

LOWER SAN JOAQUIN RIVER
FLOOD CONTROL PROJECT

OPERATION AND MAINTENANCE
MANUAL

FOR
LEVEES, IRRIGATION AND DRAINAGE STRUCTURES,
CHANNELS AND MISCELLANEOUS FACILITIES

PART I

THE RECLAMATION BOARD
1967

*See Vol "B"
for 1978 Amendment*

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APPENDIXES

- A Copies of Agreements Providing Assurances by the Lower San Joaquin Levee District and Resolution Adopted by the Reclamation Board.
- B Location Map of Lower San Joaquin River Flood Control Project, Merced River to Friant Dam.
- C Map Showing Levee Units of Lower San Joaquin River Flood Control Project, Merced River to Friant Dam.
- D Schematic Diagram of Design Flows for Adopted Plan of Lower San Joaquin River Flood Control Project, Merced River to Friant Dam.
- E Plates of Methods of Flood Fighting.
- F Checklists.
- G Suggested Semiannual Report Form.

Purpose of the Manuals 1100

Operation and Maintenance Manuals have been prepared by the Department of Water Resources, Statewide Operations Office for the Reclamation Board to be employed by the Lower San Joaquin Levee District. The district has the responsibility^{1/} for the operation and maintenance of the authorized Lower San Joaquin River Flood Control Project.

The manuals set forth operating criteria and maintenance standards to be used by the district for the integrity of the project.

The Operation and Maintenance Manuals 1200

The Operation and Maintenance Manuals have been divided into three parts for easier use and handling.

Part I -- General Data and Operation and Maintenance Manual for Levees, Irrigation and Drainage Structures, Channels and Miscellaneous Facilities 1210

The manual contains Chapter 1000 -- Introduction and Chapter 2000 -- General Rules and Procedures, which pertain to all three manuals. In addition, general flood control features of the project are included as follows: Chapter 3000 -- Levees; Chapter 4000 -- Irrigation and Drainage Structures; Chapter 5000 -- Channels; Chapter 6000 -- Miscellaneous Facilities; Chapter 7000 -- Flood Damage. Completing this manual are the Appendixes that include:

^{1/} See Agreements -- Appendix A

features of the project are included as follows. Chapter 3000 -- Levees; Chapter 4000 -- Irrigation and Drainage Structures; Chapter 5000 -- Channels; Chapter 6000 -- Miscellaneous Facilities; Chapter 7000 -- Flood Damage. Completing this manual are the Appendixes that include:

^{1/} See Agreements -- Appendix A

0001 Part I -- General Data and Operation and Maintenance 1210
Manual for Levees, Irrigation and Drainage
0011 Structures, Channels and Miscellaneous
Facilities (Continued)

Copies of Agreements, Maps, Plates of Methods of Flood Fighting, Inspection Checklists for included facilities and Semiannual Report Form.

Part II -- Operation and Maintenance Manual for Mariposa 1220
Bypass and Eastside Bypass Automatic Control
Structures and Appurtenances

These two structures are adjacent and the operation of one is dependent on the operation of the other. For this reason, it is only natural that the operation criteria and maintenance standards for the structures and appurtenances appear under one cover.

Included in this manual are complete descriptions of the facilities, maintenance guides, operation criteria and procedures, safety requirements, and inspection checklists.

A copy of this manual shall be available in the installations control house.

Part III -- Operation and Maintenance Manual for 1230
San Joaquin River and Chowchilla Canal
Bypass Automatic Control Structures and
Appurtenances

These two structures are adjacent and the operation of one is also dependent on the operation of the other. The maintenance standards for the structures and appurtenances appear under one cover.

Included in this manual are complete descriptions of the facilities, maintenance guides, operation criteria and procedures, safety requirements, and inspection checklists.

Part III -- Operation and Maintenance Manual for
San Joaquin River and Chowchilla Canal
Bypass Automatic Control Structures and
Appurtenances (Continued)

1230

A copy of this manual shall be available in the installations control house.

Location

1300

The project works are located within the Lower San Joaquin Levee District boundaries in the Counties of Merced, Madera, and Fresno. The improvements extend along and adjacent to the San Joaquin River from Merced River to Gravelly Ford (excluding that portion situated between Mendota Dam and the San Joaquin River Control Structure), along and adjacent to the alignment of the Eastside Bypass from the San Joaquin River to Chowchilla Canal Bypass, along and adjacent to the alignment of the Chowchilla Canal Bypass from the Fresno River to San Joaquin River, along and adjacent to the alignment of Bear and Owens Creeks between Eastside Bypass and East Side Canal, along the East Side Canal from Eastside Bypass to a point approximately 1.8 miles northwest of Bear Creek, along the alignment of Mariposa Bypass between the San Joaquin River and Eastside Bypass, along the alignment of Ash Slough between Eastside Bypass and Chowchilla Canal, and along and adjacent to the alignment of Berenda Slough from Eastside Bypass to a point approximately 1 mile upstream, as shown on the Location Map, Appendix B.^{2/}

Project Works

1400

The Project works covered by this manual include all completed portions of the authorized Lower San Joaquin River Flood

^{2/} Originals of plates and agreements are on file at the Reclamation Board office in Sacramento.

Control Project. The project works consist basically of levees constructed along natural drainage channels to increase floodwater carrying capacity and levees constructed for floodwater bypass channels (for project design flows see schematic diagram, Appendix D). The necessary drainage structures have been incorporated into the levee system to intercept cutoff of natural and interior drainage, along with irrigation structures.

The levees have gravel patrol roads on the levee crown, access roads to the levees and patrol bridges across flood and river channels from levee crown to levee crown so that all portions of the flood control system are reachable at all times to vehicular travel necessary for flood fighting and project maintenance operations. The necessary fencing and gates have been provided for the integrity of the project works.

Channels of the project have been cleared and grubbed of debris, brush, trees, and other wild growth to increase the floodwater carrying capacity of the channels during periods of high water.

The project consists of other miscellaneous facilities such as control structures to divert floodflows and hydrologic facilities to index floodflows in the project. A more complete description of levees, irrigation and drainage structures, channels, and miscellaneous facilities of the project works can be found in Sections 3000, 4000, 5000, and 6000, respectively of this manual. Descriptions for the automatic control

I. Project Works (Continued) (Continued) (First Contract) 1400

structures and appurtenant facilities can be found in Part II and Part III Manuals. All elevations or vertical control for the project works when referred to are on U.S.C. & G.S. Sea Level Datum, 1929 adjustment.

S.0151 Construction History (Second Contract) 1510.1

The initial contract of the construction of the authorized Lower San Joaquin River Flood Control Project was signed into effect May 1, 1959. The project utilized the alignment of portions of levee systems already in existence in the form of canal banks. These levees were reconstructed and rehabilitated along with the construction of new levees and appurtenances formulating the project. Following is the construction history of the authorized project.

First Contract. Contract 1 (Specifications 59-1)^{3/} was awarded to Fredericksen & Kasler of Sacramento, California, on May 1, 1959, to perform the work as described below for a cost of \$1,956,117.50. 1510.1

1. This work consisted of constructing approximately 51 miles of new levees, enlarging approximately 5 miles of existing levees, construction of 140 drainage and irrigation structures, and clearing along and adjacent to the natural channel of the San Joaquin River. The work also included constructing bank protective works, fencing, and improvements to the Hills Ferry County Road.

^{3/} Copies of contract specifications are on file at the Reclamation Board office in Sacramento.

First Contract. (Continued) 1510.1

2. This work is located in Merced County and extends from a point near the junction of the Merced and San Joaquin Rivers to the head of Sand Slough approximately 4.5 miles downstream from State Highway No. 152.

Second Contract. Contract 2 (Specifications 60-6) was awarded to John E. Northrup Company of La Canada, California, on April 27, 1960, to perform the work as described below for a cost of \$86,350.00.

1. This work consisted of clearing and grubbing along and adjacent to the natural channel of the San Joaquin River for a distance of approximately 19.1 miles.

2. This work is located in Merced, Madera and Fresno Counties and extends from near the head of Sand Slough, approximately 4.5 miles downstream from State Highway No. 152, at River Mile 168.6 to the south line of Section 32, T. 11 S., R. 14 E., M.D.B. & M. a point approximately 7.5 miles downstream from the City of Firebaugh, at River Mile 187.7.

Third Contract. Contract 3A (Specifications 60-20) was awarded to the Granite Construction Company of Watsonville, California, on December 20, 1960, to perform the work as described below for a cost of \$245,850.00.

1. This work consisted primarily of furnishing, hauling, placing, and compacting a crushed mineral aggregate surfacing on approximately 60 miles of existing levee crowns, road ramps, widened levee areas and certain existing access roads.

Third Contract. (Continued)

1510.3

2. This work is located in Merced County and extends from a point near the junction of the Merced and San Joaquin Rivers to the head of Sand Slough, approximately 4.5 miles downstream from State Highway No. 152.

Fourth Contract. Contract 3 (Specifications 61-1) 1510.4

was awarded to Charles L. Harney, Inc. of San Francisco, California, on May 25, 1961, to perform the work described below for a cost of \$1,445,736.20.

1. The work consisted of the construction of approximately 19 miles of new levees; enlarging approximately 1.5 miles of existing levees; construction of 4 bridges; construction approach embankments and roads for these bridges; and constructing approximately 50 drainage and irrigation structures. The work also included approximately 25 acres of clearing along and adjacent to the bypass channels; constructing bank protection; placing crushed mineral aggregate surfacing on approximately 19.5 miles of levees constructed and enlarged; fencing; constructing approximately 2.5 miles of drainage ditch; and other miscellaneous items.

2. The work is located in Merced County and extends along the Eastside Bypass alignment from a point near the junction of Bear Creek with the San Joaquin River to the Interchange area, near the heading of Sand Slough from the San Joaquin River.

Fifth Contract. Contract 3C (Specifications 61-2) 1510.5

was awarded to Charles L. Harney, Inc. of San

Seventh Contract. Contract 3D (Specifica-

1510.7

tions 62-03) was awarded to the L. M. Page Company of Monrovia, California, on September 14, 1962 to perform the work at a cost of \$106,886.15.

1. The work consisted of constructing 1.8 miles of new levees, enlarging approximately 1.5 miles of existing levees, constructing road ramps, and constructing 4 drainage and irrigation structures. Also included was placing of crushed mineral aggregate surfacing on the levees which were constructed, and seeding of the levee slopes.

2. The work is located in Merced County and extends along the San Joaquin River from a point near the head of Sand Slough to a point approximately 2 miles upstream from the head of Sand Slough.

Eighth Contract. Contract 3E (Specifica-

1510.8

tions 62-28) was awarded to H. Sykes of Patterson, California, on December 3, 1962 to perform the work described below for a cost of \$20,906.

1. This work consisted of furnishing and placing stone protection on the right bank Mariposa Bypass; constructing protection fill, furnishing and placing cobbles in the channel of Mariposa Bypass; and constructing chain link fabric cribs.

2. The work is located in Merced County, in the Mariposa Bypass just below the Mariposa Bypass Control Structure.

Ninth Contract. Contract 3B (Specifica-

1510.9

tions 63-25) was awarded to L. M. Page Company and W. A. Smith Corporation of Monrovia, California, a joint venture, on

July 24, 1963, to perform the work described below for a cost of \$1,322,366.30.

1. This work consisted of constructing approximately 17.3 miles of new levees, and enlarging approximately 6.1 miles of existing levees along the Eastside Bypass, Bear Creek, Owens Creek, and East Side Canal; constructing 5 bridges; constructing approach embankment and roads for these bridges; constructing a siphon, and a diversion structure at the head of Bear Creek; and constructing approximately 50 drainage and irrigation structures. The work also included approximately 20 acres of clearing along and adjacent to the Eastside Bypass, Bear Creek, Owens Creek, and East Side Canal channels; constructing bank protection; placing crushed mineral aggregate surfacing on approximately 23.4 miles of levees to be constructed and enlarged; fencing; and other miscellaneous items.

2. The work is located in Merced County, and extends along the alignment of Eastside Bypass from a point near the junction of Bear Creek with the San Joaquin River to the East Side Canal, along Bear Creek from the Bypass to East Side Canal, along Owens Creek from the Bypass to East Side Canal and along the East Side Canal from Mariposa Bypass to a point approximately 1.8 miles northwest of Bear Creek.

Tenth Contract. Contract 3F (Specifica-

tions 63-27) was awarded to Jack Campbell, Incorporated, of Fresno, California, on July 24, 1963, to perform the work described below for a cost of \$478,348.00.

Tenth Contract. (Continued)

1510.10

1. This work consisted of constructing the Mariposa Bypass control structure and enlarging approximately 0.7 mile of adjacent levees. The structure is made of concrete with open and gated bays and a concrete bridge across the top of the structure.

The work also included furnishing and installing anchors for the existing East Side Canal siphon.

2. The work is located in Merced County at the intersection of the Eastside Bypass and Mariposa Bypass, approximately 13 miles southwest of the City of Merced.

Eleventh Contract. Contract 4 (Specifica-

1510.11

tions 64-01) was awarded to Fredrickson and Watson Construction Company of Oakland, California, on January 20, 1964, to perform the work described below for a cost of \$2,072,214.00.

1. This work consisted of constructing approximately 24.2 miles of new levee; constructing 3 bridges; constructing approximately 44 drainage and irrigation structures, 4 drop structures and 1 siphon. The work also included constructing bank protection; placing crushed mineral aggregate surfacing on approximately 24.2 miles of levees; fencing, constructing drainage and irrigation ditches and other miscellaneous items.

2. The work is located in Merced and Madera Counties and extends along the Eastside Bypass alignment from the Sand Slough Interchange area to Avenue 18-1/2 and along the Ash Slough Alignment from the Eastside Bypass to the Chowchilla Canal.

Twelfth Contract. Contract 5-7 (Specifica-

1510.12

tions 64-42) was awarded to Pascal and Ludwig on January 20, 1965, to perform the work described below for a cost of \$2,477,958.00.

1. This work consisted of constructing approximately 43 miles of new levees; constructing 6 bridges; constructing approach embankments and roads; constructing 4 pipe arch culverts through county road approach embankments; constructing approximately 30 drainage and irrigation structures; and constructing 2 drop structures. The work also included constructing bank protection; placing crushed mineral aggregate surfacing on approximately 43 miles of new levee, constructing 1 mile of new roadway; constructing fences; constructing drainage ditches; and other miscellaneous items.

2. The work is located in Madera County and extends along the alignment of the Eastside Bypass from Avenue 18-1/2 to Chowchilla Canal, along the alignment of Berenda Slough from the Eastside Bypass to Chowchilla Canal; and along the alignment of the Chowchilla Canal Bypass from the Fresno River to 1 mile northwest of the San Joaquin River.

Thirteenth Contract. Contract 3H (Specifica-

1510.13

tions 65-03) was awarded to Pascal and Ludwig on April 7, 1965, to perform the work described below for a cost of \$454,069.00.

1. This work consisted of constructing approximately 2 miles of levee enlargement; constructing levee embankments; a concrete drop structure; approximately 600 feet

Thirteenth Contract. (Continued)

of channel excavation; improving an existing drainage structure; and other miscellaneous items.

2. The work is located in Merced County at the west end of the Mariposa Bypass at its intersection with the San Joaquin River approximately 25 miles southwest of the City of Merced, California.

Fourteenth Contract. Contract 8 (Specifications 65-30) 1510.14

was awarded to Fredrickson and Watson Construction Company on October 13, 1965, to perform the work described below for a cost of \$1,647,766.00.

1. This work consisted of clearing approximately 430 acres of San Joaquin River channel; installation of staff gages; construction of 2.7 miles of levees along both sides of the south end of the Chowchilla Canal Bypass; construction of 20 miles of levees from Lone Willow Slough to Gravelly Ford along both sides of the San Joaquin River; construction of the Chowchilla Canal Bypass-San Joaquin River Control Facilities; and construction of various drainage structures. The Chowchilla Canal Bypass-San Joaquin River Control Facilities consist of two reinforced concrete control structures with radial gates, hoists, and appurtenant electrical work.

2. The work is located in Madera and Fresno Counties, along 1.4 miles of the Chowchilla Canal Bypass, and along the San Joaquin River between Lone Willow Slough and Gravelly Ford, from 23 to 34 miles west of Fresno, California. Five staff gages are located in Merced County.

Fifteenth Contract. Contract 3G (Specifica-

1510.15

tions 65-43) was awarded to Baldwin Warren Co., Inc., on December 1, 1965, to perform the work described below for a cost of \$597,978.20.

1. This work consisted of constructing approximately 365 feet of new levee; approach embankments; a concrete control structure; approximately 1,500 feet of channel excavation; constructing a control building, and a reinforced concrete box culvert; removing the existing control embankment, float wells, and other miscellaneous items.

2. The work is located in Merced County on the Eastside Bypass and the Mariposa Bypass, approximately 25 miles southwest of the City of Merced, California.

Sixteenth Contract. Contract 10 (Specifica-

1510.16

tions 66-30) was awarded to Ted Watkins Construction Company, Inc., and Ted Watkins on September 29, 1966, to perform the work described below for a cost of \$99,359.00.

1. This work consisted of constructing a reinforced concrete bridge with approach embankment on the Eastside Bypass at Triangle "T" Ranch, and a reinforced concrete drainage structure and 215 feet of new levee near the confluence of the Fresno and San Joaquin Rivers.

2. The work is located in Madera and Merced Counties approximately 20 miles southwest of the City of Merced, California.

Flood Season and Danger Period

1600

For the purpose of this manual when flood season is referred to, it shall mean from November 15 to June 15 of each water

Flood Season and Danger Period (Continued)

1600

year. In the early portion of the flood season the San Joaquin Valley is in danger of flood from rain-flood runoff and in the latter part there is danger of flooding from snowmelt runoff.

High Water Period. The term "high water period" for the project refers to flows that overflow the low flow channel onto the floodplain and come into contact with the levee. A more specific index is when the water surface in the Eastside Bypass reaches or exceeds the reading of 102.0 feet on the Department of Water Resources gage located on the left bank of the Eastside Bypass near El Nido; on a reading of 63.0 feet on the USGS gage located near Newman on the left bank of the San Joaquin River at the old Hills Ferry Bridge site (just below the confluence of the San Joaquin and Merced Rivers). These gages are set on U.S.C. & G.S. mean sea level datum (1929 adjustment). For location of above-mentioned gages see Appendix B -- Location Map.

1610

Notification of Levee Patrolling. The Department of Water Resources has a procedure of notifying local agencies when levee patrols are required for flood control works under the jurisdiction of the responsible agency. The procedure is as follows: The joint federal-state river forecasters of the Flood Operations Center in Sacramento closely follow storm and snowmelt runoff events in the Central Valley area. Project inflows are from Pine Flat Dam on the Kings; Friant Dam on the San Joaquin; Big Dry Creek Reservoir and Diversion Channel;

1611

Francisco on October 4, 1961, to perform the work described below for the cost of \$64,086.00.

1. This work consisted of removing and replacing existing levee embankment, constructing embankment at the site of the San Joaquin River structure, excavating and refilling an inspection trench, widening levee, placing cobble revetment, constructing timber pump structure, constructing gate riser units, constructing road ramps, and furnishing and placing gravel surfacing. This work also included bracing existing metal gate posts.

2. The work is located in Merced County and extends from a point near the junction of the Merced and San Joaquin Rivers to a point approximately 1 mile downstream from State Highway No. 152.

Sixth Contract. Contract 6 (Specifications 1510.6

62-09) was awarded to Frank P. Donovan of Santa Maria, California, on June 15, 1962, to perform the work described below for a cost of \$107,000.00.

1. This work consisted of clearing and grubbing approximately 585 acres along and adjacent to the natural channel of the San Joaquin River for a distance of approximately 17.0 miles.

2. The work is located in Fresno and Madera Counties and extends from the south line of Section 32, T. 11 S., R. 14 E., M.D.B. & M., at River Mile 187.7, a point approximately 7.5 miles downstream from the City of Firebaugh, to Mendota Dam, at River Mile 204.7.

Notification of Levee Patrolling. (Continued) 1611

Fresno and Chowchilla Rivers; Merced County stream group reservoirs (Burns, Bear, Owens, and Mariposa Creeks); New Exchequer Dam on the Merced; plus miscellaneous local inflow. When any river forecast of significance is issued to the district the trustees or other responsible agency personnel are notified. They are given the river forecast, weather summary, and any other data pertinent to the situation.

After the initial notification from the Flood Operations Center, it is the district's responsibility to keep themselves informed on river and weather conditions.

Streamflow Stages. Permanent arrangements should be made by the district with the Flood Operations Center, Department of Water Resources, Sacramento, to secure streamflow stages, forecasts of streamflow stages and weather conditions of affected streams and drainage areas to properly plan adequate measures of protection. See Department of Water Resources' "Flood Emergency Operations Manual", which has been transmitted to the district. 1620

Assurances Provided by Local Interests 1700

Assurance of cooperation by local interests to maintain and operate the project is provided by an agreement made and entered into by and between the Reclamation Board of the State of California and the Lower San Joaquin Levee District, dated March 31, 1956, an agreement terminating the aforesaid agreement, dated October 7, 1958, and an agreement dated October 2, 1962, supplemental and amendatory to the agreement dated

Assurances Provided by Local Interests (Continued)

1700

October 7, 1958. Copies of these agreements are included in this manual, Appendix A.

Formation of Maintenance Area. Sections 12878 - 12878.45 of the 1965 State Water Code sets forth a procedure, available when necessary, whereby adequate and uniform maintenance of flood control projects may be secured. In substance, when the Department of Water Resources finds that there is a failure on the part of local agencies to properly maintain project works or that a local agency no longer desires to carry out project maintenance, a report to that effect is made to the State Reclamation Board, which is empowered, after hearing, to form a "maintenance area" and thereafter the Department of Water Resources maintains that particular unit of project works, and the Reclamation Board apportions the cost thereof upon the property benefited within the "maintenance area" on an ad valorem basis and the assessment is extended for collection together with county taxes on the county assessment roll.

1710

Acceptance by the Lower San Joaquin Levee District

1800

Upon completion of the construction of any portion of the authorized Lower San Joaquin River Flood Control Project and receipt of written notice from the Reclamation Board, the district shall be responsible for the operation and maintenance of those completed portions of the project. Letters of written acceptance of completed portions of the project are on file with the Reclamation Board at Sacramento.

For description and location of project works see Section 1500, "Construction History", and Appendix B, "Location Map".

General Rules and Procedures

2100

The general rules for maintenance and operation of the flood control works are as follows:

- (1) The structures and facilities constructed by the State of California for local flood protection shall be continuously maintained in such a manner and operated at such times for such periods as may be necessary to obtain the maximum benefits.
- (2) The Lower San Joaquin Levee District, the responsible local agency, which furnished assurance that it will maintain and operate completed portions of the Lower San Joaquin River Flood Control Project in accordance with regulations as set forth by the Reclamation Board and the United States, shall appoint an authorized agent for the District, 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 State of California.
- (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. The Lower San Joaquin Levee District shall cooperate with the Reclamation Board in processing permits for construction of encroachments within the limits of the flood control system.

(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 Reclamation Board, or its 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 and to the design criteria of the project. 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 Reclamation Board, or if otherwise obtained, shall be submitted for the Board's approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the Reclamation Board after completion of the work.

The above statement shall not apply to any work of interior irrigation or drainage upon reclaimed land, which

work is not actually on, through, or adjoining any portions of the flood control works under the jurisdiction of the Reclamation Board.

(6) It shall be the duty of the Superintendent to submit a semiannual report to the Reclamation Board covering inspection, maintenance, and operation of the protective works.

(7) The Reclamation Board or its authorized representative shall have access at all times to all portions of the protective works.

(8) Maintenance measures or repairs which the Reclamation Board 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.

