

SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE
MANUAL
LOWER SAN JOAQUIN RIVER & TRIBUTARIES
PROJECT, CALIFORNIA

UNIT NO 3-A
WETHERBEE LAKE
PUMPING PLANT AND
NAVIGATION GATE

APRIL 1964



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

**DEPARTMENT OF WATER RESOURCES
THE RECLAMATION BOARD**

- 9th Street, Room 335-18
Sacramento, CA 95814
(916) 445-9454

C-0



December 19, 1983

Colonel Arthur E. Williams
District Engineer
Sacramento District
U. S. Army Corps of Engineers
650 Capitol Mall
Sacramento, CA 95814

Dear Colonel Williams:

Your letter dated November 25, 1983 asked The Reclamation Board to consider adopting the interim criteria regarding the operation of the Reclamation District 2096 navigation gate and pumping station as permanent.

At its regular Board meeting in Bakersfield on December 16, 1983, The Reclamation Board approved the adoption of the interim criteria as permanent.

Sincerely,

for *Robert L. Manning*
ELDON E. RINEHART
General Manager



File: San Joaquin R.
Trib Project OSM

November 25, 1983

SPKED-D

The Reclamation Board
State of California
1416 9th Street
Sacramento, California 95814

Gentleman:

The Corps of Engineers has received a request from the Wetherbee Lake Reclamation District No. 2096 to adopt the interim criteria regarding the operation of the navigation gate and the pumping station on the San Joaquin River. Since the Reclamation Board has officially accepted responsibility for the operation and maintenance of Wetherbee Lake, we would appreciate your consideration of this matter.

In order to assist in your decision, we have enclosed 7 copies of the affected pages of the Supplement to Standard Operation and Maintenance Manual - Lower San Joaquin River and Tributaries Project, California entitled Unit No. 3-A, Wetherbee Lake Pumping Plant and Navigation Gate. The proposed changes have been highlighted for your convenience. It should be noted that the interim criteria has been utilized since 1975 without ill consequence to flood control operations; however, an increase in pumping costs to Reclamation District 2096 has resulted.

The Corps of Engineers does not object to the adoption of the interim criteria as permanent. Should the Board concur, please notify this office by letter and we will take the appropriate action to officially adopt the interim criteria.

Thank you for your efforts in this matter. Should you have any questions please contact Mr. Scott Morris of our Reservoir Control Section at 440-2378.

Sincerely,

Arthur E. Williams
Colonel, Corps of Engineers
District Engineer

Enclosures

Copy Furnished:
Wetherbee Lake Reclamation District No. 2096
Manteca, Ca. 95336

cc: Reservoir Cont Sec Civ Des Br
Engr Div 7 C-O Div

MORRIS

NEAL

COUNTRYMAN

WEDDELL

WILLIAMS



SPKED-T

17 March 1975

The Reclamation Board
State of California
1416 - 9th Street, Room 335
Sacramento, California 95814

Gentlemen:

Reference is made to your letter dated 30 October 1974 requesting our comments on the proposal by Reclamation District No. 2096 to modify the operating criteria on the Wetherbee Lake pumping plant and navigation gate.

Operating the Wetherbee Lake Navigation Gate based on closing the gate when the San Joaquin River stage exceeds 8.50 feet m.s.l. and opening the gate when the stage falls below 8.5 feet m.s.l. as proposed in the subject letter will not interfere with flood control, provided that during the period 1 October to 30 April the pumps are operated generally in accordance with the criteria established in the "Supplement to Standard Operations and Maintenance Manual, Lower San Joaquin River and Tributaries Project, California, Unit No. 3-A Wetherbee Lake Pumping Plant and Navigation Gate," dated April 1964. However, the more frequent gate closure for extended periods of time along with the maintenance of lower lake levels in the spring may interfere with irrigation and navigation interests along Walthall Slough.

In order to help determine the appropriateness of the proposed change in operation criteria, it is suggested that the Reclamation Board, as local sponsor of the Lower San Joaquin River and Tributaries Project, hold a public meeting to obtain the views of all interested parties.

After the views of all interested parties are obtained, the operating criteria can be modified by the Corps if found to be appropriate. The modified criteria should then be used for a trial period to determine

SPKRD-T
The Reclamation Board

17 March 1975

the effectiveness of the modifications before the operating regulations
are permanently changed.

Sincerely yours,

F. G. ROCKWELL, JR.
Colonel, CE
District Engineer

MADEHEIM/srb
REDACTRON

COUNTRYMAN

AICKLEN

DOYLE

HENSON

WEDDELL

POTAMOS

ROCKWELL

cc:

✓C-O Div
Engr Div
Tech Engr Br
Res Reg Sec
Wtr Res Plng Br

COMMISSION BOARD

BUILDING

SACRAMENTO 95814

1416 9TH ST.

October 30, 1974

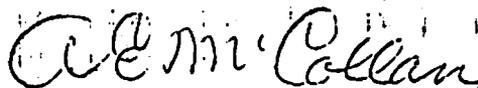
District Engineer
Sacramento District
U. S. Army Corps of Engineers
650 Capitol Mall
Sacramento, CA 95814

Dear Sir:

Attached is a copy of a letter from Mr. Richard W. Dickenson, Secretary for Reclamation District No. 2096 (Wetherbee Lake), setting forth revised operating criteria of the pumping plant and navigation gate at Wetherbee Lake on the San Joaquin River Flood Control Project. The primary purpose of the revised criteria is to minimize pumping requirements.

Please review the revised criteria and advise me of your conclusion. If you agree with the District's operating procedures, consideration should be given to revising the Operation and Maintenance Manual accordingly.

Sincerely,



A. E. MCCOLLAM
Chief Engineer and
General Manager

SPDGC-0 (5 Dec 63)

1st Ind

SUBJECT: Supplement to Standard Operation and Maintenance Manual, Unit
No. 3-A, Wetherbee Lake Pumping Plant and Navigation Gate-
Lower San Joaquin River and Tributaries Project, California

U S Army Engr Div, South Pacific, San Francisco, Calif 13 Feb 64

TO: District Engineer, U S Army Engr Dist, Sacramento

The subject supplement is approved. Minor corrections have been
indicated in red on the copy returned herewith.

FOR THE DIVISION ENGINEER:



F. C. KENDALL
Chief, Engineering Division

eb 1 Incl
1. w/d 2 cys
2. w/d

U. S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
FEDERAL & COURTS BLDG., 650 CAPITOL MALL
P. O. BOX 1739, SACRAMENTO, CALIFORNIA 95808

LESS REPLY TO
DISTRICT ENGINEER

REFER TO SPKGD

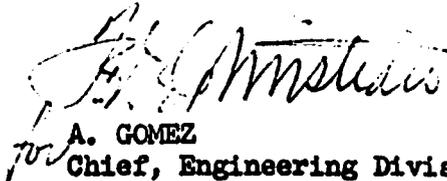
5 December 1963

SUBJECT: Supplement to Standard Operation and Maintenance Manual, Unit No. 3-A, Wetherbee Lake Pumping Plant and Navigation Gate - Lower San Joaquin River and Tributaries Project, California

TO: Division Engineer
U. S. Army Engineer Division, South Pacific
San Francisco, California

Three copies of a draft of the subject operation and maintenance manual, and two sets of contract drawings are forwarded for approval in accordance with paragraph 2 of South Pacific Division multiple letter dated 11 March 1954, subject: "Discontinuance of Submission of Copies of Operation and Maintenance Manuals." Contract drawings have been substituted for "As-Constructed" drawings which will not be available until about 1 March 1964.

FOR THE DISTRICT ENGINEER:


A. GOMEZ
Chief, Engineering Division

- 2 Incl
1. Draft, O&M Manual
(in trip)
 2. Contr. Dwgs (2 sets)

CORPS OF ENGINEERS

U. S. ARMY

SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE MANUAL

LOWER SAN JOAQUIN RIVER & TRIBUTARIES PROJECT, CALIFORNIA

UNIT NO. 3-A

WETHERBEE LAKE PUMPING PLANT

AND

NAVIGATION GATE

U. S. Army Engineer District, Sacramento
Corps of Engineers
Sacramento, California

April 1964

**SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE MANUAL
LOWER SAN JOAQUIN RIVER AND TRIBUTARIES PROJECT, CALIFORNIA**

UNIT NO. 3-A

WETHERBEE LAKE
PUMPING PLANT AND
NAVIGATION GATE
APRIL 1964

LOCATION	ADDITION OR REVISION	DATE
Exhibit G	Add copy of letter of transfer dated 19 Aug 1963	25 May 2011

SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE MANUAL

LOWER SAN JOAQUIN RIVER & TRIBUTARIES PROJECT, CALIFORNIA

UNIT NO. 3-A

WETHERBEE LAKE PUMPING PLANT AND NAVIGATION GATE

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<u>Number</u>	<u>Subject</u>	<u>Sheets</u>
A	Federal Flood Control Regulations	2
B	Determination of Drainage Pump Capacity - Walthall Slough	1
C	Frequency of Stages - San Joaquin River	1
D	"As Constructed" Drawings and Specifications	Unattached
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SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE MANUAL

LOWER SAN JOAQUIN RIVER & TRIBUTARIES PROJECT, CALIFORNIA

UNIT NO. 3-A

WETHERBEE LAKE PUMPING PLANT AND NAVIGATION GATE

SECTION I

INTRODUCTION

1-01. Authorization. The Lower San Joaquin River and Tributaries Project (of which the San Joaquin River Levees are a part) was authorized by the Flood Control Act of 22 December 1944, Public Law 534, 78th Congress, 2nd Session, Section 10 of which reads in part as follows:

"....The plan of improvement for flood control and other purposes on the Lower San Joaquin River and tributaries, including Tuolumne and Stanislaus Rivers, in accordance with the recommendation of the Chief of Engineers in Flood Control Committee Document Numbered 2, 78th Congress, 2nd Session, is approved...."

Parallel authorizing legislation by the State of California was contained in Section 33 of the Water Resources Act, Chapter 1514, California Statutes of 1945, now Section 12651 of the State Water Code.

1-02. Location. The Pumping Plant is a part of the Lower San Joaquin and Tributaries Project, a major portion of which consists of Federal levee and channel improvement and bank protection along the Lower San Joaquin River from the mouth of the Merced River to the Delta. The pumping plant and navigation gate are located in the San Joaquin River levee where that levee crosses Walthall Slough at a point about 0.8 miles upstream from Mossdale, California, on U. S. Highway No. 50. The lower reach of Walthall Slough is known as Wetherbee Lake.

