacing at 26-1/4 Avenue, channel excavation site mile 43.0, and bank protection at site mile 55.0 along the Kings River were accomplished under Contract No. DACW05-72-C-0056 by TRICO Contractors during the periods from 3 March 1972 to 22 April 1972. Specification No. 3774, Drawing No. KI 1-4-33.

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.

diversion structures built by the Corps of Engineers (see Exhibit B-5-2); and channel improvement in the vicinity of the structures.

4. Control provided. The project was built as an interim flood protection feature for the Tulare Lake Basin. Flood waters of the Kings River would be diverted either to Mendota Pool via Kings River North or to Tulare Lake via Kings River South. On completion of Pine Flat Dam the operation of the structures was coordinated with the operation of Pine Flat Dam to provide desired irrigation waters to Tulare Lake and to prevent damaging inflow to the Tulare Lake area.

5. Construction history. Construction of the project was accomplished under Contract No. W-04-167-eng-124 by Trewhitt, Shields and Fisher. Work began in September 1943 and was completed in February 1944.

PART B

INSPECTION AND MAINTENANCE - GENERAL PROCEDURE

1. Purpose of this manual. The purpose of this manual is to furnish personnel of the District Office with information on the project works, and instructions as to the details of the maintenance requirements applicable to the structural features only of the project, and to indicate satisfactory methods of flood-fighting operations and emergency repairs. The structures are to be maintained and operated in such a manner and at such times as may be necessary, to obtain maximum benefits.

2. Definitions. As used herein the terms the "Construction-Operations Division" hereinafter referred to as the "Operations Division" and "Engineering Division" shall refer to organizations within the Sacramento District, Corps of Engineers, U. S. Army. The "Project Engineer" shall mean the Chief, San Joaquin Valley Operations Office, who shall be responsible to the Chief of the Operations Division. "Flood Season" is considered to be the period between 1 November and 31 July and "Major High Water Period" is considered to be one in which the flow at the forks exceeds 6100 c.f.s. as measured at the Army Weir. All elevations referred to herein are based on U.S.G.S. datum.

3. Duties of the Engineering Division. The Engineering Division shall establish regulations governing the operations of the diversion structures during flood periods. In addition the Chief of the Division shall maintain complete records of flows

b. Files and records. The Project Engineer shall establish and maintain a file of all reports, records, and drawings concerning the project works. During flood stages a complete log shall be maintained, recording the time and amount of all gate changes, estimated flows, and all operating decisions. The files and records shall be available at all times to the Chief of the Engineering Division.

c. Encroachment of trespass on right-of-way. There shall be no encroachment of trespass which will adversely affect the efficient operation or maintenance of the project works. If it is deemed necessary the Project Engineer shall cause notices to be posted at conspicuous places along the project right-of-way directing public attention to this requirement, arrange for the prosecution of offenders under local ordinances, and report actions taken to the District Engineer, through the Chief of the Division.

d. Permits for right-of-entry or use of portion of right-of-way. Requests for permits for temporary right-of-entry or use of portions of the right-of-way shall be carefully reviewed to determine that such use will not adversely affect the safety and functioning of the project. Regulations governing issuance of permits for use of right-of-way for flood protection projects are contained in Exhibit B-3.

e. Permits for improvements or construction within the project right-of-way. All requests for permits for construction of any improvement of any nature within the limits of the project right-of-way shall be carefully reviewed by the Chief of the

g. Inspection and maintenance.

(1) The Operations Division, through the Project Engineer, shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Periodic inspections shall be made by the Chief of the Division or his authorized representative to insure that the above 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. Immediate steps shall 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 Chief of the Division.

(2) The check list shown in Exhibit B-4 shall be used in each inspection to insure that no features of the protective system are overlooked. Items requiring maintenance should be noted thereon; if items are satisfactory they shall be indicated by a check. Carbon copies of the inspector's original field notes as recorded on the check list shall be included as an inclosure to the annual report as provided in paragraph 4h(1) below of this manual.

(3) All repairs shall be made in accordance with standard engineering practice, to line and grade and in accordance with details shown on construction drawings for the project works, copies of which are included in Exhibits B-5-1 and B-5-2.

works is shown on Exhibit B-1. Detailed descriptions of the various structures are given in the following paragraphs.

6. Description of structures.

a. Army Weir. The diversion structure as shown on Exhibit B-5-1 is a reinforced concrete broad crested weir, 30 feet wide and 156 feet long and is equipped with flash boards for control of flows. The weir crest is a flat concrete slab, 12 inches thick, set at elevation 227.34. Cutoff walls 2' 0" x 6' 0" at the upstream side and 2' 0" x 6' 6" at the downstream side rest on top of Wakefield piling driven about 20 feet into the stream bed. Piling and cutoff walls are provided under the abutment walls and also extend under the wing walls for 29' 9". The abutment walls are 30 feet long, 12 inches thick and are 11' 8" high above the weir crest. Vertical wing walls 40 feet long are set perpendicular to the abutment walls. The top of the wing walls and abutments is at elevation 239.0. A reverse filter and 4-inch tile drains are located at the downstream end of the structure to relieve uplift at the toe of the slab. A reinforced concrete bridge spans the weir and is supported by concrete piers on 12-foot centers. Slots are provided near the upstream end of the piers to accommodate the 4" x 8" flashboards. Grooves are provided in the 4 center piers for the installation of gates. Center supports, consisteing of 10WF21 beams, for the flashboards are anchored to the weir crest and bridge deck. Curbs 4" x 8" and 6" x 6" on the upstream side and downstream side respectively extend for the entire length of the bridge. Drain holes are located on 26-foot centers

8. At each inspection required by paragraph 4g of this report, the following items, if applicable, shall be particularly noted:

a. Damage or settlement of concrete pipe or conduits;

b. Condition of slide gate guides, stems and hoists;

c. Condition of concrete, e.g., cracks, spalls, erosion;

d. Debris or other obstructions to flow;

e. Condition of access bridges to flow control gates;

f. Condition of embankments adjacent to structures;

g. Condition of riprap stone blanket or protective cover adjacent to structures;

h. Condition of paint on fence posts and gates.

9. All eroded concrete shall be repaired as soon as any reinforcing steel is exposed or erosion reaches a depth of 4 inches. The repair shall be made by thoroughly cleaning the surface by chipping or sand blasting, and building up the concrete to its original section. For this purpose, the use of pneumatically-placed Portland cement mortar is considered satisfactory. All evidence of settlement, uplift or failure of concrete structures shall be referred to the District Engineer for analysis and recommendation of remedial action. If the inspection shows the control gates have been jammed by debris or other obstructions, they shall be thoroughly cleaned so that they operate freely to a full opening or full closure. The operating mechanism of the control gate on the three outlet works shall be kept well lubricated. Following is the recommended lubrication for the gates.

c. First-aid equipment and the names of designated physicians shall be made available to maintenance personnel.

d. Sealed containers of paints, varnishes, lacquers, thinners, and other inflammable paint materials, shall be kept in a well-ventilated location free from excessive heat, smoke, sparks, flame, or the direct rays of the sun.

(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.

(12) Trees preserved in the floodway of site mile 43.0 and 55.0 during prosecution of contract listed in paragraph 1-05e above shall not be removed as a part of normal maintenance as long as they remain in a healthy condition.

> "(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:

TITLE 33—NAVIGATION AND NAVIGABLE WATERS

Chapter II—Corps of Engineers, War Department

PART 208—FLOOD CONTROL REGULATIONS

MAINTENANCE AND OPERATION OF FLOOD CONTROL WORKS

Pursuant to the provisions of section 3 of the Act of Congress approved June 22, 1936, as amended and supplemented (49 Stat. 1571; 50 Stat. 877; and 55 Stat. 638; 33 U. S. C. 701c; 701c–1), the following regulations are hereby prescribed to govern the maintenance and operation of flood control works:

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

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

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

(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the 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 War Department or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

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

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

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

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

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

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

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

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

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

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

(v) Drains through the levees and gates on said 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 durin times of emergency.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(2) *Operation.* Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass 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

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

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

(ii) Inlet and outlet channels are open;

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

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

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

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

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

(i) No parts are missing;

(ii) Metal parts are adequately covered with paint;

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

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

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

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

(2) *Operation.* Erection of each movable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them.

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

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

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

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

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

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

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

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

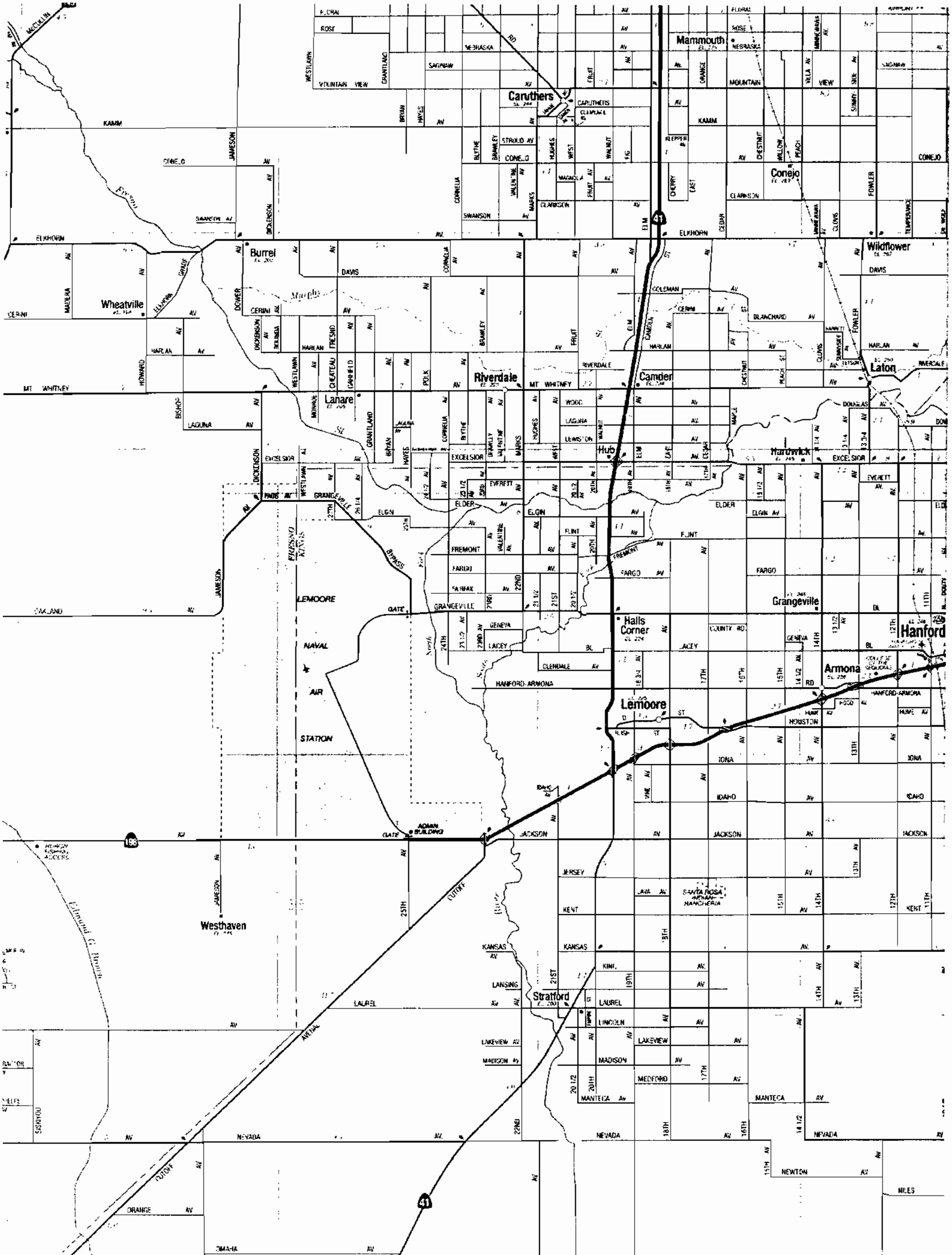
(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works.