Clarification of Duties 2200

Most of the general duties outlined above are self-explanatory; however, amplification of items (2), (5), (6), and (9) is considered advisable to insure common interpretation. Therefore the following items furnish suggestions for complying with those requirements:

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

(1) An assistant to act for and in the absence of the Superintendent.

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

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

Proposed Improvements or Alterations. Drawings or prints of proposed improvements or alterations to the existing flood control works must be submitted for approval

to the Reclamation Board, sufficiently in advance of the proposed construction to permit adequate study and consideration of the work. Drawings or prints, in duplicate, showing any improvements or alterations as finally constructed should be furnished to the Reclamation Board after completion of the work.

Semiannual Inspection. The Superintendent of the district shall make semiannual inspections of all control structures, levees, irrigation and drainage structures, channels, and miscellaneous facilities of the authorized Lower San Joaquin River Flood Control Project. These reports should be submitted within a ten-day period prior to June 1 and December 1 of each year and will include all dated copies of reports of inspections made during the period of report. Report of his findings of these inspections shall be made to the Department of Water Resources and the Reclamation Board. A form of the semiannual report is included as Appendix G of this manual.

Coordination with Operation of Public and Private Facilities. The Superintendent should have specific knowledge of all pertinent public utilities and private facilities located within the district for which he is responsible in order to coordinate all phases of the flood-fighting activities. Such knowledge should be extended to include the names, telephone numbers and addresses of all persons who might

Facilities. (Continued)

necessarily be contacted in case of damage to highway roads and bridges, railroads, powerlines, telephone lines, gas lines or structures.

Safety Requirements. Since patrolling of levees,

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

Inspection Procedure. The Department of Water Resources

will make semiannual inspections of all features of the Lower San Joaquin River Flood Control Project and report its findings to the Lower San Joaquin Levee District and the Reclamation Board. Supervisory powers and duties of the Department of Water Resources are applicable to all features of the Lower San Joaquin River Flood Control Project operated and maintained by the district.

The following procedure is used in inspecting the flood control project maintained and operated by the district:

Personnel of the Department of Water Resources make a detailed inspection in the spring and fall of each year and make a report on any required maintenance. The inspection objectives are to determine if the following items are being adhered to:

(1) That all brush, trees and wild growth other than sod are removed from the levee crown and slopes.

(2) That all weeds, grass and debris on the levees have been burned during the appropriate season where not dangerous or impractical.

(3) That all grass and weeds on the levee have been removed by other means than burning where removal by burning is dangerous or impracticable. This applies only where burning would constitute a hazard to improvements.

(4) That all burrowing animals have been exterminated.

(5) That all caves, sloughs, burrows, holes, slips or other damaged portions of the levees have been repaired.

(6) That no revetment work or stone slope protection have been displaced, washed out or removed.

(7) That the crown of the levees is well shaped and maintained and that unauthorized vehicular travel is restricted.

(8) That stock grazing on the levees is restricted to conditions and seasons when the levee would not be seriously scarred or otherwise damaged thereby.

(9) That encroachments are not being erected on the levees which would hinder travel by authorized patrol vehicles.

(10) Prevent the erection of structures on, additions to, or alterations of, the levees unless authorized by permit from the Reclamation Board.

(11) That all irrigation and drainage structures through the levee are in good working condition.

(12) That an active channel maintenance program is being carried out.

(13) That all bridges of the project are in good condition.

(14) That all control structures are in good working condition.

(15) That all drainage ditches and culverts are clear of brush and wild growth, debris has been removed, and all caves, sloughs, holes, slips or other damaged portions of ditches have been repaired, and that they function properly.

(16) That all fencing and gates that have been damaged have been repaired and work properly.

(17) That all damaged staff gages have been repaired.

(18) That all damaged mileage markers have been repaired and are in their proper location.

(19) That all automatic control structures and appurtenances are free of debris, damaged portions have been repaired, maintenance has been performed and they function properly.

Following this detailed inspection, a joint field inspection is made with representatives of the Lower San Joaquin Levee District and the Department of Water Resources to review and discuss the inspection report.

nances are free of debris, damaged portions have been repaired, maintenance has been performed and they function properly.

Following this detailed inspection, a joint field inspection is made with representatives of the Lower San Joaquin Levee District and the Department of Water Resources to review and discuss the inspection report.

Periodic Inspections. Inspections should be made by the Superintendent at the times specified below: 2270

- (1) During the month of October which is prior to the beginning of the flood season.
- (2) Immediately following each major high-water period.
- (3) In the absence of high water, at periods not exceeding 90 days.
- (4) At intermediate times as necessary.

Checklists 2300

The checklists shown in Appendix F should be used in each inspection to insure that no features of the protective system are overlooked. Items requiring maintenance should be noted thereon; if items are satisfactory, they should be so indicated by a check.

Drawings 2400

Detailed "As Built" drawings^{4/} of the project works have been transmitted to the district on completion of the individual contracts (see Section 1500 - Construction History). These drawings shall be kept on file by the district for easy reference. The drawings are necessary for the operation and maintenance of the protective works.

^{4/} Originals of "As Built" drawings are on file at the Reclamation Board office in Sacramento.

Description

3100

The levees described in this manual extend along and adjacent to the San Joaquin River from Merced River to a point approximately 3 miles upstream from Mariposa Bypass, from junction with Eastside Bypass at Slough interchange pool to a point approximately 2.2 miles upstream, and from junction with Chowchilla Canal Bypass to Gravelly Ford; along and adjacent to right bank of Salt Slough from junction with San Joaquin River to a point approximately 2.5 miles upstream; along and adjacent to the alignment of the Eastside Bypass from the San Joaquin River to Chowchilla Canal Bypass; along and adjacent to Bear and Owens Creeks from Eastside Bypass to East Side Canal; along the alignment of the left bank of East Side Canal from Eastside Bypass to a point approximately 1.8 miles northwest of Bear Creek; along and adjacent to the alignment of Mariposa Bypass from San Joaquin River to Eastside Bypass; along and adjacent to Ash and Berenda Sloughs from Eastside Bypass to Chowchilla Canal; and along and adjacent to the alignment of Chowchilla Canal Bypass from its junction with Eastside Bypass to the San Joaquin River.

This system comprises a total distance of approximately 193.1 linear miles of levee as shown on the map showing levee units, Appendix C. These levees are with slopes of one on three waterside and one on two landside with crown widths varying from 12, 20, 24 to 28 feet. Levees constructed along streams have been provided with a freeboard of 3 feet above

Description (Continued)

LEVEES

3100

maximum design water surface elevation and on bypass levees
the freeboard is 4 feet.

Patrol roads have been provided on the levee crown. These roads are 4-inch-thick crushed mineral aggregate surfacing with 3 percent cross slope from the levee centerline to the shoulder. The 12-foot-wide levee crown has a 10-foot-wide roadway with 1-foot taper at the shoulder and the 20-foot-wide levee crown has a 12-foot-wide roadway with 4-foot taper.

The necessary drainage structures, road approaches and access roads, bank protection, and appurtenances were also included in this work. For more complete detail in construction of the above-mentioned levees and appurtenances refer to the "As Built" drawings.

Maintenance

3200

General. The project shall be so maintained that the

3210

serviceability of the structures in flood periods will be assured. Periodic inspections shall be made by the Superintendent to see that proper maintenance measures are carried out. These inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high-water period, and other times at intervals not exceeding 90 days or oftener if needed to insure proper maintenance of the project.

Conditions warranting maintenance force action are as follows:

- (1) Settlement, sloughing, or materials loss of grade of levee cross section;
- (2) Caving on either landside or riverside of the levee which might affect the stability of the levee section;
- (3) Seepage, saturated areas, or sand boils;
- (4) Drainage pipes through the levee and gates attached thereto that may cause trouble during high water;
- (5) Displacement of revetment or riprap;
- (6) Unauthorized activity around project levees such as burning of grass and weeds during inappropriate season which will retard or destroy the growth of the sod cover;
- (7) Access roads to and on the levee which need repair;
- (8) Cattle guards and gates needing replacement or repairs;
- (9) Levee crown roadway needing reshaping for proper drainage;
- (10) Unauthorized grazing or vehicular traffic on the levees;
- (11) Unapproved encroachments on the levee or within the right-of-way which might endanger the structure or hinder its proper functioning during times of emergency.

Special Instructions. A list of items in conjunction with and directly related to levee maintenance is as follows:

0152 Revetment Work. (1) Where scour, wash, settlement 3221

or failure of a portion of the originally provided stone protection has occurred the scour or wash shall be filled with earth free from organic material, placed in layers and compacted as directed under "Repairs to Levee and Embankment" of this section and additional stone placed so that the stone protection is brought up to its original section. In case of emergency when stone is not readily available, sandbags or bags filled with gravel may be used to make temporary repairs. When permanent repair of the stone protection is made, the stone used shall be as similar to the original kind and gradation as possible and shall be placed to the original thickness as shown on the "As Built" drawings.

(2) When it is indicated that stone protection on the levee or bank is required beyond the limits of the original construction or in reaches not originally provided with such protection, the district will provide for such by proper sloping of the banks and placement of stone protection as needed to protect completed work. The work shall be done in accordance with standard engineering practice. Drawings or prints showing such improvements or alterations shall be furnished the State Reclamation Board after completion of the work.

Care of Vegetation on Levee. (1) A good growth of sod is the desired vegetative cover on the levee and should be encouraged by necessary maintenance practices.

(2) Brush, trees, and other wild growth shall be cleared from the levee crown and slopes. A strip of brush and

small trees may be retained, through application to the Reclamation Board, on the floodplain within 10 feet of the levee on the waterward side where necessary to prevent erosion and wave wash.

(3) Weeds, grasses, and debris on the levee may be burned during appropriate seasons where not dangerous or impracticable in order to permit the detection of cracks, holes, burrows, slips, and other damage and to permit the extermination of burrowing animals. Burning permits shall be obtained from the proper local authority by the Superintendent before burning is started. Where burning is dangerous or impracticable, the levee slopes shall be mowed to remove the tall grass and weeds.

Repairs to Levee Embankment. Fill needed to bring the levee section back to original cross section shall be placed in layers not exceeding 6 inches in thickness and compacted in accordance with the original specifications. The fill material shall be free from brush, roots, sod or other unsuitable material and be near optimum moisture content for compaction. Stripping of existing vegetative growth and scarifying the underlying material to a depth of 6 inches shall be done where necessary before new fill material is placed. New sod cover should be established as soon as possible by seeding after the first fall rains.

Depredations of Burrowing Animals. Burrowing

animals such as muskrats, ground hogs, ground squirrels, moles and gophers found in the levee should be exterminated after

which the dens and runways should be opened up and backfilled with compacted material or pressure grouted with a cement grout mixture. Levees kept properly cleared are not seriously menaced by burrowing animals as they prefer areas where high grass, weeds and brush are 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 can be obtained from the County Agricultural Agent.

Livestock Grazing on Levees. The landowners adjoining the project levees have agreed to pay for additional maintenance costs of the levee due to livestock grazing. The major damage occurs during the rainy season when the levees are wet. The owners should be encouraged to keep the livestock off the levees during this period. Where damage occurs, the landowner adjoining the damaged section is the responsible party whether he owns the livestock or is leasing his land to another party.

Patrol Roads on Levees and Access Roads. Patrol roads on the levees and access roads to the levees shall be maintained in such a condition that they will be serviceable at all times to vehicular travel necessary for maintenance or flood-fighting operations.

County of Merced Responsibility. The County of Merced has agreed to assume the responsibility for the maintenance of the roadway surfaces and shoulders of the roads on the following reaches of levee:

County of Merced Responsibility. The County of Merced has agreed to assume the responsibility for the maintenance of the roadway surfaces and shoulders of the roads on the following reaches of levee:

(1) The roadway on the levee on the right bank of the Eastside Bypass between McNamara Road and Sandy Mush Road;

(2) The roadway on the levee on the left bank of the Eastside Bypass between a point approximately 400 feet west of McNamara Road and a line common to the United States-McNamara Ranch properties.

(3) The roadway on the levee along the south side of the interchange area of the Eastside Bypass between the West Washington Bridge and the Sand Slough Bridge.

(4) The roadway on the levee along the eastern approach to the Hills Ferry Bridge.

Checklists 3300

A suggested form to use in the inspection of levees is located in Appendix F of this manual. (See pages F-1, F-2 and F-3)

Operation 3400

During "high-water periods" (see Section 1600) the levees shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope of the levee and to be certain that:

- (1) There are no indications of slides or sloughs developing;
- (2) Wave wash or scouring action is not occurring;
- (3) No low reaches of levee exist which may be overtopped;
- (4) No other conditions exist which might endanger the levee.

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

Patrols. It shall be the duty of the district to keep in contact with the Department of Water Resources' Flood Operations Center in Sacramento during all periods of flood danger, and to maintain a patrol of the project works in the area that floodflows have overflowed the low flow channel onto the floodplain and have come into contact with the levee (See Section 1600 -- "Flood Season and Danger Period").

Recommendations for setting up levee patrols and flood fighting techniques can be found in the Department of Water Resources' "Emergency Flood Operations Manual" under Sections 5500 -- Suggestions for Organizing Levee Patrols and 5600 -- Methods of Flood Fighting, respectively.

The Flood Operations Center is responsible for data collection and issuance of a joint river forecast with the U. S. Weather Bureau and coordinates with the Corps of Engineers, 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.

Description

4100

This section of the manual deals with the numerous irrigation and drainage structures which pass through, under, or over the levees to provide for the passage of water from the waterway to the protected area for irrigation or other usage or from the protected area to the waterway for drainage purposes.

In general, these structures are corrugated metal pipes, reinforced concrete box culverts, steel pipes, or reinforced concrete pipes. Culverts have been constructed with reinforced concrete endwalls and headwalls. Cutoff walls have been provided of corresponding material as the culvert. Flow through culverts is controlled on the river side either with positive closure devices accessible during high water or with automatic flap gates.

The positive closure devices are gate riser units which consist of a corrugated metal pipe or reinforced concrete riser housing with slide gate and lift assembly, wood cover, and miscellaneous metal work. The slide gate lifting device is a threaded steel rod system with either the handwheel or pedestal-type lift. Miscellaneous metal work consists of locking device, ladder, gate lift support, and vent pipe. The district shall supply lock and key to secure the cover of the riser unit.

Automatic flap gates are cast steel flap gates attached at the discharge end of drainage structure which is on the waterside of the levee embankment.

Drainage and irrigation structures which extend through the levee are listed as follows:

UNIT NO. 1

San Joaquin River - Right Bank

Levee Mile	Size of Pipe	Description	Feet Below Crown
0.02*	24" CMP	Flap Gate W.S.	8.5
0.35*	36" CMP	Flap Gate W.S.	15.5
0.62*	24" CMP	Flap Gate W.S.	6.6
0.87*	24" CMP	Flap Gate W.S.	6.6
0.95*	24" CMP	Flap Gate W.S.	5.9
1.17*	24" CMP	Flap Gate W.S.	5.6
1.34*	36" CMP	Flap Gate W.S.	9.8
1.48*	24" CMP	Flap Gate W.S.	9.5
1.69*	24" CMP	Flap Gate W.S.	11.6
1.83*	36" CMP	Flap Gate W.S.	11.2
1.98*	24" CMP	Flap Gate W.S.	7.9
2.08*	24" CMP	Flap Gate W.S.	8.0
2.25*	36" CMP	Flap Gate W.S.	9.6
2.52*	24" CMP	Flap Gate W.S.	7.0
2.70*	24" CMP	Flap Gate W.S.	5.7
3.16*	36" CMP	Flap Gate W.S.	7.1
3.50*	36" CMP	Flap Gate W.S.	6.8
3.95*	30" CMP	Flap Gate W.S.	4.4
4.16*	48" CMP	Flap Gate W.S.	10.1
4.27*	24" CMP	Flap Gate W.S.	9.9
4.72*	24" CMP	Flap Gate W.S.	7.9
5.05*	24" CMP	Flap Gate W.S.	5.8
5.95*	24" CMP	Flap Gate W.S.	6.5
6.13*	48" CMP	Flap Gate W.S.	9.0
6.40*	24" CMP	Flap Gate W.S.	7.6
6.64*	24" CMP	Flap Gate W.S.	7.7
6.90*	36" CMP	Flap Gate W.S.	8.2
7.21*	24" CMP	Flap Gate W.S.	3.1
7.46*	24" CMP	Flap Gate W.S.	6.0
7.69*	24" CMP	Flap Gate W.S.	8.0
8.07*	24" CMP	Flap Gate W.S.	6.3
8.41*	24" CMP	Flap Gate W.S.	4.4
8.61*	24" CMP	Flap Gate W.S.	6.9
8.93*	24" CMP	Flap Gate W.S.	7.2
9.00*	36" CMP	Flap Gate W.S.	6.6
9.03*	24" CMP	Flap Gate W.S.	7.2
9.37*	24" CMP	Flap Gate W.S.	7.6
9.67*	24" CMP	Flap Gate W.S.	0.6
9.93*	24" CMP	Flap Gate W.S.	6.0

UNIT NO. 1 (Continued)

Levee Mile	Size of Pipe	Description	Feet Below Crown
10.23*	24" CMP	Flap Gate W.S.	7.3
10.72*	24" CMP	Flap Gate W.S.	4.2
10.72*	24" CMP	Flap Gate W.S.	4.2
11.00*	24" CMP	Flap Gate W.S.	4.8
11.18*	24" CMP	Flap Gate W.S.	3.6
11.48*	24" CMP	Flap Gate W.S.	8.7
11.76*	24" CMP	Flap Gate W.S.	15.0
12.11*	24" CMP	Flap Gate W.S.	10.5
12.94*	24" CMP	Flap Gate W.S.	7.5
13.48*	24" CMP	Flap Gate W.S.	12.1
13.58*	24" CMP	Flap Gate W.S.	12.1
13.81*	24" CMP	Flap Gate W.S.	8.9
14.21*	24" CMP	Flap Gate W.S.	11.9
14.65*	24" CMP	Flap Gate W.S.	7.7
15.29*	24" CMP	Flap Gate W.S.	6.6
15.57*	24" CMP	Flap Gate W.S.	6.5
15.81*	24" CMP	Flap Gate W.S.	9.2
16.09*	24" CMP	Flap Gate W.S.	9.6
16.15*	24" CMP	Flap Gate W.S.	12.7
16.72*	24" CMP	Flap Gate W.S.	9.4
17.01*	24" CMP	Flap Gate W.S.	9.6
17.19*	24" CMP	Flap Gate W.S.	11.0
17.26*	24" CMP	Flap Gate W.S.	13.8
17.53*	24" CMP	Flap Gate W.S.	7.5
18.19*	24" CMP	Flap Gate W.S.	10.0
18.45*	24" CMP	Flap Gate W.S.	8.1
18.79*	24" CMP	Flap Gate W.S.	10.4
19.17*	24" CMP	Flap Gate W.S.	7.4
19.34*	60" CMP	Flap Gate W.S.	15.5
19.54*	24" CMP	Flap Gate W.S.	7.1
19.81*	24" CMP	Flap Gate W.S.	6.5
20.18*	24" CMP	Flap Gate W.S.	7.2
20.27*	36" CMP	Flap Gate W.S.	8.0
20.71*	30" CMP	Flap Gate W.S.	8.9
21.40*	36" CMP	Flap Gate W.S.	5.6
21.76*	24" CMP	Flap Gate W.S.	4.7
22.13*	24" CMP	Flap Gate W.S.	7.2

UNIT NO. 2

San Joaquin River - Left Bank

.24*	24" CMP	Flap Gate W.S.	8.8
.67*	24" CMP	Flap Gate W.S.	12.9
1.02*	24" CMP	Flap Gate W.S.	6.6
1.22*	24" CMP	Flap Gate W.S.	5.6

UNIT NO. 2 (Continued)

Levee Mile	Size of Pipe	Description	Feet Below Crown
1.34*	36" CMP	Flap Gate W.S.	11.6
1.62*	24" CMP	Flap Gate W.S.	8.1
1.86*	24" CMP	Flap Gate W.S.	8.7
2.30*	24" CMP	Flap Gate W.S.	4.3
2.32*	24" CMP	Flap Gate W.S.	4.3
2.59*	24" CMP	Flap Gate W.S.	5.9
2.96*	24" CMP	Flap Gate W.S.	8.0
3.29*	24" CMP	Flap Gate W.S.	10.4
3.62*	24" CMP	Flap Gate W.S.	8.0
3.95*	24" CMP	Flap Gate W.S.	6.7
5.43*	24" CMP	Flap Gate W.S.	6.5
6.06*	24" CMP	Flap Gate W.S.	10.1
6.50*	24" CMP	Flap Gate W.S.	5.7
7.05*	24" CMP	Flap Gate W.S.	10.2
7.77*	24" CMP	Flap Gate W.S.	6.0
8.16*	24" CMP	Flap Gate W.S.	7.1
8.48*	24" CMP	Flap Gate W.S.	7.5
9.86*	24" CMP	Flap Gate W.S.	6.7
9.02*	36" CMP	Flap Gate W.S.	5.8
9.20*	24" CMP	Flap Gate W.S.	5.9
9.46*	24" CMP	Flap Gate W.S.	7.0
10.12*	24" CMP	Flap Gate W.S.	10.2
10.81*	24" CMP	Flap Gate W.S.	6.0
11.17*	24" CMP	Slide Gate W.S.	6.0
11.43*	24" CMP	Slide Gate W.S.	6.0
13.22*	24" CMP	Slide Gate W.S.	4.6

UNIT NO. 3

San Joaquin River - Right Bank

.43*	24" CMP	Flap Gate W.S.	9.8
.77*	24" CMP	Flap Gate W.S.	7.8
1.72*	24" CMP	Flap Gate W.S.	6.0
2.05*	36" CMP	Flap Gate W.S.	3.0

UNIT NO. 4

San Joaquin River - Left Bank

.27*	36" CMP	Flap Gate W.S.	14.7
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UNIT NO. 5

Eastside Bypass - Right Bank

Levee Mile	Size of Pipe	Description	Feet Below Crown
0.07*	24" CMP	Flap Gate W.S.	6.8
0.30*	24" CMP	Flap Gate W.S.	5.6
0.59*	30" CMP	Flap Gate W.S.	5.4
0.65*	36" CMP	Flap Gate W.S.	9.8
0.84*	24" CMP	Flap Gate W.S.	13.3
1.44*	36" CMP	Flap Gate W.S.	16.5
2.85*	24" CMP	Flap Gate W.S.	14.0
3.33*	24" CMP	Flap Gate W.S.	13.3
3.67*	24" CMP	Flap Gate W.S.	13.4
4.02*	24" CMP	Flap Gate W.S.	15.2
4.27*	24" CMP	Flap Gate W.S.	8.7
4.54*	24" CMP	Flap Gate W.S.	10.0
4.89*	24" CMP	Flap Gate W.S.	10.2
5.15*	24" CMP	Flap Gate W.S.	10.1
5.58*	24" CMP	Flap Gate W.S.	7.4
6.35*	24" CMP	Flap Gate W.S.	11.0
7.36*	24" CMP	Flap Gate W.S.	9.9
7.58*	24" CMP	Slide Gate W.S.	18.9
8.44*	24" CMP	Flap Gate W.S.	14.8
8.83*	Deadman Creek Drainage Ditch Structure	2 Slide Gates Land Side	9.8
8.90*	48" CMP	East Side Canal Siphon	12.6
9.26*	36" CMP	Slide Gate W.S.	11.9
10.05*	24" CMP	Slide Gate W.S.	13.9
11.48*	2-48" CMP	Slide Gates W.L.	12.0
11.63*	24" CMP	Flap Gate W.S.	9.4
11.99*	24" CMP	Flap Gate W.S.	10.1
12.38*	24" CMP	Flashboard Attach. L.S. Flap Gate W.S.	8.6
12.87*	24" CMP	Flashboard Attach. L.S. Flap Gate W.S.	8.5
13.40*	48" CMP	Flashboard Attach. L.S. Flap Gate W.S.	6.0
14.72*	24" CMP	Flap Gate W.S.	9.9
13.83*	24" CMP	Flap Gate W.S.	10.5
14.44*	24" CMP	Flap Gate W.S.	10.7
15.09*	36" CMP	Flap Gate W.S.	9.0
15.74*	24" CMP	Flap Gate W.S.	10.2
15.77*	36" CMP	Slide Gate W.S.	7.7
15.80*	24" CMP	Flap Gate W.S.	10.6
16.67*	24" CMP	Flap Gate W.S.	10.2
17.20*	24" CMP	Flap Gate W.S.	9.4
17.52*	24" CMP	Flap Gate W.S.	9.1
18.07*	24" CMP	Flap Gate W.S.	11.8