1-03. Project Description. The pumping plant consists of three drainage pumps with a rated capacity of 22,500 gallons per minute (50 c.f.s.) each at a total dynamic head of 16 feet. The pumps are operated automatically by float actuated controls. Gravity drainage from Walthall Slough is discharged through the opened navigation gate. For more detailed description of the pumping plant facilities see paragraph 6-01 of this manual.

The navigation gate consists of a 16 foot wide tainter gate set in a reinforced concrete structure that abuts the right side of the pumping plant. The transverse center-line of the gate structure coincides with the center-line of the levee, and the profiles of the gate structure side retaining walls are similar to the levee cross-section outline.

The navigation gate is 23 feet high, and its sill is set at elevation -3.0 feet. The top of the gate is sealed against the upstream girder of the operating bridge across the gate structure, so that the closed gate will provide a barrier to prevent river flow into Walthall Slough at any stage up to the design river stage of elevation 25.2 feet. For more detailed description of the navigation gate structure see paragraph 6-01 of this manual.

1-04. Construction Data Construction of the Wetherbee Lake Pumping Plant and Navigation Gate was accomplished under Contract No. DA-04-167-CIVENG-62-68 by Jack Cambell, Inc. during the period from 8 June 1962 to 10 September 1963.

SECTION II

LOCAL COOPERATION REQUIREMENTS

2-01. Requirement of Local Cooperation. As stated in Flood Control Committee Document, No. 2, 76th Congress, 2nd Session, local interests are required to (a) furnish all lands, easements, and rights-of-way necessary for construction or improvement of levees by the Federal Government downstream from the mouth of Merced River; (b) bear expense of utility alterations and relocations; (c) hold and save the United States free from damages due to the construction works and their subsequent maintenance and operation; and (d) maintain all levees and channel improvements after completion in accordance with regulations prescribed by the Secretary of the Army.

2-02. Assurances Provided by Local Interests. The State of California by legislation enacted in 1955 has agreed to furnish the required cooperation. Section 12657 of the State Water Code states:

"Except as otherwise provided in Chapters 1 and 2 of this part, the Reclamation Board shall give assurances satisfactory to the Secretary of War that the local cooperation, required by Section 3 of the Act of Congress approved December 22, 1944 (Public, numbered 534, Seventy-eighth Congress, Second Session), and Section 2 of the Act of Congress, approved August 18, 1941 (Public, numbered 228, Seventy-eighth Congress, First Session), will be furnished by the State in connection with the flood control projects authorized and adopted in Sections 12648, 12650, 12651, 12652, 12654, and 15656.5 and on any flood control projects on any stream flowing into or in the Sacramento Valley or the San Joaquin Valley hereinafter approved and authorized by Congress."

Section 12651 of the Water Code covers specifically the Lower San Joaquin River and Tributaries Project.

2-03. Acceptance by the State Reclamation Board. Responsibility for operating and maintaining the completed works was officially accepted by the Reclamation Board of the State of California by letter dated, September 12, 1963, as shown on the attached letter of acceptance, EXHIBIT G. Therefore, in so far as this manual is concerned, "local interests" refers to the State Reclamation Board or the responsible party or parties designated by the Board for detailed operation and maintenance.

SECTION III

MAINTENANCE AND OPERATION - GENERAL PROCEDURE

3-01. Reference to Approved Regulations. This manual is submitted in accordance with provisions of Title 33 - Navigation and Navigable Waters, Chapter II, Corps of Engineers, Department of the Army, Part 208 - Flood Control Regulations, Maintenance and Operation of Flood Control Works, approved by the Secretary of the Army, 9 August 1944, a copy of which is included as EXHIBIT A, Sheets 1 and 2.

3-02. Intent of Regulations. The general intent of the regulations approved by the Secretary of the Army is stated in paragraph 208.10 (a) (1) as follows: "The structure and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain and maximum benefits."

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

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

to be applicable to all flood-protection projects for which such regulations are required by law. Section 208.10 (a) (10) of the regulations reads as follows:

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

This manual has, therefore, been prepared to furnish local interests with information on the project works and advise as to the details of the operation and maintenance requirements applicable to this particular project, to state procedure required by the Department of the Army, and to indicate satisfactory methods of flood fighting operations and emergency repairs. The project works are to be maintained and operated in accordance with the Flood Control Regulations referred to above and interpretations thereof contained herein.

3-04. Definitions. The term "District Engineer" shall mean the District Engineer of the U. S. Army Engineer District, Sacramento, or his authorized representative. The term "right bank" or "left bank" shall mean the right or left bank or side, respectively, of a stream or channel when facing downstream. See Paragraph 2-03 for the definition of "local interests."

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

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

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

- (4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way of the protective facilities.
- (5) No improvement shall be passed over, under or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any features of the works without prior determination by the District Engineer of the Department of the Army or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer, or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the works.
- (6) It shall be the duty of the Superintendent* to submit a semi-annual report to the District Engineer covering inspection, maintenance, and operation of the protective works.
- (7) The District Engineer or his authorized representative shall have access at all times to all portions of the protective works.
- (8) Maintenance measures or repairs which the District Engineer deems necessary, shall be promptly taken or made.
- (9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods."

*In this case the "Superintendent" will be a representative of Reclamation District No. 2096.

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

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

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

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

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

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

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

c. Encroachment or Trespass on Right-of-way. In accordance with the provisions of Flood Control Regulations 208.10 (a) (4), no encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted on the rights-of-way or in the flood storage area for the protective facilities. The Superintendent will, therefore, cause notices to be posted at conspicuous places in the project area directing public attention to this regulation. The Superintendent shall notify any offenders and report the offense and the action taken to the State Reclamation Board.

d. Permits for Improvements or Construction within the Project Right-of-Way. All requests for permits for construction of any improvements of any nature within the limits of the project right-of-way or within the limits of the Walthall Slough flood storage area below elevation 12 feet mean sea level datum, shall be referred to the District Engineer through the State Reclamation Board for determination that such construction will not adversely affect the stability, safety, and functioning of the protective facilities and flood storage areas of Wetherbee Lake and Walthall Slough upstream of the navigation gate, and for definition of conditions under which permit should be granted. These conditions will include, among others, the following items:

(1) That all work shall be performed:

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

(b) To the satisfaction of the District Engineer.

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

e. Coordination of Local Activities. In accordance with the provisions of Flood Control Regulations, paragraph 208.10 (a) (9), the Superintendent will, during periods of flood flow, coordinate the functions of all agencies, both public and private, that are connected with the protective works. Arrangements shall be made with the local law enforcement agencies, street departments, and railroad and utility companies for developing a coordinated flood-fighting program; and an outline of this program shall be filed with the District Engineer.

f. Inspection.

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

"(b) Levees (1) Maintenance . . . Periodic inspections shall be made by the Superintendent to insure that . . . maintenance measures are being effectively carried out . . . Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days and such intermediate times as may be necessary to insure the best possible care of the levee."

(2) The suggested check lists and instructions shown in EXHIBIT I, Sheets 1 to 11, inclusive, are to be followed in each inspection to insure that no features of the protective system are overlooked. Carbon copy of the inspector's original field notes as recorded on the check list shall be transmitted to the District Engineer immediately following each inspection, and one copy included as an inclosure to the semi-annual report as provided in paragraph 3-07 (h) (1) of this manual.

g. Maintenance.

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

"(b) (1) Maintenance. The superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to . . . exterminate burrowing animals, and to provide for . . . removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces . . . Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent."

(2) Full responsibility for making the necessary repairs and the methods used is placed on the Superintendent, but the experience and facilities of the District Engineer will be available to him for advice and consultation.

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

changes or alterations that may be proposed by the superintendent shall be submitted to the District Engineer for investigation and approval before prosecution of the work.

h. Reports.

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

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

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

(c) Actions on encroachment or trespass.

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

(e) Permits issued for improvements or construction within the project area including the Walthall Slough flood storage area.

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

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

3-08. Inspection Procedure. ✓ Since the enactment of State Legislation of Chapter 1528, Statutes of 1947, the Department of Water Resources, State of California, has made semi-annual inspections of all levees of authorized flood control projects in the Sacramento-San Joaquin drainage basin pursuant to the Federal Regulations of 16 August 1944 (Title 33), and reports its findings to the local agency, the State Reclamation Board and the U. S. Army Engineer District, Sacramento. This activity, initiated pursuant to Section 208.10 (a) of the Federal Regulations, has in effect provided for transfer from the local agencies to the State Department of Water Resources the obligation of compliance with Sections 8371, 8372, and 8373 of the Water Code of the State of California. These sections of the Code require the local responsible agencies to submit a report to the State Department of Water Resources on or before 1 June of each year on the condition of the levees and channels within their jurisdiction. Supervisory powers and duties of the Department are applicable to all works of the authorized projects maintained and operated by the local agencies without regard to status of completion, or expenditure of Federal funds on the construction of such works.

Upon completion of the fall inspection the State Department of Water Resources publishes an annual report entitled, "Status of Project Levee Maintenance" which indicates the degree of proficiency attained by each obligated local agency in providing required maintenance.

SECTION IV

FEATURES OF THE PROJECT SUBJECT TO FLOOD CONTROL REGULATIONS

4-01. Levees. The levee adjoining the Pumping Plant and Navigation Gate is subject to the Flood Control Regulations and is more fully described in the Supplement to the Standard Operation and Maintenance Manual for the San Joaquin River and Tributaries Project, entitled, "Unit No. 3, Right Bank of San Joaquin River from Stanislaus River to Wetherbee Lake."

4-02. Structures. The Pumping Plant and Navigation Gate are subject to the same Flood Control Regulations as the levees and channels, therefore, the operation, maintenance and inspection of these features shall be coordinated with that of the levees and channels.

4-03. Pumping Plant

a. Description. The Pumping Plant is described in Paragraph 6-01 of this manual.

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

"(f) Pumping Plants (1) Maintenance. Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood season to insure that all equipment is in order for instant use. At regular intervals, plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubricants for all types of machines...shall be kept on hand at all times...All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year...Only skilled electricians and mechanics shall be employed on tests and repairs. ...Repairs requiring removal of equipment from the plant shall be made during off-flood seasons in so far as practicable."

c. Operation. Pertinent Requirements of the Code of Federal Regulations, EXHIBIT A, paragraph 208.10 (f) (2) are quoted in part as follows:

"(f)(2) Operation. ...The operator shall be familiar with the equipment manufacturer's instructions and drawings and with the "Operating Instructions"

for each station...Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the District Engineer following each flood season."

The frequency of visits by competent operators to check pumping operations will vary greatly and schedules will have to be flexible enough to meet changing conditions, from extreme emergency flood conditions where continuous duty of operator is warranted, to visits every 4 hours, 8 hours, or 24 hours.