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

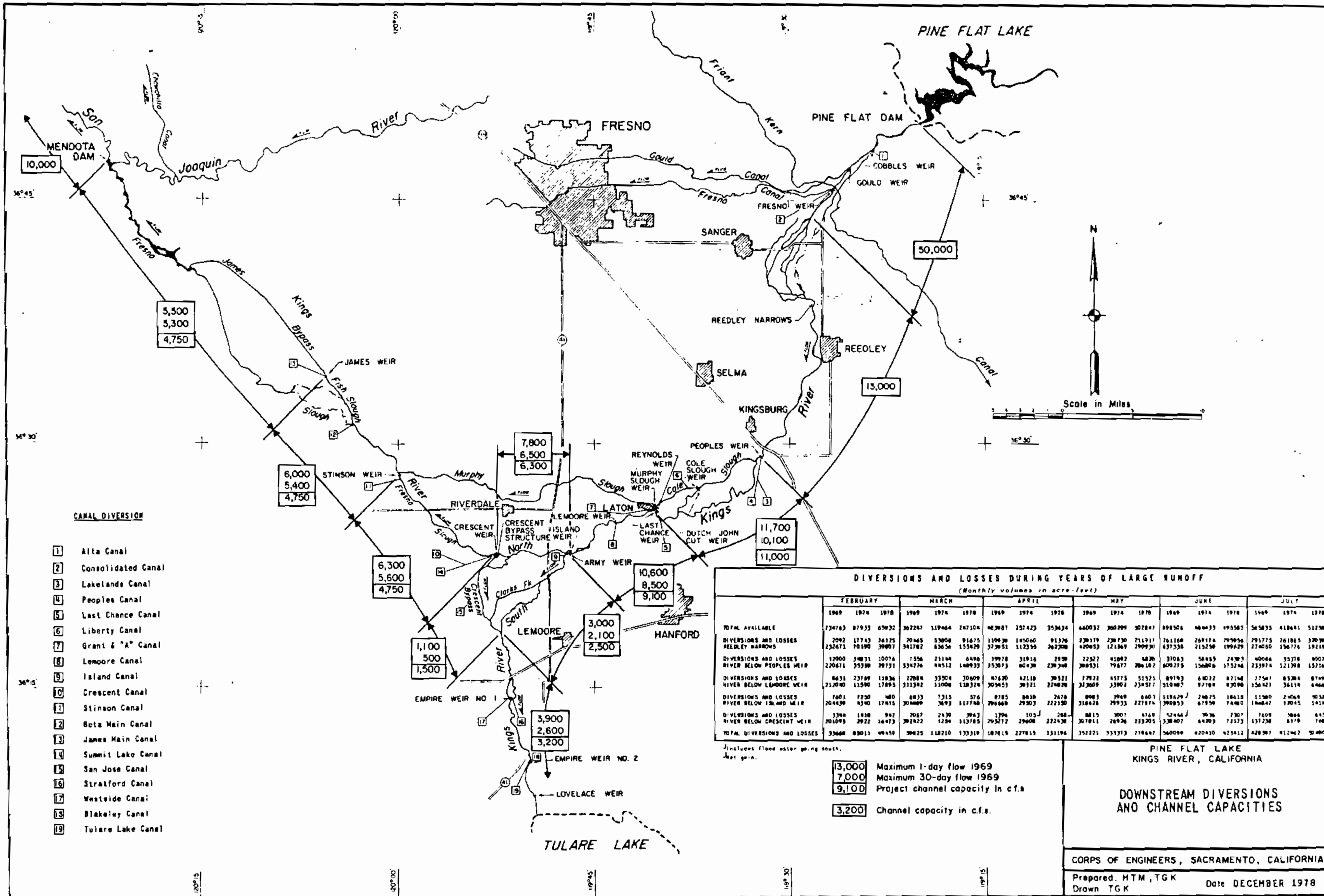
(2) *Operation.* Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become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

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

(2) *Operation.* Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor. (Sec. 3, 49 Stat. 1571, as amended; 33 U.S.C. 701C) [9 F.R. 9999, Aug. 17, 1944; 9 F.R. 10203, Aug. 22, 1944]



Mammouth
Caruthers
Conejo
Burrel
Wildflower
Wheatville
Riverdale
Camden
Laton
Lanare
Hub
Hardwick
Grangeville
Halls Corner
Hanford
Armona
Lemoore
LEMOORE
NAVAL
AIR
STATION
Westhaven
Stratford
ELKHORN
MT WHITNEY
JACKSON
NEVADA


PINE FLAT LAKE
PINE FLAT DAM
FRESNO
Friant
Kern
Gould Canal
Fresno Canal
COBBLES WEIR
GOULD WEIR
FRESNO WEIR
SANGER
REEDLEY NARROWS
REEDLEY
SELMA
KINGSBURG
Kings River
PEOPLES WEIR
MENDOTA DAM
San Joaquin River
Chowchilla Canal
Fresno Slough
James Bypass
Kings Bypass
JAMES WEIR
Fish Slough
STINSON WEIR
Murphy Slough
RIVERDALE
CRESCENT WEIR
CRESCENT BYPASS STRUCTURE
LEMOORE WEIR
ISLAND WEIR
LATON
REYNOLDS WEIR
MURPHY SLOUGH WEIR
COLE SLOUGH WEIR
Cole Slough
LAST CHANCE WEIR
DUTCH JOHN CUT WEIR
ARMY WEIR
North Fork
Clarks Fk
Crescent Bypass
South Fork
LEMOORE
HANFORD
EMPIRE WEIR NO 1
EMPIRE WEIR NO. 2
LOVELACE WEIR
TULARE LAKE
10,000
5,500
5,300
4,750
6,000
5,400
4,750
6,300
5,600
4,750
1,100
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1,500
7,800
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2,500
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2,600
3,200
10,600
8,500
9,100
11,700
10,100
11,000
13,000
50,000
N
Scale in Miles
CANAL DIVERSION
1 Alta Canal
2 Consolidated Canal
3 Lakelands Canal
4 Peoples Canal
5 Last Chance Canal
6 Liberty Canal
7 Grant & "A" Canal
8 Lemoore Canal
9 Island Canal
10 Crescent Canal
11 Stinson Canal
12 Beta Main Canal
13 James Main Canal
14 Summit Lake Canal
15 San Jose Canal
16 Stratford Canal
17 Westside Canal
18 Blakeley Canal
19 Tulare Lake Canal

DIVERSIONS AND LOSSES DURING YEARS OF LARGE RUNOFF

(Monthly volumes in acre-feet)

	FEBRUARY 1969	FEBRUARY 1974	FEBRUARY 1978	MARCH 1969	MARCH 1974	MARCH 1978	APRIL 1969	APRIL 1974	APRIL 1978	MAY 1969	MAY 1974	MAY 1978	JUNE 1969	JUNE 1974	JUNE 1978	JULY 1969	JULY 1974	JULY 1978
TOTAL AVAILABLE	234763	87933	69932	362247	119464	247104	483087	257423	353634	660032	360299	502847	898506	484433	495585	565835	418651	512988
DIVERSIONS AND LOSSES	2092	17743	24125	20465	53808	91675	110630	145060	91376	230179	230730	211917	261160	269174	295956	291775	261065	370907
REEDLEY NARROWS	232671	70190	39807	341782	65656	155429	372851	112395	262300	429853	121569	290930	637338	215258	199629	274060	156776	192191
DIVERSIONS AND LOSSES	17000	34031	10076	7556	21144	6496	39978	31916	2950	22527	41092	4820	37063	58455	24383	40086	35378	40077
RIVER BELOW PEOPLES WEIR	220671	35359	29731	334226	44512	148933	353073	80430	239340	300531	79677	286102	600275	156806	175246	233974	121398	152164
DIVERSIONS AND LOSSES	8631	23789	13836	22884	33504	30609	47620	42110	30521	17922	45773	51575	89193	61022	87148	77567	85284	87496
RIVER BELOW LEMOORE WEIR	212040	11590	17895	311342	11008	118324	305453	38321	274820	313609	33904	234527	510482	97784	83098	156421	36114	64664
DIVERSIONS AND LOSSES	7601	7250	480	6833	7315	576	8785	8838	2670	8983	3969	6601	119679 1/	24875	18618	11500	21069	50527
RIVER BELOW ISLAND WEIR	204439	4340	17415	304809	3693	117748	296660	29303	222150	316626	29933	227974	390853	67959	74480	144847	17045	14144
DIVERSIONS AND LOSSES	3344	1410	942	2067	2439	3963	1794	105 2/	288-	8815	3007	4769	52446 1/	9936	2307	7609	5866	6458
RIVER BELOW CRESCENT WEIR	201095	2922	16473	302422	1254	113785	293217	29608	222430	307811	26926	223205	338407	64703	72173	137238	6179	7686
TOTAL DIVERSIONS AND LOSSES	33664	85013	49459	59825	118210	133319	107619	277815	131196	352221	333313	279647	560090	420430	423412	420307	412462	504892

1/ Includes flood water going south.
2/ Net gain.

13,000	Maximum 1-day flow 1969
7,000	Maximum 30-day flow 1969
9,100	Project channel capacity in c.f.s
3,200	Channel capacity in c.f.s.

PINE FLAT LAKE
KINGS RIVER, CALIFORNIA

DOWNSTREAM DIVERSIONS AND CHANNEL CAPACITIES

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared. HTM, TGK
Drawn TGK

Date DECEMBER 1978

CHART A

EXHIBIT B-3

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 in-

KINGS RIVER CHANNEL IMPROVEMENT

STRUCTURES

CHECK LIST NO. 1

Inspector's Report Sheet No._____Date_____

Item	Remarks
(a) Name of structure and location	
(b) Debris or obstructions to flow	
(c) Damage or settlement of culverts or structures	
(d) Condition of concrete	
(e) Condition of riprapped intake & outlet sections	
(f) Condition of control gates and accessories	
(g) Condition of access bridges	
(h) Corrective action taken since last inspection	
(i) Comments	

_____
Inspector

EXHIBIT B-4
Sheet 1 of 2

EXHIBIT B

"AS CONSTRUCTED" DRAWINGS

File No.	Title
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
KI 1-4-33	Channel Improvement Sites 1, 2, and 3
KI 1-4-40	Channel Improvement, Lemoore Weir to 8th Avenue, in 24 sheets.

EXHIBIT B
Unattached

INDEX OF DRAWINGS

Exhibit B-6

C O P Y

KINGS RIVER CONSERVATION DISTRICT

C O P Y

June 2, 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 your letter, dated May 2, 1972, File No. SPKCO-0, advising of the completion of work on April 24, 1972 in accordance with Contract No. DACW05-72-C-0056, and transferring the work to the Kings River Conservation District for operation and maintenance.

A tour of inspection of the work under the above referenced contract was made by the Board of Directors of the District on April 17, 1972. A final tour of inspection of the completed work by representatives of the Corps of Engineers and representatives of this District, was made on April 26, 1972, and a report of these inspections was made to the Board of Directors.

At the regular meeting of the Board of Directors held on May 12, 1972, upon motion duly made, seconded and carried unanimously, the authorized construction work completed on April 24, 1972, in accordance with Contract No. DACW05-72-C-0056, Specification No. 3774, 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

EXHIBIT F

C O P Y

KINGS RIVER CONSERVATION DISTRICT
FRESNO, CALIFORNIA

C O P Y

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-O, 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 consistant (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 F
Sheet 2 of 2

C O P Y

KINGS RIVER CONSERVATION DISTRICT

April 14, 1976

C O P Y

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-O), 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

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

24

REPLY TO
ATTENTION OF

SPKED-F

3 February 1975

SUBJECT: Kings River Channel Improvement Project, Kings River and Tulare Lake, California - Letter Supplement No. 1 to Design Memorandum No. 3

Division Engineer, South Pacific

1. Purpose. - The approved General Design Memorandum No. 3 provided for channel improvements downstream from Lemoore Weir. The purpose of this letter supplement is to extend the improvements outlined in General Design Memorandum No. 3 from Lemoore Weir upstream to 8th Avenue and to remedy project deficiencies in this reach which became evident as a result of the record snowmelt runoff of June 1969.

2. References. -

a. Design Memorandum No. 3, "Kings River and Tulare Lake Project, General Design - Kings River Channel Improvements" dated 20 April 1959.

b. "Reservoir Regulation Manual for Pine Flat Project", dated 1 November 1953, revised February 1962.