UNIT NO. 5 (Continued)

Levee Mile	Size of Pipe	Description	Feet Below Crown
18.68	24" CMP	Flap Gate W.S.	8.2
19.11	24" CMP	Flap Gate W.S.	10.4
19.15	24" CMP	Flap Gate W.S.	10.5
19.46	24" CMP	Flap Gate W.S.	9.4
19.50	24" CMP	Flap Gate W.S.	10.0
19.84	24" CMP	Flap Gate W.S.	8.5
19.92	36" CMP	Flap Gate W.S.	7.2
20.05	36" CMP	Flap Gate W.S.	7.3
20.18	36" CMP	Flap Gate W.S.	7.8
20.59	24" CMP	Flap Gate W.S.	8.8
21.08	24" CMP	Flap Gate W.S.	10.1
21.42	36" CMP	Flap Gate W.S.	10.0
21.81	24" CMP	Flap Gate W.S.	10.8
21.85	24" CMP	Flap Gate W.S.	9.0
22.19	24" CMP	Flap Gate W.S.	8.6
22.46	24" CMP	Flap Gate W.S.	8.8
22.79	24" CMP	Flap Gate W.S.	10.5
22.94	24" CMP	Flap Gate W.S.	9.5
23.15	30" CMP	Flap Gate W.S.	9.5
23.62	30" CMP	Flap Gate W.S.	9.9
23.85	36" CMP	Flap Gate W.S.	9.4
24.18	24" CMP	Flap Gate W.S.	9.4
24.46	24" CMP	Flap Gate W.S.	9.5
24.82	24" CMP	Flap Gate W.S.	9.1
24.87	30" CMP	Flap Gate W.S.	8.7
25.43	30" CMP	Flap Gate W.S.	9.2
25.51	30" CMP	Flap Gate W.S.	9.8
25.53	30" CMP	Flap Gate W.S.	9.9
26.11	24" CMP	Flap Gate W.S.	9.4
26.29	36" CMP	Flap Gate W.S.	10.2
26.85	24" CMP	Flap Gate W.S.	9.7
26.87	24" CMP	Flap Gate W.S.	9.6
27.22	36" CMP	Flap Gate W.S.	9.2
28.17	24" CMP	Flap Gate W.S.	9.2
28.69	30" CMP	Flap Gate W.S.	8.6
28.95	48" RCP	Rodunder siphon	11.7
		Slide Gate L.S.	
29.49	36" CMP	Flap Gate W.S.	7.5
29.72	2.5'x2.5' RCBC	Flap Gate W.S.	9.0
30.04	2.5'x2.5' RCBC	Flap Gate W.S.	10.1
30.96	2.5'x2.5' RCBC	Flap Gate W.S.	10.3
31.19	2.5'x2.5' RCBC	Flap Gate W.S.	10.4
31.64	4'x3' RCBC	Flap Gate W.S.	11.0
31.71	2.6'x2.6' RCBC	Flap Gate W.S.	10.0
		Headwall Flashboard Attachment L.S.	
32.22	2.6'x2.6' RCBC	Flap Gate W.S.	11.2
		Headwall Flashboard Attachment L.S.	

UNIT NO. 5 (Continued)

Levee Mile	Size of Pipe	Description	Feet Below Crown
33.01	2.6'x2.6'	RCBC Flap Gate W.S.	9.2
33.72	2.6'x2.6'	RCBC Flap Gate W.S.	10.9
34.51	3'x3'	RCBC Slide Gate L.S.	5.9
		Chowchilla Canal	
		Irrigation Structure	

UNIT NO. 6

Eastside Bypass - Left Bank

0.05*	24" CMP	Flap Gate W.S.	10.1
0.74*	24" CMP	Slide Gate W.S.	8.0
0.86*	24" CMP	Flap Gate W.S.	14.4
1.95*	24" CMP	Flap Gate W.S.	12.7
2.61*	36" CMP	Slide Gate W.S.	3.8
2.65*	24" CMP	Flap Gate W.S.	8.1
2.85*	24" CMP	Flap Gate W.S.	8.8
3.09*	24" CMP	Flap Gate W.S.	9.9
3.29*	24" CMP	Flap Gate W.S.	8.6
3.43*	36" CMP	Flap Gate W.S.	13.0
3.54*	36" CMP	Slide Gate W.S.	4.0
3.77*	24" CMP	Flap Gate W.S.	6.2
3.97*	36" CMP	Slide Gate W.S.	3.7
4.17*	24" CMP	Flap Gate W.S.	8.8
4.41*	24" CMP	Flap Gate W.S.	9.4
4.70	36" CMP	Slide Gate W.S.	4.8
4.75*	24" CMP	Flap Gate W.S.	8.7
4.94*	24" CMP	Flap Gate W.S.	8.9
5.34*	24" CMP	Flap Gate W.S.	9.0
5.63*	24" CMP	Flap Gate W.S.	9.0
6.06*	24" CMP	Flap Gate W.S.	7.1
6.79*	24" CMP	Slide Gate W.S.	6.6
6.97*	36" CMP	Slide Gate W.S.	7.7
7.29*	24" CMP	Flap Gate W.S.	8.8
7.74*	24" CMP	Flap Gate W.S.	10.0
8.21*	24" CMP	Flap Gate W.S.	14.8
8.51*	24" CMP	Flap Gate W.S.	9.4
9.64*	3-48" CMP	Eastside Canal Diversion Box	
	1-36" CMP, 2-48" Slide Gates,	1-36" Slide Gate	
11.64*	24" CMP	Flap Gate W.S.	14.7
11.82*	36" CMP	Slide Gate W.S.	13.7
13.30*	24" CMP	Slide Gate W.S.	8.8
14.44*	24" CMP	Flap Gate W.S.	10.2
15.76*	24" CMP	Flap Gate W.S.	12.0
15.91*	36" CMP	Flap Gate W.S.	13.8
16.49*	36" CMP	Slide Gate W.S.	5.9
		Siphon Under Channel	

UNIT NO. 6 (Continued)

Levee Mile	Size of Pipe	Description	Feet Below Crown
18.27*	24" CMP	Flap Gate W.S.	9.2
18.91	48" CMP	Slide Gate L.S.	5.0
		Siphon Under Channel	
18.97*	24" CMP	Slide Gate W.S.	8.3
19.36*	48" CMP	Slide Gate W.S.	16.3
19.85	2.5'x2.5' RCBC	Flap Gate W.S.	10.8
29.34	36" CMP	Irrigation Structure	9.7
		Slide Gate W.S.	
30.27	48" RCP	Rodunder Siphon	10.3
		Slide Gate L.S.	
35.33	6'x4' RCBC	Slide Gate W.S.	10.1
		Fresno River Irrigation Structure	

UNIT NO. 7

Bear Creek - Right Bank

0.07*	24" CMP	Flap Gate W.S.	9.4
0.33*	24" CMP	Flap Gate W.S.	9.6
0.49*	36" CMP	Slide Gate W.S.	6.4
0.53*	24" CMP	Flap Gate W.S.	7.3
0.85*	24" CMP	Flap Gate W.S.	7.5
0.94*	24" CMP	Flap Gate W.S.	9.4
1.17*	48" CMP	Flap Gate W.S.	10.4
1.51*	24" CMP	Flap Gate W.S.	11.7
2.48	24" CMP	Flap Gate W.S.	7.4
2.64*	24" CMP	Flap Gate W.S.	9.4
3.09*	24" CMP	Flap Gate W.S.	8.3

UNIT NO. 8

Bear Creek - Left Bank

0.23*	24" CMP	Flap Gate W.S.	7.4
0.57*	24" CMP	Flap Gate W.S.	10.3
0.72*	24" CMP	Flap Gate W.S.	8.3
0.89*	24" CMP	Flap Gate W.S.	9.4
1.21*	24" CMP	Flap Gate W.S.	9.7
1.38*	24" CMP	Flap Gate W.S.	10.0
2.05*	24" CMP	Flap Gate W.S.	9.9
2.12*	24" CMP	Flap Gate W.S.	7.3
2.77*	24" CMP	Flap Gate W.S.	8.4
3.06*	36" CMP	Flap Gate W.S.	10.4
3.24*	24" CMP	Flap Gate W.S.	8.0
3.43*	24" CMP	Flap Gate W.S.	11.0

Description (Continued)

4100

UNIT NO. 9

Owens Creek - Right Bank

<u>Levee Mile</u>	<u>Size of Pipe</u>	<u>Description</u>	<u>Feet Below Crown</u>
0.47*	24" CMP	Slide Gate W.S.	16.6
0.70*	24" CMP	Flap Gate W.S.	6.5
0.87*	24" CMP	Crane Irrigation Structure 2-Slide Gates W.S.	7.5

UNIT NO. 10

Owens Creek - Left Bank

0.02*	24" CMP	Flap Gate W.S.	7.3
0.31*	36" CMP	Slide Gate W.S.	17.4

UNIT NO. 11

Mariposa Bypass - Right Bank

.42*	24" CMP	Flap Gate W.S.	8.9
.65*	24" CMP	Flap Gate W.S.	8.2
.84*	24" CMP	Flap Gate W.S.	8.2
1.13*	24" CMP	Flap Gate W.S.	7.8
1.50*	48" CMP	Slide Gate W.S.	12.4
1.99*	24" CMP	Flap Gate W.S.	10.6
3.04*	24" CMP	Flap Gate W.S.	14.6
3.32*	24" CMP	Flap Gate W.S.	7.3
3.33*	48" CMP	Slide Gate L.S. Eastside Canal Siphon	11.5

UNIT NO. 12

Mariposa Bypass - Left Bank

.39*	24" CMP	Flap Gate W.S.	8.5
1.06*	24" CMP	Flap Gate W.S.	8.1
1.27*	24" CMP	Flap Gate W.S.	15.0
1.53*	24" CMP	Flap Gate W.S.	11.4
2.16*	24" CMP	Flap Gate W.S.	11.7
2.70*	24" CMP	Flap Gate W.S.	8.7
3.00*	24" CMP	Flap Gate W.S.	12.3
3.36*	48" CMP	Eastside Canal Siphon	11.4

UNIT NO. 13

Ash Slough Levee - Right Bank

<u>Levee Mile</u>	<u>Size of Pipe</u>	<u>Description</u>	<u>Feet Below Crown</u>
1.14	2-36" CMP	Rodunder Irrigation Structure 2-Slide Gates W.S.	9.3

UNIT NO. 14

Ash Slough Levee - Left Bank

1.15	36" CMP	Rodunder Irrigation Structure Slide Gate W.S.	8.3
1.26	36" CMP	Irrigation Structure Slide Gate W.S.	6.3

UNIT NO. 15

Berenda Slough - Right Bank

.48	2.5'x2.5' RCBC	Flap Gate W.S.	7.1
1.01	2.5'x2.5' RCBC	Flap Gate W.S.	4.0
1.53	2.5'x2.5' RCBC	Flap Gate W.S.	4.5

UNIT NO. 16

Berenda Slough - Left Bank

1.46	2.5'x2.5' RCBC	Flap Gate W.S.	5.2
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UNIT NO. 17

Chowchilla Canal Bypass - Right Bank

2.58	5'x4' RCBC	Flap Gate W.S.	9.1
4.69	5'x4' RCBC	Flap Gate W.S.	9.1
8.38	5'x4' RCBC	Flap Gate W.S.	10.6
9.89	5'x4' RCBC	Flap Gate W.S.	10.8
13.30	5'x4' RCBC	Flap Gate W.S.	9.5
14.69	2.5'x2.5' RCBC	Flap Gate W.S.	11.0

X

Description (Continued)

(Continued) 4100

UNIT NO. 22

East Side Canal Levee - Left Bank

Levee Mile	Size of Pipe	Description	Feet Below Crown
0.10*	24" CMP	Slide Gate L.S.	12.5
1.02*	36" RCP	Existing Siphon	5.0
1.57*	8" CMP	No Closure Device	6.2
2.72*	24" CMP	Slide Gate L.S.	8.3
5.48*	48" CMP	Slide Gate L.S.	11.4

UNIT NO. 23

San Joaquin River - Right Bank

.21	2.5'x2.5' RCBC	Flap Gate W.S.	9.7
5.71	3' x3' RCBC	Flap Gate W.S.	5.1
8.33	2.5'x2.5' RCBC	Flap Gate W.S.	2.2
8.54	2.5'x2.5' RCBC	Flap Gate W.S.	2.6
9.03	16" Steel	Irrigation Pipe (Well on W.S.)	2' Min.
9.27	16" Steel	Irrigation Pipe (Well on W.S.)	2' Min.
9.76	2-5.25'x4' Barrel RCBC	2-Slide Gates W.S. (Gravelly Ford Canal Irrigation Structure)	5.3

UNIT NO. 24

San Joaquin River - Left Bank

8.15	36" C.P.	Flap Gate W.S.	--
8.32	12" C.P.	Flap Gate W.S.	--

UNIT NO. 25

Salt Slough - Right Bank

0.02*	24" CMP	Flap Gate W.S.	8.5
0.35*	24" CMP	Flap Gate W.S.	9.6
0.59*	24" CMP	Flap Gate W.S.	12.7

* Denotes "as built" drainage or irig structures

Description (Continued)

(Continued) 4100

UNIT NO. 25 (Continued)

<u>Levee Mile</u>	<u>Size of Pipe</u>	<u>Description</u>	<u>Feet Below Crown</u>
0.97*	24" CMP	Flap Gate W.S.	11.4
2.05*	24" CMP	Flap Gate W.S.	2.0
2.45*	24" CMP	Flap Gate W.S.	9.2

Inspection and Maintenance

4200

General. Adequate measures shall be taken to insure

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that inlet and outlet channels are kept open and trash drift or debris is not allowed to accumulate near drainage structures. Flap gates and manually-operated slide gates 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:

- (1) Pipes, gates, operating mechanisms, riprap, and headwalls are in good condition;
- (2) Inlet and outlet channels are open;
- (3) Care is being exercised to prevent the accumulation of trash and debris near the structures and that fires are not allowed to occur near bituminous coated pipes;
- (4) Erosion is not occurring adjacent to the structures which might endanger its watertightness or stability.

*Denotes "as built" Drainage or irrigation structure.

Feet Below Crown denotes measurement from finish levee crown to top of pipe or culvert.

Note on Abbreviations: CMP - Corrugated Metal Pipe
 LS - Landside
 WS - Waterside
 RCBC - Reinforced Concrete Box Culvert

to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspection. The following maintenance activity shall be carried out:

(1) Lubricate moving parts of lift assembly, stems of lift gates and hinge points of flap gates with a light film of high grade lubricant, such as, Alvania #2 EP, Molylcote Type G, Tycol Azepro 11.

(2) Damaged protective coatings of metal parts shall be replaced as soon as possible. The surface shall be thoroughly cleaned and an approved type of coating applied. The cleaning and coating shall be as specified by the manufacturers' recommendation for that item or the latest approved method.

(3) All eroded concrete shall be repaired as soon as erosion reaches a depth of 4 inches or any reinforcing steel is exposed. All evidence of settlements, uplift, or failure of concrete should be referred to the General Manager of the State Reclamation Board for analysis and recommendation of remedial measures.

(4) 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.

Compliance with the provisions prescribed above pertaining to drainage structures is essential for proper maintenance of the levee system covered by this manual. Levee failure caused by neglected drainage structures are of common occurrence and

it is of utmost importance that these structures always be kept in perfect working condition.

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 low-lying pockets on the landside of the levee. Plans for the modification of side drainage facilities or the maintenance of side drainage facilities affected by filling of low lying pockets should be submitted to the Reclamation Board for approval before such work is started.

Maintenance of irrigation structures is the responsibility of the individual property owner unless the district has agreed to maintain the structure.

Inspection. Periodic inspections shall be made to

insure that all facilities are in good operating condition as follows:

(1) Since the outlets of pipes crossing under the levee are inundated at relatively low water stages, all pipes extending through the levee shall be inspected considerably in advance of the beginning of the flood season. The gates on these pipes should be checked at the same time.

(2) Inspection of all drainage structures shall also be made following each major high-water period.

(3) At other times not exceeding 90 days.

(4) If the inspection of an irrigation structure of a private owner discloses any condition requiring repair or maintenance, the Superintendent shall notify the private owner about the deficient condition. When the next scheduled inspection is

made and the structure deficiency has not been corrected, the Superintendent shall address a letter to the owner of the structure, with a copy to the Reclamation Board, directing attention to the conditions observed and requesting that immediate steps be taken to correct them. The owner of the structure will advise the district as to the nature of the corrections undertaken and the date that the corrections were completed. The district will advise the Reclamation Board of the actions taken by the property owner.

Encroachments. A permit from the Reclamation Board must be obtained for any additional fences, culverts or other encroachments proposed by a property owner. Culvert or pipe installations will be made in accordance with standards and drawings established by the Reclamation Board. These standards and drawings and application forms may be obtained from the Reclamation Board, Room 1335, Resources Building, 1416 - 9th Street, Sacramento, California, 95814. No work shall be undertaken unless approved by the Reclamation Board. A State engineer will check the installation for compliance with the Reclamation Board order. This procedure insures that proposed encroachments will not be detrimental to the proper operation and maintenance of the project and also will insure that the proposed structures are properly installed.

The Superintendent or his assistants should advise the property owner of the need to obtain the Board permit prior to construction of additional irrigation or drainage structures.

Checklists

A form suggested as a checklist for reporting inspections of drainage structures will be found in Appendix F. These should be used in each inspection to insure that structures are kept in working condition at all times. (See pages F-4 and F-5).

Operations

Irrigation and drainage structures shall be operated to prevent or reduce flooding during the flood season and periods of high water. 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 and hand-operated slide gates and valves shall be closed to prevent escape of floodwaters from the channel. All irrigation and 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 should be taken to correct any situation which appears to be developing into a condition that will endanger the safety of the levee.

Positive Closure Devices.

It is essential that the protection afforded by the flood control project not be nullified in any extent by backflow through irrigation and drainage structures. It is the responsibility of the Superintendent to see that the gates are operated according to the best interest of the project.

Positive Closure Devices.

It is essential that the protection afforded by the flood control project not be nullified in any extent by backflow through irrigation and drainage structures. It is the responsibility of the Superintendent to see that the gates are operated according to the best interest of the project.

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

Compliance with the maintenance provisions prescribed in paragraph 4200 above pertaining to drainage structures is essential for proper maintenance of the levee system covered by this manual. Levee failure caused by neglected drainage structures are of common occurrence; it is therefore of utmost importance that these structures always be kept in perfect working conditions.

Description

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The channel as defined for this project is that area lying along the waterway between the waterward toe of one levee and the waterward toe of the opposite levee. In cross section this includes the drainage channel and banks, and the area from top of bank to toe of levee which is called the berm or floodway.

The channels consist of natural drainage channels and bypass channels constructed as a part of the project. These channels extend along and adjacent the San Joaquin River from Merced River to Mendota Dam, and from junction with Chowchilla Canal Bypass to Gravelly Ford; along and adjacent to Salt Slough from junction with San Joaquin River to a point approximately 2.5 miles upstream; along and adjacent to the alignment of Eastside Bypass from San Joaquin River to Chowchilla Canal Bypass; along and adjacent to Bear and Owens Creeks from Eastside Bypass to East Side Canal; along and adjacent to the alignment of Mariposa Bypass from San Joaquin River to Eastside Bypass; along and adjacent to Ash and Berenda Sloughs from Eastside Bypass to Chowchilla Canal; and along and adjacent to alignment of Chowchilla Canal Bypass from its junction with Eastside Bypass to the San Joaquin River. These areas are as shown on the Location Map of Appendix B.

An important feature included under this chapter is the Sediment Settling Basin situated in the Chowchilla Canal Bypass just

below the control structure. The settling basin has been designed for a 1.5 project storm bed load. This volume of sedimentation storage is approximately 200,000 cubic yards. The main geometric shape of the settling basin measures 1,600 feet along the centerline of the bypass channel, 350 feet in width, and 7.5 feet in depth below an extended line between the entrance and exit inverts of the drainage channel. The side slopes are 3 to 1 with 500-foot wedge-shaped transition at each end conforming to the drainage channel section.

Sedimentation disposal areas have been provided on the land-side of the Chowchilla Canal Bypass levees. On the right bank, the spoil area extends from Levee Mile 14.70 to Levee Mile 16.09 and on the left bank, from Levee Mile 13.99 to Levee Mile 15.27.

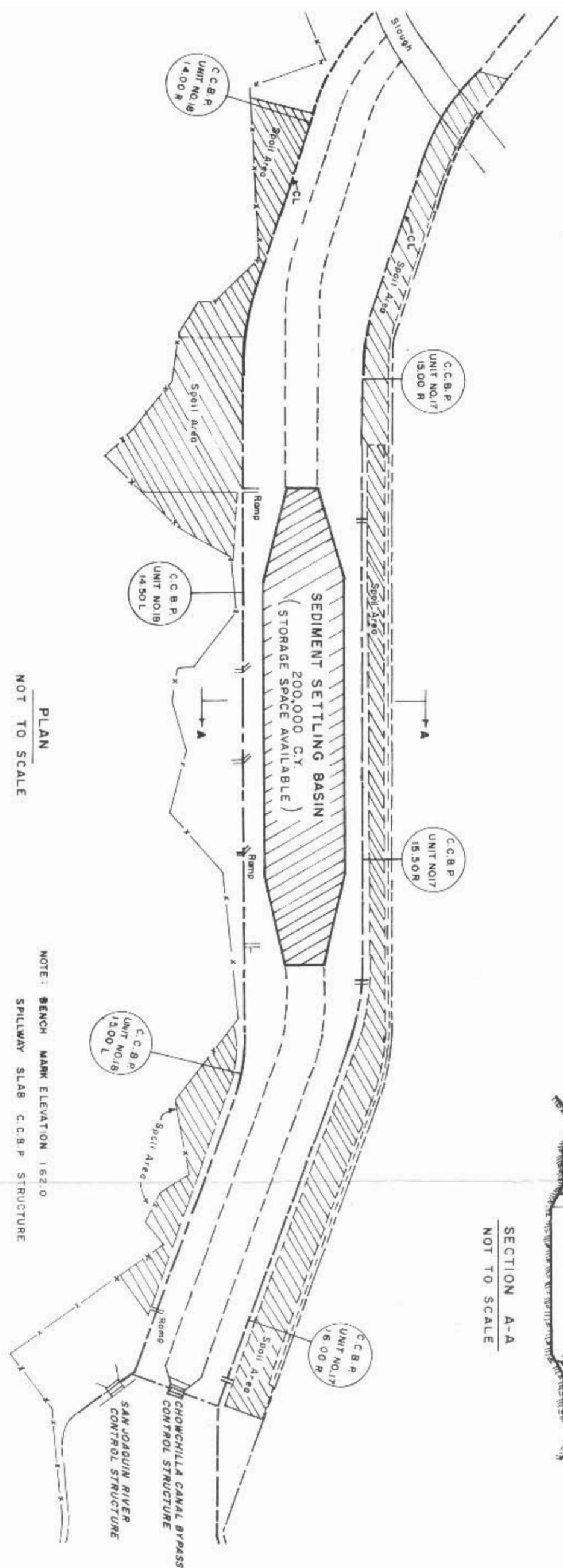
Ramps have been constructed for hauling the sedimentation material across the levees from the channel area to the spoil areas on the landward side of levee system. Three of these ramps are on the right levee and five are on the left. Following is a plan and profile for assistance when it will be necessary to reestablish the settling basin. Also shown is the location of ramps and spoil areas.