4-04. Navigation Gate.

a. Description. The Navigation Gate is described in paragraph 6-01 of this manual.

b. Maintenance and Operation. Pertinent parts of paragraphs 4-03b and 5-04 of this manual apply to the maintenance and operation of the Navigation Gate.

SECTION V

OPERATION REGULATIONS

5-01. Objectives. The operational objectives of the navigation gate and pumping plant at Wetherbee Lake are, (a) to allow free passage of small boats between Wetherbee Lake and San Joaquin River when the stage of San Joaquin River is lower than the damaging stage in Wetherbee Lake, (b) to prevent flooding around Wetherbee Lake and Walthall Slough by closing the navigation gate and turning on the pumps, and (c) to maintain about 400 acre-feet of sump storage space in Wetherbee Lake and Walthall Slough during those winter periods when the navigation gate is closed. A secondary objective is to minimize pumping requirements by choosing favorable times for opening and closing the navigation gate.

5-02. Definitions. The term "structure" used in this section of the manual refers to the joint navigation gate and pumping plant located in the outlet of Wetherbee Lake which is described in detail in paragraph 6-01.

The gages used for operation of the structure are:

"River Gage" is the staff gage located on the river side of the structure.

"Lake Gage" is the staff gage on the lake side of the structure.

"Vernalis Gage" is the upstream State Department of Water Resources gage on San Joaquin River near Vernalis at the Durham Ferry Bridge. This gage is used in forecasting flows and stages for the reach of San Joaquin River pertinent to these regulations.

The term "stage" refers to a water surface elevation read from any of the above gages.

"Official forecast" refers to the river forecast issued by the Joint Federal-State River Forecasting office in Sacramento. These forecasts are normally released by the press, radio, and television as a public service. They may also be obtained by calling the forecast office, Sacramento 442-1201 or 445-5800.

The term "operator" refers to the individual responsible for the physical operation of the units of the structure and also responsible for obtaining all required stage data and forecasts of river trends and future stages.

"Automatic operation" refers to operation of the pumps when starting and stopping of the pumps are controlled by the float control mechanism described in paragraph 6-01a.(2).

5-03. Basis of operation. The navigation gate will be closed only when there is an actual or impending stage in the river at the River Gage in excess of the maximum nondamaging stage of 12.0 feet in Wetherbee Lake. When the gate is open, all pumps will be shut off. When the gate is closed, the pumps will be turned on and placed in automatic operation. The pumps can be set for manual operation in case of failure of the automatic controls. During the summer period from 1 April to 30 September when inflow from Walthall Slough is small, closure of the navigation gate will be based on actual stages on the River Gage combined with an official forecast of sustained river stages above the damaging level in Wetherbee Lake. When the gate is closed during this period, stages in Wetherbee Lake will be regulated by automatic operation of pumps between 11.1 and 12.1 feet, in order to minimize pumping heads upstream along Walthall Slough. During the winter period from 1 October to 30 April when inflow from Walthall Slough may be relatively high, closure of the navigation gate will be based on forecasted river stages and trends to allow time for evacuation of the sump storage prior to occurrence of actual river stages equal to the damaging stage in the lake. When the gate is closed during this period, the stage in Wetherbee Lake at the Lake Gage will be automatically controlled by the pumps. The stage at the Lake Gage will vary between 5.1 and 6.1 feet except immediately after gate closure or during periods of high inflow from Walthall Slough when stages may rise as high as 12 feet for short periods. The navigation gate will be re-opened in both winter and summer, whenever the stage at the River Gage has receded to less than 12.0 feet and the forecast is for sustained river stages below that level. Detailed operation procedures for the navigation gate are given in paragraph 5-05a.

5-04. Regulations. The following regulations are prescribed to accomplish the operational objectives in accordance with the foregoing basis of operation:

a. Summer operation. Operation during the summer from 1 April to 30 September shall be as follows:

(1) The navigation gate shall be kept in its full open position and the pumps turned off whenever the stage in San Joaquin River at the River Gage is less than the maximum non-damaging stage in Wetherbee Lake of 12.0 feet, except as noted below.

The Term "operator" refers to the individual responsible for the physical operation of the units of the structure and also responsible for obtaining all required stage data and forecasts of river trends and future stages.

"Automatic operation" refers to operation of the pumps when starting and stopping of the pumps are controlled by the float control mechanism described in paragraph 6-01a(2).

5-03. Basis of operation. The navigation gate will be closed only when there is an actual or impending stage in the river at the River Gage in excess of the maximum nondamaging stage of 8.5 feet in Wetherbee Lake. When the gate is open, all pumps will be shut off. When the gate is closed, the pumps will be turned on and placed in automatic operation. The pumps can be set for manual operation in case of failure of the automatic controls. During the summer period from 1 May to 30 September when inflow from Walthall Slough is small, closure of the navigation gate will be based on actual stages on the River Gage combined with an official forecast of sustained river stages above the damaging level in Wetherbee Lake. When the gate is closed during this period, stages in Wetherbee Lake will be regulated by automatic operation of pumps between 8.0 and 9.0 feet, in order to minimize pumping heads upstream along Walthall Slough. During the winter period from 1 October to 30 April when inflow from Walthall Slough may be relatively high, closure of the navigation gate will be based on forecasted river stages and trends to allow time for evacuation of the sump storage prior to occurrence of actual river stages equal to the damaging stage in the lake. When the gate is closed during this period, the stage in Wetherbee Lake at the Lake Gage will be automatically controlled by the pumps at about 8.5 feet. When inflow from Walthall Slough is forecasted to raise the lake stage above 12 feet, the lake will be lowered to about 5.5 feet. The navigation gate will be re-opened in both winter and summer, whenever the stage at the River Gage has receded to less than 8.5 feet and the forecast is for sustained river stages below that level. Detailed operation procedures for the navigation gate are given in paragraph 5-05a.

5-04. Regulations. The following regulations are prescribed to accomplish the operational objectives in accordance with the foregoing basis of operation:

a. Summer operation. Operation during the summer from 1 May to 30 September shall be as follows:

(1) The navigation gate shall be kept in its full open position and the pumps turned off whenever the stage in San Joaquin River at the River Gage is less than the maximum nondamaging stage in Wetherbee Lake of 8.5 feet, except as noted below.

(2) When an official forecast indicates that river stages in excess of 8.5 feet are impending, the operator shall read the River Gage frequently and shall close the navigation gate at a convenient time during the interval when the river stage is between 7.5 and 8.5 feet. After closing the gate, the operator shall set pumps No. 1 and 2 for automatic operation with the selector switch in the summer position. In the event the prolonged closure of the navigation gate during this period significantly interferes with irrigation needs along Walthall Slough by preventing necessary withdrawal of San Joaquin River water through the entrance to Wetherbee Lake, the navigation gate may be partially opened for sufficient periods of time to satisfy such legal rights, provided that this occasional action does not cause the stage on the Lake Gage to rise above 9.0 feet.

(3) When the actual stage has dropped to less than 8.5 feet at the River Gage, and the official forecast is for sustained or decreasing stages, the operator shall turn off the pumps and reopen the navigation gate. Reopening shall be made as close to a 8.5 foot stage as practicable in order to minimize pumping and to prevent large difference in water level on the two sides of the gate. Should the difference in stage exceed about 2 feet, the initial gate opening should be limited to about 1 foot until the difference in stage is less than 1 foot, after which the gate shall be raised to the full-open position.

b. Winter operation. Operation during the winter period from 1 October to 30 April shall be as follows:

(1) The navigation gate shall be kept in its full open position and the pumps turned off whenever the stage in San Joaquin River at the River Gage is less than 8.5 feet, except as noted below.

(2) Whenever the San Joaquin River is rising and an official forecast has been issued that the stage of San Joaquin River at the Vernalis Gage will exceed 21.0 feet (corresponding to about 8.5 at the River Gage) during the next 24 hours, the operator shall close the navigation gate as soon as practicable. When the stage in Wetherbee Lake at the Lake Gage is forecasted to exceed 12.0 feet due to excessive storm inflow from Walthall Slough, all 3 pumps will be started on manual control in accordance with procedures outlined in paragraph 5-05b.(1)(c)2. Control of the pump operation shall be transferred from manual to automatic at the end of 4 hours of operation, or when the water surface in the pump sump has been lowered to 5.5 feet, whichever occurs first.

(3) When the actual stage has dropped to 8.5 feet at the River Gage and the official forecast is for sustained or decreasing stages, the operator shall turn off the pumps and reopen the navigation gate. The initial opening of the gate shall be limited to about 1 foot until the difference in water levels is less than 1 foot, after which the gates shall be raised to the full open position.

c. Emergency operation. In the event of failure of the automatic controls for the pumps, the operator shall control the pumps manually to effect an operation comparable to the automatic schedule outlined in paragraph 6-01 (2)(d). If the stage in Wetherbee Lake at the Lake Gage temporarily exceeds the damaging level of 8.5 feet because of excessive storm inflow or malfunctioning of the pumps, and this stage is actually higher than the river stage, the navigation gate may be temporarily opened as much as necessary to reduce excessive stages in the lake. After such an emergency opening, the gate should be reclosed as soon as practicable.

5-05. Operation procedures summary.

Physical operation of the navigation gate and pumps to carry out the foregoing regulations are outlined below.

a. Navigation gate.

(1) Procedure for closing gate.

(a) Make usual check of the channel under gate. Remove any obstructing material before closure is initiated. Disconnect the gate service anchor from the gate leaf.

(b) Check for boats in or approaching structure, allow such boats to pass through the structure or alter their course prior to gate closure.

(c) Control Sequence.

1. Remove cover on master control station.

2. Press the "lower" gate operation contact, hold momentarily and release. This will close the gate, stop the hoist motor and set the brake automatically.

3. If gate does not function as indicated, refer to more detailed instructions in paragraph 6-01b. (3)(b)1.

(2) Procedure for opening gate.

(a) Check the water level on each side of gate and if this difference in stage exceeds approximately 2 feet; the initial gate opening should be limited to about 1 foot until the difference in stage is less than 1 foot.

(b) Control sequence.

1. Remove cover on master control station.

(2) When an official forecast indicates that river stages in excess of 12.0 feet are impending, the operator shall read the River Gage frequently and shall close the navigation gate at a convenient time during the interval when the river stage is between 11.0 and 12.0 feet. After closing the gate, the operator shall set pumps No. 1 and 2 for automatic operation with the selector switch in the summer position. In the event that prolonged closure of the navigation gate during this period significantly interferes with irrigation needs along Walthall Slough by preventing necessary withdrawal of San Joaquin River water through the entrance to Wetherbee Lake, the navigation gate may be partially opened for sufficient periods of time to satisfy such legal rights, provided that this occasional action does not cause the stage on the Lake Gage to rise above 12.0 feet.