3. General. - Construction of the Kings River Channel Improvement Project was authorized in the Flood Control Act of 1944 (Public Law 534, Seventy-eighth Congress, second session). The authorization provided for the construction of Pine Flat Dam and Lake and supplemental channel improvement work to regulate flows in the branches of Kings River in the vicinity of Laton. General Design Memorandum No. 3 for the channel improvements was approved by SPD 1st indorsement dated 20 May 1959 to SPK basic letter dated 20 April 1959. This letter constitutes Supplement No. 1 to Design Memorandum No. 3. Attached as Plate I is a map showing the limits of the work described in this supplement. This additional work was determined to be necessary to rectify project deficiencies which became evident during the 1969 flood. The work was requested by the Kings River Conservation District, the sponsoring agency which furnished the requirements of local cooperation and has agreed to accept the maintenance responsibility for the existing channels of the project upon completion of the described work.

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

File: 700.16
500.02

February 13, 1974

Department of the Army
Sacramento District, Corps of Engineers
650 Capitol Mall
Sacramento, California 95814

Attention: Mr. William Doyle
Chief, Planning Branch

Gentlemen:

The Department of Water Resources has recently completed an inspection of the Kings River Channel Improvement project to determine the condition of the project and to observe the operation and maintenance activities of the District. As a result of this inspection several questions came up regarding the project levees on the South Fork from the north line of Sections 11 and 12, T. 19S, R. 19E., to Empire Weir No. 1. Basically, these questions are as follows:

1) Throughout most of this reach of the river the easements acquired by this District are confined to the river channel and do not include all of the levees that exist today. Is the District responsible for maintenance of levees in this section that are outside of the easement acquired?

2) There are several meandering levees along the right bank. If the District is responsible for levee maintenance, which of these levees is to be considered as the project levee?

On July 17 and 18, 1973 a joint inspection of this problem area was made by Messrs. MacClanahan, Neudeck and Wolber of the Department of Water Resources, Mr. John Rampala of your office and Mr. David Howe of the Kings River Conservation District. Mr. Rampala has located the problem area and some of the suggested project levee alignments on aerial photographs for your reference.

During this joint inspection it was noted that some of the right bank levees show signs of sand bagging and erosion that occurred during the 1969 flood, indicating that these levees are not of sufficient heighth to confine standard design flood.

It will be appreciated if you will review this matter and advise us of the operation and maintenance responsibility of the District in this reach of the Kings River.

Sincerely yours,

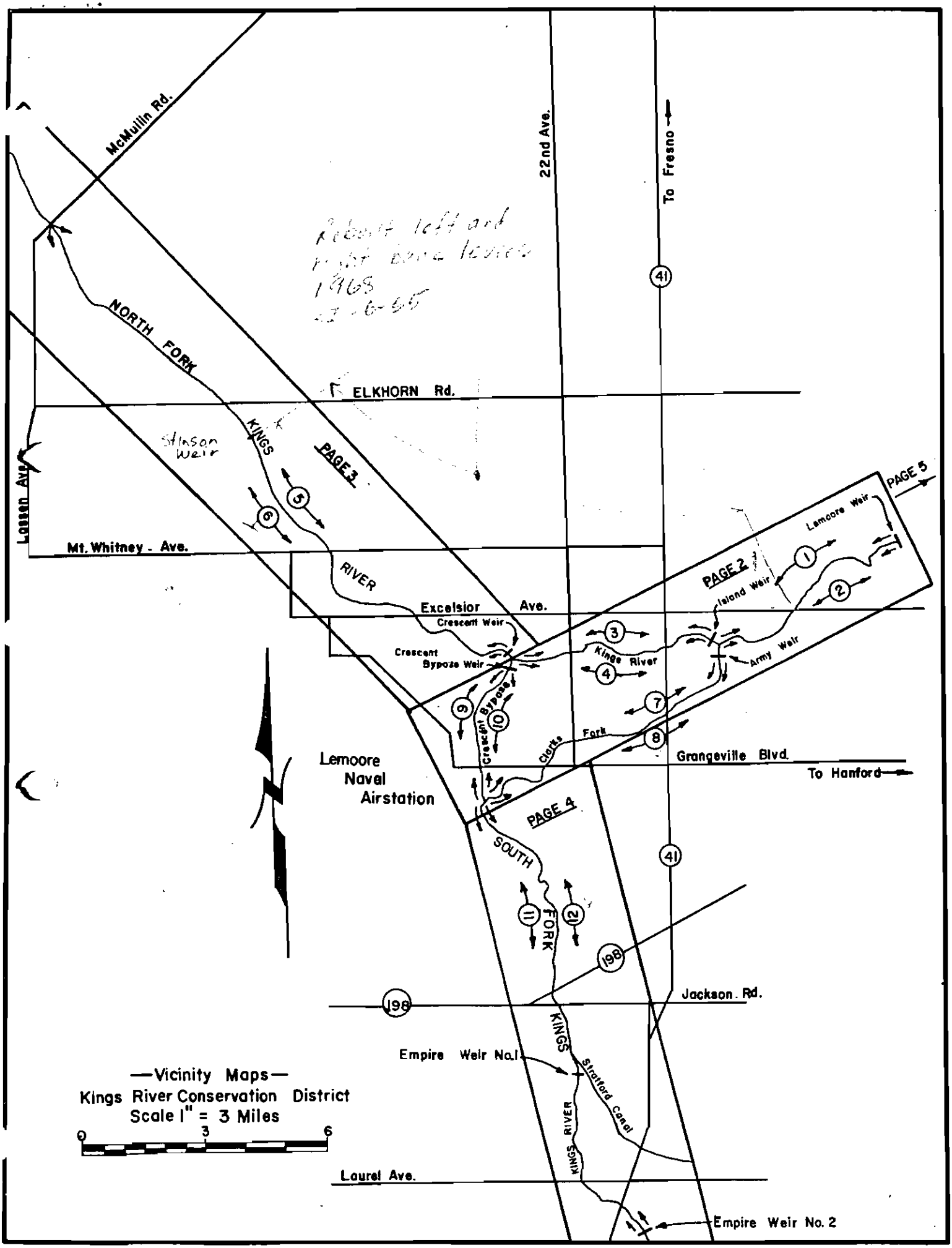
KINGS RIVER CONSERVATION DISTRICT

Jeff L. Taylor
General Manager-Chief Engineer

JLT:mvs

Interim reply furnished 14 Feb 74

Final reply to be made within 40 days


McMullin Rd.
22nd Ave.
To Fresno
41
Robert left and right dam levees 1965 12-6-65
NORTH FORK
ELKHORN Rd.
Stinson Weir
KINGS
PAGE 3
Lassen Ave
5
6
Mt. Whitney Ave.
RIVER
Excelsior Ave.
PAGE 5
Lemoore Weir
PAGE 2
Island Weir
1
2
Crescent Weir
Crescent Bypass Weir
3
Kings River
4
Army Weir
9
10
Crescent Bypass
7
Clarks Fork
8
Grangeville Blvd.
To Hanford
Lemoore Naval Airstation
PAGE 4
SOUTH
FORK
11
12
198
Jackson Rd.
Empire Weir No.1
Stratford Canal
KINGS RIVER
Laurel Ave.
Empire Weir No. 2
—Vicinity Maps—
Kings River Conservation District
Scale 1" = 3 Miles
0
3
6

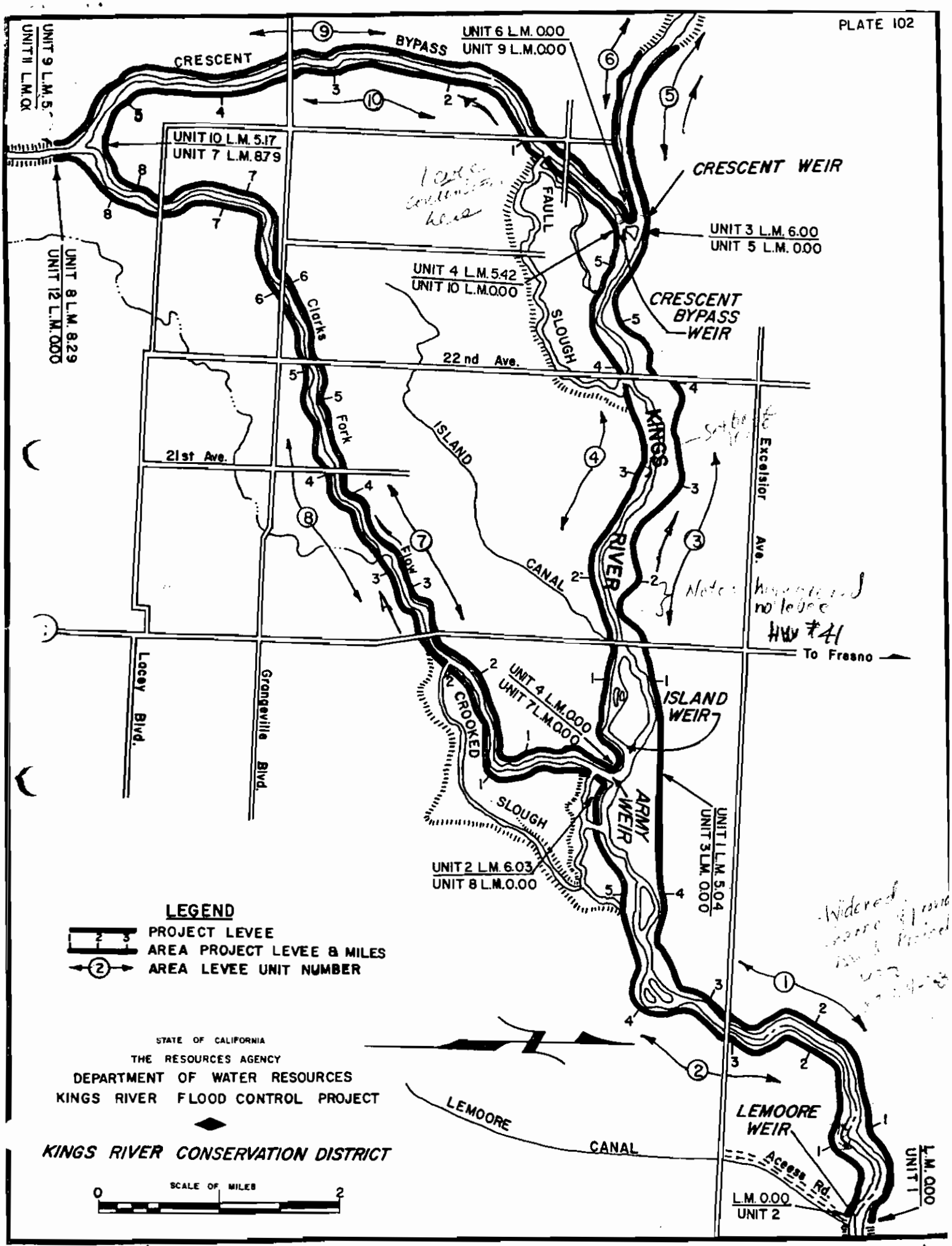


PLATE 102
CRESCENT
BYPASS
UNIT 6 L.M. 0.00
UNIT 9 L.M. 0.00
UNIT 9 L.M. 5.
UNIT 11 L.M. 0.
UNIT 10 L.M. 5.17
UNIT 7 L.M. 8.79
CRESCENT WEIR
FAULT
UNIT 3 L.M. 6.00
UNIT 5 L.M. 0.00
UNIT 4 L.M. 5.42
UNIT 10 L.M. 0.00
CRESCENT BYPASS WEIR
UNIT 8 L.M. 8.29
UNIT 12 L.M. 0.00
Clarks
SLOUGH
22 nd Ave.
KINGS
RIVER
Excelsior Ave.
5 Fork
ISLAND
21st Ave.
Flow
CANAL
HWY #41
To Fresno
Lacey Blvd.
Grangeville Blvd.
UNIT 4 L.M. 0.00
UNIT 7 L.M. 0.00
N CROOKED
ISLAND WEIR
SLOUGH
ARMY WEIR
UNIT 1 L.M. 5.04
UNIT 3 L.M. 0.00
UNIT 2 L.M. 6.03
UNIT 8 L.M. 0.00
LEGEND
PROJECT LEVEE
AREA PROJECT LEVEE & MILES
AREA LEVEE UNIT NUMBER
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
KINGS RIVER FLOOD CONTROL PROJECT
KINGS RIVER CONSERVATION DISTRICT
SCALE OF MILES
0
2
LEMOORE
CANAL
LEMOORE WEIR
Access Rd.
L.M. 0.00
UNIT 2
L.M. 0.00
UNIT 1