Inspection and Maintenance

5200

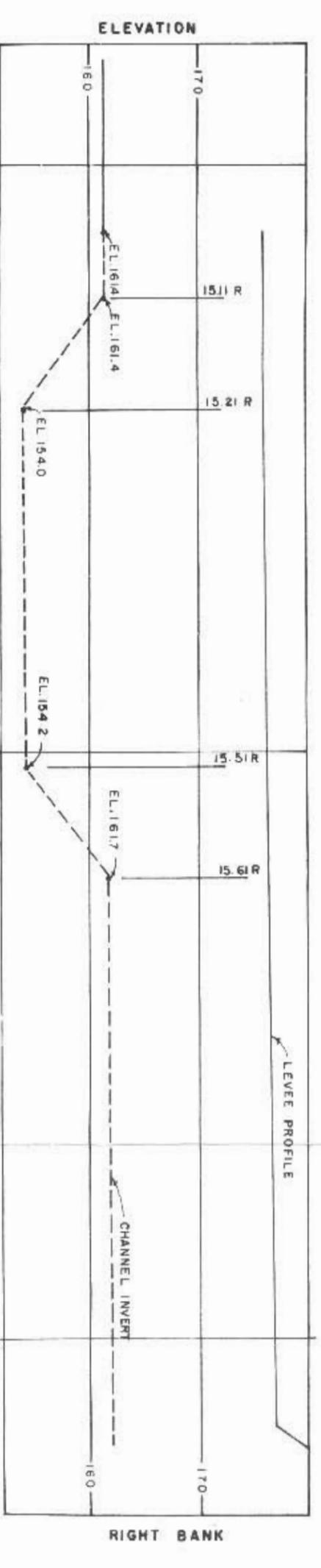
Periodic Inspections. Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

5210

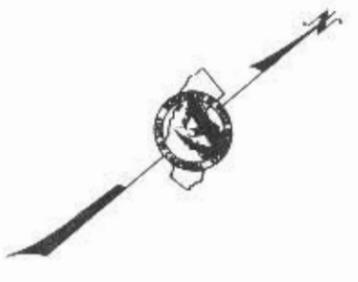


PLAN
NOT TO SCALE

NOTE: BENCH MARK ELEVATION 162.0
SPILLWAY SLAB C.C.B.P. STRUCTURE



PROFILE OF SETTLING BASIN
NOT TO SCALE



STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
STATEWIDE OPERATIONS OFFICE

PLAN AND PROFILE
OF
SEDIMENT SETTLING BASIN
AND
SPOIL AREA

1966

0992 Periodic Inspections. (Continued) Channel Maintenance

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(1) The channel floodway is clear of debris, weeds, and wild growth.

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

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

(4) That the Sediment Settling Basin has maximum space available for deposition of debris material.

(5) Banks are not being damaged by rain or wave wash and are not sloughing.

(6) Riprap sections are in good condition.

(7) 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 and end of the flood season and at other periods at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions found on the inspections.

Channel Maintenance. The channels of the project shall be maintained and kept clear of regrowth of vegetation. This is necessary as regrowth of vegetation will change the floodflow characteristics of the project channels. The purpose of channel maintenance is to insure that the channel is kept in as good a condition as when the project was constructed.

5220

A regular program of channel maintenance shall be instituted by the district. Before the beginning of the flood season the following maintenance operations shall be accomplished:

(1) Tree and brush growth in the channel shall be cleared and removed along with any debris that may be present. For exception see 3222 (2) - A strip of brush and small trees may be retained, through application to the Reclamation Board, on the floodplain within 10 feet of the levee on the waterward side where necessary to prevent erosion and wave wash. Regrowth of trees and brush will need regular attention.

Vegetation measuring 6 inches or more in largest diameter as measured 3 feet above the ground surface is classified as a tree. Vegetation measuring less than the above limiting diameter is classified as brush and includes willows, tules or like vegetation but does not include grass, weeds, crops, or other similar organic matter.

All debris resulting from clearing operations shall be burned and removed from the channel. Piling for burning shall be done in such a manner as to cause the least fire risk.

Burning shall be done in conformance with local regulations.

All burning shall be so thorough that the materials are reduced to ashes. Debris which cannot be burned shall be removed from the channel and disposed of.

(2) Shoaling or aggradation at inlets and outlets of side drainage structures shall be removed so that the drains function properly.

(3) Suitable riprap material shall be placed to repair existing slope protection or in other locations found to be

critical trouble points to stabilize the channel alignment and preserve the general uniformity of the bank lines.

(4) Sediment, rubbish, industrial waste, debris, plugs or other obstructions shall be removed from the channel to prevent any tendency for the flow to be deflected within the channel. The material that accumulates in the main channel as a result of turbulences shall be removed to keep the channel clear.

(5) Sediment and debris shall be removed from the Sediment Settling Basin. The Sediment Settling Basin, entrance and exit channel thereto shall be restored to the lines and grades as shown on the preceding Sediment Settling Basin Plan and Profile sheet of this chapter.

The sediment material shall be wasted in designated spoil areas along the landside of the Chowchilla Canal Bypass levees. Material shall be graded to a uniform surface, and sloped to drain. Compaction of this material is not required.

When spreading material in the spoil areas, care should be taken not to bury any of the drainage ditches or side drainage inlets. Material shall be placed against landside of levee when making lifts. Begin fill 5 feet away from right-of-way fence and maintain a 3 to 1 slope.

(6) Encroachments in the channel shall be noted and reported to the Reclamation Board immediately.

U. S. A. Wildlife Management Area. The district 5221 is responsible for project channel and levee maintenance within the area shown on the Location Maps (Appendix B as U. S. A. Wildlife Management Area). The U. S. Government is responsible

for the maintenance of the following facilities within the channel of the wildlife management area:

- (1) 16" irrigation well and pump on elevated pad at levee height.
- (2) 2250 feet of low dikes, 3 feet high, 10:1 slopes with 6-foot crown.
- (3) Drainage structure, 24 feet C.S.P. with 36-inch flashboard riser.
- (4) Fences located in channel of wildlife management area.

Checklists

5300

Suggested forms to use in the inspection of the channels and the Debris Settling Basin are located in Appendix F. (See pages F-6, F-7, F-8, and F-9)

Operation

5400

Both banks of the channels and floodways 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.

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.

Clearing of channels presents hazards, which, unless foreseen and guarded against, may result in serious consequences. Clearing the channel of growing vegetal matter involves the use of axes, brush-hooks or other sharp-edged hand tools. In order that the work may be accomplished with a minimum of exposure, the following precautions should be observed:

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

Description

6100

Miscellaneous facilities and structures which were constructed by contract as a part of, or in conjunction with, the protective works, and which effect their functioning include the following items:

Bridges, Low Water and Dip Crossings. Bridges, low water 6110

and dip crossings are listed as follows and are located as shown on Location Map, Appendix B.

(1) Bear Creek Patrol Bridge over Eastside Bypass.

(2) Sand Slough Patrol Bridge over Sand Slough

Interchange Pool.

(3) East Side Canal Patrol Bridge over Bear Creek.

(4) Sandy Mush Road County Bridge over Eastside

Bypass.

(5) West Washington Road County Bridge over Eastside

Bypass.

(6) Avenue 21 County Bridge over Eastside Bypass.

(7) Road 4 County Bridge over Eastside Bypass.

(8) Avenue 18-1/2 County Bridge over Eastside Bypass.

(9) Road 9 County Bridge over Berenda Slough.

(10) Road 9 County Bridge over Eastside Bypass.

(11) Avenue 14 County Bridge over Chowchilla Bypass.

(12) Firebaugh-Madera Road Bridge over Chowchilla Bypass.

(13) Firebaugh-Fresno Road Bridge over Chowchilla Bypass.

(14) Triangle "T" Ranch Access Bridge over Eastside

Bypass.

(15) Harney Access Bridge across channel of Eastside Bypass. (Deck 2 feet below maximum design water surface elevation.)

(16) Dickinson Ferry Road (Greenhouse Road) Access Bridge across channel of Eastside Bypass. (Deck 3 feet below maximum design water surface elevation.)

(17) Hayfield Access Bridge across channel of Eastside Bypass. (Deck 5 feet below maximum design water surface elevation.)

(18) Chamberlain Road Access Bridge across channel of Eastside Bypass. (Deck 2 feet below maximum design water surface elevation.)

(19) Crane Access Bridge across channel of Bear Creek. (Deck 3.5 feet below maximum design water surface elevation.)

(20) State Highway 152 Bridge across Eastside Bypass.

(21) Low water (dip) crossing of Bear Creek at west line of Section 3, T. 8 S., R. 11 E.

(22) Low water crossing (pipe culvert), Eastside Bypass along west line of Section 14, T. 8 S., R. 11 E.

(23) McNamara Road low water (dip) crossing of Eastside Bypass along east line, Section 32, T. 8 S., R. 12 E.

(24) Newhall low water (dip) crossing of Eastside Bypass. North line, Section 30, T. 9 S., R. 13 E.

All bridges are reinforced concrete structures consisting of piles, deck slab, with abutment at each end. The patrol and access bridges are 18'-4" in width, the county bridges 30'-4" wide, and the Highway 152 Bridge is 34'-0" wide. They have either a

metal or timber guardrail. Approach embankments connect the bridge ends to the adjacent levee. The embankment slopes have a 12-inch thick layer of stone protection from the toe to a point 3 feet below the top.

Bridges for patrol and access purposes have been constructed as part of the major control structures. These are as follows:

- (1) Mariposa Bypass Control Structure and patrol bridge.
- (2) Eastside Bypass Control Structure and patrol bridge.
- (3) Chowchilla Bypass Control Structure and patrol bridge.
- (4) San Joaquin River Control Structure and patrol bridge.

The new bridges in conjunction with the major control structures are more fully described in the control structure manuals.

6120 Structures. Miscellaneous structures which are a part of the project are listed as follows:

- (1) San Joaquin River Structure

The San Joaquin River structure is located in the channel of the San Joaquin River at the junction of the Eastside Bypass and Sand Slough interchange pool. The structure is a reinforced concrete culvert through the levee with head and end walls. Also appurtenant to the installation are a timber sheet piling cutoff wall and 24" thick stone protection on the downstream slopes of the river bank. Portions of the stone protection adjacent to the end wall have been grouted.

X

The culvert has four 5'-3" x 6'-0" barrels with each opening 5 feet square. A slide gate and lift device has been installed at the upstream end of each barrel.

(2) Sand Slough Structure

The Sand Slough structure is located at the junction of the San Joaquin River and Eastside Bypass at Sand Slough interchange pool. The structure consists of stone grouted cobble cutoff walls, grouted cobble slope and crest paving, and reinforced concrete Parshall flume with timber flashboards.

(3) Bear Creek Diversion Structure

The Bear Creek Diversion structure is located in the channel of Bear Creek at the junction with East Side Canal. The structure is reinforced concrete with cutoff wall, invert slab 14 feet wide and 52 feet long. One-foot thick walls forming six 7-foot wide bays, end walls and wing walls, 3-foot wide catwalk spanning all the bays from end wall to end wall, and flashboards (3 inch x 12 inch x 7 feet - 10 inches) of Redwood -- 10 each bay. Also included is the grouted stone channel, slope protection and levees extending from the patrol bridge upstream to the head of the project; and the asphalt concrete patrol road on the left bank extending from the patrol bridge to the diversion structure.

(4) Owens Creek Structure

The Owens Creek structure is an existing structure which controls the flow into the project at East Side Canal and Owens Creek. The structure is reinforced concrete with seven bays,

3

X

invert slab, end walls and wing walls. Flashboards are in the upstream end of the structure to control the water surface elevation in the East Side Canal.

A 12-foot wide timber decking has been constructed across the structure as a part of the project. The decking provides access across Owens Creek for patrol and maintenance purposes.

(5) Fresno River Drainage Structure

The Fresno River drainage structure is located at the mouth of the Fresno River. More specifically, its location is in the right bank of the San Joaquin River approximately 1.2 miles upstream from the end of Levee Unit No. 3. The structure is a 4-foot by 6-foot reinforced concrete box culvert. The riser unit and slide gate with pedestal type lifting device is on the landward side of the San Joaquin River. The culvert has a head and end wall with a 2-foot by 8-foot wide channel invert stone protection adjacent to and the full length of the headwall.

Included with the installation is a levee embankment plugging the channel of the Fresno River along the axis of the right bank levee of the San Joaquin River. The Fresno River Channel between Eastside Bypass and the San Joaquin River is interior drainage and is not a part of the project works.

(6) Drop Structures

These structures are reinforced concrete with cutoff walls, crest or headwall, spillway apron slab, floor blocks, endsills,

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Structures. (Continued)

6120

sidewalls, and wingwalls. Stone protection for channel and slopes has been provided upstream and downstream of the structure. A levee embankment connects the structure with the levee system.

Drop structures with headwalls extending above the invert of the channel have drain ports so that water will not pound upstream of the structure. Drop structures constructed as a part of the project are listed with their location as follows:

<u>Stream</u>	<u>Location</u>	<u>Weir Crest Elev.</u>
Mariposa Bypass	Left bank -- L.M. 0.00	85.0
Ash Slough	Left bank -- L.M. 0.09	138.5
Ash Slough	Left bank -- L.M. 0.38	142.0
Ash Slough	Left bank -- L.M. 0.76	145.5
Ash Slough	Left bank -- L.M. 1.14	149.0
Eastside Bypass	Left bank -- L.M. 35.31	147.4
Eastside Bypass	Left bank -- L.M. 35.74	151.5

Drainage Ditches and Culverts. There are three general 6130

types of drainage ditches constructed as a part of the project works. These are: Type "A" drain ditch constructed between right-of-way line and landward toe of levee. It has a vee-shaped cross section with one-to-one side slopes and depth that varies. This ditch provides drainage on the landward side of levee to drainage structure inlets in the locations as shown on the plans; Type "B" drain ditch has been constructed on the waterward side of levee. It has a trapezoidal cross section with three-to-one side slopes, 10-foot wide bottom, and depth

5

Drainage Ditches and Culverts. (Continued) 6130

that varies. This ditch provides drainage from outlet of drainage structure across berm to low flow channel in the locations as shown on the plans; Type "C" drain ditch connect Type "A" drain ditches to drainage structure inlets in the locations as shown on the plans. The Type "C" drainage ditch is similar to the Type "B" except it has 2-to-1 side slopes and a 5-foot wide bottom; also included under this section is any other type of drainage ditch not mentioned above but constructed as a part of the project.

Culverts have been provided under certain levee approach embankments on the landward side to facilitate passage of drainage. The culvert locations, types, and sizes are as shown on the contract drawing.

Drain Channel and Pipe Arch Culverts. The Drain Channel 6140

is located on the landside of the Chowchilla Canal Bypass right bank levee, Unit No. 17. The centerline of the Drain Channel is situated 50 feet inside of the right-of-way line and extends from Levee Mile 0.64, where the channel discharges into the Fresno River, to Levee Mile 14.66, the head of the channel. The typical cross section of the Drain Channel is trapezoidal. The bottom varies in width from 10 feet, 20 feet and 40 feet with side slopes of 2:1. The channel invert varies from 2 to 11 feet below natural ground.

Three county roads are intersected by the Drain Channel. Multiplate pipe arch culverts have been provided to pass drainage through the county road approach embankments. Pipe arches are

Drain Channel and Pipe Arch Culverts. (Continued) 6140

12-gauge corrugated metal. Bituminous coating have been applied to the plates. Culvert ends extend two feet beyond the embankment slope and have been beveled parallel to the embankment slope.

The Drain Channel has a 50-foot transition reach from the typical channel trapizoidal cross section to the ends of the pipe arch culverts. Following is additional descriptive detail for the Drain Channel and pipe arch culverts.

CHOWCHILLA CANAL BYPASS -- UNIT NO. 17

Drain Channel		
Levee Mile	Bottom Width	Average Depth Below Natural Ground
0.64 to 0.74	40 feet	3 to 4 feet
0.74 to 8.33	20 feet	5 feet
8.33 to 14.66	10 feet	5 feet

Pipe Arch Culverts			
Levee Mile	Size of Pipe	Invert Elevation	County Road Approach Embankment
2.55	(2) 13'-3"x9'-4"x106'	151.8'	Avenue 14
8.35	(1) 18'-9"x12'-2"x126'	156.1'	Firebaugh-Madera Road
9.86	(1) 13'-3"x9'-4"x98'	157.3	Firebaugh-Fresno Road

Fencing and Gates. The fencing of this project consists of 6150 right-of-way and channel breakaway fencing. The posts are either metal (10 feet maximum center to center) or wood (R/w--14 feet maximum center to center, breakaway -- 17 feet maximum center to center). Fencing is made of four or five

7

Fencing and Gates. (Continued)

6150

strands of barbed wire with wire stay at third points between posts. The gates are the drag or metal drive type.

The right-of-way line of the exterior of the project works is bound by fencing. Downstream of the Sand Slough interchange area, the State owns flowage easement over the floodways. Channel breakaway fencing delineates property lines within this portion of the project. Upstream of the interchange area, the State owns the land of the floodways in fee. As a result, all fencing has been removed within the floodway in that portion of the project.

Any fencing within the project right-of-way, either by the property owner in a case of State easement lands or by a lessee in the case of State fee lands, must be under Reclamation Board permit prior to construction.

Hydrologic Facilities. Hydrologic facilities installed on the levees and channels portion of the project consist of the following:

6160

Staff Gages. (1) Bear Creek at East Side Canal.

6161

Located on the left bank Bear Creek just downstream on East Side Canal.

(2) Owens Creek at East Side Canal. Located on the left bank Owens Creek just downstream of East Side Canal.

(3) Mariposa Bypass at Eastside Bypass. Located on the left bank Mariposa Bypass just downstream of Mariposa Bypass Automatic Control Structure.

(4) San Joaquin River at Eastside Bypass. Located on the left bank just downstream of the San Joaquin River Control Structure.

(5) Eastside Bypass at Washington Road. Located on the right bank Eastside Bypass upstream from West Washington Road County Bridge.

(6) Ash Slough at Chowchilla Canal. CCID installed gage on the upstream face of the right wing wall of the Ash Slough drop structure, just downstream of the Chowchilla Canal.

(7) Berenda Slough at Chowchilla Canal. Located on the left bank of Berenda Slough downstream from Chowchilla Canal.

(8) Fresno River at Chowchilla Canal. Located on the right bank Fresno River downstream from Chowchilla Canal.

A staff gage installation consists of three timber staff gage posts in line and normal to the centerline of the levee. One is located in the low water channel, another is on the berm and the third is on the levee slope. The posts vary in height from 4 to 8 feet above grade. The 1-foot diameter posts have been set 5 feet below grade with a 6-inch thick concrete ring backfill from the bottom of the post to grade. A 2-inch x 8-inch redwood face plate is bolted to the timber post. Attached to this face plate is an enameled metal staff gage set to U.S.C. & G.S. sea level datum, 1929 adjustment; which can be read to the nearest one-tenth of a foot.

An exception to the above typical staff gage installation is the installation of staff gages at Ash Slough at Chowchilla Canal. At this location, two 2-inch x 8-inch redwood face plates have been anchor bolted to the upstream face of the

drop structures right headwall. As in the typical installation, an enameled metal staff gage is attached to each timber face plate.

Water Stage Recorders. (1) San Joaquin River near Newman 6162

U. S. Geological Survey's continuous water stage recorder and staff gage located on left bank 300 feet downstream from new bridge on Hills Ferry Road, and 500 feet downstream from Merced River. This installation is maintained by the U. S. Geological Survey. A telemetering device, operated and maintained by the Department of Water Resources for river forecasting purposes, is also a part of this station.
(Datum U.S.C. & G.S.)

(2) San Joaquin River at Fremont Ford Bridge --

U. S. Geological Survey's continuous water stage recorder and staff gage located on left bank 30 feet downstream from Fremont Ford Bridge. This installation is maintained by the U. S. Geological Survey. (Datum U.S.C. & G.S.)

(3) San Joaquin River near Stevinson -- Department

of Water Resources continuous water stage recorder and staff gage located on bridge on Lander Avenue. This installation is maintained by the Department of Water Resources. (Datum U.S.C. & G.S.)

(4) Eastside Bypass near El Nido -- Department of

Water Resources continuous water stage recorder and staff gage located on the left bank approximately 0.6 mile downstream of Chamberlain road access bridge. This station is maintained by the Department of Water Resources. A telemetering device,

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operated and maintained by the Department of Water Resources for river forecasting purposes, is also a part of this installation. (Datum U.S.C. & G.S.)

(5) San Joaquin River near Dos Palos -- U. S. Bureau of Reclamation continuous water stage recorder and staff gage located 800 feet below the head of Temple Slough, 6.5 miles east of Dos Palos. This installation is maintained by the U. S. Bureau of Reclamation. (Datum U.S.E.D.)

(6) San Joaquin River near Mendota -- U. S. Bureau of Reclamation continuous water stage recorder and staff gage located 2.5 miles below Mendota Dam, 4 miles north of Mendota. This installation is maintained by the U. S. Bureau of Reclamation. A telemetering device, operated and maintained by the Department of Water Resources for river forecasting purposes, is also a part of this station. (Datum U.S.B.R.)

(7) San Joaquin River below Gravelly Ford -- U. S. Bureau of Reclamation continuous water stage recorder and staff gage located on the left bank on the west section line of Section 18, T. 3 S., R. 17 E. This installation has a telemetering device and is operated and maintained by the U. S. Bureau of Reclamation.

Mileage Markers. - The project has been divided into numerous levee units as shown on the map in Appendix C. Mileage markers have been furnished and installed every one-half mile in each unit. The marker designates the unit and levee mile beginning at the downstream end of the particular

Mileage Markers. (Continued)

6170

unit and proceeding upstream. These markers have been placed for location and direction purposes.

The mileage marker consists of metal post, anchor, and target plates. The 7-foot long post with anchor near bottom has been driven 3 feet into the ground at the edge of the levee. Two target plates have been welded to the top of the post with the faces perpendicular to the centerline of the levee and visible to traffic in either direction. Painted on the face plates are the unit designation and levee mileage.

Inspection and Maintenance

6200

Inspection of miscellaneous facilities and maintenance requirements shall be made at the same time that the inspection and maintenance of other features of the project are made.

If the inspection of any miscellaneous facility of a private party (either constructed before, during, or after the completion of the project) 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, with a copy to the Reclamation Board, directing attention to the conditions observed and requesting that immediate steps be taken to correct them. A report on the action taken by the owner shall be submitted to the Reclamation Board with the next annual report.

Bridges. Degree of inspection and maintenance for various types of bridge ownership in the project are as follows:

6170 County Bridges. The State's interest and the 6211

responsibility of the levee district in county road bridges and is primarily confined to their affect on the safety and functioning of the flood control works. However, any conditions noted in the inspection that may affect them in any way should, as a matter of courtesy, be brought to the attention of the responsible agency.

The district and the Counties of Merced and Madera have agreed to certain maintenance responsibilities concerning the following county bridges:

6200 County of Merced

- (1) Sandy Mush Road Bridge over Eastside Bypass.
- (2) Sand Slough Patrol Bridge, over Sand Slough interchange pool.
- (3) West Washington Road Bridge over Eastside Bypass.
- (4) Dickinson Ferry Road (Greenhouse Road) Access Bridge, across channel of Eastside Bypass.
- (5) Chamberlain Road Access Bridge, across channel of Eastside Bypass.