(3) When the actual stage has dropped to less than 12.0 feet at the River gage, and the official forecast is for sustained or decreasing stages, the operator shall turn off the pumps and reopen the navigation gate. Reopening shall be made as close to a 12.0 foot stage as practicable in order to minimize pumping and to prevent large difference in water level on the two sides of the gate. Should the difference in stage exceed about 2 feet, the initial gate opening should be limited to about 1 foot until the difference in stage is less than 1 foot, after which the gate shall be raised to the full-open position.

b. Winter operation. Operation during the winter period from 1 October to 30 April shall be as follows:

(1) The navigation gate shall be kept in its full open position and the pumps turned off whenever the stage in San Joaquin River at the River Gage is less than 12.0 feet, except as noted below.

(2) Whenever the San Joaquin River is rising and an official forecast has been issued that the stage of San Joaquin River at the Vernalis Gage will exceed 24.5 feet (corresponding to about 12.0 at the River Gage) during the next 24 hours, the operator shall close the navigation gate as soon as practicable and start all 3 pumps on manual control in accordance with procedures outlined in paragraph 5-05b. (1)(c)2. Control of the pump operation shall be transferred from manual to automatic at the end of 4 hours of operation, or when the water surface in the pump sump has been lowered to 7.0 feet, whichever occurs first.

(3) When the actual stage has dropped to 10.0 feet at the River Gage and the official forecast is for sustained or decreasing stages, the operator shall turn off the pumps and reopen the navigation gate. The initial opening of the gate shall be limited to about 1 foot until the difference in water levels is less than 1 foot, after which the gates shall be raised to the full open position.

c. Emergency operation. In the event of failure of the automatic controls for the pumps, the operator shall control the pumps manually to effect an operation comparable to the automatic schedule outlined in paragraph 6-01(2)(d). If the stage in Wetherbee Lake at the Lake Gage temporarily exceeds the damaging level of 12 feet because of excessive storm inflow or malfunctioning of the pumps, and this stage is actually higher than the river stage, the navigation gate may be temporarily opened as much as necessary to reduce excessive stages in the lake. After such an emergency opening, the gate should be reclosed as soon as practicable.

5-05. Operation procedures summary.

Physical operation of the navigation gate and pumps to carry out the foregoing regulations are outlined below.

a. Navigation gate.

(1) Procedure for closing gate.

(a) Make usual check of the channel under gate. Remove any obstructing material before closure is initiated. Disconnect the gate service anchor from the gate leaf.

(b) Check for boats in or approaching structure, allow such boats to pass through the structure or alter their course prior to gate closure.

(c) Control Sequence.

1. Remove cover on master control station.

2. Press the "lower" gate operation contact, hold momentarily and release. This will close the gate, stop the hoist motor and set the brake automatically.

3. If gate does not function as indicated, refer to more detailed instructions in paragraph 6-01b. (3)(b)1.

(2) Procedure for opening gate.

(a) Check the water level on each side of gate and if this difference in stage exceeds approximately 2 feet; the initial gate opening should be limited to about 1 foot until the difference in stage is less than 1 foot.

(b) Control sequence.

1. Remove cover on master control station.

2. Press the "raise" gate operation contact, hold momentarily and release.

3. Press the "stop" gate operation contact, when the gate position indicator shows about 1-foot gate opening.

4. When the difference in stage on each side of the gate is less than 1-foot; again press the "raise" gate operation contact, hold momentarily and release. The gate will raise until it automatically stops approximately 1-foot below the normal full open position.

5. Press the "raise" gate operation contact a third time, hold momentarily and release. The gate will raise to the normal full open position, where the limit switch will automatically stop the gate and set the brake.

6. Secure the gate hangers on each side of gate as a safety measure.

b. Pump operation.

(1) Starting pumps.

(a) Make a physical check of pump sump and trash-rack structure and remove any material that might interfere with operation or damage the pumps. Also, make sure that there are no swimmers near the trash racks.

(b) Insure that pumps are properly lubricated in accordance with detailed directions in paragraph 6-01a(2)(f).

(c) Control sequence.

1. Summer operation.

a. Turn selector switch to "summer" position.

b. Turn the H.O.A. switch on No. 3 pump to "off" position.

c. To start pumps No. 1 and 2 turn H.O.A. switch to "A" or automatic position.

d. This puts the two pumps on automatic operation, controlled by the float switch.

e. To stop the pumps, turn the H.O.S. switches to the "off" position.

2. Winter operation.

- position.
- a. Turn selector switch to "Winter"
 - b. To start the pumps for manual operation, turn the H.O.A. switch on all pumps to "H" (one at a time).
 - c. To change from manual to automatic operation, it is necessary to stop the pumps by turning the H.O.A. switch from "H" to "off". After approximately a 10 minute time delay, turn the H.O.A. switch to "A". (Pump will not start until the time delay period has elapsed).
 - d. To stop the pumps, turn the H.O.A. switch to "off" position.

5-06. Notification of gate operation. It shall be the responsibility of the operator to post a written notice of proposed time of opening or closing of the navigation gate in a conspicuous place near the structure. Such notice shall be posted as much in advance of the action as practicable and shall contain estimated time of action similar to the following:

NOTICE TO BOATING INTERESTS

Pursuant to the operation regulations for the Wetherbee Lake Structure notice is hereby given that the navigation gate will be closed about 6:00 p.m. tomorrow, February 15. It is currently estimated the high stages in San Joaquin River will require the gates to remain closed until about February 25. The lake will be drawn down to 5.0 feet and may range from that stage up to as high as 12.0 feet, depending upon storm inflow to the lake.

JOHN DOE
Operator
February 14, 1964

5-07. Log of gate and pump operation. The operator shall maintain a log recording the time and change in gate setting, and a record of pump control settings. Copies of this log shall be furnished to the State Reclamation Board as a part of the annual operation report, and to the State Department of Water Resources upon their request.

SECTION VI

MECHANICAL AND ELECTRICAL FEATURES

6-01. Description.

a. Pumping plant.

(1) General. The pumping facilities consist of a drainage collecting sump, three pumps, each provided with a 30-inch diameter discharge pipe that carries the flow through the top and down the river side of the levee. The discharge end of each 30-inch discharge pipe is provided with a standard wood type flap gate, equipped with rubber seals, to prevent backflow in the event of the river stage exceeding the project design stage elevation 23.2. Pipe invert, at the discharge end, is at elevation 8.0. Pipe invert where it passes through the top of the levee is at elevation 23.2 which is above the flood plane; however, a vent pipe is provided to prevent any possibility of a reverse flow syphon in the event the flap gate provided over the discharge end should fail to adequately seal. The discharge pipes are buried below the grade of the levee to protect them from fire or other damage. The bottom of the collection sump is at elevation -4.0 and the bottom of the pump suction bell is approximately two feet above this point. The pumping plant structure is open on two sides. A steel trash rack surrounds the open part of the structure so that water from the sump cannot reach the pumps except through the trash rack. The three drainage pumps that control the water level in the collecting sump are automatically controlled by float operated electrical switch controller and appurtenances. The switch controller has six adjustable stages, two for each pump, namely, a high W.S. stage for starting the pump motor and a low W.S. stage for stopping the pump motor.

(2) Drainage pumps.

(a) Type. Each pump is a vertical, axial flow with submerged open impeller, directly connected to a vertical electric motor. Pumps are designed to permit ready withdrawal of the entire pump, including discharge column elbow, housing and suction bell, through the opening in the floor at the motor. The pumps are supported from the top of the pumping plant structure deck which is at elevation 26.2. Capacity of each pump is approximately 22,500 gpm @ 16 feet total dynamic head or approximately 19,500 gpm @ 22 feet total dynamic head without exceeding the name plate rating of the motor (125 HP) by more than the motor service factor of 1.15. Pump operating efficiency is approximately 75% when operating under the required capacity condition at 16 feet TDH and about 80% when at 22 feet TDH.

(b) Pump operating conditions.

	<u>Summer May-Sep</u>	<u>Winter Oct-Apr</u>
(1) Min. starting Static Head-----	12.6	12.6
(2) Normal starting Static Head-----	12.6	18.6
(3) Max. Operating Static Head-----	13.6	19.6
(4) Cap. @ Max. Oper. Static Head GPM-----	22,500	19,500
(5) No. of Pumps Operating-----	2	3
(6) Max. Motor Horsepower -----	125	125

(c) Summer operation. During the summer, operation of the Navigation Gate and pumps will be as specified in paragraph 5-05a., and 5-05b. One pump will be manually out of service. The other two pumps to be set for automatic operation with the first pump set to start at water surface elevation 12.1 and stop at water surface elevation 11.1; the second pump set to start at water surface elevation 12.3 and stop at water surface elevation 11.3.

(d) Winter operation. During the winter, operation of the navigation gate and pumps will be as specified in paragraph 5-05b. All 3 pumps to be manually started one at a time to prevent excessive starting load on line. Pumps shall remain on manual control for 4 hours or until the pump sump water surface elevation is below 7.0 feet at which time all 3 pumps shall be set for automatic float controlled operation with the first pump set to start at sump water surface elevation 6.1 and stop at sump water surface elevation 5.1; the second pump set to start at elevation 6.3 and stop at elevation 5.3 and the third pump set to start at elevation 6.5 and stop at elevation 5.5.

(e) Terminology.

1. Minimum starting static head is the difference between the sump water surface elevation 12.1 and the centerline elevation of the discharge pipe over the levee elevation 24.7 or 12.6 feet. This is the same for summer and winter operation.

2. Normal starting static head is the difference between the sump water surface elevation when the pumps start on automatic operation and the centerline elevation of the discharge pipe over the levee elevation 24.7. During summer operation (May-Sep) this difference is 24.7-12.1 or 12.6 feet. During winter operation (Oct-Apr) this difference is 24.7-6.1 or 18.6 feet.

3. Total dynamic head. The total dynamic head consists of the static head (difference between the water surface in the sump and centerline elevation of the discharge through the top of the levee at the highest point) plus the losses through the system. The losses through the system do not include losses in the pump itself and in 10 feet of the discharge column.

(1) Pump lubrication system. An Eaton manufacturing Company Farval System with eight distribution lines is provided for lubricating the pump. The eight distribution lines from the pump terminate in two headers with four lines per header. Each header is connected to the pump by a separate line through a slide valve, located at the base of the pump provided to control the direction of flow. This pressure lubrication system includes a hand operated pump and a 2,000 p.s.i. pressure gage. Hand lube fittings are also provided to permit the use of a separate standard hand operated pressure gun. Operation of the Farval System is as follows:

1. Operate pump by pulling handle forward and returning it until gage stops at 1,000 p.s.i. pressure.

2. Hold pressure for one minute to make sure lubricant is delivered to all points.

3. Pull slide valve handle, at base of pump, outward to reverse pressure connections and repeat 1 and 2 above.

4. Push slide valve handle into original position to relieve pressure on system. DO NOT LEAVE SYSTEM UNDER PRESSURE.

(3) Float wells and recorder house.