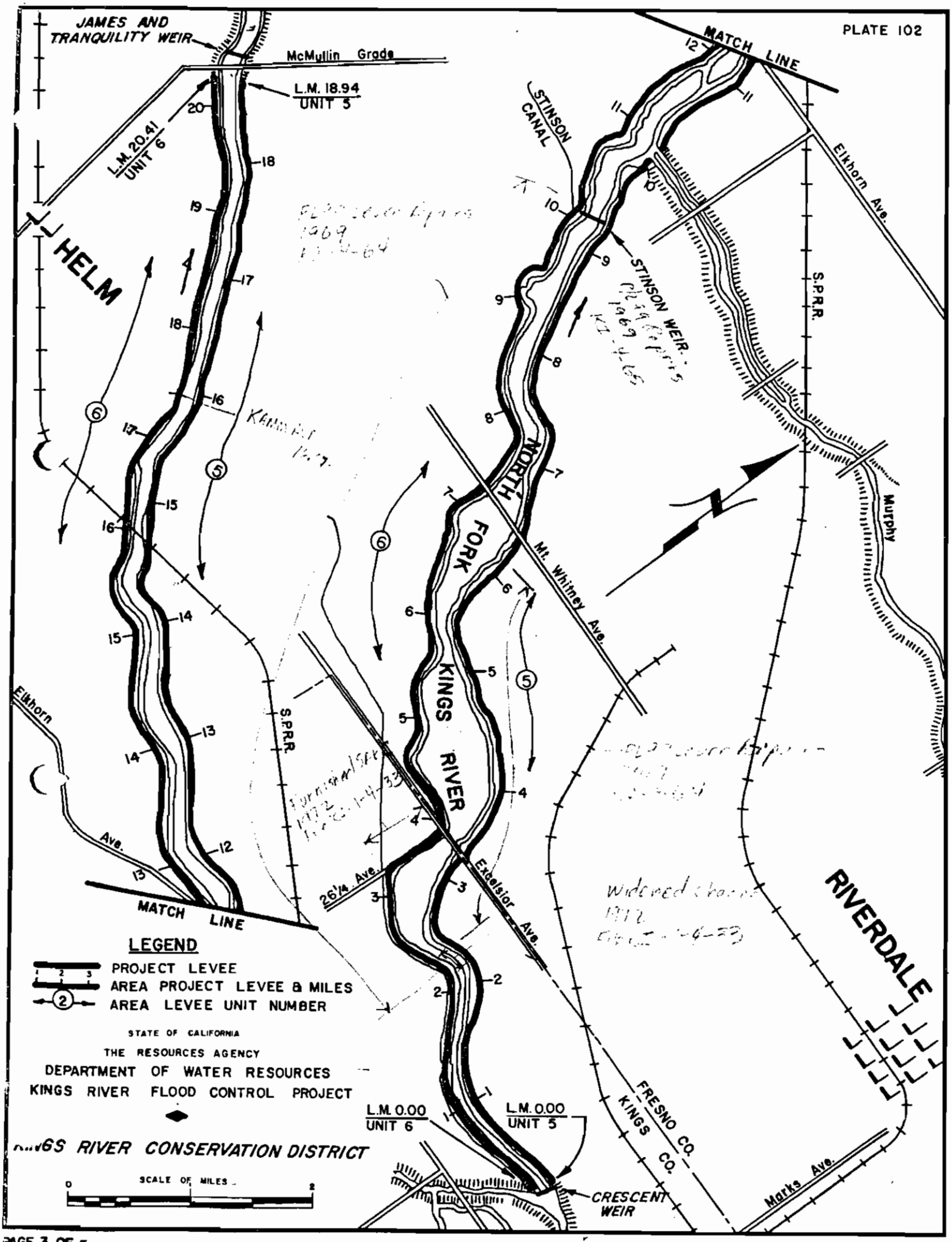


PLATE 102
JAMES AND TRANQUILITY WEIR
McMullin Grade
L.M. 18.94 UNIT 5
L.M. 20.41 UNIT 6
MATCH LINE
STINSON CANAL
STINSON WEIR
Elkhorn Ave.
S.P.R.R.
HELM
NORTH FORK KINGS RIVER
Mt. Whitney Ave.
Murphy
Elkhorn Ave.
S.P.R.R.
26¼ Ave.
Excelsior Ave.
MATCH LINE
RIVERDALE
FRESNO CO.
KINGS CO.
Marks Ave.
CRESCENT WEIR
L.M. 0.00 UNIT 6
L.M. 0.00 UNIT 5
LEGEND
PROJECT LEVEE
AREA PROJECT LEVEE & MILES
AREA LEVEE UNIT NUMBER
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
KINGS RIVER FLOOD CONTROL PROJECT
KINGS RIVER CONSERVATION DISTRICT
SCALE OF MILES
0
2

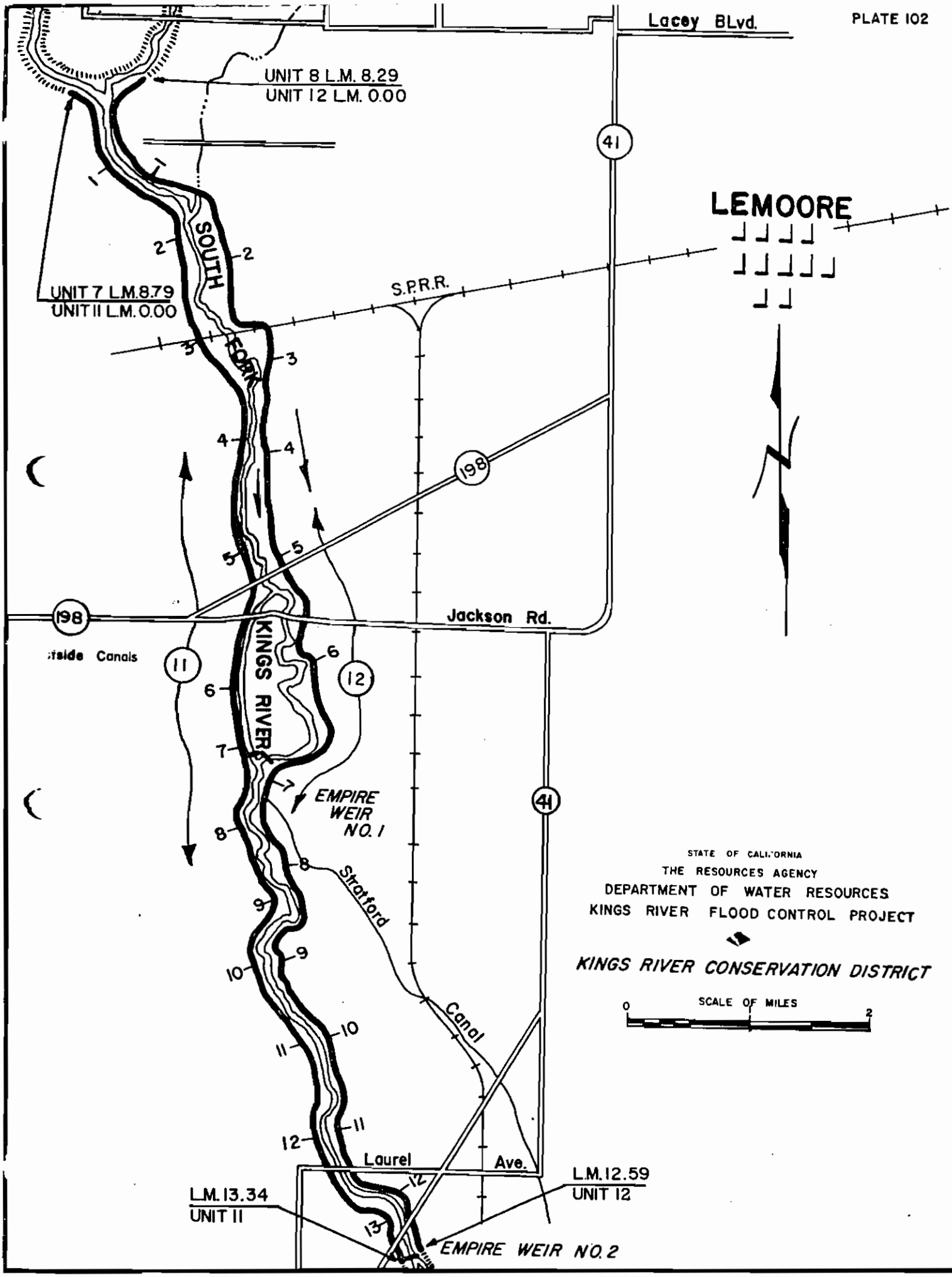
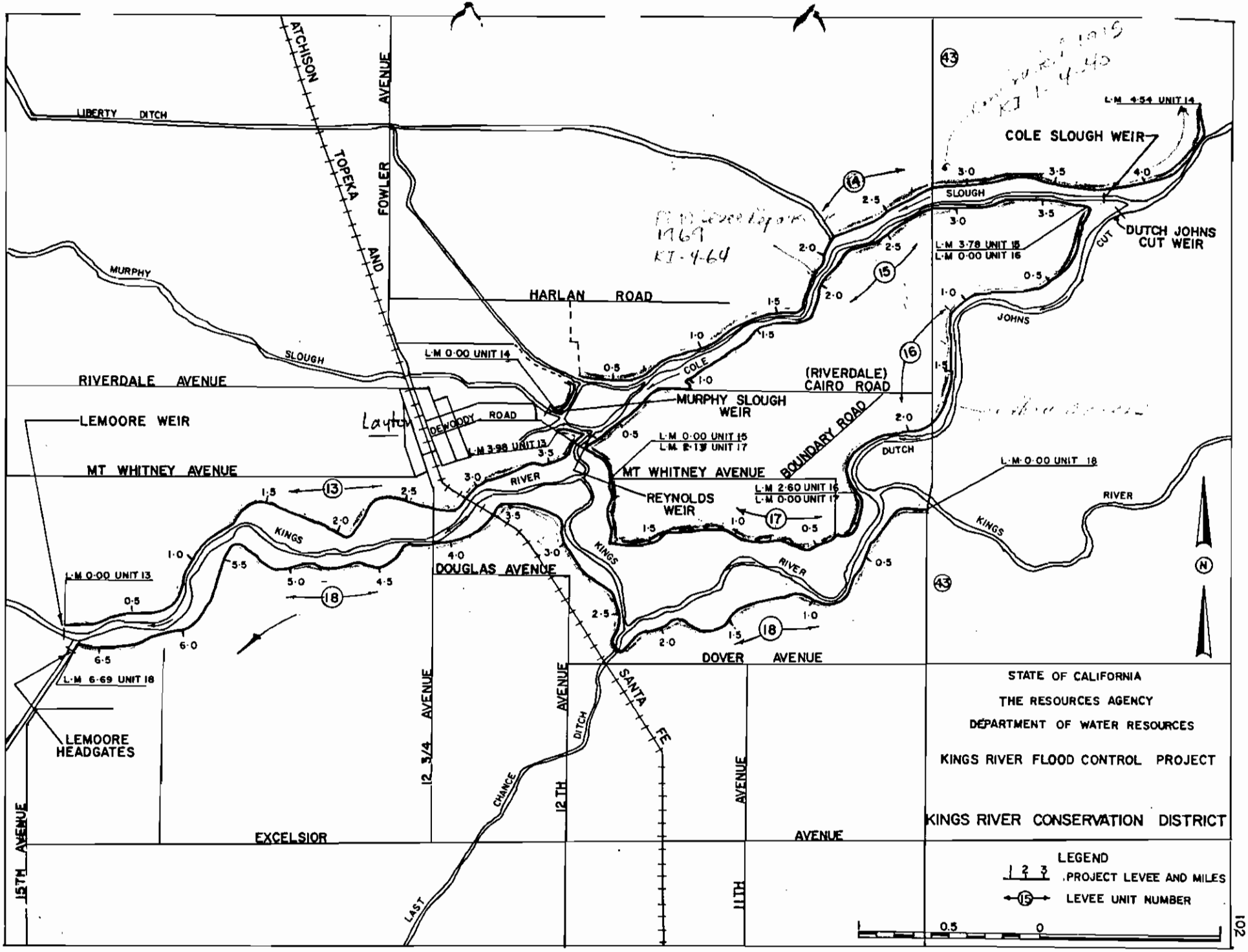