County of Madera

- (1) Avenue 21 Bridge, over Eastside Bypass.
 - (2) Road 4 Bridge, over Eastside Bypass.
 - (3) Avenue 18½ Bridge, over Eastside Bypass.
 - (4) Road 9 Bridge, over Eastside Bypass.
 - (5) Avenue 14 Bridge, over Chowchilla Bypass.
 - (6) Firebaugh-Madera Road Bridge, over Chowchilla Bypass.
- 4m

County of Madera (Continued)

(7) Firebaugh-Fresno Road Bridge over Chowchilla Bypass.

(8) Road 9 Bridge, over Berenda Slough.

District's Maintenance Responsibility.

6211.1

The levee district's maintenance responsibility concerning the above-mentioned county bridges has been agreed to as follows:

- (1) The substructure of the bridges;
- (2) The waterside approach embankments to the bridges and adjoining levee;
- (3) The embankment slope stone protection.

Counties' Maintenance Responsibility.

6211.2

Counties of Merced and Madera maintenance responsibility concerning their respective county bridges has been agreed to as follows:

- (1) Roadway surfaces, including shoulders and parking area over and across embankments, levees and bridges;
- (2) The landside approach embankments to the bridges;
- (3) The superstructure of the bridges, including the deck and roadway, guardrails or sidewalks, and lighting facilities where provided;

(4) Markings and signs on the bridges;

(5) Maintaining control of public traffic on said roadways with said control to include the erection and maintenance of appropriate roadside signs and warning devices.

Patrol Bridge. The patrol bridge should have a

6212

good appearance and when making inspection look for the following:

Concrete spalling, eroding, severe cracking, or exposure of reinforcing bars; make sure deck expansion hinges are functioning properly, are clean, and metal work and adjacent concrete are in good condition; railings not damaged or out of alignment, and bolts secure; erosion to channel at piles, bridge embankment, bank protection, and abutment seat; and if protective finishing damaged, repaint with approved type of materials after surfacing is prepared and apply as set forth in contract specifications.

If any item is in need of repair or maintenance

include in the next scheduled maintenance activity.

Access Bridges. Low level crossings were constructed

6213

for the use of individual property owners. They should be checked prior to each flood season and after each period of high flow to see that a condition has not developed which will be detrimental to the safety of the flood control project. Any such condition should be called to the attention of the appropriate landowner for remedial work. These low level access bridges have removable timber guard rails.

Division of Highways Route 152 Bridge and Route

6214

140 Bridge. The State has an interest in this from the aspect of flood control and the Division of Highways through ownership of the bridge. The State's flood control responsibility and responsibility of the levee district in the above highway bridge

19

is primarily confined to the effect of the safe functioning of the flood control works.

Any conditions noted in the inspection that may affect the bridge in any way should, as a matter of courtesy, be brought to the attention of the Division of Highways.

Structures. Listed as follows are the items to consider when making the inspection and maintenance of structures.

(1) San Joaquin River Structure

This structure shall have a good general appearance and function properly. The entrance and exit of the structure and the barrels of the conduit shall be clear of any foreign objects or debris. Check to see if the concrete is spalling, eroding, cracking excessively, or reinforcing bars are exposed; metal work is not damaged or in need of refinishing; embankment and slope protection adjacent to the structure or appurtenant to, are free of uncontrolled weed growth, and not in need of reshaping or repair. If any item is in need of repair or maintenance include required work in the next scheduled maintenance activity.

(2) Sand Slough Structure

This structure shall have a good general appearance and function properly. The weir and Parshall flume shall be clear of any foreign objects or debris. Check to see if the concrete is spalling, eroding, cracking excessively, or reinforcing bars are exposed; embankment and grouted slope

protection adjacent to the structure or appurtenant to, are free of uncontrolled weed growth, and not in need of reshaping or repair. If any item is in need of repair or maintenance include in the next scheduled maintenance activity.

(3) Bear Creek Diversion Structure

During the flood season (see paragraph 1600) the district will be responsible for maintenance of the Bear Creek diversion structure and appurtenances excluding the siphon.

During the irrigation season the East Side Canal and Irrigation Company will be responsible for maintenance of the Bear Creek Irrigation Structure and appurtenances. (Joint Use Agreement #1596 on file at the Reclamation Board.)

(4) Owens Creek Control Structure

This structure shall have a good general appearance and function properly. Check concrete structure and wood decking. See that timber members are properly secured and not damaged. If wood caps, stringers, decking, or treads are in need of repairs or replacement, schedule work for next project maintenance activity.

(5) Drop Structures

These structures shall have a good general appearance and function properly. Check to make sure channel, structure and immediate downstream channel are clear of debris; stone protection is not undermined or covered by excessive weed growth; concrete is not spalling, eroding, cracking excessively, or reinforcing bars are not exposed; drainage ports are clear and

Structures. (Continued)

6220

functioning properly. The embankment between the structure and levee shall be included in the regular levee maintenance program. If any item is in need of repair include work for next scheduled maintenance program.

Drainage Ditches and Culverts. Drainage ditches and

6230

culverts shall be maintained in good condition and function properly. The ditches shall drain in the direction and manner in which they were designed and constructed. Adequate measures shall be taken to insure that drainage ditches are kept open, free of weeds or wild growth, and that trash drift or debris is not allowed to accumulate. Check for change in cross section such as erosion, sloughing, scouring, and disposition of soil.

The culvert's inlet channel, barrel, and outlet shall be free of trash or debris. Check for erosion adjacent to the embankment of the inlet and outlet of the pipe. If any drainage ditch reach or culvert is in need of repair, cleaning, or other type of maintenance function include work in the next scheduled maintenance activity.

Drain Channel and Pipe Arch Culvert. Drain Channel and

6240

pipe arch culverts shall be maintained in good condition and function properly. Adequate measures shall be taken to insure that the Drain Channel is kept open, free of weeds or wild growth, and that trash or debris is not allowed to accumulate. Check for change in cross section such as erosion, sloughing, scouring, and disposition of debris material.

Drain Channel and Pipe Arch Culvert. (Continued) 6240

The pipe arches' inlet, barrel, and outlet shall be free of trash or debris. Check for erosion adjacent to the embankment and the channel inlet and outlet of the culverts. Inspect the entire length of the pipe arches for damage to the plates and bituminous protective coating. If the Drain Channel is in need of repair, cleaning, or weed control, and the pipe arches are in need of repair to plates or protective coating, or other type of maintenance function, include work in the next scheduled maintenance activity.

Fencing and Gates. Fencing and gates shall be maintained in good condition and function properly. Fence and gate posts shall be stable, true to line and plumb; barbed wire shall be continuous, taut, properly spaced and attached to each post with wire stay at third points between posts. If any fencing or gate is in need of repair, replacement or other type of maintenance include in the next scheduled maintenance activity.

After a high-water period if any channel breakaway fencing needs to be reinstalled, it shall be reinstalled as soon as practical. This condition is dependent on the wetness of the berm in the floodplain.

Hydrologic Facilities. Staff gages shall be maintained by the district. Stage recorder installations are maintained by their respective owners. The district should remove trash or debris that accumulates near an installation, and notify the interested owner if repairs or maintenance seems necessary.

Hydrologic Facilities. (Continued)

The staff gage installations shall be kept in good condition and clear of trash or debris; check to see if posts are plumb; erosion to channel near posts isn't taking place; post and face plate is not damaged. Any item that needs repairing, replacing or maintaining shall be included in the next scheduled maintenance activity.

If vertical control of the staff gages requires checking or the enameled metal plate needs replacing or maintenance, notify the Department of Water Resources, San Joaquin District Office in Fresno.

Mileage Markers. Mileage markers shall be maintained in good condition. Check to see that markers are plumb, clean, not bent or damaged. If markers require repair, replacement, or maintenance such as painting, straightening, parts replacement, complete replacement, or cleaning include work in next scheduled maintenance activity.

Checklists

Recommended checklists for miscellaneous facilities are shown in Appendix F. (See pages F-10 to F-24 inclusive.)

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 during the flood season without approval of the Reclamation Board, unless designed therefor.

0252 Bridges. The above general operation statement applies 6410

to this paragraph.

The removable wooden guard rails on the private access bridges shall be removed during the flood season to provide for the unimpeded flow of water across the low level bridges.

0253 Structures. The above general operation statement applies 6420

to this paragraph with the following supplemental criteria:

(1) San Joaquin River Structure

The San Joaquin River Structure shall be operated in the following manner.

Manual Operation:

- 0270
1. Begin gate operation when $Q = 10,000$ cfs in the Interchange Area.
 2. Open one gate fully (assumed opening time is one-half hour).
 3. Wait two hours.
 4. Repeat Steps 2 and 3 until all gates are open.

0300

If the district desires to modify the gates to a power operation, the manual operation schedule will not be valid because the short gate opening time will cause a high initial surge velocity. The power operation schedule is predicated on opening each gate in two steps of short time magnitude with a 30-minute waiting period between each step to minimize the surge caused by the rapid opening.

0400 Power Operation:

1. Begin operation when $Q = 10,000$ cfs in the Interchange Area.
2. Open one gate through one-half opening (assumed opening time five minutes).
3. Wait one-half hour.

Power Operation: (Continued)

4. Repeat Step 2.
5. Wait two hours.
6. Repeat Steps 2 through 5 until all gates are open.

It is suggested that whenever the gates are operated, the two interior gates be opened first in order to maintain relatively symmetrical discharge from the structure. Actual operating conditions may show that safe and practical adjustments to the schedules can be made.

During periods of receding flood flows in the Interchange Area, the gates may be operated by reversing the opening schedule, closing the four gates when the flood channel capacity drops below 10,000 cfs, or leaving the gates open during the entire recession of flow.

Following is a drawing "San Joaquin River Structure Rating Curves", dated July 14, 1967, showing the theoretical discharge rating of the structure in relation to the control elevations of the structure and the flow through the Interchange Area. The control gate operator can monitor the staff gage on the San Joaquin River just upstream of the structure. The Department of Water Resources' San Joaquin District Office will assist the district to verify the computed rating curve for the staff gage at this location. If the staff gage cannot be read the Eastside Bypass's El Nido gaging station can serve to monitor the gate operation.



Structures. (Continued)

6420

(2) Sand Slough Structure

The Sand Slough structure and San Joaquin River control structure have been designed to divide and divide automatically the flows, ranging from minimum measurable flow to and including 200 cfs, occurring in the San Joaquin River above the river and the Sand Slough structure so that the first 50 cfs of flow in the river will be diverted into Sand Slough and that all flows in excess thereof will be divided as equally as possible between the river and Sand Slough. In addition, the structure has been so designed so that the automatic low flows division may be changed temporarily by the Superintendent whenever necessary to deliver water introduced into the river only for transportation and regulated so as not to affect the water rights of local interests.

(3) Bear Creek Siphon and Diversion Structure

All flashboards shall be removed from the diversion structure during the flood season, November 15 to June 15 of each water year, or shall be removed as directed.

Drainage Ditches and Culverts. The above general operation statement applies to this paragraph.

6430

Drain Channel and Pipe Arch Culverts. The above general operation statement applies to this paragraph.

6440

Fencing and Gates. The above general operation statement applies to this paragraph.

6450

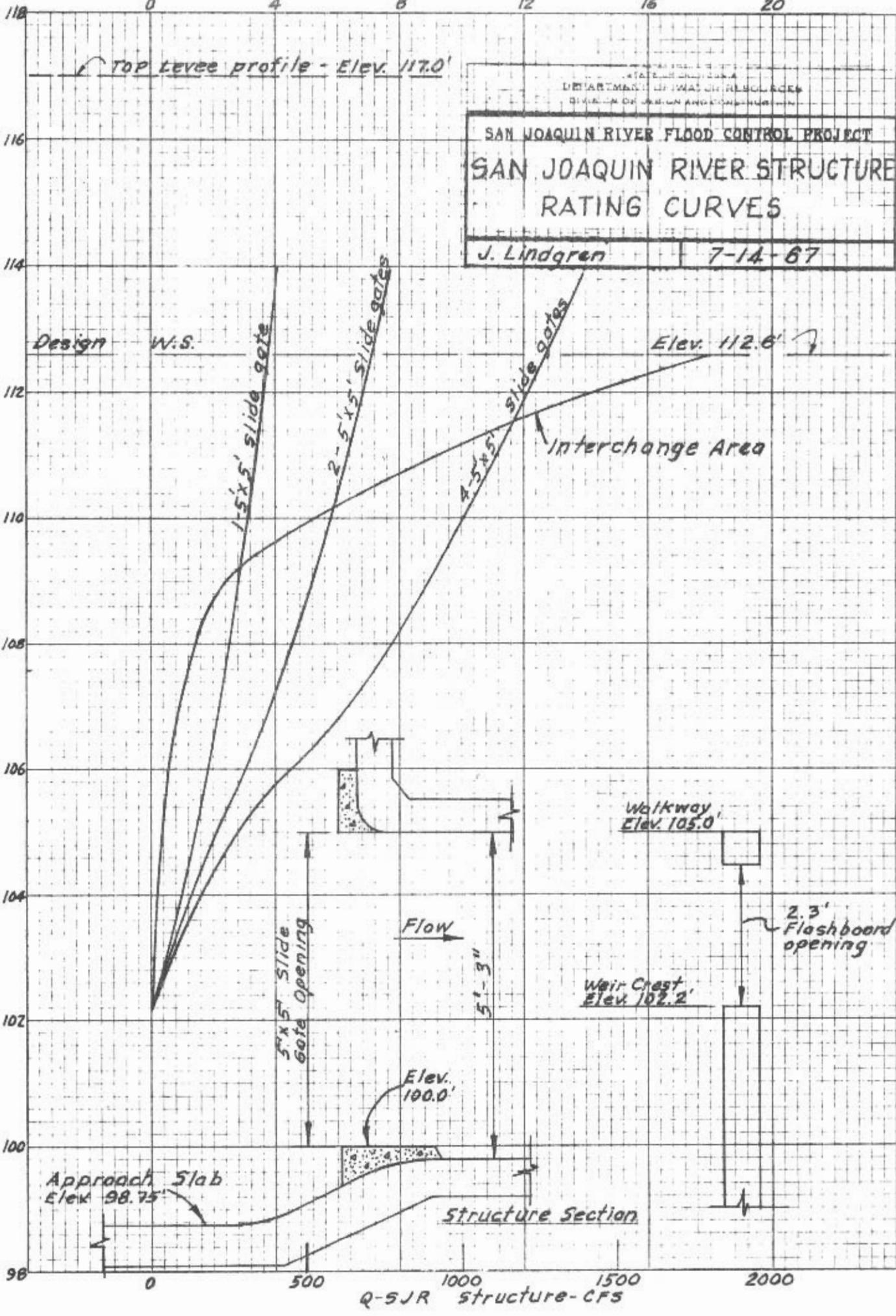
Hydrologic Facilities. The above general operation state- 6460
ment applies to this paragraph with the following supplemental
criteria:

Staff Gages. The staff gage installations construc- 6461
ted as a part of the project are for the purpose of indexing
flows. The Staff gages as described in Section 7141 shall be
read and recorded once a week on a routine basis throughout the
flood season. Each month's record shall be duplicated and a
copy sent to the Department of Water Resources, P. O. Box 388,
Sacramento, California -- Attention: Statewide Operations Office,
Flood Forecasting and Control Branch.

To reproduce an adequate stage hydrograph of moderate
and high flows, it will be necessary to record water surface
elevations at more frequent intervals than the once a week
basis described above. The following criteria will be of
assistance for period of recording: with moderate to high flows
in the low flow channel record water surface elevation once a day;
when the water stage is above the toe of the levee, read and
record the water stage every six hours. In the latter case,
in all probability, the district should be in a condition of
levee patrols required on a 24-hour basis.

A sample copy of Staff Gage Record form can be found
following this paragraph. Make an original copy and reproduce
it so that an ample supply is available for use. One form will
readily contain the regular monthly report of one stage reading
per station per week: Eight days record of one stage reading
per day; and two days record of four stage readings per day.

Q Interchange Area - 1000 CFS



STATE OF CALIFORNIA
 DEPARTMENT OF WATER RESOURCES
 DIVISION OF DESIGN AND CONSTRUCTION

SAN JOAQUIN RIVER FLOOD CONTROL PROJECT

SAN JOAQUIN RIVER STRUCTURE

RATING CURVES

J. Lindgren | 7-14-67

K&E 10 X 10 TO THE INCH 46 0703
 7 X 10 INCHES
 KEUFFEL & ESSER CO.

Elevation in Feet - DWR Datum

Q-SJR Structure-CFS

Design W.S.

Elev. 112.6'

Interchange Area

Walkway
Elev. 105.0'

2.3'
Flashboard
opening

Weir Crest
Elev. 102.2'

Elev. 100.0'

Structure Section

Approach Slab
Elev. 98.75'

5'x5'
Slide
Gate
Opening

Flow

5'-3"

118
116
114
112
110
108
106
104
102
100
98

0 4 8 12 16 20

TOP Levee profile - Elev. 117.0'

1-5'x5'
slide gate

2-5'x5'
slide gates

4-5'x5'
slide gates

The time of the corresponding staff gage reading can be recorded in either of the two accepted methods. These are 1 to 12 o'clock a.m. or p.m. and the 24-hour clock 0000 to 2400 hours.

RECORD OF STAFF GAGE READINGS

19__

STATION	MONTH	TIME	STAGE																	
	DAY																			
BEAR CR. AT EAST SIDE CANAL																				
OWENS CR. AT EAST SIDE CANAL																				
MARIPOSA BYPASS AT EASTSIDE BYPASS																				
SAN JOAQUIN R. AT EASTSIDE BYPASS																				
EASTSIDE BYPASS AT WASHINGTON ROAD																				
ASH SLOUGH AT CHOWCHILLA CANAL																				
BERENDA SLOUGH AT CHOWCHILLA CANAL																				
FRESNO R. AT CHOWCHILLA CANAL																				

NOTE:

NORMAL CLOCK	3 AM	6 AM	9 AM	NOON	3 PM	6 PM	9 PM	MIDNIGHT	12:45 AM
24-HOUR CLOCK	0300	0600	0900	1205	1500	1800	2100	2400	0045

REPAIR OF DAMAGE TO PROJECT WORKS AND
METHODS OF COMBATING FLOOD CONDITIONS

7000

Repair of Damage

7100

In the event of serious damage to the project works, whether due to flood conditions or other causes and which may be beyond the capability of local interests to repair, the district shall contact the representative of the Department of Water Resources, State of California, who coordinates maintenance of the project works of the Lower San Joaquin River Flood Control Project. The state representative will give assistance or advice, or will determine appropriate action to be taken.

Applicable Methods of Combating Floods

7200

For applicable methods of combating flood conditions, reference is made to the Department of Water Resources "Flood Emergency Operations Manual", where the subject is fully covered. For plates of methods of Flood Fighting see Appendix E.

APPENDIX A

COPIES OF AGREEMENTS PROVIDING ASSURANCES BY
THE LOWER SAN JOAQUIN LEVEE DISTRICT AND
RESOLUTION ADOPTED BY THE RECLAMATION BOARD

A G R E E M E N T

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

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

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

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

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

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

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

NOW, THEREFORE, IT IS HEREBY AGREED:

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

(2) In consideration therefor the District agrees:

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

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

(b) To maintain and operate, in accordance with the regulations prescribed by the Secretary of the Army, all levee and channel improvements together with all other project works within the jurisdiction or boundaries of the Lower San Joaquin Levee District.

Maintenance and operation of these works shall commence immediately, but shall not include the performance of work to be accomplished in connection with the initial construction of the project;

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

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

LOWER SAN JOAQUIN LEVEE DISTRICT

THE RECLAMATION BOARD

By /s/ H. B. Wolfe
Chairman President

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

By /s/ A. R. Cocke
Secretary

By /s/ George H. Holmes
Secretary

A G R E E M E N T

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

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

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

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

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

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

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

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

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

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

NOW, THEREFORE, IT IS HEREBY AGREED:

(1) That District hereby agrees:

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

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

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

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

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

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

THE RECLAMATION BOARD

LOWER SAN JOAQUIN LEVEE DISTRICT

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

By /s/ H. B. Wolfson
President

By /s/ George H. Holmes
Secretary

By /s/ A. R. Cocke
Secretary

R E S O L U T I O N

ADOPTED BY THE RECLAMATION BOARD
MAY 4, 1961

WHEREAS, this Board did on December 12, 1955, in Los Banos, California, pursuant to Section 8621 of the Water Code of the State of California, adopt a substitute plan of flood control for San Joaquin River and tributaries between the Mouth of the Merced River and Friant Dam, as set forth in a report of the Division of Water Resources, Department of Public Works, issued in July 1954 and supplemented in November 1955; and

WHEREAS, this Board did modify the said substitute plan at a meeting in Los Banos on March 26, 1958, in accordance with the report of the Department of Water Resources entitled "Supplement to 1954 Report on Control of Floods, Lower San Joaquin River and Tributaries, Friant Dam to Merced River", dated February 1958; and

WHEREAS, both the original plan and the modification thereof were approved by the Department of Finance and the Corps of Engineers; and

WHEREAS, various interests have raised objections to that portion of the plan involving the area upstream of Sand Slough; and

WHEREAS, a hearing was held in Los Banos on July 24, 1959, to consider modification of the plan between Gravelly Ford Canal and the proposed Fresno River Detention Basin; and

WHEREAS, as a result of this hearing the Board did appoint Harold E. Hedger, an experienced consulting engineer, to thoroughly investigate possible alternate plans in this reach of the project; and

WHEREAS, on July 20, 1960, said Harold E. Hedger did present a fully documented report to this Board, copies of which were distributed widely among individuals, associations and public bodies throughout the affected areas and which was discussed at a public hearing of this Board held in Los Banos on December 1, 1960; and

WHEREAS, the plan adopted on December 12, 1955, and the modification thereof on March 26, 1958, contemplated that many years might elapse before flood control reservoirs were constructed on Fresno and Chowchilla Rivers and that early construction and operation of the Fresno River Detention Basin and associated works as a part of the Lower San Joaquin Flood Control Project would be necessary during the period prior to completion of such reservoirs; and

WHEREAS, rights of way for said Fresno River Detention Basin and certain associated features were purchased by this Board in anticipation of such early construction and operation; and

WHEREAS, reports of the Chief of Engineers to the Congress with respect to said Fresno and Chowchilla River Reservoirs are far advanced, bills for authorization of said reservoirs are pending in the Congress, and the conditions which led this Board to plan for interim operation of said Detention Basin features are much less likely to occur; and

WHEREAS, at said December 1, 1960 public hearing and subsequently thereto it was proposed that further investigation be made of a plan to carry part of the waters of the San Joaquin River

in a by-pass following the Chowchilla Canal to Fresno River, thence northwesterly to Sand Slough rather than only to the vicinity of the Fresno River Detention Basin; and

WHEREAS, such an investigation was made by the Department of Water Resources and the results presented in a memorandum report dated March 15, 1961; and

WHEREAS, the results of this investigation were reported to this Board at a public hearing held in Sacramento on March 16, 1961, and lengthy testimony was received from the proponents and opponents of the said modification of the project and the said modification of the project was described in full detail; and

WHEREAS, this Board has thoroughly reviewed all of the material presented to it at the various public hearings and meetings and in the various reports involving proposed modification of the said March 26, 1958 plan; and

WHEREAS, this study has revealed the superiority from a flood control standpoint of modifying the project in accordance with the recommendation of the Lower San Joaquin Levee District, to wit: By eliminating construction of the Fresno River Detention Basin and associated features and by constructing a Chowchilla Canal By-pass in general conformance with the plan outlined in the said memorandum report of March 15, 1961; and

WHEREAS, the estimated cost to construct such a modified plan between Sand Slough and the head of Gravelly Ford Canal is \$9,059,000, while the cost to construct the previously adopted plan is now estimated to be \$9,701,000; and

WHEREAS, any plan which may be adopted modifying the plan will require the approval of the Department of Finance and

the Corps of Engineers, U. S. Army, and will also require the revision of the October 7, 1958, agreement between this Board and the Lower San Joaquin Levee District:

NOW, THEREFORE, BE IT HEREBY RESOLVED that this Board does determine that the modification of the plan of flood control for the San Joaquin River and Tributaries, as fully described at its public hearing of March 16, 1961, which did in substance provide for a by-pass to divert up to 5,500 cubic feet per second of water from the San Joaquin River at the head of Lone Willow Slough through the Chowchilla Canal, northerly to the area of Sand Slough, and for elimination of the Fresno River Detention Basin and related works, will substantially improve the project of flood control while reducing the overall cost of the project, this Board does, subject to modification from time to time by this Board, adopt this modified substitute plan as outlined at its meeting of March 16, 1961, subject to the following express conditions:

(1) That no construction shall be commenced until new assurances, satisfactory to this Board, have been received whereby the Lower San Joaquin Levee District, or other responsible entities agree to operate and maintain the project upon its completion and to hold and save the United States free from damages due to the construction works, and to hold and save the State of California harmless from all claims, damages or liability due or incidental to the design, construction, operation, repair and maintenance of any portion of the project.