(a) Float wells. One float well is provided for float controls of the pump operation and one for the pump sump to accommodate the float and accessories required for the operation of a water stage recorder. The top end of each pipe terminates about 12-inches above the top deck of the pumping plant structure. The bottom end of each well is anchored to the concrete floor of the pump pit and the top is secured to the concrete deck. Holes are provided through the wall of the float wells near the bottom to permit the water surface to equalize with that outside without undesired fluctuation or surges. The float well for float controls of pump operations is a 10-inch diameter steel pipe, hot dipped galvanized, having a 3/16-inch wall thickness. The sump float well is 18-inch diameter steel pipe, hot dipped galvanized, having a 1/4-inch wall thickness.

(b) Recorder house. A recorder house is installed over the float wells to protect the recorder and pump float controller. A wood shelf is provided over the 18-inch diameter well to support the recorder assembly. The pump automatic float controller is mounted on a floor stand with an operating float in the 10-inch diameter well. This recorder house shall not be utilized for miscellaneous storage of materials and equipment except for records and charts specifically pertaining to the equipment installed inside.

b. Tainter gate and hoist.

(1) General. The navigation channel structure connecting Weatherbee Lake and the river has a clear width of 16-feet for navigation and is provided with a tainter type gate and hoist for closing the channel when the water surface rises to about elevation 12 feet and for opening the channel when the water surface is at or below this general elevation, to permit normal navigation. The effective clear height of the channel for navigation is 20 feet which corresponds to the distance from the top of the gate bottom fixed sill embedded in the concrete to the under edge of the gate, when the gate is in full open position. The effective clear width of the channel for navigation is 16 feet. The bottom of the channel is at elevation -4.0 and the bottom gate sill seat is at elevation -3.0. Low water surface is +2.0; maximum operating water surface is +12.0 and the maximum design flood pool is at elevation +23.2. A head wall as part of the bridge structure was provided across the top of the channel to reduce the height of the gate required to close off the channel under flood pool conditions. When the gate is in full open position, a minimum of 5.0 feet of head clearance is provided for boat traffic during the highest operation stage, elevation 12.0. CAUTION: The channel shall be cleared of all navigation or persons while the gate is being raised or lowered.

(2) Gate and trunnion assembly.

(a) Gate leaf assembly. Height of the gate leaf curved skin plate, when the gate is in full closed position, extends from elevation -3.0 to elevation +20.0 making a total height of 23 feet. Radius from the centerline of the trunnion to the outside of the skin plate is 25 feet. Centerline of the trunnion is at elevation +7.0 which is 10-feet above the top of the gate sill. The gate assembly includes the frame work of the gate leaf, seals all around the skin plate assembly, and bronze bushed steel spools to which the end struts are joined at the trunnion yoke. The gate leaf steel skin plate is carried by supporting structural steel members. The hydrostatic load on the skin plate is transferred to the trunnion by end frames or struts placed parallel to the channel side walls. The channel walls are recessed as required to permit location of the struts and trunnions so as not to obstruct the 16-foot width channel clear passage required for navigation when the gate is in full open position. The gate leaf rubber-seals are the "J" type that bear against steel seal bearing plates anchored to the concrete at the ends, across the top and across the bottom (gate sill) when the gate is in closed position. Means are provided for adjusting the seal bearing on the fixed plates. Bearing surfaces of the bearing plates are a corrosion resistant material to prevent possibility of corrosion or abnormal friction between the sliding surfaces. Care must be exercised in establishing the seal

pressure on the seal bearing plates so that they will not be too tight during periods of maximum ambient operating temperature, or too loose during periods of minimum ambient operating temperatures.

(b) Gate stop. At each end of the gate leaf near the bottom edge of the skin plate an anchor is provided for attaching the steel hoisting ropes. This anchor assembly is attached to the gate leaf by means of bolting to facilitate raising the leaf above the normal full open position, clear of the above head wall, for inspection and maintenance if desired, as well as to facilitate removal of the gate leaf assembly from the well. The top of the rope anchor assembly is designed to limit the maximum height the gate may be raised. In the event the full open over travel electric limit switch control fails to stop the hoist gate raising operation then the gate raising operation will be stopped by contacting a fixed metal stop secured to the underside of the above head wall across the channel.

(c) Seal bearing plates. The end seal bearing plates are anchored to the channel side walls in alignment with the travel curvature of the end gate seals; the face to face distance at the top is slightly greater than at the bottom. When the gate is in full closed position the bottom rubber seal is compressed against the fixed gate sill anchored to the bottom of the channel. The end and bottom seal bearing plates are corrosion resistant clad steel. The top seal bearing plate assembly is designed to permit adjustment of the amount the top seal is compressed when the gate leaf is in full closed position. By loosening the top row of locking nuts, the adjustment may be accomplished by the adjusting screws provided. The bottom row of locking nuts have been adjusted adequately loose to permit the bearing plate assembly to slide for adjustment. The sliding surfaces are a corrosion resistant material. The top seal bearing surface is fabricated of a corrosion resistant material.

(d) Trunnion and anchorage. The bronzed bushed steel spool to which the gate end struts are jointed is held in place by the trunnion pin and welded steel yoke. The yoke is anchored to the concrete at the upstream end of the side recesses with thrust, resulting from the hydrostatic load on the gate, taken directly into the reinforced concrete side walls. A bronze bearing ring is provided between each end of the steel gate spool and the yoke side members to serve as an end bearing for the spool as well as to facilitate adjustment of the clearances by varying the thickness of the rings. These bronze bearing rings are secured to the side members of the yoke by means of bronze screws. Adjusting screws are provided as part of the trunnion yoke assembly to facilitate accurate alignments. The retaining bars were welded in place after the yoke was finally aligned and anchored to permit accurate positioning of the yoke assembly should it ever be removed; also, to eliminate any possibility of the yoke shifting after it has been installed. After the trunnion

assembly was accurately aligned and securely anchored in place by the anchor bolts, a zinc alloy filler approximately 1/2-inch thickness was poured between the under side of the yoke base and the thrust bearing plate anchored to the concrete, also, between the side plate of the yoke and the adjacent wall flush plate. Before attempting this latter operation, the specified procedure should be carefully reviewed, so as not to distort or otherwise damage the yoke assembly. Lubrication is provided for the trunnion bearings and end bronze rings by a pressure lubrication system with lubrication points accessible from top of the respective channel walls. This system is designed to withstand a working pressure of 10,000 p.s.i.

(e) Gate guide roller and guide plates. A guide roller assembly is provided at the top and bottom horizontal girder at each end of the gate leaf assembly just back of the skin plate to insure proper alignment of the gate leaf in the gate well throughout its travel from full open to full closed position. Corrosion resistant clad steel bearing plates are secured flush with the concrete side walls to serve as a bearing track for the guide rollers. Means are provided for adjusting the clearances between the roller face and the track for the guide rollers. The rollers, are provided with self lubricating (graphite plug type) bronze bushings.

(f) Gate service anchor. The service anchor assembly is provided to hold the gate in full open position in the event it is desired to disconnect the gate hoisting ropes to permit maintenance or other work. It is recommended that it also be connected to take the load off the hoisting ropes and to prevent any possibility of an undesired gate closure during the relative long periods when navigation is authorized through the channel.

(3) Gate hoist.

(a) Description. The channel tainter gate is raised and lowered by three 1-inch 6x30 flat stranded 304 stainless steel ropes at each end of the gate. The ropes ride over deep circular groove type rope drums of the electric motor-driven hoist and are attached to the upstream face of the gate near the bottom. The rope anchor assembly at the gate end is provided with means for adjusting the rope tension so that each rope take its share of the load. The general arrangement of the gate hoisting machinery consists of the hoisting rope and drum sets, open gear sets, speed reducer assemblies, line shaft assembly, driving motor, electric brake, limit switch controller, machinery base and appurtenances. The bases upon which the hoisting machinery is mounted are fabricated principally of structural steel and are leveled, grouted and bolted to the top of the channel end piers or walls. The hoist is designed for a normal capacity of 36,000 pounds on each drum, at the start of the gate travel from full closed position, or a total of about 72,000 pounds for both drums. The

machinery is mounted in sets so arranged that each side of each gate is equipped with one set of main gearing driven through and maintained in synchronism by a line shaft. The line shaft carries a brake and worm gear set. The driving motor is connected to the worm gear set through a flexible coupling. A gate position indicator is driven by the main gearing, and is located where it can be read from the hoist pushbutton control station. This control station is provided with a cover secured in place by screws to provide a measure of security against the possibility of the gate being lowered by unauthorized persons and thereby endangering navigation in the channel. If it is found that the cover provided is not adequate, a locking device could be added as an additional security measure. Switch controls for the bridge lighting that have been similarly protected by locating them in this same inclosure and may be left in "ON" position except when necessary to perform maintenance operations, thus eliminating the necessity for removing the cover to turn the lights "ON" or "OFF". The channel navigation lights are controlled by a time switch. In addition to the electric motor drive, the hoist may also be operated by a hand operated drive; an electrical interlock control being provided to prevent any possibility of the electric motor being energized while the hoist is being controlled by the hand operated unit. The electric motor and worm gear reducer unit may also be disconnected from the hoist by means of a cut-out coupling provided between the worm (primary) reducer and the secondary reducer. This particular feature is provided to reduce the load on the hand operated auxiliary control when it is being used. In view of the very slow hoisting speed obtainable with the hand-wheel control, its use will probably be limited to that of making fine adjustments and similar operations. The hand wheel control is equipped with a means for braking and holding the load when the main hoist brake is locked in released position. CAUTION: Care shall be exercised to insure that one of the brakes provided is in control of the load before releasing the other. The main hoist brake is an automatic electric operated type and is installed on the main drive shaft between the hoisting units or sets. When the hoist electric motor is energized by the "UP" or "DOWN" pushbutton control station this brake is automatically released; also, when the electric motor is de-energized by the control station or by a limit control switch the brake is automatically applied.

Storage cabinet. A steel storage cabinet is provided on one end of the hoist base for storage of the spare motor, lubricating equipment, tools, lubricants and miscellaneous small parts. This storage compartment should be kept clean and orderly and securely locked.

(b) Operation.