PLATE 102
Lacey BLvd.
UNIT 8 L.M. 8.29
UNIT 12 L.M. 0.00
41
LEMOORE
SOUTH FORK
UNIT 7 L.M.8.79
UNIT 11 L.M. 0.00
S.P.R.R.
198
Jackson Rd.
KINGS RIVER
11
12
EMPIRE WEIR NO. 1
Stratford
Canal
Laurel Ave.
L.M.12.59
UNIT 12
L.M.13.34
UNIT 11
EMPIRE WEIR NO. 2
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
KINGS RIVER FLOOD CONTROL PROJECT
KINGS RIVER CONSERVATION DISTRICT
SCALE OF MILES
0
2



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

KINGS RIVER FLOOD CONTROL PROJECT

KINGS RIVER CONSERVATION DISTRICT

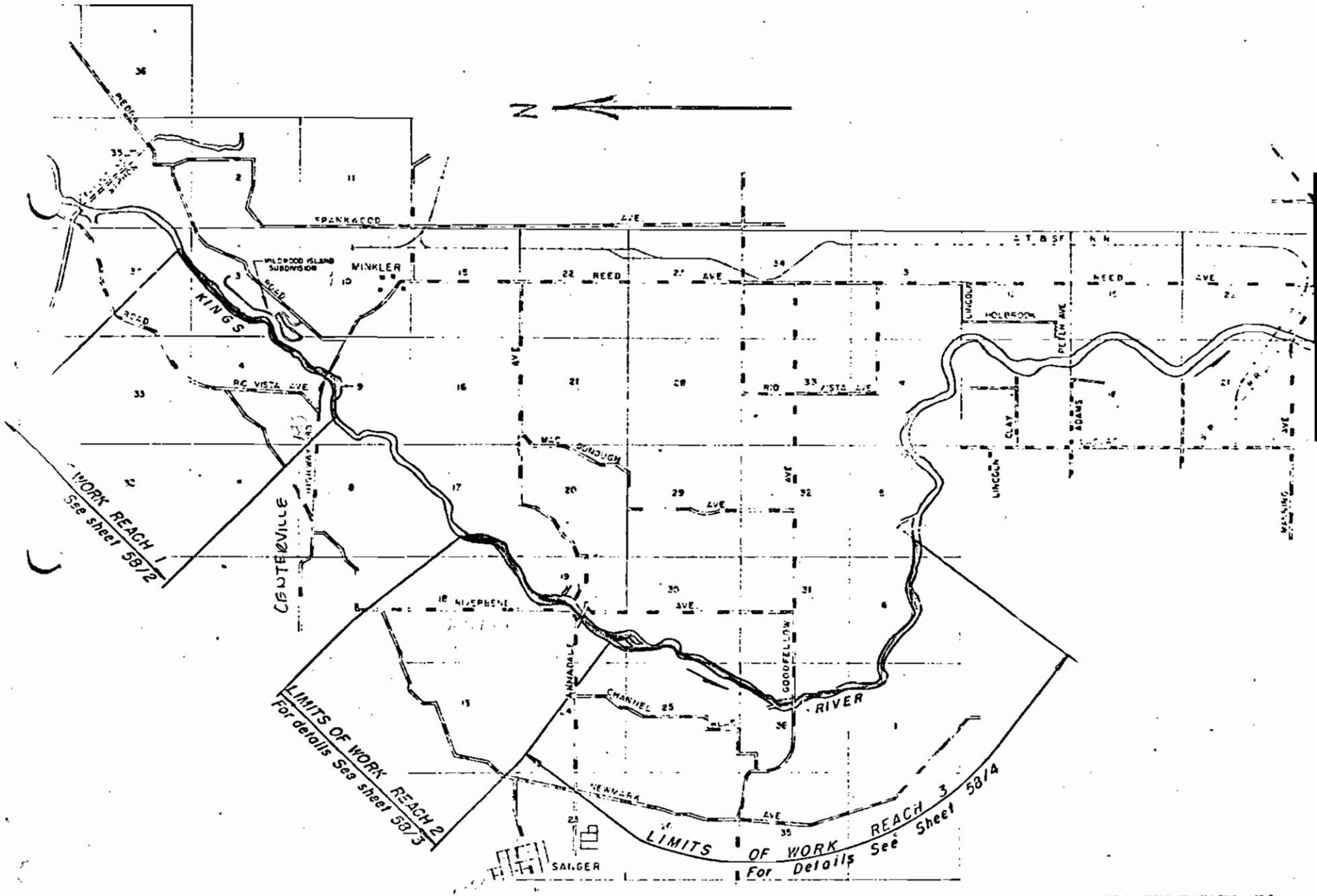
LEGEND

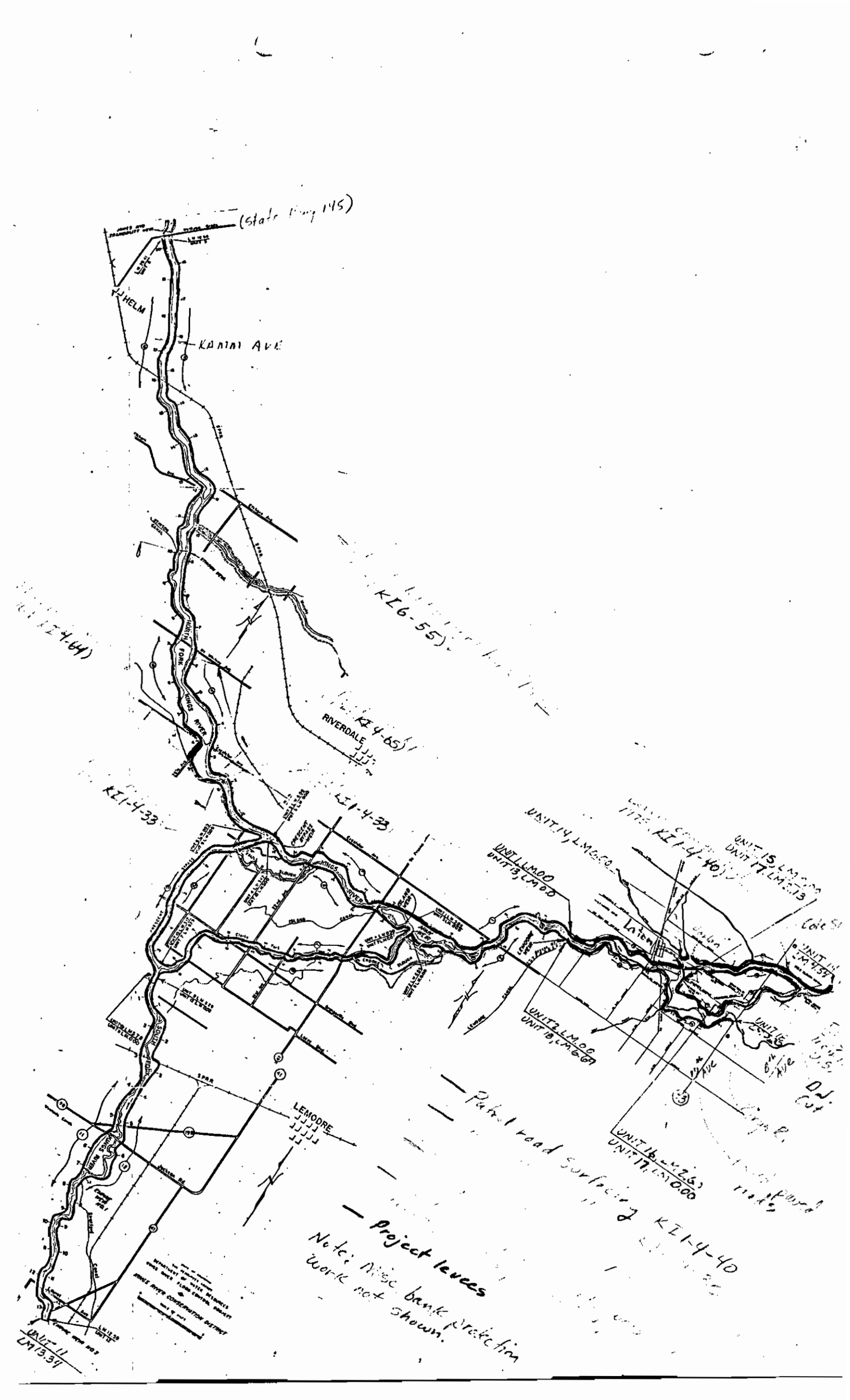
1 2 3 PROJECT LEVEE AND MILES

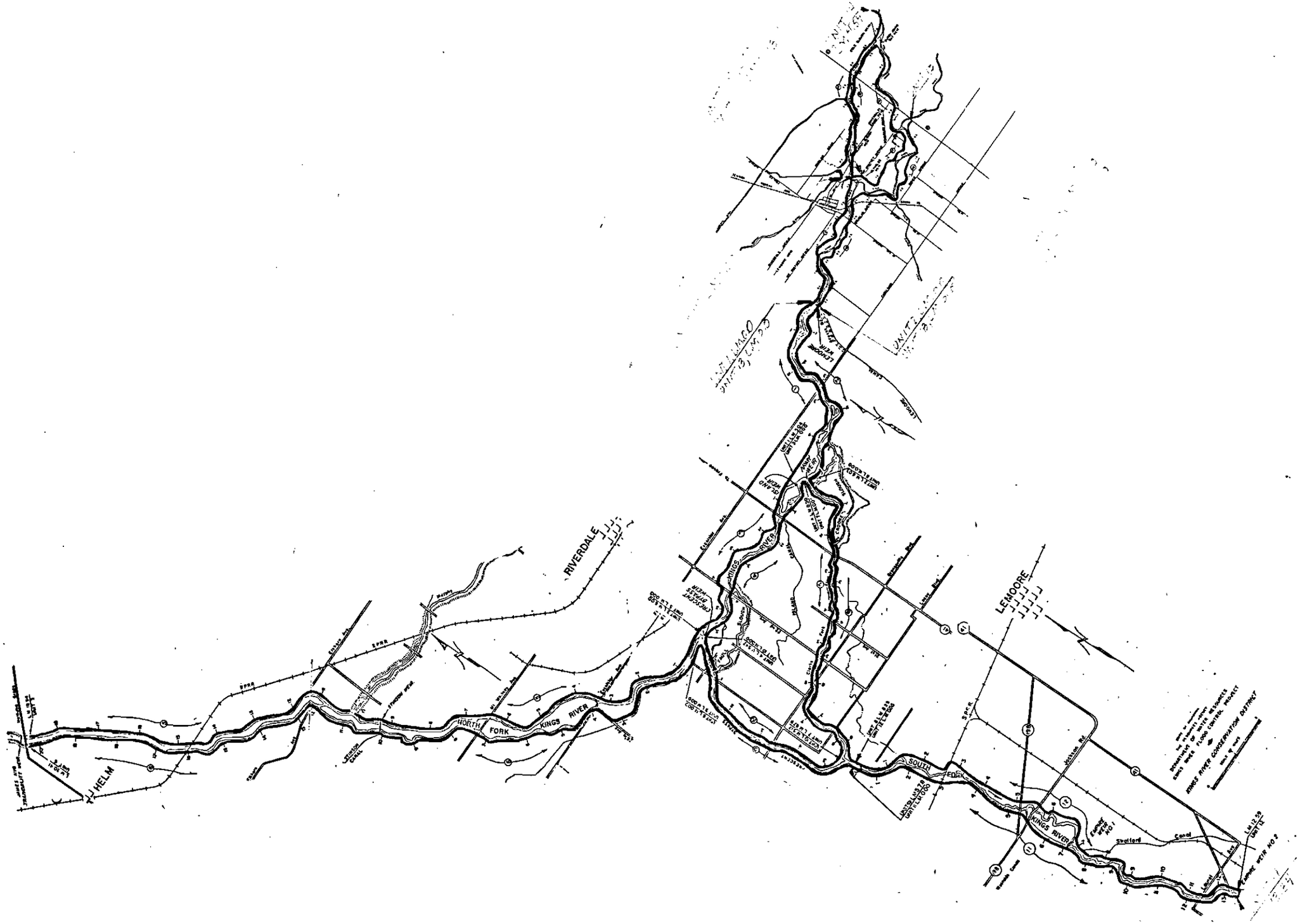
15 LEVEE UNIT NUMBER

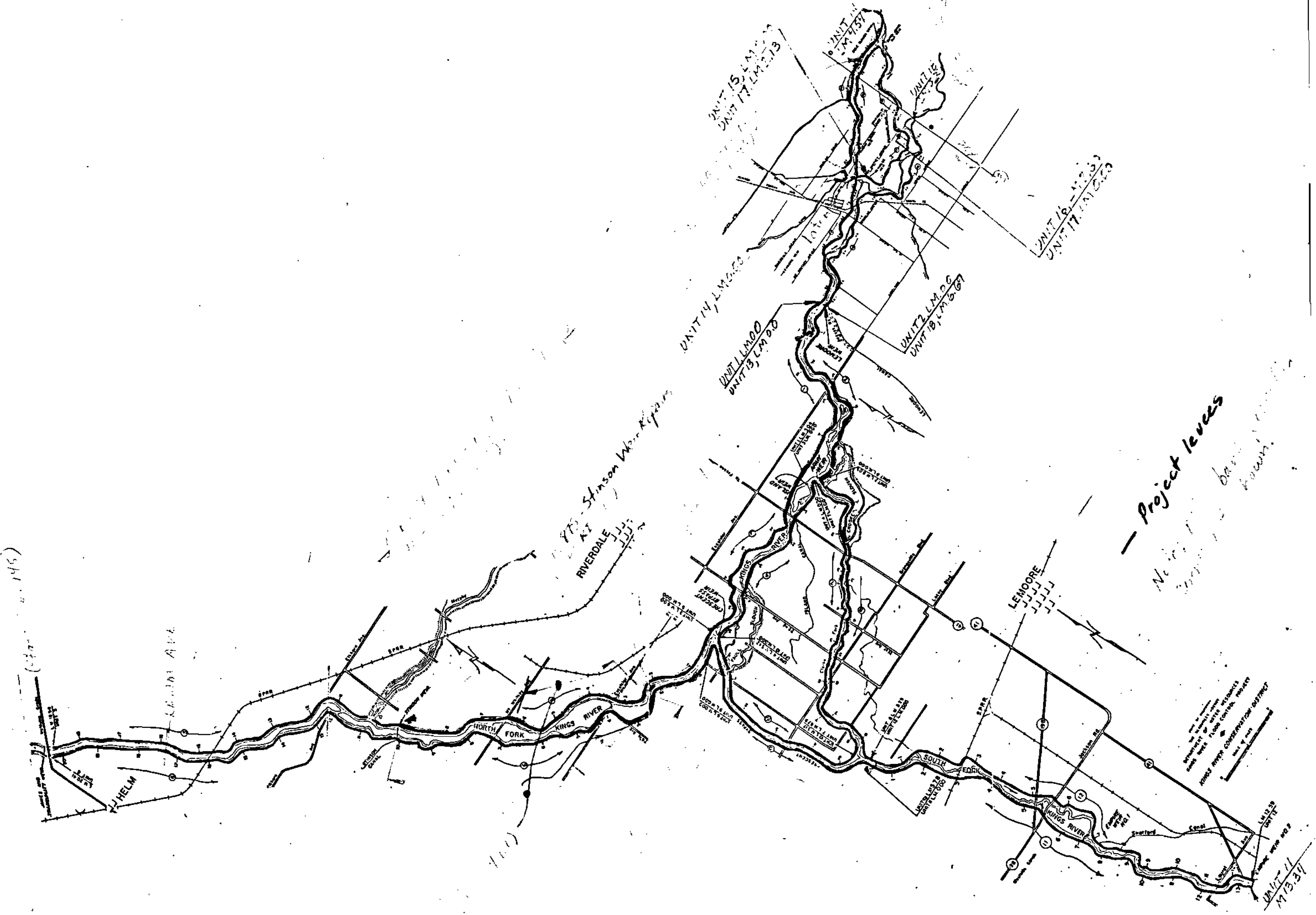
102

3-77

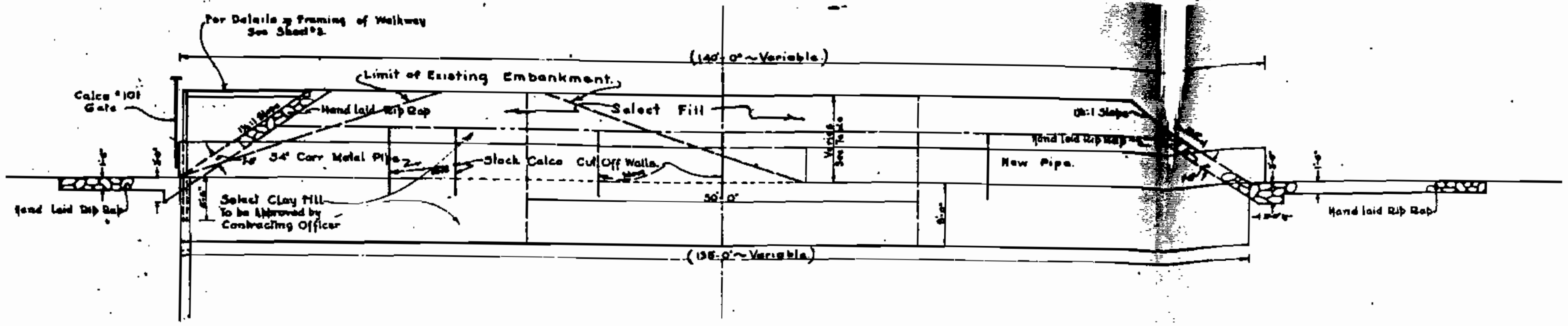

N
SPRAGUE AVE
WINKLER
WILDWOOD ISLAND SUBDIVISION
REED AVE
KINGS ROAD
RIO VISTA AVE
MAC DONOUGH
CENTREVILLE
HIGHWAY 43
18 MILE BEND
ANNADALE
GOODFELLOW