A G R E E M E N T

THIS AGREEMENT made and entered into by and between THE RECLAMATION BOARD of the State of California, hereinafter referred to as the "Board", and the LOWER SAN JOAQUIN LEVEE DISTRICT, hereinafter referred to as "District", on the 2nd day of October, 1962, as supplemental and amendatory to that certain agreement between the parties hereto, dated October 7, 1958, in view of the following circumstances:

WHEREAS, the project of flood control for the San Joaquin River and tributaries between the mouth of the Merced River and Friant Dam, adopted by Board on December 12, 1955, as modified by the Board on March 26, 1958, provided that the Pick-Anderson By-pass should carry up to 500 cubic feet per second of the project flow; and

WHEREAS, the Board and the District desire that the Pick-Anderson By-pass be eliminated as a flood channel and that the structures at the head of Sand Slough be modified to divert an additional 500 cubic feet per second of flow down the Eastside By-pass and to limit the flow down the San Joaquin River immediately below the structures at Sand Slough to a maximum of 1500 cubic feet per second; and

WHEREAS, District did, by a resolution adopted on April 10, 1962, approve the modification of the project in the manner recited above; and

WHEREAS, Board concluded that the said modification in the project was feasible and, therefore, did, on September 6, 1962, so modify the project subject to District executing within

30 days a revised agreement agreeing to assume full responsibility for any liability arising from the said modification;

NOW, THEREFORE, IT IS HEREBY AGREED:

That all of the provisions of that certain agreement dated October 7, 1958, between the parties hereto, shall be fully applicable to the project of flood control for the San Joaquin River and tributaries upstream of the mouth of the Merced River as modified by the Board on September 6, 1962, by the elimination of the Pick-Anderson By-pass and the limiting of the flow in the San Joaquin River immediately below the structures at Sand Slough to 1500 cubic feet per second.

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

THE RECLAMATION BOARD of the
State of California

By /s/ Stanley W. Kronick
President

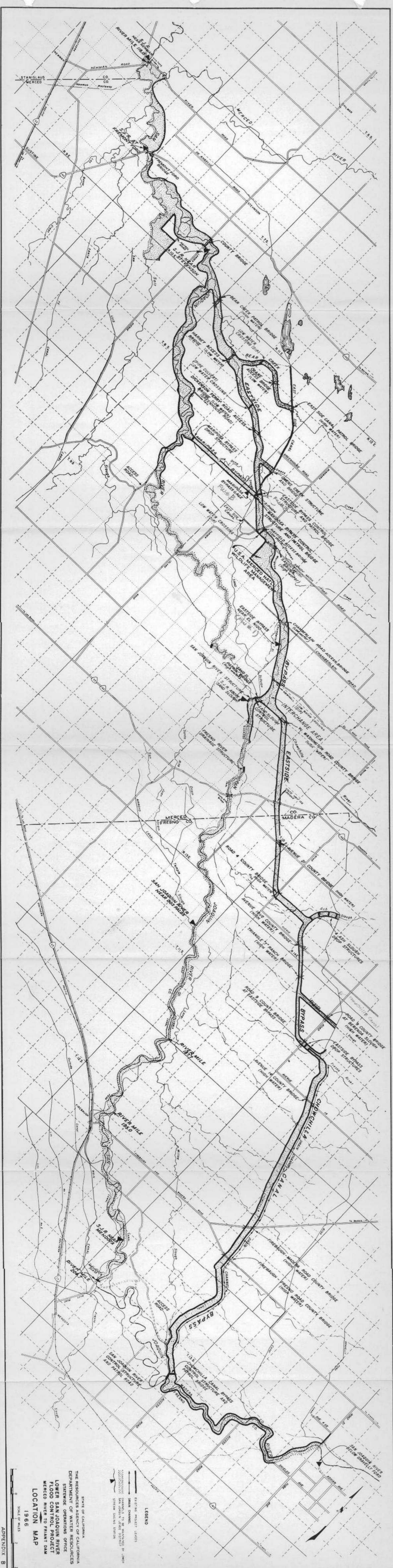
By /s/ Wallace McCormack
Secretary

LOWER SAN JOAQUIN LEVEE
DISTRICT

By /s/ H. B. Wolfson
President

By /s/ D. G. Nelson
Secretary

APPENDIX B



STATE OF CALIFORNIA
 THE RESOURCES AGENCY OF CALIFORNIA
 DEPARTMENT OF WATER RESOURCES
 STATEWIDE OPERATIONS OFFICE
 LOWER SAN JOAQUIN RIVER
 FLOOD CONTROL PROJECT
 MERCED RIVER TO FRIANT DAM
 LOCATION MAP
 1966

LEGEND

- EXISTING PROJECT LEVELS
- DAM CHANNEL
- CHANNEL TO BE MAINTAINED BY LIMP
- SAN JOAQUIN LEVEL DISTRICT
- STREAM GAGING STATION

SCALE OF MILES
 0 1 2

APPENDIX B

APPENDIX C

UNIT No. 1 - SAN JOAQUIN RIVER RIGHT BANK LEVEE ALONG AND ADJACENT TO THE SAN JOAQUIN RIVER FROM JUNCTION OF MERCED RIVER TO A POINT APPROXIMATELY 3.0 MILES UPSTREAM FROM MARIPOSA BYPASS.

UNIT No. 2 - SAN JOAQUIN RIVER LEFT BANK LEVEE ALONG AND ADJACENT TO THE SAN JOAQUIN RIVER FROM JUNCTION WITH SALT SLOUGH TO A POINT APPROXIMATELY 2.0 MILES UPSTREAM FROM MARIPOSA BYPASS.

UNIT No. 3 - SAN JOAQUIN RIVER RIGHT BANK LEVEE ALONG AND ADJACENT TO THE SAN JOAQUIN RIVER FROM EASTSIDE BYPASS AT SAND SLOUGH INTERCHANGE POOL TO A POINT APPROXIMATELY 2.2 MILES UPSTREAM.

UNIT No. 4 - SAN JOAQUIN RIVER LEFT BANK LEVEE ALONG AND ADJACENT TO THE SAN JOAQUIN RIVER FROM EASTSIDE BYPASS AT SAND SLOUGH INTERCHANGE POOL TO A POINT APPROXIMATELY 1.6 MILES UPSTREAM.

UNIT No. 5 - EASTSIDE BYPASS RIGHT BANK LEVEE ALONG AND ADJACENT TO THE ALIGNMENT OF EASTSIDE BYPASS FROM JUNCTION WITH THE SAN JOAQUIN RIVER TO CHOWCHILLA CANAL BYPASS.

UNIT No. 6 - EASTSIDE BYPASS LEFT BANK LEVEE ALONG AND ADJACENT TO THE ALIGNMENT OF EASTSIDE BYPASS FROM JUNCTION WITH THE SAN JOAQUIN RIVER TO CHOWCHILLA CANAL BYPASS.

UNIT No. 7 - BEAR CREEK RIGHT BANK LEVEE ALONG AND ADJACENT TO BEAR CREEK FROM JUNCTION WITH EASTSIDE BYPASS TO EAST SIDE CANAL.

UNIT No. 8 - BEAR CREEK LEFT BANK LEVEE ALONG AND ADJACENT TO BEAR CREEK FROM JUNCTION WITH EASTSIDE BYPASS TO EAST SIDE CANAL.

UNIT No. 9 - OWENS CREEK RIGHT BANK LEVEE ALONG AND ADJACENT TO OWENS CREEK FROM JUNCTION WITH EASTSIDE BYPASS TO EAST SIDE CANAL.

UNIT No. 10 - OWENS CREEK LEFT BANK LEVEE ALONG AND ADJACENT TO OWENS CREEK FROM JUNCTION WITH EASTSIDE BYPASS TO EAST SIDE CANAL.

UNIT No. 11 - MARIPOSA BYPASS RIGHT BANK LEVEE ALONG AND ADJACENT THE ALIGNMENT OF MARIPOSA BYPASS FROM JUNCTION WITH SAN JOAQUIN RIVER TO EASTSIDE BYPASS.

UNIT No. 12 - MARIPOSA BYPASS LEFT BANK LEVEE ALONG AND ADJACENT THE ALIGNMENT OF MARIPOSA BYPASS FROM JUNCTION WITH SAN JOAQUIN RIVER TO EASTSIDE BYPASS.

UNIT No. 13 - ASH SLOUGH RIGHT BANK LEVEE ALONG AND ADJACENT ASH SLOUGH FROM JUNCTION WITH EASTSIDE BYPASS TO CHOWCHILLA CANAL.

UNIT No. 14 - ASH SLOUGH LEFT BANK LEVEE ALONG AND ADJACENT ASH SLOUGH FROM JUNCTION WITH EASTSIDE BYPASS TO CHOWCHILLA CANAL.

UNIT No. 15 - BERENDA SLOUGH RIGHT BANK LEVEE ALONG AND ADJACENT BERENDA SLOUGH FROM JUNCTION WITH EASTSIDE BYPASS TO CHOWCHILLA CANAL.

UNIT No. 16 - BERENDA SLOUGH LEFT BANK LEVEE ALONG AND ADJACENT TO BERENDA SLOUGH FROM JUNCTION WITH EASTSIDE BYPASS TO CHOWCHILLA CANAL.

UNIT No. 17 - CHOWCHILLA CANAL BYPASS RIGHT BANK LEVEE ALONG AND ADJACENT THE ALIGNMENT OF CHOWCHILLA CANAL BYPASS FROM JUNCTION OF EASTSIDE BYPASS AT FRESNO RIVER TO SAN JOAQUIN RIVER.

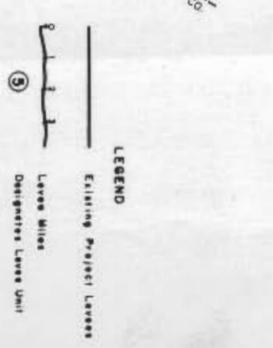
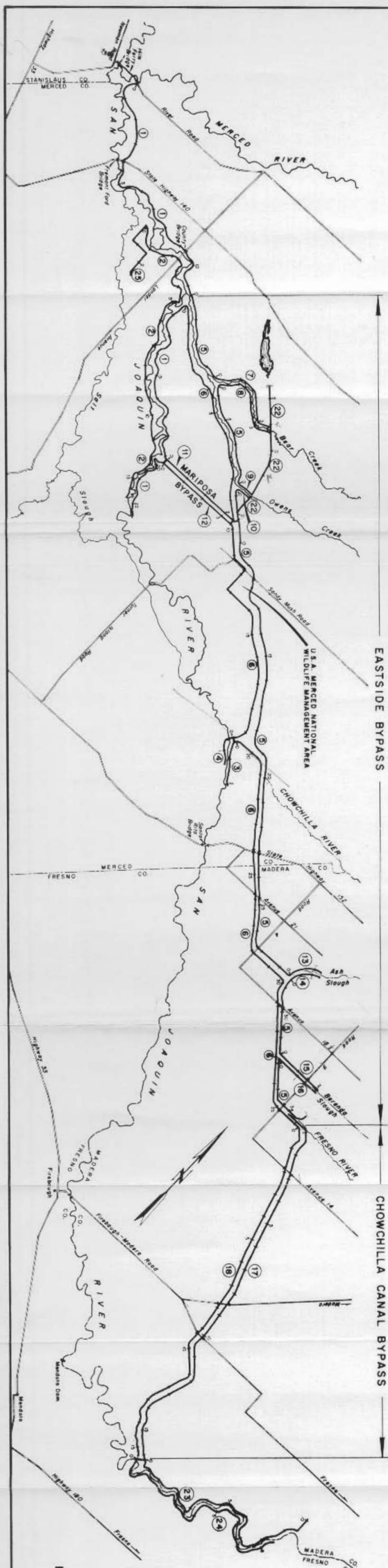
UNIT No. 18 - CHOWCHILLA CANAL BYPASS LEFT BANK LEVEE ALONG AND ADJACENT THE ALIGNMENT OF CHOWCHILLA CANAL BYPASS FROM JUNCTION WITH EASTSIDE BYPASS TO SAN JOAQUIN RIVER.

UNIT No. 22 - EAST SIDE CANAL LEVEE ALONG AND ADJACENT THE LEFT BANK EAST SIDE CANAL EMBANKMENT FROM JUNCTION WITH EASTSIDE BYPASS TO A POINT APPROXIMATELY 1.7 MILES NORTHWEST OF BEAR CREEK.

UNIT No. 23 - SAN JOAQUIN RIVER RIGHT BANK LEVEE ALONG AND ADJACENT THE SAN JOAQUIN RIVER FROM JUNCTION WITH CHOWCHILLA CANAL BYPASS TO GRAVELLY FORD CANAL.

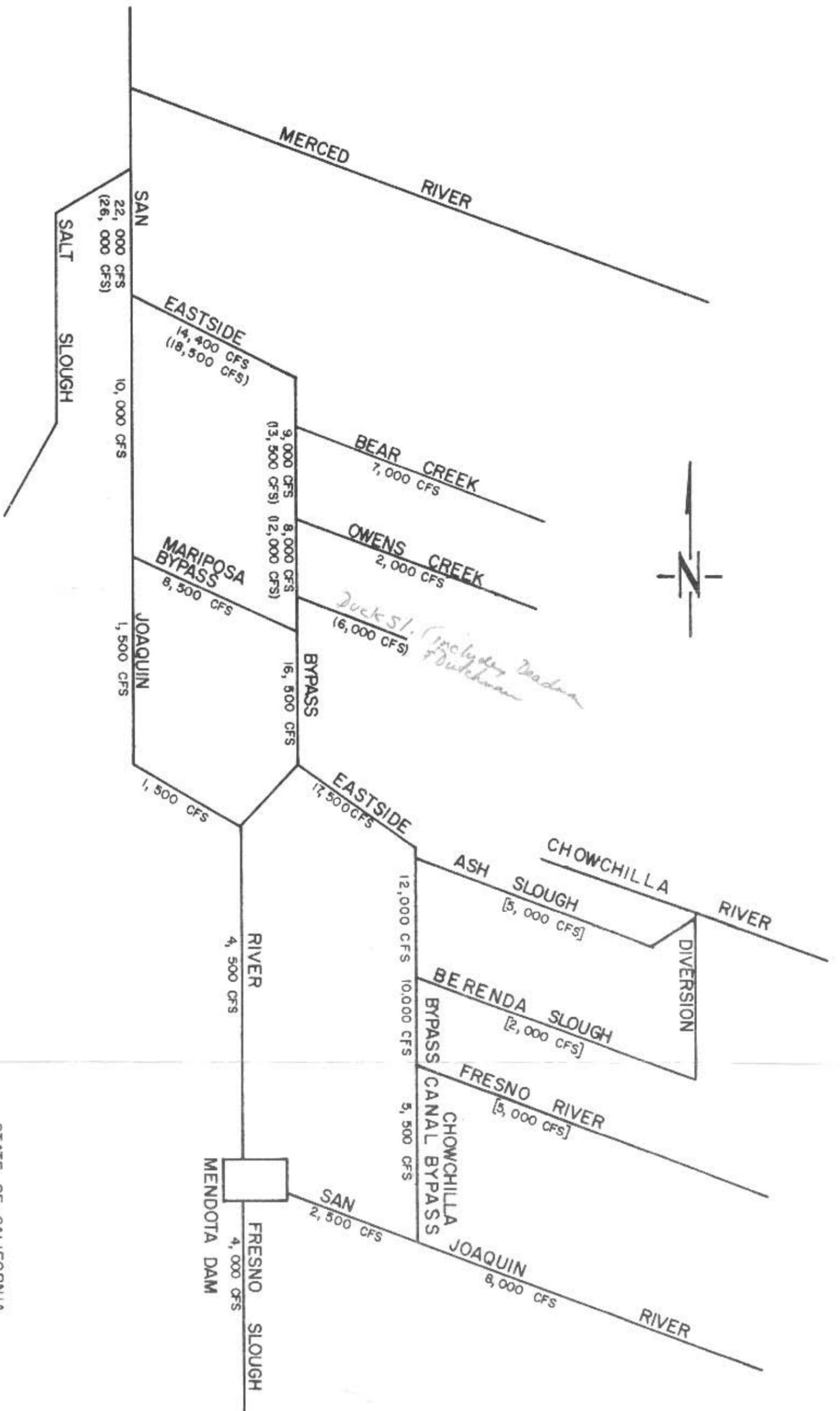
UNIT No. 24 - SAN JOAQUIN RIVER LEFT BANK LEVEE ALONG AND ADJACENT THE SAN JOAQUIN RIVER FROM JUNCTION WITH CHOWCHILLA CANAL BYPASS TO A POINT APPROXIMATELY 8.5 MILES UPSTREAM.

UNIT No. 25 - SALT SLOUGH RIGHT BANK LEVEE ALONG AND ADJACENT TO SALT SLOUGH FROM JUNCTION WITH SAN JOAQUIN RIVER TO A POINT APPROXIMATELY 2.5 MILES UPSTREAM.



THE STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
DIVISION OF OPERATIONS
MAP SHOWING LEVEL UNITS
LOWER SAN JOAQUIN RIVER
FLOOD CONTROL PROJECT
MERCED RIVER TO FRIANT DAM
DECEMBER 1968
Scale of Map

APPENDIX D



[] FUTURE OPERATING CAPACITY (DESIGNED INTO SYSTEM)
 () FUTURE OPERATING CAPACITY

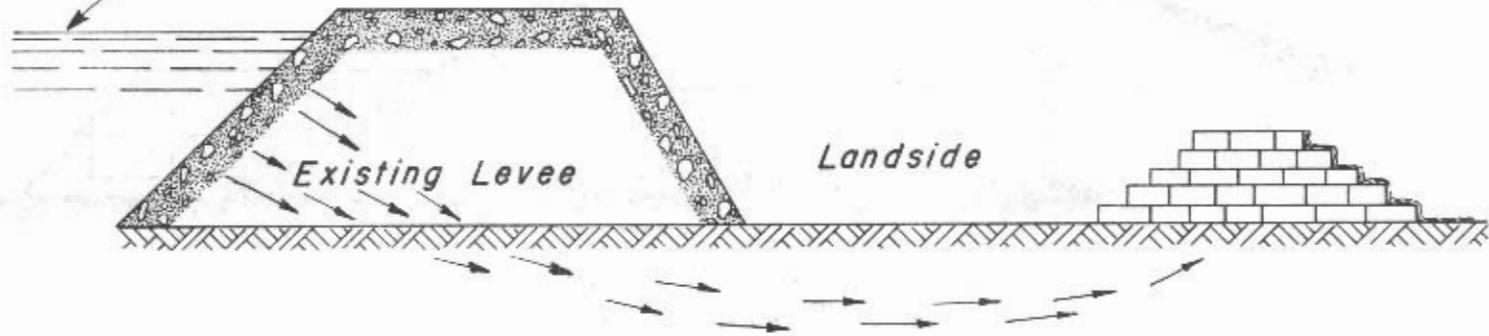
STATE OF CALIFORNIA
 THE RESOURCES AGENCY OF CALIFORNIA
 DEPARTMENT OF WATER RESOURCES
 DIVISION OF OPERATIONS
**LOWER SAN JOAQUIN RIVER
 FLOOD CONTROL PROJECT**
 MERCED RIVER TO FRIANT DAM
 SCHEMATIC DIAGRAM OF DESIGN FLOWS
 FOR ADOPTED PLAN

1964

APPENDIX E

PLATES OF METHODS OF FLOOD FIGHTING

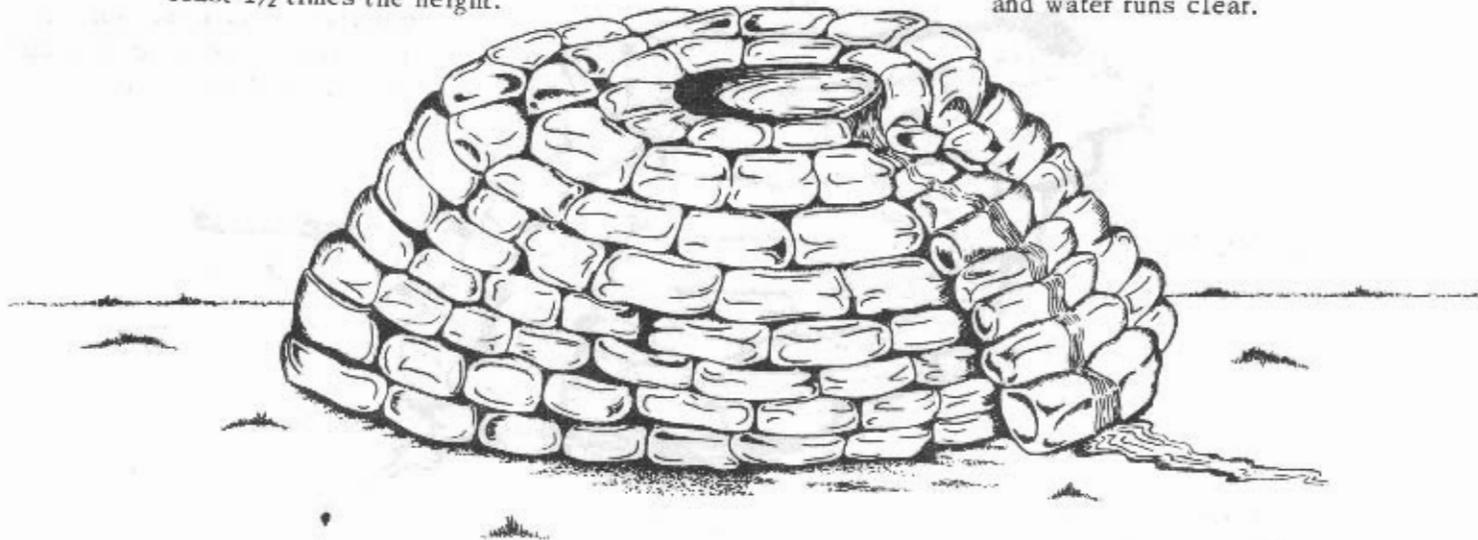
Riverside
Water Surface



Bottom width should be at
least $1\frac{1}{2}$ times the height.