1. General. The normal travel of the gate from full closed to full open position may be interrupted at any point by

manual operation of the "STOP" button at the control station or by the functioning of an overload relay. In the event that the gate fails to stop at the normal full open (raised) position due to the failure of the limit switch element to operate, the line contactor is opened by an emergency limit switch at the gate full open over travel position. Similarly should the gate hoist fail to stop its lowering operation when the gate reaches its full closed position, the hoist will be stopped by the full closed over travel limit switch. When the gate hoist operation has been stopped by the gate full raised or full closed over travel limit switches, it is necessary to operate the "BACK-OUT" switch to permit further operation of the gate in its normal travel range. The operation of the gate is controlled from momentary contact pushbuttons marked "RAISE", "LOWER", "STOP", "RAISE BACK-OUT", and "LOWER BACK-OUT", mounted in the motor control cabinet on the gate hoist platform. In addition to the gate travel controls set forth above, the hoist increment limit switch also stops the raising travel of the gate when the bottom edge of the gate has been raised approximately one-foot short of full open position; after which the operator must restart the hoist to complete the raising of the gate to full open position. The operator should remain at the control station during this period of final gate opening so as to be able to stop the gate hoist raising operation in the event the stop limit switches should fail to function according to plan and thus prevent the maximum stalling torque of the motor from being applied to hoisting ropes and appurtenances. The operator should also be near the control station and where he can view the channel in the area below the gate to eliminate any possibility of endangering anyone in the channel; also, to insure expeditious stopping the hoist in the event the control limit switches fail to function as planned. The above limit switch controls are all included in the master limit switch assembly of the gate hoist and is driven directly from the hoist gearing. A slack rope limit switch is provided as a separate unit to stop the hoist should the gate be obstructed in its normal down travel. This switch is closed while the gate is in normal travel. When it is opened by a gate obstruction, the switch contacts remain open, disrupting power to the hoist motor and setting the brake; by operation of the slack rope manual shunting switch, up travel operations are made possible, thus releasing the gate from the obstruction. Following obstruction removal and return of cable tension, normal down travel operations may be resumed. A manual operation limit switch is provided in conjunction with the hand operated control assembly, to prevent any possibility of the electric motor drive being energized when the hoist is being operated by hand. The main hoist electric brake must be locked out prior to hand operation. When the hand operated assembly is disengaged, the motor is automatically connected electrically to permit operation of the hoist from the pushbutton control station. Before disengaging the hand control the main hoist electric brake shall be unlocked to permit normal braking operation. During unattended periods, the disconnecting breaker for the gate drive motor starter shall be de-energized to prevent unauthorized operation of the gate by tampering with control cabinet cover.

2. Scheme of operation.

a. General. The scheme of operation of the control system for the navigation gate is as indicated by the schematic control wiring diagram included as Exhibit K of this manual, and as specified below.

b. Control points. The operation of the gate hoist motor is controlled by a pushbutton type master control station, located on the gate hoist, with momentary contacts designated "RAISE", "LOWER", and "STOP" with pushbuttons and red pilot lights for overtravel indication.

c. Operating features.

aa. Momentary actuation of the "RAISE" and "LOWER" contacts of the master control station provides seal-in operation of the control circuit.

bb. A limit switch with contacts actuated by the movement of the operating elements of the gate hoist machine automatically controls as indicated, the sequence incremental operations and the stopping operations initiated manually from the master control station. The limit switch is so connected, to the hoist machine that the contacts providing the incremental control automatically stops the gate 1 foot below the normal open position. Further gate operation to normal open position is accomplished by energizing raise pushbutton.

cc. Momentary actuation of the "STOP" contact of the master control station during any operation will de-energize the control circuit, stop the hoist motor and set the brake.

3. Sequence of operation.

a. Raising. When the "RAISE" contact of the master control station is actuated, held momentarily and released, the hoist motor starts and will run until the gate has raised approximately one foot below the normal full open position at which point the increment limit switch will automatically de-energize the control circuit, stop the hoist motor and set the brake. The gate continues to rise when the "RAISE" button contact is again pushed, held momentarily and released. The gate motor starts and runs until the gate reaches the raised position where the limit switch automatically de-energizes the control circuits, stops the hoist motor and sets the brake.

b. Lowering. When the "LOWER" contact of the master control station is actuated, held momentarily and released, the hoist motor will start and run until the gate reaches the normal closed gate position at which point the limit switch will de-energize the control circuit, stop the hoist motor and set the brake.

c. Backout from overtravel. If during normal operation, the gate motor should fail to stop when the gate reaches the normal raised or closed positions the overtravel limit switch contacts the hoist motor after overtravel by de-energizing the "main" or "line" contactor of the controller with red pilot light indicating direction of overtravel. To operate the gate after overtravel, the opposite direction of travel pushbutton is energized to permit operation of the gate only in the direction away from the overtravel position. Attainment of normal raised or lowered gate position is indicated by de-energization of overtravel relay and red pilot lights. If normal or overtravel limit switches fail to stop the gate raising operation, fixed gate stop will block further gate travel. If neither switch stops the hoists gate lowering travel after the gate has reached full closed position, the slack rope limit switch will also operate to stop the hoist motor.

c. Standard equipment.

(1) Channel gate hoist.

(a) Secondary reducer. Hewitt-Robins Inc., Johns Machinery Division, Chicago 24, Illinois, Herringbone Speed Reducer; Size and type 195 THC; Catalog Rating 0.85; S/N 359650; Service factor 1; Service rating 0.85; Input RPM 177; Ratio 331.8; Style No. 1.

(b) Primary reducer. Delroyd; No. 457063; Model D30; Ratio 923.

(c) Hoist motor. Westinghouse; HP 2; Frame 184; Model A USP; Lock KVA Code F; Serial No. 24N9022; 3 phase; 440 volt; % Load 100; Hours 24; °C Rise 5°; Life Line A; Series 2; Amps 2.9.

(2) Pumping plant.

(a) Pumps. Cascade Company Serial Numbers 5260, 5261, and 5262; pump size 36P; Propeller PR .80; RPM 708; Capacity at maximum efficiency 22,500 GPM; TDH max. Eff 18.6.

(b) Pump motors. General Electric Company Model 5K6325 X C168A; HP 125; Type K; Code F; Frame 6325PY; NEMA Class; Design B; Volts 440; 60 cycle; 3 Phase; FL Amp 159; FL Speed 700; °C Rise 40° Continuous; (Serial Numbers NXJ104001; NXJ104002; and NXJ104003.) Oil Lubricated, Capacity of upper oil reservoir is 11-quarts and capacity of lower oil reservoir is 5-quarts.

(c) Automatic switch or gage controller. Automatic Control Company, St. Paul, Minnesota, S/N 71355.

(d) Pump lubricator. Eaton Manufacturing Company, Farval System Model DA5, Series 1A.

6-02. Inspection.

a. General. Periodic inspections are required to detect incipient faults before serious damage takes place, therefore, the importance of making these inspections cannot be over emphasized. The frequency and extent of inspection required in a measure will be influenced by the conditions under which the equipment is required to operate including whether or not the particular operation is relatively continuous or periodic for the period concerned. Once each year the entire mechanical and electrical installation should be given a thorough detailed inspection. The regular more frequent inspections are made to make certain that all parts of the equipment including controls are in operable condition and properly lubricated; that no parts are missing; that all painted surfaces are covered with adequate coats of protective paints; that there is no evidence of rust; and that the entire plant is in a clean and presentable condition. In order that no items of inspection will be overlooked, an inspection schedule listing all items requiring inspection shall be carried during the inspection as guide, check list and record. Exhibits included as part of this manual will serve as a guide and check list for conducting the inspections and preparation of reports.

b. Pumping plant.

(1) Pumps.

(a) During periods of pumping operations, daily inspections should be made to ascertain that there is sufficient lubricant for the pump bearings and that the pump and motor are operating smoothly, and that there is no abnormal vibration of the assembly. The operator should be instructed to immediately shut off the pump, should an unusual noise or vibration develop, rather than wait to consult with someone else, inasmuch as by prompt action at the moment trouble first develops, serious damage to the pump may be prevented. Noise, vibration, etc., may be due to a worn or damaged bearing, loose anchors, obstruction in pump such as rocks, wood, etc., or other possible causes.

(b) Check the oil and grease lubricating pipes provided to carry the lubricant to the pump bearings and note any indication of leakage at any point with particular attention to the connection at the pump housing. Also, make note of any unusual noise that might indicate that the lubricant is not reaching the bearings. The grease seal packing rings on the pump drive shaft should be checked occasionally as they may become dry and harden to the extent of scoring the shaft and/or failing to adequately retain the lubricant. For location of the packing rings, refer to the applicable shop drawings. Occasionally, check the grease lubrication pipe which runs to the bottom of the pump suction bowl to insure that it has not been broken off or otherwise damaged.

(c) Inspect the anchors at the pump operating floor, and note any indication of movement of the pump units, and loose bolts.

(d) Inspect the discharge connections for signs of leakage at the couplings or vibration while the pump is operating. Check flap gates in the discharge lines, note any abnormal noise or sluggishness of movement in opening or closing. Also, check the discharge lines, including the accessible pipe connections and the air release riser assemblies at the top of the levee.

(e) Inspect each pump drive shaft and couplings for alignment, and note any tendency for the shaft to vibrate, or any looseness in the couplings and connections. Worn shaft bearings will cause the shaft to vibrate, however, in some instances it may not be easily detected without the use of special instruments.

(f) Carefully inspect all metal work, and note any indications of rust, leakage when pump is operating, abnormal wear or other signs of deterioration.

(g) Insofar as practical, occasionally check the ability of the pump to deliver the required capacity and note any indication that the pump is in need of adjustment, suction lines restricted, or debris in the suction bell.

(2) Motors.

(a) Carefully inspect the motor to insure that it is being properly lubricated. Check to insure that the oil is at proper level especially as pertains to the pump motors. The oil level should be 1/8-inch below center of the site gage. (Check instructions on motor name plate and other manufacturers data.) Note especially any leakage at the connections. Feel the bearing housings while the motor is operating and note any indication of abnormal heating at these points. Also note any unusual noise or vibration which would indicate that the bearings require attention and/or the unit is out of balance. Any clicking noise while the motor is running may be due to a cracked ball in the bearings, or some loose part and must be immediately corrected.

(b) Note any oil leaking by the oil seals, or any oil on the outside or inside of the motor housing.

(c) Check the motor for smoothness of operation under full load and note any abnormal noise or vibration of the assembly.

(d) Inspect the motor for signs of excessive temperature rise due to an apparent overload or other causes. This condition should be reflected in the switchboard ammeter.

(e) Check the functioning of the motor controls especially when starting up under load.

(f) Check the motor base anchor bolts to insure tightness; also note, any indication that the motor base has shifted on its support. While checking the motor base also inspect the coupling connection at the juncture of the motor pump drive shaft, and note any indication of wear, looseness or start of fracture.