CHANNEL 25
RIVER
HENVEY
SALGER
HOLBROOK
PERTH AVE
LINCOLN
CLAY
ADAMS
MANNING
WORK REACH 1
See sheet 58/2
LIMITS OF WORK REACH 2
For details See sheet 58/3
LIMITS OF WORK REACH 3
For Details See Sheet 58/4


(State Hwy 145)
HELM
KAMAI AVE
KL6-55)
KL4-65)
RIVERDALE
KL1-4-33
KL1-4-33
KINGS RIVER
NORTH FORK KINGS RIVER
SPAR
LEMOORE
UNIT 14, LM0.00
UNIT 1, LM0.00
UNIT 3, LM0.00
UNIT 15, LM0.00
UNIT 17, LM3.13
UNIT 2, LM0.00
UNIT 18, LM6.68
UNIT 16, LM2.63
UNIT 17, LM10.00
UNIT 11, LM13.34
Project levees
Note: Misc bank protection work not shown.

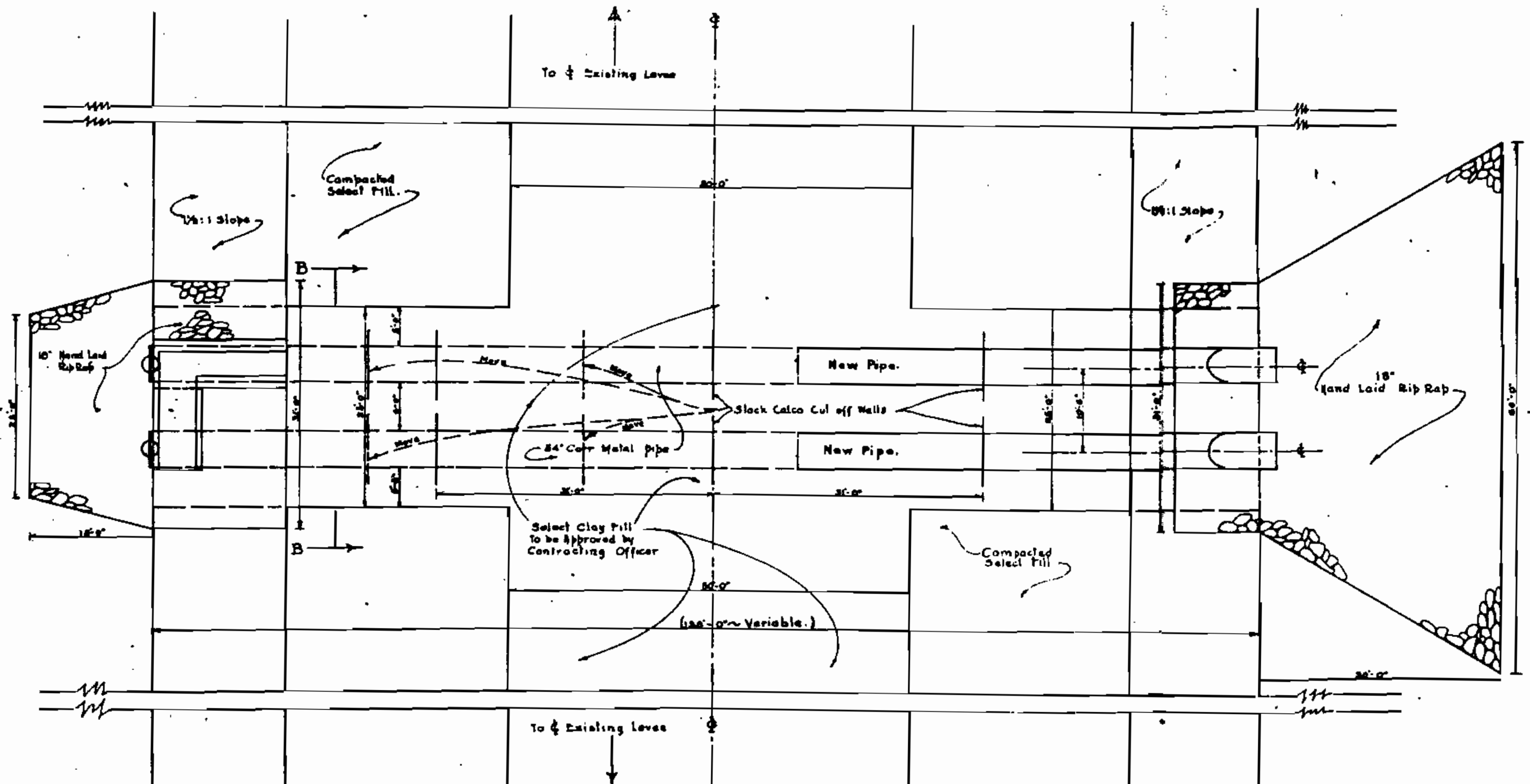

RIVERDALE
LEMOORE
HELM
NORTH FORK KINGS RIVER
SOUTH FORK KINGS RIVER
KINGS RIVER
Stratford Canal
KINGS RIVER FLOOD CONTROL PROJECT



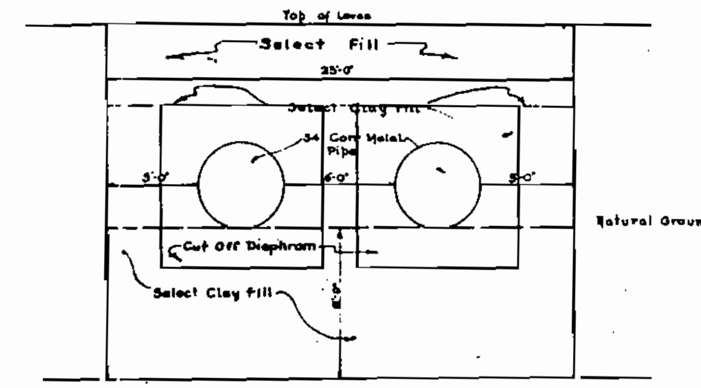
RIVERDALE
LEMOORE
HELM
NORTH FORK KINGS RIVER
SOUTH FORK
KINGS RIVER
UNIT 1, LM 0.0
UNIT 13, LM 0.0
UNIT 2, LM 0.0
UNIT 18, LM 6.67
UNIT 14, LM 0.00
UNIT 15, LM
UNIT 17, LM
UNIT 11
— Project levees