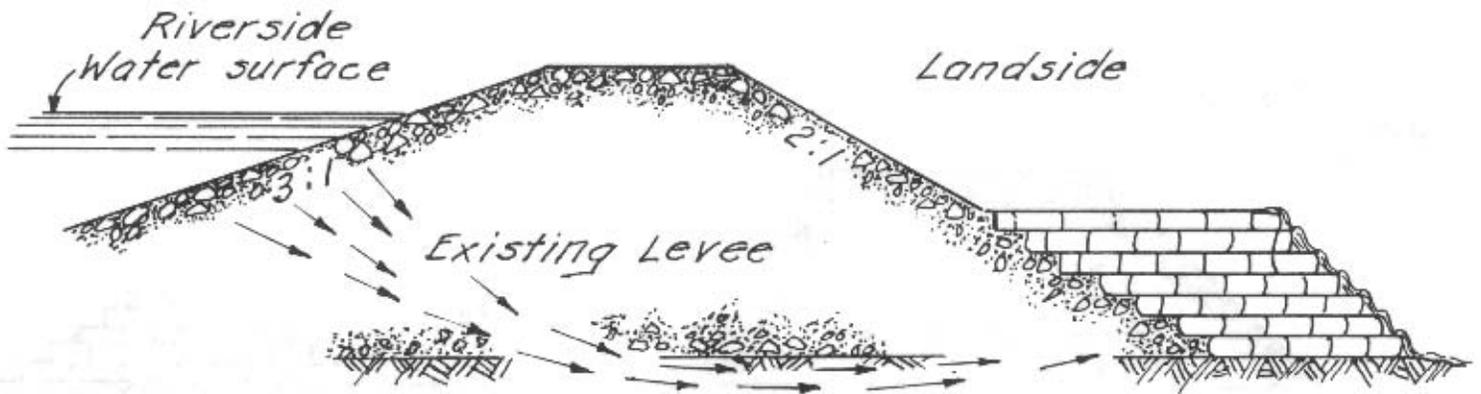
NEVER completely stop the flow
from a sand boil. This may cause
the boil to "break out" in an ad-
jacent area.

ALWAYS control the boil to the
point it ceases to carry material
and water runs clear.

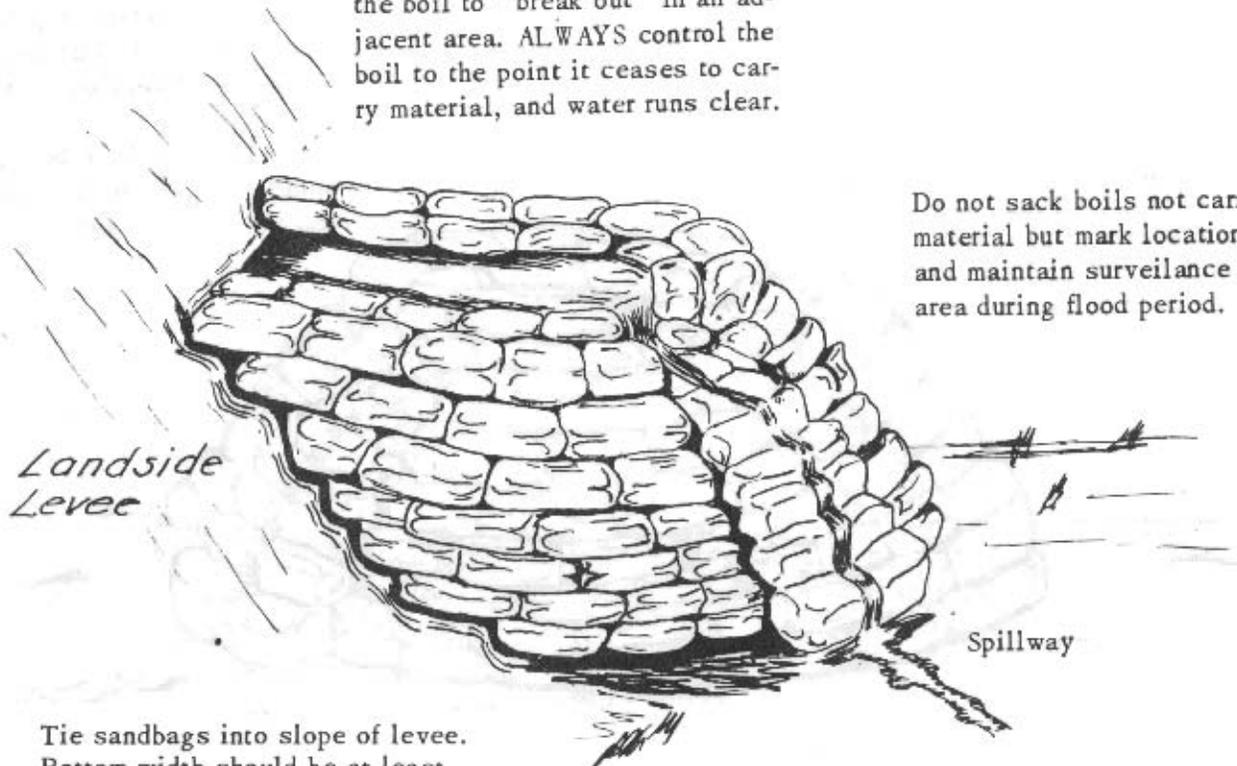


Do not sack boils not carrying
material but maintain surveillance
during flood periods.

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DEPARTMENT OF WATER RESOURCES
STATEWIDE OPERATIONS OFFICE
FLOOD OPERATIONS CENTER
METHODS OF FLOOD FIGHTING
CONTROL OF SAND BOILS
(Away from levee)



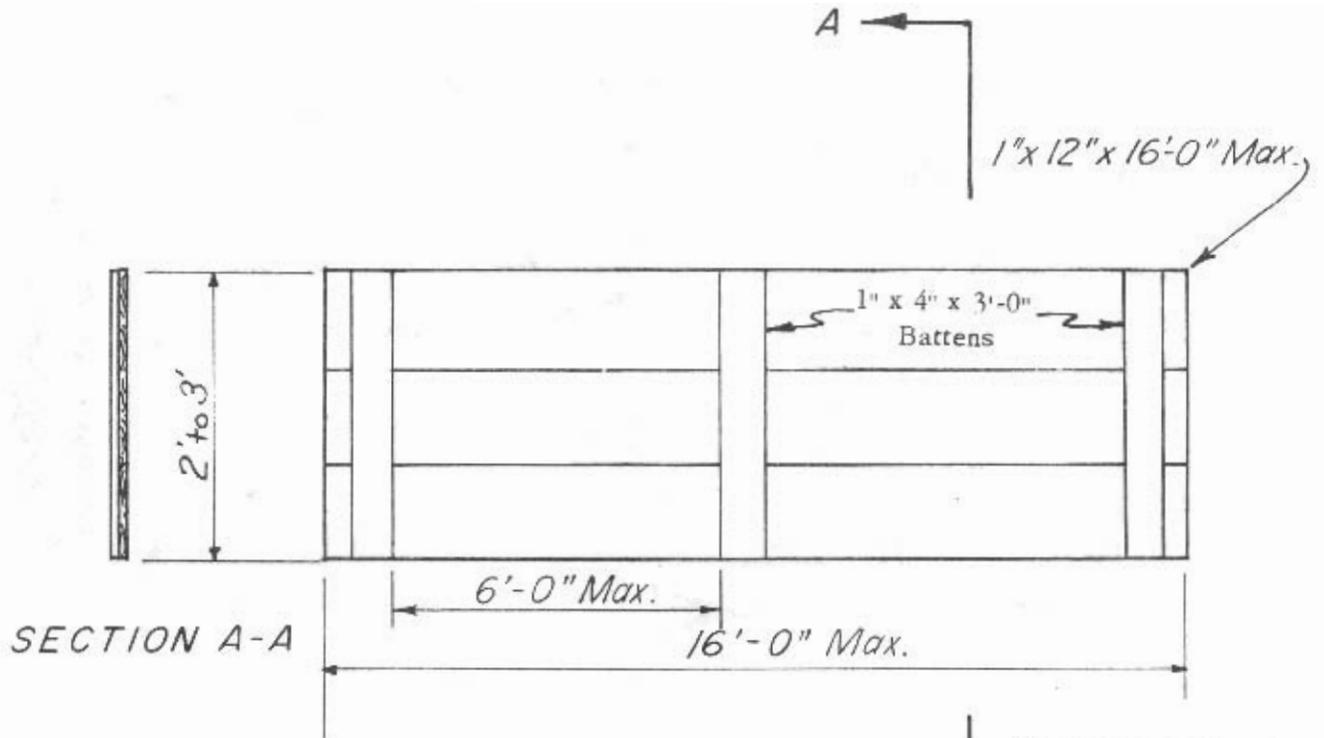
NEVER completely stop the flow from a sand boil. This may cause the boil to "break out" in an adjacent area. ALWAYS control the boil to the point it ceases to carry material, and water runs clear.



Do not sack boils not carrying material but mark location well and maintain surveillance of this area during flood period.

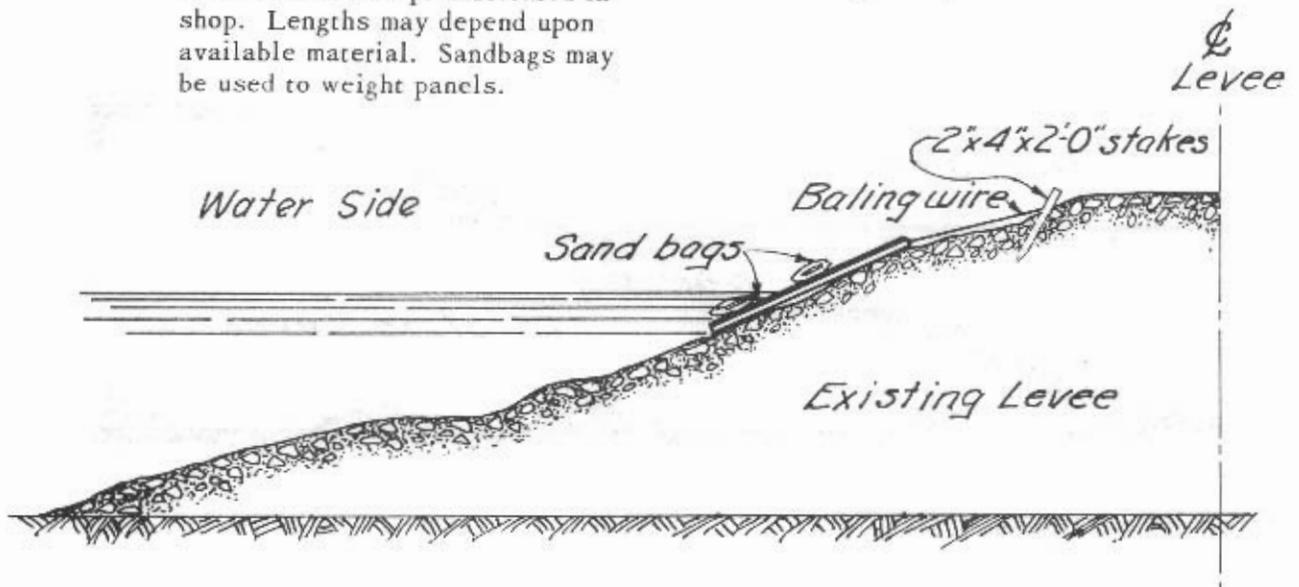
Tie sandbags into slope of levee. Bottom width should be at least $1\frac{1}{2}$ times height.

STATE OF CALIFORNIA
 DEPARTMENT OF WATER RESOURCES
 STATEWIDE OPERATIONS OFFICE
 FLOOD OPERATIONS CENTER
 METHODS OF FLOOD FIGHTING
CONTROL OF SAND BOILS
 (Near levee)



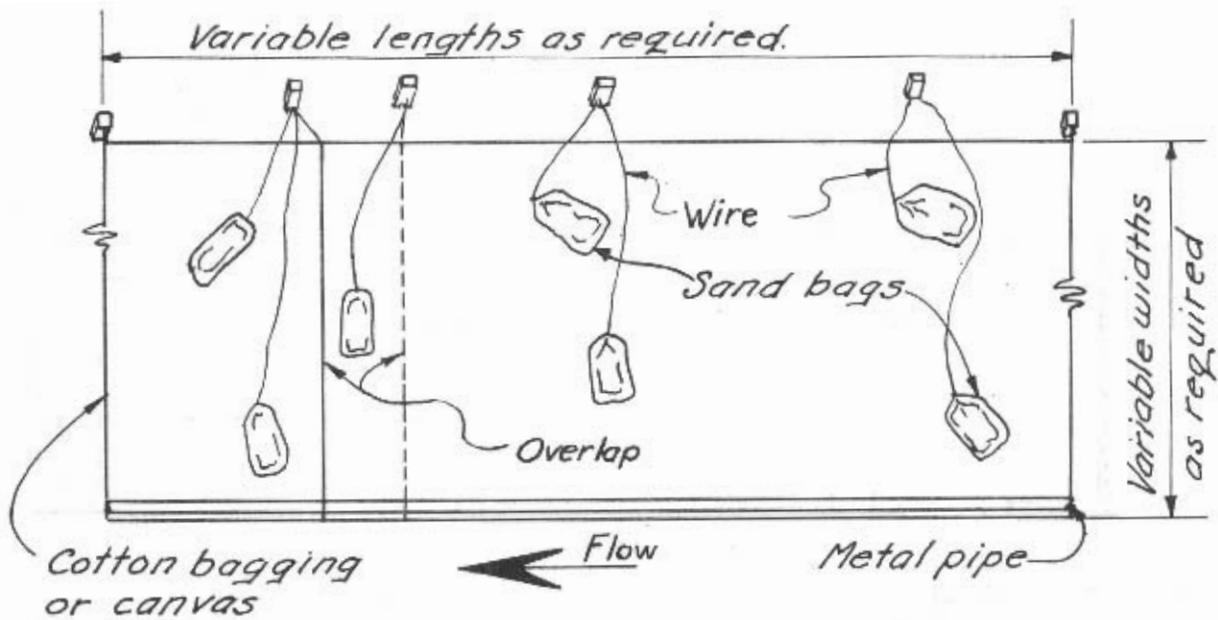
Panels should be prefabricated in shop. Lengths may depend upon available material. Sandbags may be used to weight panels.

Wires are used to raise or lower panels with varying water elevation.

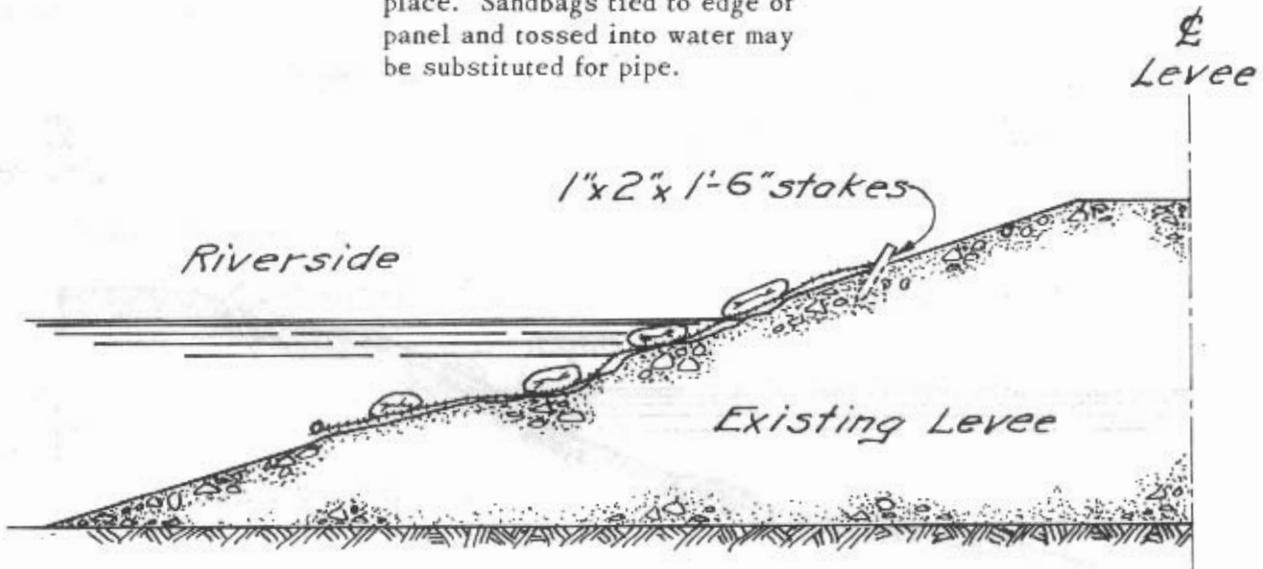


NOTE: Panels may be placed in a vertical position depending upon existing conditions.

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 FLOOD OPERATIONS CENTER
 METHODS OF FLOOD FIGHTING
 WAVE WASH PROTECTION



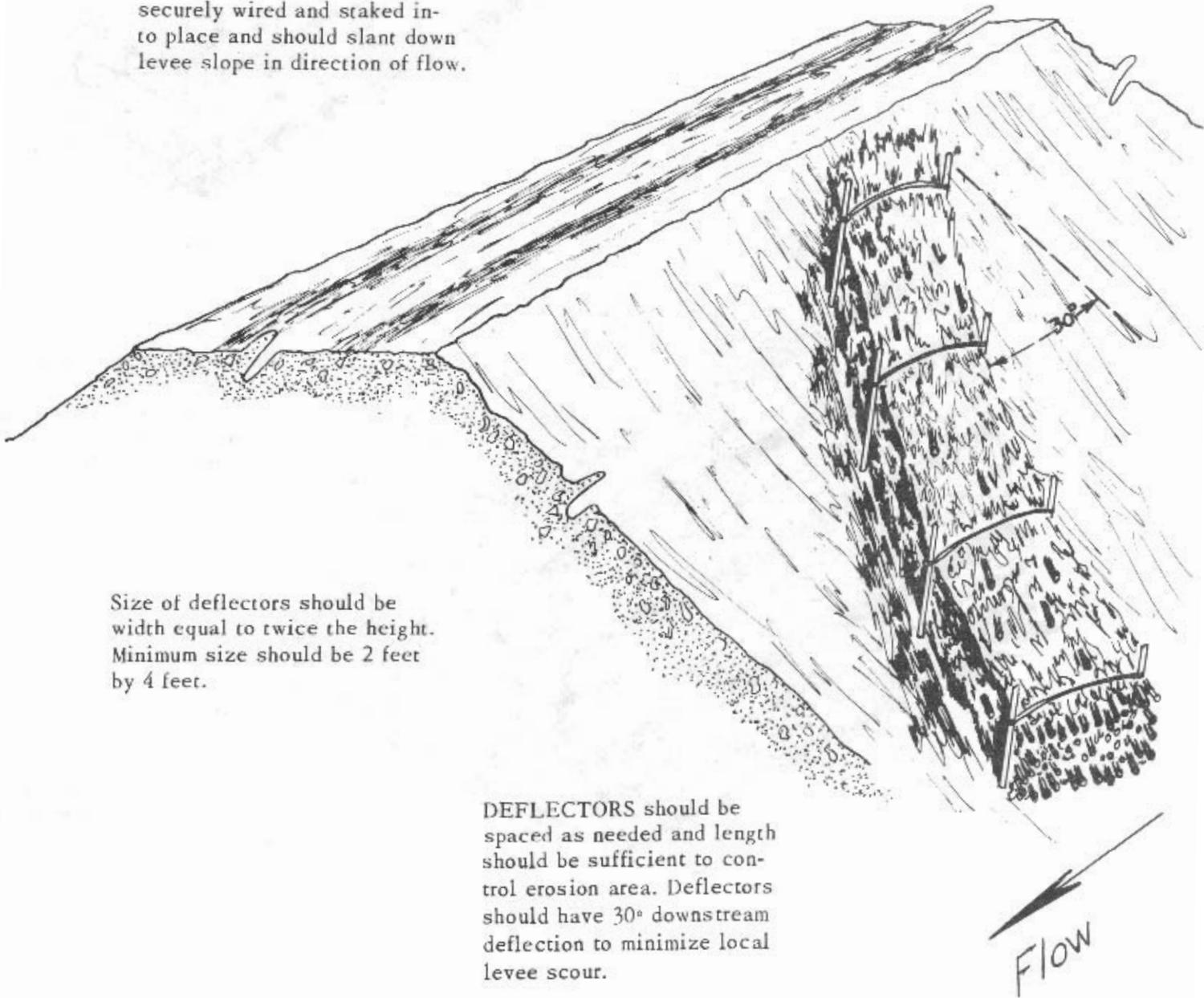
Material is wrapped on pipe and rolled into water. Bags placed at random keep cloth panels in place. Sandbags tied to edge of panel and tossed into water may be substituted for pipe.



Always lay cloth panels in an upstream direction. Tie all bags to levee with wire and stakes.

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 FLOOD OPERATIONS CENTER
 METHODS OF FLOOD FIGHTING
WAVE WASH PROTECTION

DEFLECTORS may consist of brush, stone-filled bags or tree tops. Material should be securely wired and staked into place and should slant down levee slope in direction of flow.



Size of deflectors should be width equal to twice the height. Minimum size should be 2 feet by 4 feet.

DEFLECTORS should be spaced as needed and length should be sufficient to control erosion area. Deflectors should have 30° downstream deflection to minimize local levee scour.

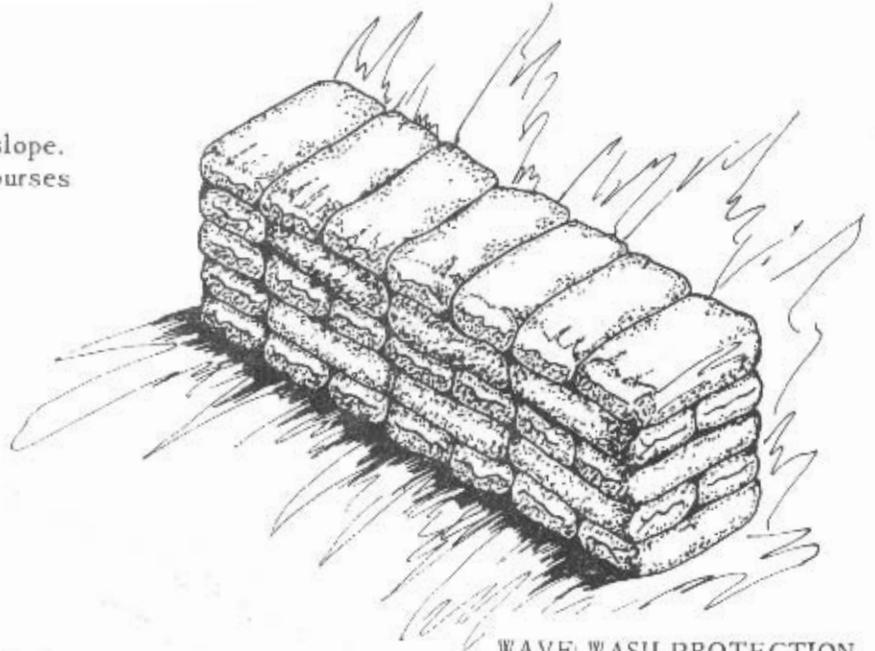
STATE OF CALIFORNIA
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STATEWIDE OPERATIONS OFFICE
FLOOD OPERATIONS CENTER

METHODS OF FLOOD FIGHTING

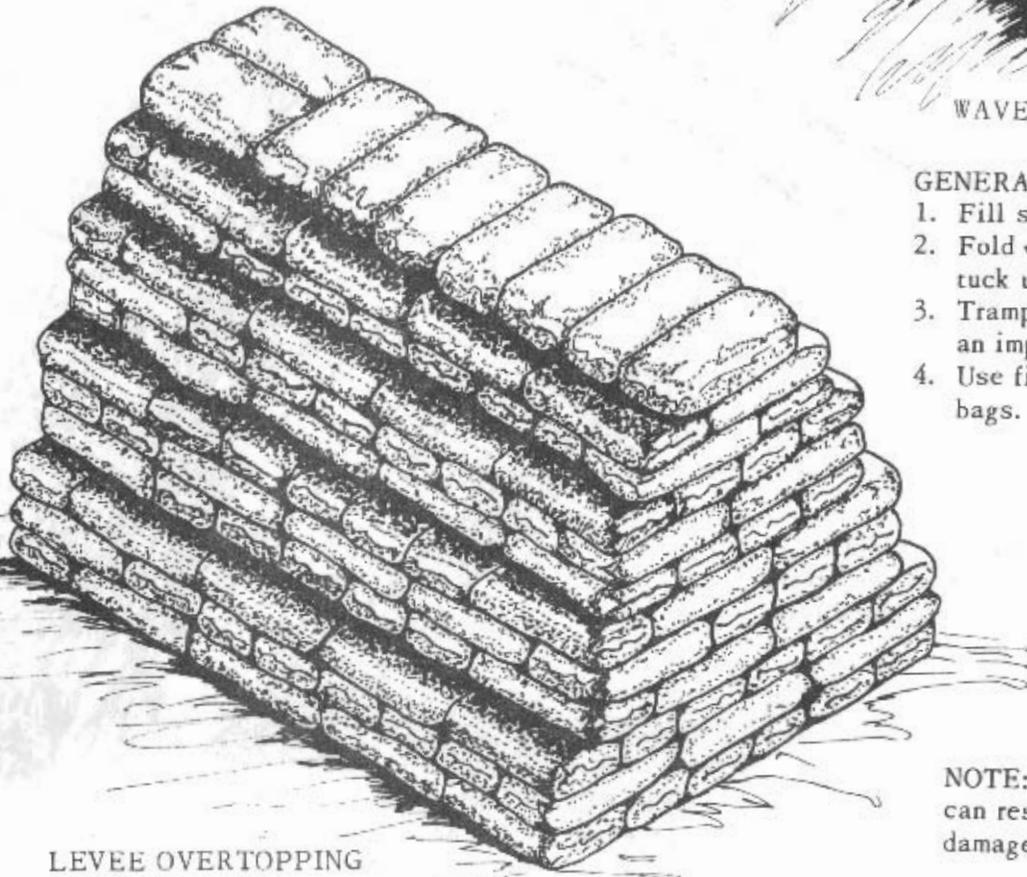
CONTROL OF CURRENT SCOURING

REVELEMENTS

Place bags perpendicular to slope.
Place header and stretcher courses
as shown.