(g) Check supply of spare parts, if any, on hand and note need for repainting or repair.

(h) Note collections of oil, dust or other material on or around the motor assembly which may constitute a possible fire hazard.

(i) When initially starting a motor after it has been previously removed and reinstalled, check for correct direction of rotation before applying full load.

(3) Trash racks.

(a) Occasionally check the metal work and note any rust spots, need for painting or other maintenance.

(b) Note the presence of debris including rags, weeds, etc., which may be clogging the openings through the vertical bars. Also note the presence of debris in the collection sump, immediately upstream from the trash racks, which can be expected to move against the rack and which should be removed.

(4) Discharge flap gates.

(a) Inspect the metal work, wood work and seals making up the gate assembly and note need for maintenance.

(b) Note any improper functionings of the gate, including any indication of leakage when closed, limited or sluggish travel when operating as well as any debris which may be present to foul the movement of the flap in opening or closing. Check looseness of hinge anchor bolts and hinge pin wear.

(c) Note need for painting or other maintenance.

(5) Pumping plant structure. At least once each year thoroughly inspect the entire structure and note need for painting or other maintenance required to restore to its original condition. Pay particular attention to junction of steel and concrete. (Persons should not be permitted in the pump sump or on the outside of the structure in front of the trash racks when the pumps are operating.)

c. Channel gate and hoist.

(1) Gate leaf.

(a) All nuts and bolts on the leaf shall be inspected to determine whether or not they are sufficiently tight.

(b) The gate leaf shall be carefully inspected for signs of rust as well as condition of all painted surfaces.

(c) Any signs of excessive wear shall be noted, for example, where the hoist ropes are attached and also its bearing on the upstream face of the leaf.

(d) The general alignment of the gate leaf between the channel side walls shall be noted; also, note any sign of distortion of the gate leaf structure. It shall be noted if the gate leaf moves freely when being hoisted without a tendency to bind at any point.

(2) Gate fixed stop. Check the fixed stop provided at the underside of the headwall across the channel that limits the maximum possible travel of the gate in the raising operation. Note any indication of damage to the stops bearing faces or indication that stops are not in proper alignment to take an equal share of the load.

(3) Gate seals.

(a) Seals should be inspected as conditions permit to determine whether or not they are properly adjusted and that there is no abnormal leakage especially when gate is in full closed position. Give particular attention to the top seal assembly during flood conditions.

(b) Any signs of deterioration of the surface or excessive wear at any section shall be noted.

(c) Seal anchor bolts and plates should be secure in place.

(d) The seal bearing plates that are anchored to or embedded in the concrete, at the sides, bottom and across the top of the canal gate wall shall be inspected for any signs of deterioration, or excessive wear; also, the bolted joint connections shall be checked for rightness.

(4) Gate trunnion and anchorage.

(a) All points shall be checked for need of lubrication.

(b) The pins, bushings and yoke rings shall be inspected, to the extent practical without disassembly, for signs of abnormal wear, or signs of misalignment.

(c) All cap screws on the end plates and nuts and bolts connecting the struts to the trunnion shall be inspected to determine whether or not they are sufficiently tight. Also note any signs of possible shifting of the trunnion yoke on the thrust girder.

(d) All metal surfaces shall be checked for signs of rust as well as for the condition of the painted surfaces.

(e) Any part of the trunnion interferring with the anchor member shall be noted.

(f) The freedom of gates on trunnions shall be noted.

(g) The condition of the concrete structure shall be checked.

(h) Inspect the trunnion thrust girder anchorage, etc., for need of maintenance attention. Any indication that the thrust girder is shifting when the gate is subject to maximum river head shall be especially noted.

(5) Gate hoist.

(a) Hoist rope drums.

1. Any part of the hoisting ropes or drums worn excessively shall be noted.

2. Check need for lubrication and need for adjustment. Especially note any indication that the load is not being equally distributed between the three ropes provided for each drum; also, check condition of the rope anchorage assembly at the gate.

(b) Drive shaft couplings.

1. All nuts and bolts shall be inspected to determine whether or not they are sufficiently tight.

2. Signs of rust and condition of all painted surfaces shall be carefully noted.

3. The need for lubrication shall be checked.

(c) Primary reducer. (Reducer to which motor is connected.)

1. Any signs of oil leakage past the shaft oil seals shall be noted.

2. All nuts and bolts shall be inspected to determine whether or not they are sufficiently tight.

3. The oil level in gear housing shall be checked.

4. The oil drain plugs and shaft caps shall be inspected for oil leakage and water in bottom of each gear case shall be drained by carefully removing drain plug.

5. Signs of rust and the condition of all painted surfaces shall be carefully noted.

(d) Secondary reducer. (Unit driven by primary reducer.)

1. All nuts and bolts should be inspected to determine whether or not they are sufficiently tight. True alignment of the unit must be maintained at all times.

2. The oil level in gear housing shall be checked. A high oil level shall be maintained.

3. Inspection shall be made for oil leakage past the shaft oil seals, shaft caps, and oil drains plugs.

4. The condition of the painted surfaces and any signs of rust shall be noted.

(e) Indicator and reducer.

1. Inspection shall be made for oil leakage past the shaft.

2. Any oil is leaking past the shaft oil seals, shaft caps, or the oil drain plug shall be noted.

3. A check shall be made for signs of rust as well as for the condition of the painted surfaces.

4. A check shall be made for functioning of the indicator, including accuracy, readability of gage, lubrication, and condition of metal work.

(f) Guards. Insure that all guards provided for the drive shaft and other rotating parts are in place, in good condition and securely fastened to their supports.

(g) Hoist brakes.

1. Note shall be made if the brake shoes are excessively worn.
2. All nuts and bolts shall be inspected to determine whether or not they are sufficiently tight.
3. The entire brake unit shall be checked to see that it is properly adjusted and functioning properly.
4. All points of lubrication shall be inspected for proper lubrication.
5. Check operation of the manual releases provided for the main hoist brake.

(h) Machinery bases.

1. The condition of all metal work shall be checked for signs of rust or need for repainting.
2. Anchor bolt nuts shall be checked for tightness.

(i) Bearings.

1. All bearings shall be checked for proper lubrication.
2. Abnormal wear on any of the bearings shall be noted.
3. Check alignment of the shafts to bearing assemblies; insure that the bearing is securely anchored in its housing and that the bearing assembly is being held tight on its supporting bracket. Any indication of bearing misalignment or shifting of either bearing assembly or supporting bracket shall be noted.

(j) Hoist motor.

1. Any need for lubrication shall be noted.
2. The condition of paint shall be checked.
3. Any unusual noise when the motor is operating shall be noted.

(k) Gate travel limit switch controls.

1. Periodically inspect the main limit switch control assembly and note any indication of loose connections, abnormal wear of the rotating members, presence of dirt or moisture inside the assembly housing, need for lubrication or other need for maintenance attention.

2. Check the slack rope limit switch control for proper adjustment, etc. This may be checked by manual operating conditions.

3. Periodically make trial hoisting operations to determine whether the travel limiting controls provided are adjusted and functioning according to the operation and control plan.

(l) Hoist hand operated control assembly.

1. Periodically inspect for adequacy of lubrication and functioning. Insure that the unit can be readily engaged and disengaged. Check particularly functioning of the cut-out couplings.

2. Check brake and locking means.

3. Check functioning and general condition of hoist motor disconnect and connecting electric switch control.

(m) Storage cabinet. Check to insure that the interior is being kept in a clean and orderly manner. Note any lubricant containers not adequately covered to exclude grit or other foreign materials. Check adequacy of door lock. Note possible fire hazards. Check condition of equipment in storage.

d. Electrical system.

(1) Float operated controls.

(a) Check the controls for proper functioning. Insofar as practical inspect the inside and outside of the float wells for any indication of debris which may interfere with the operation of the float including possible restriction of water inlets.

(b) Inspect all metal work for indications of rusting, objectionable accumulation of dust, etc.

(c) Insure that the operating mechanism is properly lubricated and sealed. At least twice a year remove the cover and inspect the mechanism located there for proper functioning, adequate lubrication and note any indications of water, dirt, etc. which may have accumulated.

(d) Insure that the base anchor bolts are secure and that float line is in true alignment with centerline of the float. Also, note any indication of wear or other deterioration of the line assembly including connections at float and driving unit. Occasionally inspect the float for possible damage.

(e) Check electrical wiring and connections from controller unit. Inspect mercury contacts and check all terminals for tightness. Use an electricians insulated screwdriver suitable for the service to avoid injury to person making inspection.

(f) Transfer plugs shall be periodically transposed for manual alternation of pump programming to provide even wear on all pumping units during the operating season. Test plug provided shall also be operated to permit checking of float switch circuit continuity.

(2) Main switch board.

(a) The main switch board panel, switches, instruments, and appurtenances should be kept clean and free from dust. Doors of all cabinets should be kept closed, and locked. Power supply should be "ON" at all times and pumping plant set for automatic operation when the navigation gate is in the closed position.

(b) Check the switches and controls to insure that they are mechanically and electrically operable. Note especially any indication of sluggish operation.

(c) Note any of the instruments such as meters and recorders which are not registering properly. Check the supply of recording charts on hand and note need for replenishment of the supply.

(d) Note especially any indication of loose connections, insulation deterioration, unusual odors or mechanical failure within or around the switch boards.

(e) Note any failure of the controls on the respective panels to control the operation of the units for which they are intended.

(f) Note the need for cleaning or other maintenance and insure that the access is properly locked at all times except during necessary inspection and maintenance periods.

(g) Check pilot lights for correct operation. Check thermal overload resets. Check operation of gate interlock system. Check operation of float control system. Check operation of strip heaters.

(h) Circuit breakers.

1. Air type. The main points to be observed in the inspection of an air type circuit breaker are: condition of contacts, condition of arc-chutes, and whether the operating mechanism works freely yet is positive in closing, latching and tripping. The inspector should, while observing their condition, lubricate pins and bushings subject to wear, see that all others are in place, and that all bolts, nuts and set screws having to do with the breaker structure are set tight. Note also any evidence of heating, wipe off all the breaker bushings and check for cracked bushings.

2. Safety. Before approaching a circuit breaker for general inspection, sufficient precautions should be taken to guarantee the safety of the personnel and also prevent damage to the apparatus. The circuit breaker shall be de-energized by opening the breaker and also the disconnecting switch on the switch board. The control circuit and closing source of power should be cleared to prevent damage or injury from mechanical operation.

(i) Starters.

1. Yearly inspection of all motor starters should be made at the beginning of the winter season, with partial inspection continuing at regular monthly intervals throughout the operating season.