SECTION A-A
Scale 1/8"-1'0"



• PLAN •
Scale 1/8"-1'



Cross Section Select Clay Fill. B-B.
Scale 1/8" = 1'-0"

~ TABLE.~

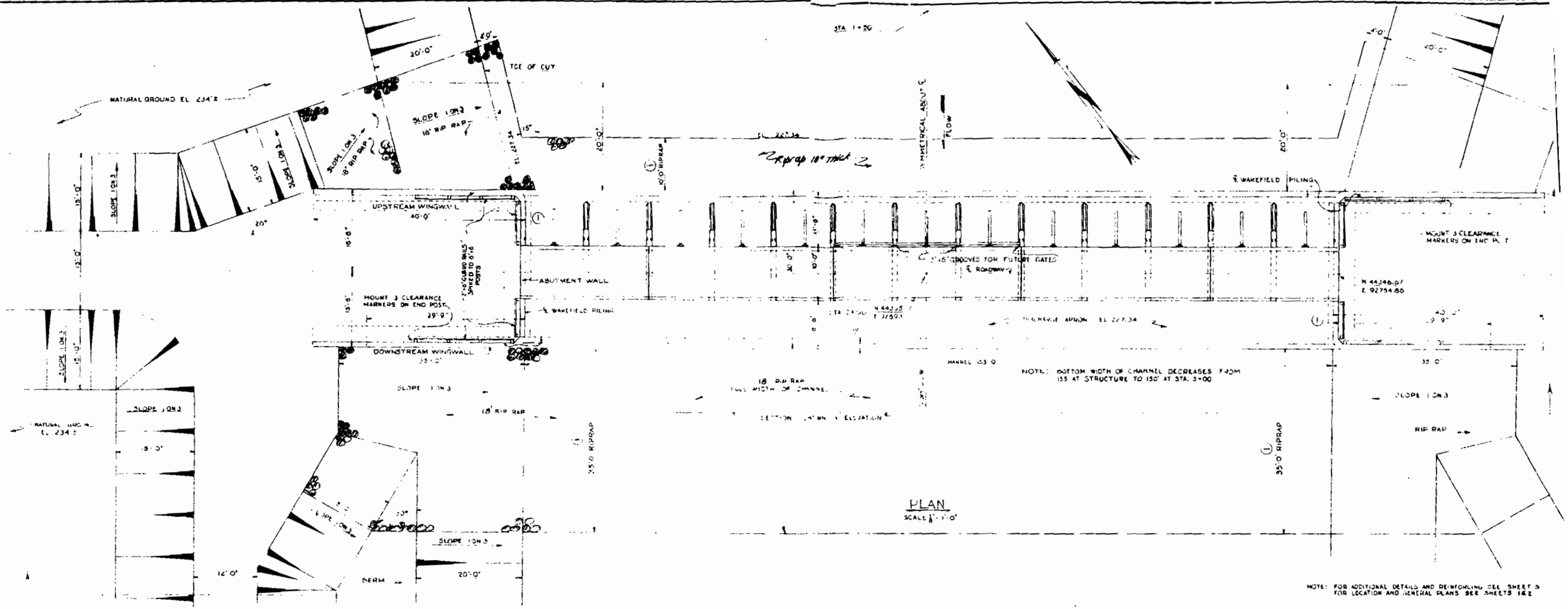
LOCATION OF STRUCTURE	FAULL SLOUGH	SAND SLOUGH	CROOKED SLOUGH
BEARING ON ℄ OF LEVEE	N 88° 27' W	N 76° 40' W	DETERMINE IN FIELD
ELEVATION TOP OF LEVEE	226.50	222.50	241.00
INLET INVERT ELEV. OF PIPE	218.28	214.25	230.00
OUTLET INVERT ELEV. OF PIPE.	218.00	214.00	229.75
NUMBER OF PIPES	1.	2.	2.
COORDINATES AT ℄ OF STRUCTURE	N 44034 E 75039	N 42475 E 70117	N 44192 E 57580
LENGTH OF PIPE	120'	120'	140'

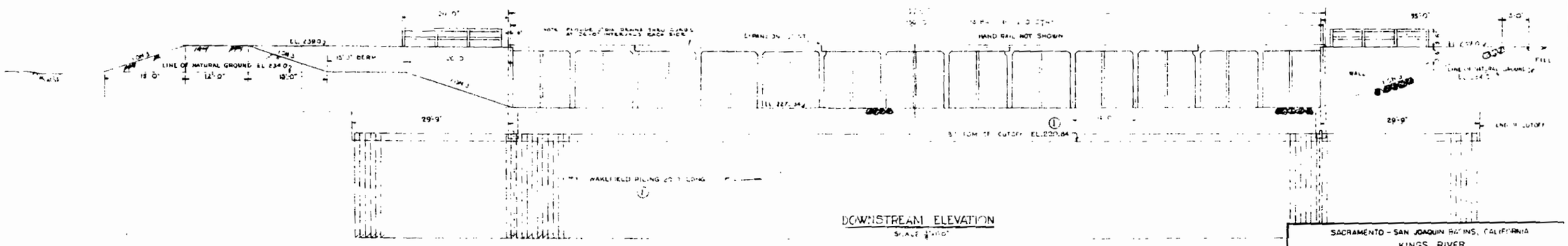
"AS CONSTRUCTED"

SACRAMENTO SAN JOAQUIN BASINS. CALIFORNIA.
KINGS RIVER
CHANNEL IMPROVEMENT PROJECT.
FAULL, SAND AND CROOKED SLOUGHS
CULVERT STRUCTURES

U. S. Engineer Office, Sacramento, California,
SCALE AS SHOWN.
MAR
Submitted: [signature] Engineer
Approval Recommended: [signature] Major, Corps of Engineers
Approved: [signature] Major, Corps of Engineers U. S. A.
Dr. W | Tr. W | Ch
File KI-1 | No. 4

EXHIBIT B-5.2





"AS CONSTRUCTED"

NO	REVISION	DATE	BY	APV'D
1	RIPRAP ADDED, PILING AND CUTOFF DEPTHS REVISED, JOINT ELIMINATED	11-2-43	C.O.B.	

SACRAMENTO - SAN JOAQUIN BASINS, CALIFORNIA
KINGS RIVER
CHANNEL IMPROVEMENT PROJECT
SOUTH FORK DIVERSION STRUCTURE
PLAN AND ELEVATION
SCALE IN FEET 0 5 10 15
IN SHEETS SHEET NO

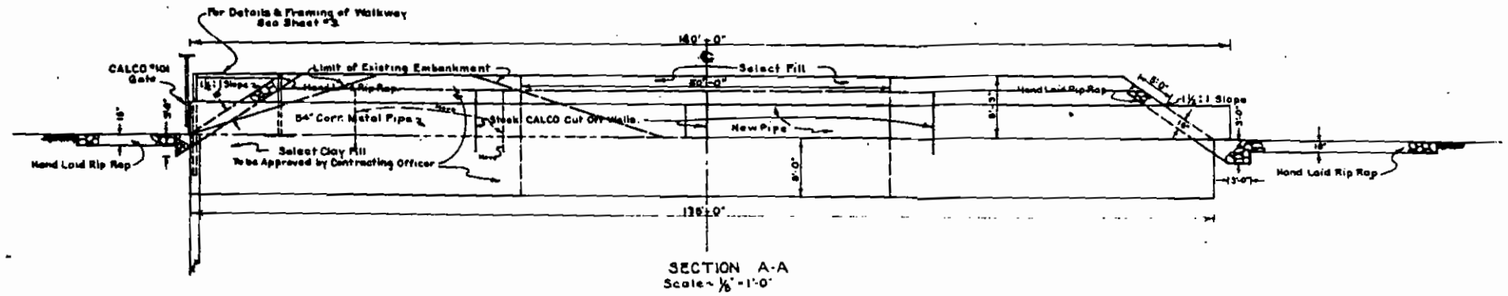
U. S. ENGINEER OFFICE, SACRAMENTO, CALIFORNIA, October, 19

DESIGNED	RECOMMENDED:
SUBMITTED:	APPROVED:

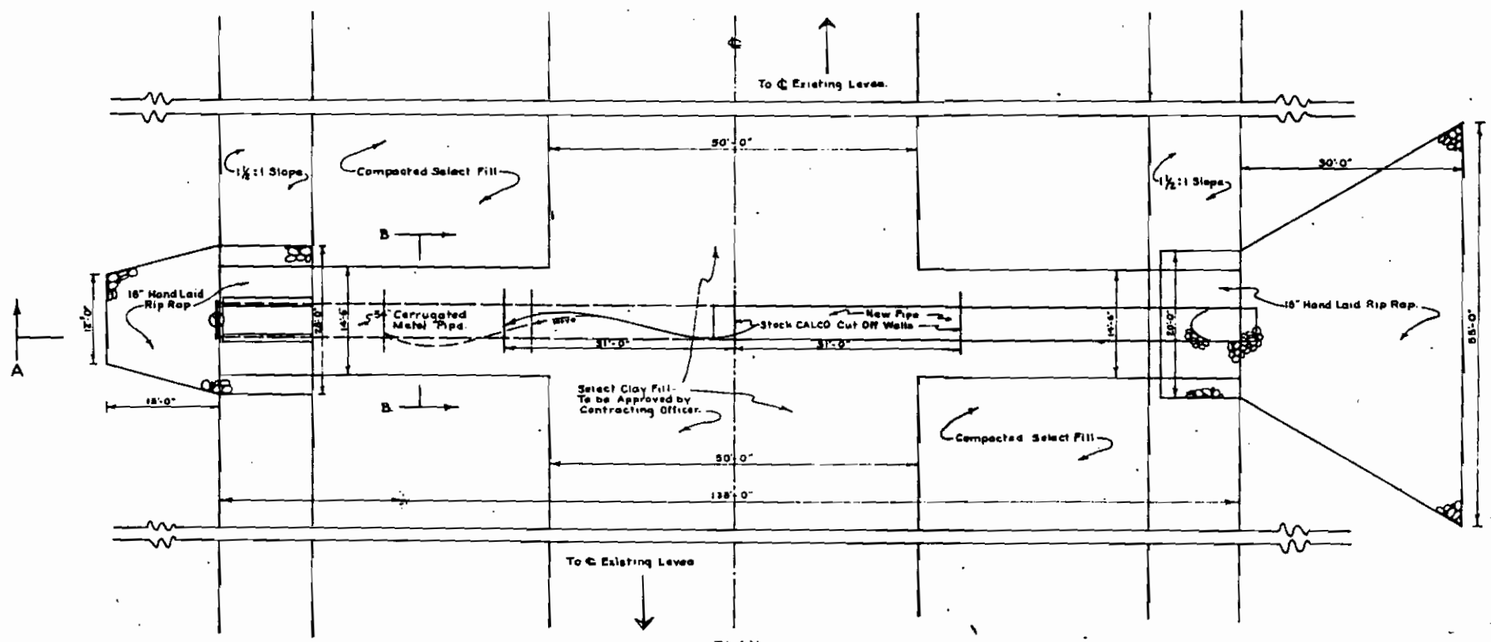
DR. BY C.G.B/B TR. BY J.S.R CH. BY P.B.F

KI-1 | 4 | 4

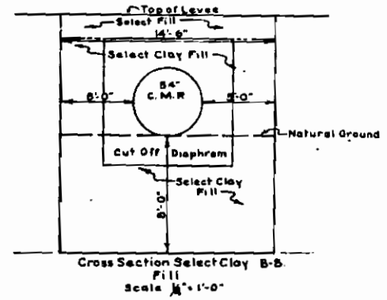
EXHIBIT B-5-1



SECTION A-A
Scale- ⅛" = 1'-0"



PLAN
Scale- ⅛" = 1'-0



Cross Section Select Clay Fill B-B
Scale ⅛" = 1'-0"

"AS CONSTRUCTED"

SACRAMENTO - SAN JOAQUIN BASINS CALIFORNIA
KINGS RIVER
CHANNEL IMPROVEMENT PROJECT
FAULL, SAND, AND CROOKED SLOUGHS.
CULVERT STRUCTURES

IN 33 SHEETS | Scale - Noted | SHEET NO 2.

U.S. Engineer Office, Sacramento, California, March, 1944

Submitted: [signature] Engineer

Approval Recommended: [signature] Major, Corps of Engineers, U.S.A.