WAVE WASH PROTECTION



LEVEE OVERTOPPING

LEVEE SECTION

For heights 1 foot or less lay 3 single
staggered courses in a lengthwise
direction. For heights in excess of 1
foot lay bags in manner shown above
with height proportional to base.

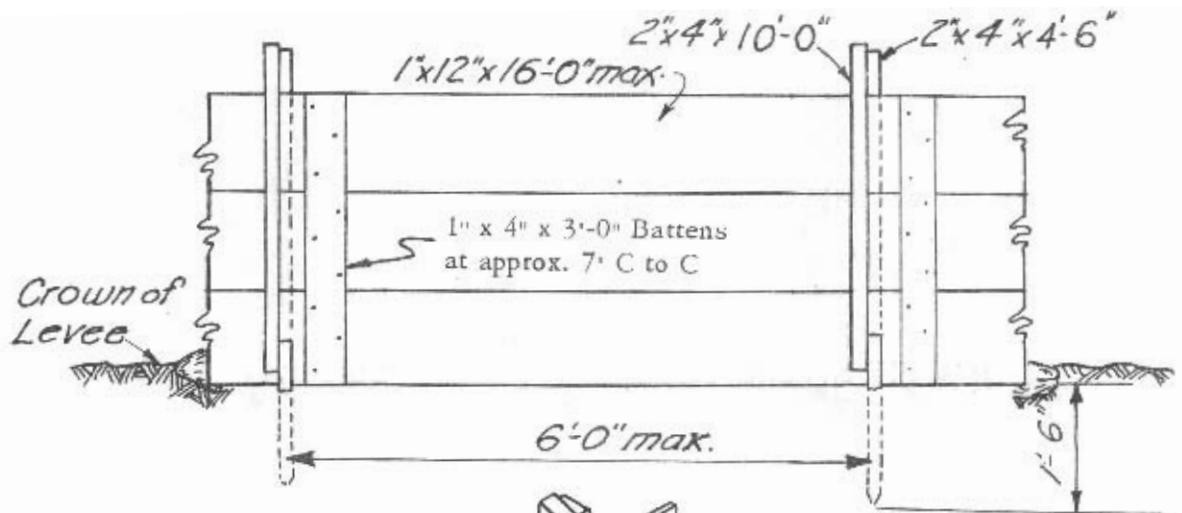
GENERAL:

1. Fill sandbags $\frac{1}{2}$ to $\frac{2}{3}$ full.
2. Fold open end of bag over & tuck underneath.
3. Tramp bags with feet to obtain an impervious section.
4. Use fine sand or silt for filling bags.

NOTE: Improperly placed bags
can result in failure & serious
damage.

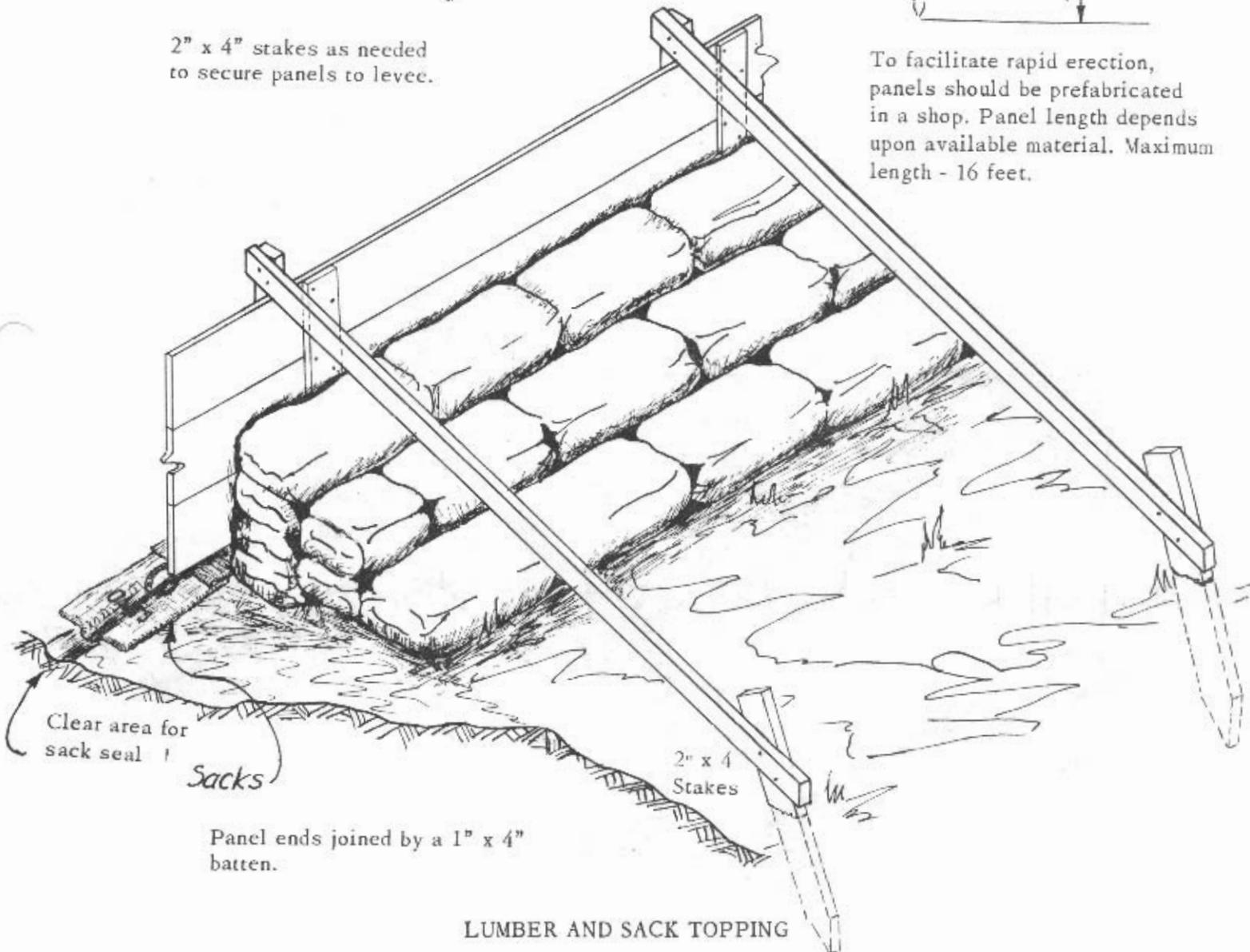
STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
STATEWIDE OPERATIONS OFFICE
FLOOD OPERATIONS CENTER
METHODS OF FLOOD FIGHTING

ADDITIONAL USES OF SANDBAGS



2" x 4" stakes as needed to secure panels to levee.

To facilitate rapid erection, panels should be prefabricated in a shop. Panel length depends upon available material. Maximum length - 16 feet.



Clear area for sack seal

Sacks

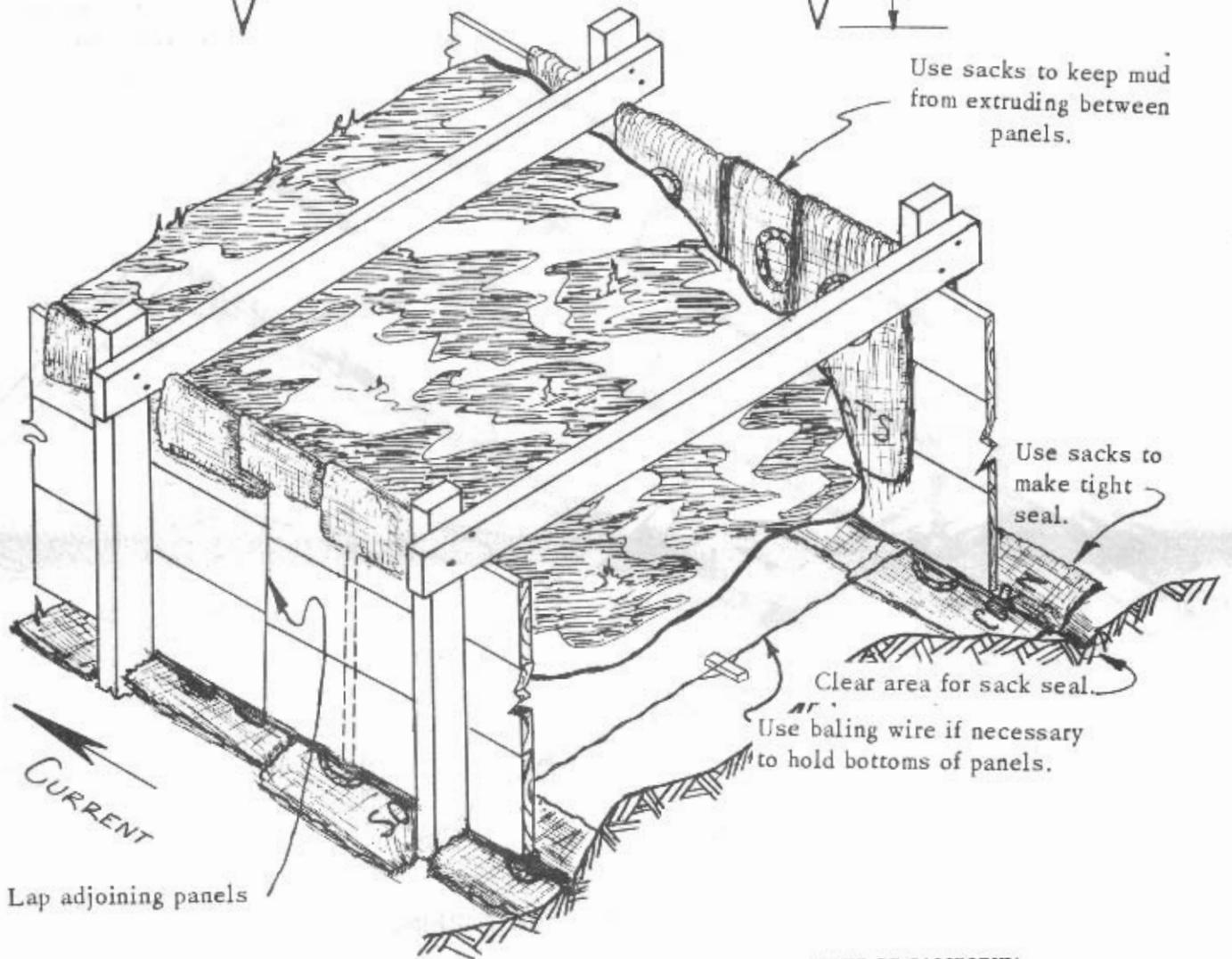
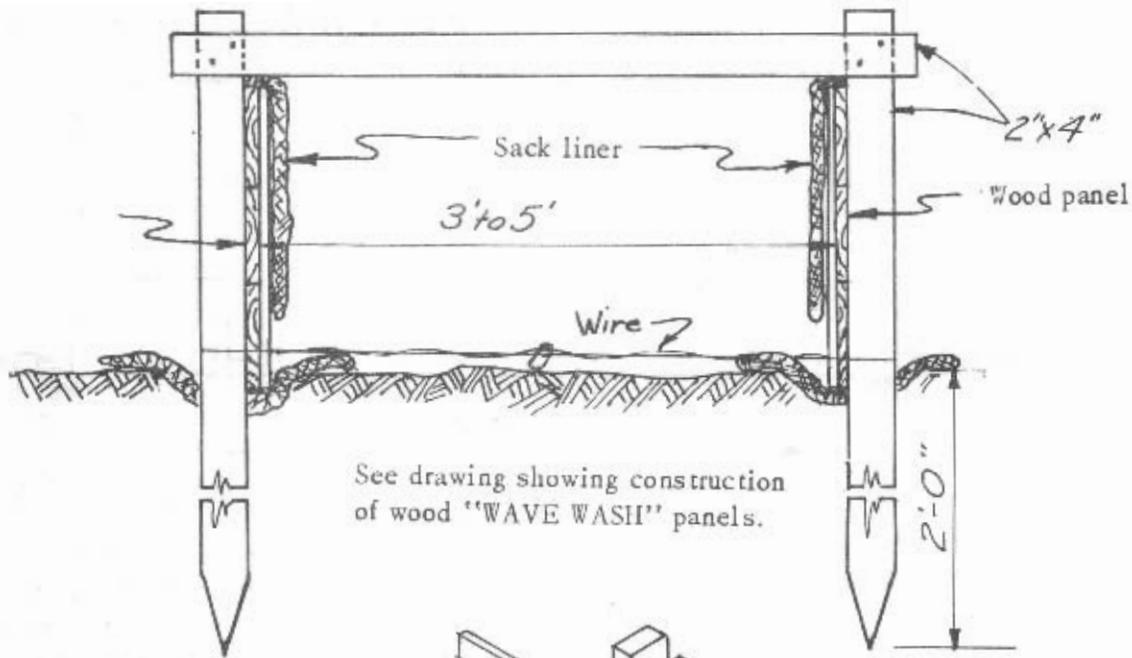
Panel ends joined by a 1" x 4" batten.

2" x 4 Stakes

LUMBER AND SACK TOPPING

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DEPARTMENT OF WATER RESOURCES
STATEWIDE OPERATIONS OFFICE
FLOOD OPERATIONS CENTER
METHODS OF FLOOD FIGHTING

CONTROL OF LEVEE OVERTOPPING



MUD BOX

STATE OF CALIFORNIA
 DEPARTMENT OF WATER RESOURCES
 STATEWIDE OPERATIONS OFFICE
 FLOOD OPERATIONS CENTER
 METHODS OF FLOOD FIGHTING

CONTROL OF LEVEE OVERTOPPING

APPENDIX F

CHECKLISTS

SUGGESTED CHECKLIST NO. 1A - LEVEES

Unit Number or Numbers _____

Inspector's Report Sheet No. _____

Inspector _____

Date _____

Superintendent _____

Item	(a) Location	(b) Condition	(c) Maintenance Measures Taken Since Last Inspection	(d) Remarks
Settlement, sloughing, or loss of grade				
Caving or erosion of levee slopes				
Dislodged or displaced stone protection				
Sod on levee slope				
Weed or undesirable vegetation				
Animal burrows				
Evidence of seepage or sand boils				

SUGGESTED CHECKLIST NO. 1B - LEVEES

Unit Number or Numbers _____

Inspector's Report Sheet No. _____

Inspector _____

Date _____

Superintendent _____

(a) Item	(b) Location	(c) Condition	(d) Maintenance Measures Taken Since Last Inspection	(e) Remarks
Patrol road and levee crown				
Access Roads				
Ramps				
Farm gates and fencing				
Unauthorized encroachments on rights-of-way				

SUGGESTED CHECKLIST NO. 2

DRAINAGE AND IRRIGATION STRUCTURES

Unit Number or Numbers _____

Inspector's Report Sheet No. _____

Inspector _____

Date _____

Superintendent _____

(a) Location by Levee Mileage	(b) Debris or Other Obstruction to Flow	(c) Damage or Settlement of Pipe or Conduit	(d) Condition of Concrete Headwall or Invert Paving	(e) Condition of Right-of-Way Adjacent to Structure	(f) Maintenance Measures Taken Since Last Inspection	(g) Remarks

- Item (a) -- For a given Unit or Units record adverse levee mileage where adverse affect corresponding to listed item has taken place or is occurring. If condition of item is adequate write full length.
- Item (b) -- Describe physical condition of specific item listed or if full length of Unit or Units is adequate rate good, fair, etc.
- Item (c) -- Indicate maintenance measures that have been performed since last inspection and their condition at the time of this inspection.
- Item (d) -- Record opinion, if any, of contributory causes for conditions observed and also any observations not under other columns.

Instructions for Completing Sheets F-1, F-2
 (To be Printed on Back of F-1, F-2)

Instruction for Completing Sheet F-4
(To be Printed on Back of Sheet F-4)

- Item (a) -- Enter levee mileage of structure not up to standards. If irrigation and drainage structures of unit are adequate under all items of Checklist No. 2 enter full length.
- Item (b) -- Inspect inlet, barrel, and outlet for accumulation of sediment, rubbish, and vegetal matter.
- Item (c) -- 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 conduit or been disturbed.
- Item (d) -- Inspect the concrete portions of the structures for evidence of settlement, cracks, pop-outs, spaces, abrasive wear, or other deterioration.
- Item (e) -- Inspect backfill area adjacent to structure for evidence of erosion caused by overflow of the structure.
- Item (f) -- Indicate physical measures that have been taken to correct conditions reported in last inspection, and their condition at time of this inspection.
- Item (g) -- Record opinion, if any, of contributory causes for conditions observed, also any observations not covered under other items.

SUGGESTED CHECKLIST NO. 3A - CHANNELS

Write name of River, Bypass or Slough

Inspector's Report Sheet No. _____

Inspector _____

Date _____

Superintendent _____

Item	(a) Location	(b) Condition	(c) Maintenance Measures Taken Since Last Inspection	(d) Remarks
Vegetal growth in channel				
Debris and refuse in channel				
Extent of aggradation or degradation				
Condition of stone protection reach				
Condition of channel adjacent to bridges				
Unauthorized encroachments within right-of-way				

Instructions for Completing Sheet F-6
(To be Printed on Back of F-6)

- Item (a) -- For a given Unit or Units record adverse levee mileage where adverse affect corresponding to listed item has taken place or is occurring. If condition of item is adequate write full length.
- Item (b) -- Describe physical condition of specific item listed or if full length of Unit or Units is adequate rate good, fair, etc.
- Item (c) -- Indicate maintenance measures that have been performed since last inspection and their condition at the time of this inspection.
- Item (d) -- Record opinion, if any, of contributory causes for conditions observed and also any observations not under other columns.

SUGGESTED CHECKLIST NO. 3B - CHANNELS

DEBRIS SETTLING BASIN
CHOWCHILLA CANAL BYPASS

Inspector's Report Sheet No. _____

Inspector _____

Date _____

Superintendent _____

Item	Location	(1) As Constructed	(2) Average Existing	(3) Average Depth	(4)	(5) Area	(6)	(7) Volume Cu. Ft.
<u>SECTION A</u> Entrance Channel Invert	L.M. 15.61 R	161.7'	-----	-----	-- x 150' =	A -----		
<u>SECTION B</u> Bottom Set- tling Basin	L.M. 15.51 R	154.2'	-----	-----	-- x 350' =	B -----	$\frac{A+B}{2} \times 500'$	-----
<u>SECTION C</u> Bottom Set- tling Basin	L.M. 15.35 R	154.1'	-----	-----	-- x 350' =	C -----	$\frac{B+C}{2} \times 800'$	-----
<u>SECTION D</u> Bottom Set- tling Basin	L.M. 15.21 R	154.0'	-----	-----	-- x 350' =	D -----	$\frac{C+D}{2} \times 800'$	-----
<u>SECTION E</u> Existing Chan- nel Invert	L.M. 15.11 R	161.4'	-----	-----	-- x 150' =	E -----	$\frac{D+E}{2} \times 500'$	-----
Maintenance Measures Taken Since Last Inspection							Total Vol. in Cu.Ft.	<u>27</u>
Remarks							Total Vol. in Cu.Yd.	-----

Instructions for Completing Sheet F-8
(To be Printed on Back of F-8)

Item -- Supply cross-sections as required. Sections shown assume disposition of material on level plane.

-- Indicate maintenance measures that have been performed since last inspection and their condition at the time of this inspection.

-- If there has been no change in the storage capacity of the settling basin state this fact under remarks.

Location -- Supply necessary horizontal control.

(1) -- As constructed elevation -- See plan and profile Chapter 5000.

(2) -- Assign average existing elevation from cross-section.

(3) -- Column (2) -- Column (1).

(4) -- Column (3) x mean width of section.

(5) -- Product of (4) or area of section.

(6) -- Average end method (first reach would be area Section A + area Section B \div 2 x length of reach).

(7) -- Volume of reach in cubic feet. Summation gives total volume of debris in cubic feet. Divide by 27 and volume is converted to cubic yards.

SUGGESTED CHECKLIST NO. 4A - MISCELLANEOUS FACILITIES

BRIDGES

Inspector's Report Sheet No. _____ Inspector _____
 Date _____ Superintendent _____

Bridge Name	(a) Note Condition of				(b) Maintenance Measures Taken Since Last Inspection	(c) Remarks
	Piles and Abutments	Embankment and Stone Protection	Deck Slab and Hinge Point	Railing		
Bear Creek Patrol Bridge						
Sand Slough Patrol Bridge						
East Side Canal Patrol Bridge						
Sandy Mush Road-County						
West Washington Road-County						
Avenue 21-County						
Road 4-County						

SUGGESTED CHECKLIST NO. 4B - MISCELLANEOUS FACILITIES

BRIDGES

Inspector's Report Sheet No. _____

Inspector _____

Date _____

Superintendent _____

Bridge Name	(a) Note Condition of				Railing	(b) Maintenance Measures Taken Since Last Inspection	(c) Remarks
	Piles and Abutments	Embankment and Stone Protection	Deck Slab and Hinge Point				
Avenue 18½ - County							
Road 9 Ber. Sl. - County							
Road 9 E.S.B.P. - County							
Avenue 14 - County							
Firebaugh- Madera Road - County							
Firebaugh- Fresno Road - County							
Triangle "T" Access							

SUGGESTED CHECKLIST NO. 4C - MISCELLANEOUS FACILITIES

BRIDGES

Inspector's Report Sheet No. _____ Inspector _____
 Date _____ Superintendent _____

Bridge Name	(a) Note Condition of				(b) Maintenance Measures Taken Since Last Inspection	(c) Remarks
	Piles and Abutments	Embankment and Stone Protection	Deck Slab and Hinge Point	Railing		
Harney Access						
Dickinson Ferry Road Access						
Hayfield Access						
Chamberlain Road Access						
Crane Access						