Approved: [signature] Major, Corps of Engineers, U.S.A.

Div.	Sheet
KI-1	4

DRAWING 15

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

FRESNO CO. / KINGS CO.

SOUTHERN PACIFIC

ATCHISON TOPEKA AND SANTA FE

KINGS RIVER NORTH

SAND SLOUGH CULVERT STRUCTURE (GOVERNMENT OWNED) Removed 1969

ISLAND WEIR RECTIFICATION OWNED & OPERATED BY LOCAL INTERESTS)

B.M. Bronze Disk N.E. Cor. So. Side Weir Elev. 276.46

SOUTH FORK DIVERSION STRUCTURE (ARMY WEIR) (GOVERNMENT OWNED)

HEINLEN CUT CLOSURE

KINGS RIVER

1969 Removed

FAULL SLOUGH CULVERT STRUCTURE (GOVERNMENT OWNED)

CROOKED SLOUGH CULVERT STRUCTURE (FLORABELLE CUT) (GOVERNMENT OWNED)

SOUTH FORK DIVERSION CHANNEL

CLARKS FORK GAGE

Crooked Slough

BY-PASS

CRESCENT

Clarks Fork

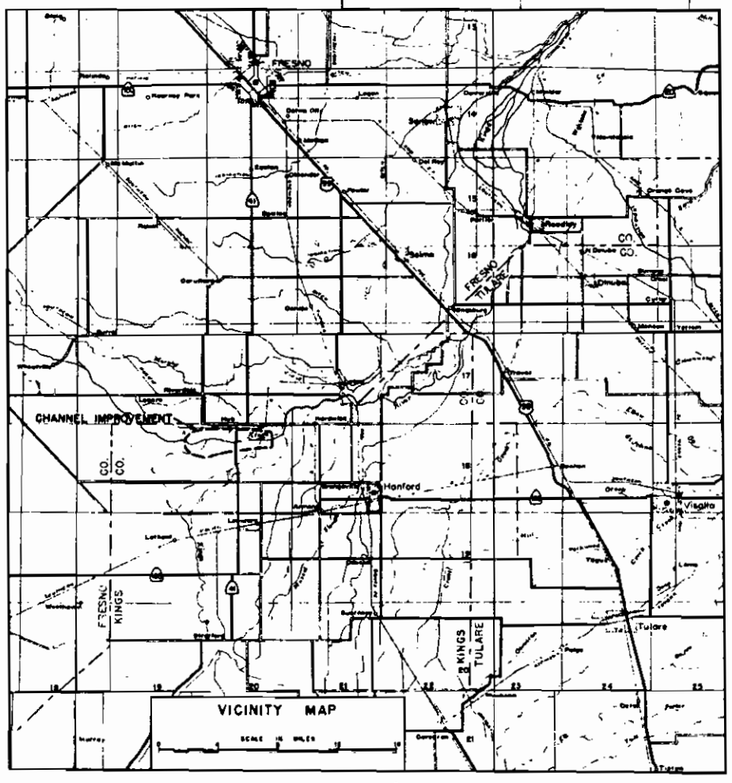
South Fork

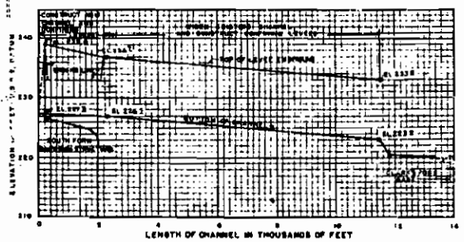
KINGS RIVER SOUTH

R.19 E. / R.20 E.

T.17 S. / T.18 S.

FRESNO / KINGS





PROFILE - SOUTH FORK DIVERSION CHANNEL AND CLARKS FORK CHANNEL IMPROVEMENT "AS CONSTRUCTED"

Note: Crooked Slough Closure, Heinlen Cut, Sand Slough and Faull Slough Culvert Structures and Island Weir Rectification not in this contract.

SACRAMENTO - SAN JOAQUIN BASINS, CALIFORNIA

KINGS RIVER

CHANNEL IMPROVEMENT PROJECT

LOCATION MAP

IN SHEETS SHEET NO. 1

U.S. Engineer Office, Sacramento, California, October 1943

Designed — Senior Engineer

Recommended — Principal Engineer

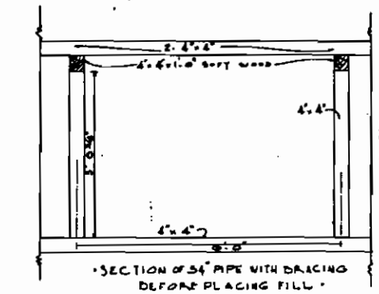
Submitted — Engineer

Approved — Major, Corps of Engineers, U.S.A.

Dr. by B.B.E. Tr. by B.B.E. Ch. by F.B.F.

KI-1 | 4 | 1

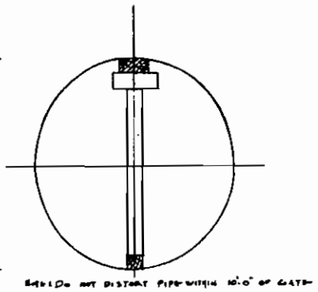
NO.	REVISION	DATE	BY	APVD
1	Culverts added at Crooked Slough	11-4-43	C&B	BBF



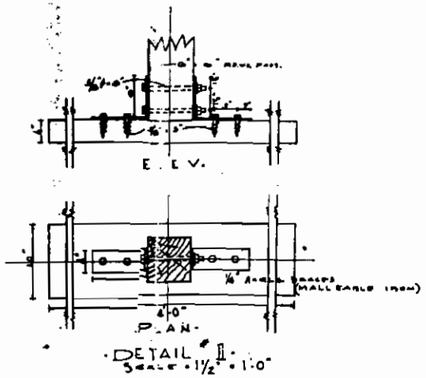
· SECTION OF 54" PIPE WITH BRACING BEFORE PLACING FILL ·

Note: Leave Bracing in Pipe until Fill Settles.

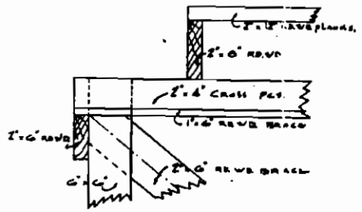
Scale 3/8" = 1'-0"



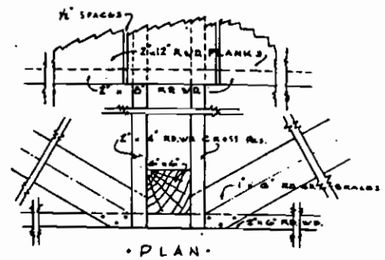
· CROSS SECTION 54" PIPE · (WITH BRACING)



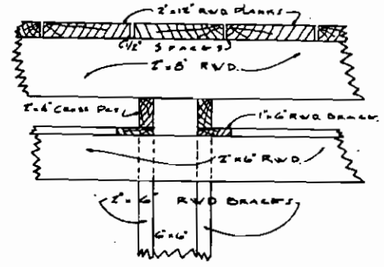
· DETAIL #1 ·
Scale · 1½" = 1'-0"



· DETAIL ·

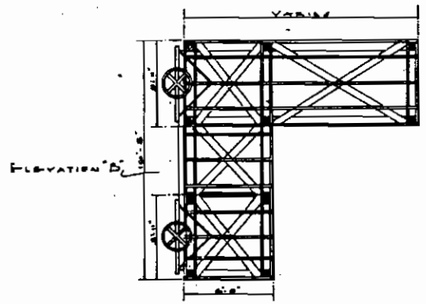


· PLAN ·

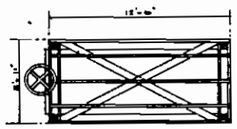


· ELEV ·

· DETAIL #3 ·
Scale · 1½" = 1'-0"

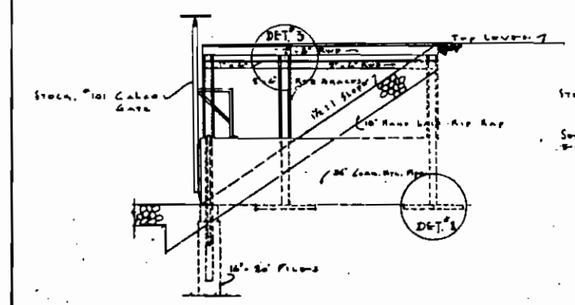


· PLAN (DOUBLE PIPE) ·

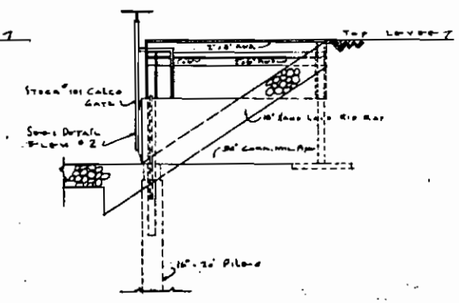


· PLAN (SINGLE PIPE) ·

Scale 1/4" = 1'-0"

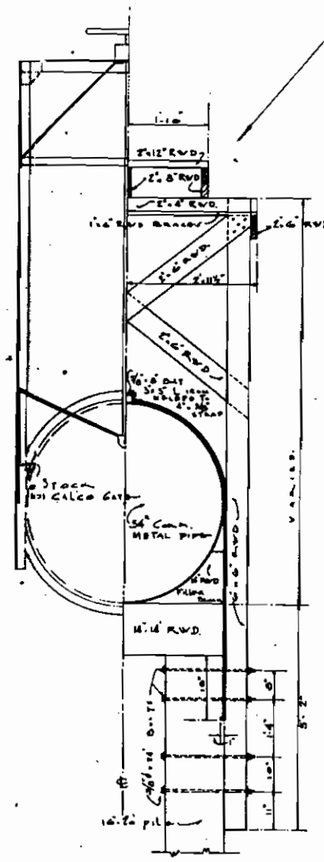


· SECTION (DOUBLE PIPE) ·

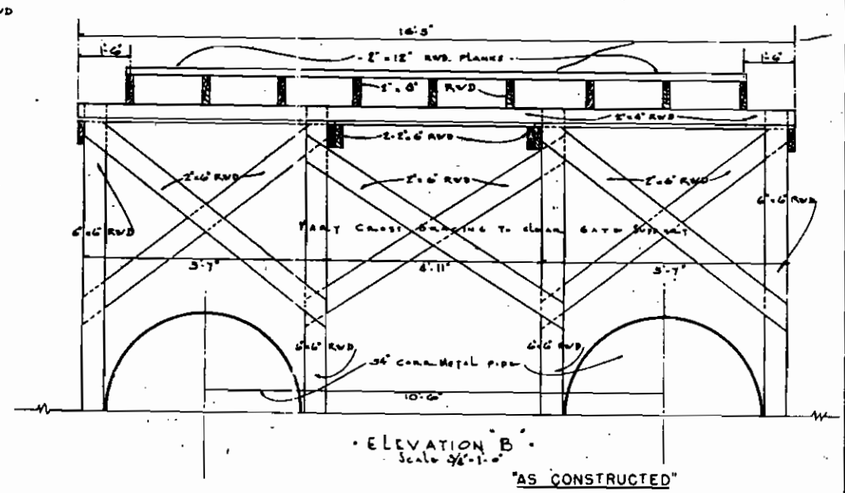


· SECTION (SINGLE PIPE) ·

Scale 1/4" = 1'-0"



· ½ ELEV. DETAIL #2 ·
Scale · 3/4" = 1'-0"



· ELEVATION B ·
Scale 3/16" = 1'-0"

"AS CONSTRUCTED"

· SACRAMENTO - SAN JOAQUIN BASINS - CALIFORNIA ·

KINGS RIVER
CHANNEL IMPROVEMENT PROJECT
FAULL, SAND, AND CROOKED SLOUGHS
CULVERT STRUCTURES.

IN 3 SHEETS | Scale · Noted | SHEET NO 5

U.S. Engineer Office, Sacramento, California. MAR. 1944

Submitted: Approval Recommended:

Approved: Major, Corps of Engineers, U.S.A.

Major, Corps of Engineers, U.S.A.

Drawing No.	Sheet No.	Div.	Tracing No.
KI-1	4		16

EXHIBIT B-5-2 Sheet 5