2. Check all connections and note any that are not adequately secure.

3. Check the contact gap with the contactor fully open and note any need for adjustment or other attention.

(3) Miscellaneous.

(a) Note whether all light fixtures and controls are functioning properly and are clean. The flood light fixtures should be clean inside and out. Check the flood lights at night for proper adjustment.

(b) Inspect the circuit breakers and switches and note any indication that maintenance is required. Also check adequacy of the number of spare fuses on hand.

(c) Periodic inspections at least every year should be made of the entire electrical system provided for operation of the main pumping units.

(d) Reliance for power to operate the electrical facilities is placed on the Utility Company. Any conditions noted in the inspection that may effect in any way the reliability of the power supply should be especially noted and brought to the attention of the Utility Company in writing or other accepted practice without delay.

(e) Government-furnished automatic water level recorder shall be observed to determine that it is operating and being serviced as required.

e. Miscellaneous.

(1) Painting. At least once each year carefully inspect all painted surfaces and note need for repainting or other maintenance.

(2) Hazards.

(a) Check to insure that the proper warning notices are legible and properly posted.

(b) Check all access manholes and note any covers not in place or in need of maintenance.

(c) Insure that access gates provided to exclude unauthorized persons are kept adequately locked or guarded.

(d) Note presence of any grease or oil accumulations on floor which may contribute to a fire or slipping hazard.

(e) Inspect the concrete structure for signs of abnormal cracks or other conditions requiring maintenance.

(f) Be certain no tools, rags, etc., are left on oil switches, circuit breakers, motors or any other electrical equipment before applying power.

(3) Sump.

(a) Sumps shall be given visual inspection periodically for deposits of sediment that might tend to reduce the storage capacity. Any deposits shall be removed. Design storage capacity must be maintained.

(b) The Wetherbee Lake portion of the sump shall be kept clean of debris, thistles, etc., that may be blown or worked through the trash rack.

(c) The areas draining into the pump sump shall be kept clean of debris, weeds, etc., that could wash against the trash

racks or otherwise prevent efficient function of the drainage system as a whole.

(4) Navigation channel. The navigation channel shall be checked periodically and cleared of any debris that may impede functioning of the gate and hoist as well as navigation operations.

6-03. Maintenance.

a. General. Since proper functioning of the pumping plant and navigation channel gate installation is vital to adequate operation of the equipment, controls and appurtenances be continuously maintained in good operating condition. The subject of maintenance and procedures can only be briefly touched upon herein and should be expanded and improved upon as continued experience is gained in operation of the equipment, and as new improved procedures are developed to expeditiously and efficiently handle the special problem which may arise. All damaged or unserviceable parts shall be repaired or replaced, without delay. Before attempting major repair, the applicable contract plans, shop drawings, specifications, as well as catalogs, descriptive data and operating procedures supplied by the manufacturers of the equipment installed should be carefully reviewed. Certain specific points as pertains to the principal units are discussed below; however, full use shall be made of all pertinent technical data furnished with the respective units. For special points requiring maintenance, refer to the periodic inspection reports. Use high grade lubricants which are suitable for the service. In all instances lubricant specifications shall be in accordance with the equipment manufacturers' recommendations; or if none in accordance with best practice for the service. The lubricant schedule included as part of this manual will serve as a guide; however, before ordering lubricants for standard manufacturers' assemblies such as pumps, pump motors and gear reducers, a check should be made as to equipment and lubricant suppliers recommendations, not only to insure selection of the right type and grade, but also to take advantage of the most recent developments. Painting required should be performed in accordance with the original contract specifications. All necessary maintenance work shall be performed by skilled mechanics and electricians; where replacements are made the replacement parts shall be equal in quality to those originally installed or of suitable later improved design. Exhibits included as part of this manual will serve as guides and check lists for conducting the inspections, maintenance and preparation of reports.

b. Pumping plant.

(1) Pumps.

(a) If excessive vibration or noise occurs when the pump is operating, the cause for which is not readily apparent,

the operator shall immediately stop the pump inasmuch as prompt action may avoid serious damage to the pump. A relative sudden development of abnormal noise or vibration may be due to numerous causes such as bearing failure, loose anchors, or debris sucked into the pump. Consult with an authorized representative of the pump manufacturer. It is necessary to determine whether mechanical or hydraulic conditions are causing the trouble in order to determine what corrective action is required. Persons untrained in pump engineering and operation should not be engaged to "trouble shoot" concerning major problems relating to the pump unit itself.

(b) When installing, adjusting and performing general maintenance, make full use of the "Installation and Operating Instructions" prepared by the pump manufacturer for the pumps installed.

(c) The pumps are of relatively simple, rugged design and normally will require very little maintenance except for keeping the machinery clean and properly lubricated. Lubricants of the proper type and quality shall be used in each instance. However, use of more oil than called for by the manufacturer might result in waste. Careful and frequent inspections will in most instances reveal sources of possible trouble before they have had a chance to require a major repair operation to be performed. Insure that the grease and oil applications are functioning properly and that the lubricant is reaching the bearings.

(d) When it becomes necessary to pull or disassemble the pump unit to inspect, adjust and repair, all parts put back shall be thoroughly cleaned. At this time, the bearings should also be carefully cleaned including removal of the old lubricant. The points required to be lubricated and methods provided are indicated on the approved shop drawings. Lubricating is the most important phase of pump maintenance and should be checked daily (during periods of pumping operations) but the lubricant should only be added as required. It is not enough merely to apply the lubricant at the points provided as it must also be assured that the lubricant is reaching the bearings in each instance.

(e) Note location of oil seals provided for the pump bearings to prevent leakage of lubricant from the bearings and also to prevent foreign matter from entering the bearings. Excessive lubricant consumption requires replacement of seals. Replace the seals with new ones when the pump is disassembled for servicing or more frequently if required.

(f) In tightening bolted connections, use suitable size and proper type of wrench to avoid possible undesired overstressing of the threads and/or marring the heads of the bolts and nuts. When assembling the discharge line to the pump, tighten the bolts, each a

little at a time to pull the seals together evenly and exercise care to insure against the possibility of pulling the pump out of line or throwing an undesired strain on the pump unit. After completing the assembly of the pump to the discharge line, carefully recheck the alignment of the pumping unit.

(g) A flap gate is installed at the end of each discharge pipe. These flap gates must be in proper operating condition at all times and any failure of this gate to operate properly shall be carefully investigated and the necessary maintenance performed without delay. Inspect those points noted on the inspection report and perform such maintenance as required. Give particular attention to the gate hinge bearing assembly and to the seals.

(h) The pump sump is protected by a trash rack; however, it is possible that rags, and other materials may work through which could wrap around and restrict the pump operation. Any debris noted within the enclosure which might clog or damage the pumps should be removed from the pump sump.

(i) Any rust spots noted during the inspection shall be carefully cleaned with a wire brush or other suitable means and repainted in accordance with the original specifications. Unpainted surfaces such as exposed shafting, etc., which have corroded shall be carefully cleaned and coated with waterproof grease or suitable rust preventative. This and similar maintenance not classed as an emergency should be performed once a year and during the non-operating period when most practical.

(2) Main pump motors.

(a) Carefully investigate all items noted on the inspection report and perform such maintenance as found to be required. Read "Manufacturers Instructions" carefully before installing or operating. Refer to "Motor Name Plate" for proper instruction including bearing adjustment and type of lubricant. The motor is built to resist momentary upthrust. During reassembly of the motor special care shall be exercised to avoid damage to the lower bearing. Assure that the motor bearings are being adequately but not excessively lubricated at the points provided in each instance and that the lubricant is reaching the bearings. Refer to the data provided on the name-plate of the motor in each instance as well as the applicable Manufacturers Instruction sheet. Note for signs of any oil leakage around the oil reservoir or oil piping and feel the bearings to determine whether or not there is any indication of the bearing becoming overheated and if so, shut down the unit. Oil capacity of the upper reservoir is 11-quarts and the lower reservoir is 5-quarts. Fill until oil is 1/8-inch below center of site gage. (See instructions on the name plate and other pertinent manufacturers instructions.) Change oil twice yearly or oftener depending on service conditions.

(b) When installing the pump motors, insure that the base when installed is level and that the connecting coupling is tight. When tightening the anchor bolts, tighten down the nuts gradually and uniform all around using a wrench of suitable size to permit adequate but not excessive tightening. Before installing shaft coupling, start motor and check to insure that the rotation is in the proper direction, as the pump unit must not be allowed to operate in reverse rotation.

(c) Should the motor pump unit remain idle for any extended length of time, occasionally make a start and short running tests to determine whether the unit including the starter and control are in proper operating condition. Any major repairs or adjustments must be performed only by skilled mechanics and/or electricians thoroughly experienced with the type of equipment involved.

(3) Trash racks.

(a) The trash racks are provided primarily to prevent debris from entering the pumping compartment that might otherwise tend to clog or damage the pumps. These racks should be kept free from debris. (Persons should not be permitted in the water in front of these trash racks when the pumps are operating.)

(b) When corrosion of the metal work occurs, it shall be thoroughly cleaned and painted.

(4) Flap gates. Discharge pipe flap gates that have become unserviceable shall be replaced or repaired at the earliest practical date. Keep channel iron supports painted in accordance with the original contract specifications and hinges adequately lubricated as required to insure proper functioning.

(5) Pumping plant structure. At least once each year thoroughly inspect the entire structure and perform any required maintenance to restore to its original condition.

c. Channel gate and hoist.

(1) General. Before attempting any major maintenance work as pertains to the gate and hoist, first carefully review the equipment manufacturers descriptive data, and maintenance recommendations. Major overhaul of standard units of equipment such as gear reducer units should be performed by the equipment manufacturer whenever practical. Replacement of seals and gaskets can usually be accomplished by less experienced mechanics. For those operations requiring the use of a crane or other hoisting equipment to handle heavy units of the assemblies, first check capacity of the bridge, and other supporting structural members to determine that the proposed hoisting equipment plus the proposed load will not exceed the capacity of the supporting structure. Where a crane

is to be employed, especially for those operations requiring the crane boom to extend, for example, beyond the side edge of the bridge, first check, the rated capacity of the crane for the boom hoisting radius required to determine that the selected equipment has adequate capacity. Before initiating painting operations on the gate leaf assembly, take proper precautionary measures as required to fully protect the maintenance personnel from possible injury due to falling objects, toxic fumes, or other causes. All necessary maintenance work shall be performed by skilled mechanics and electricians. Where replacements are made, the parts shall be equal in quality to those originally specified.

(2) Gate and trunnion anchorage.

(a) Rust spots disclosed by the inspection shall be thoroughly cleaned with a wire brush and painted.

(b) When tightening cap screws, nuts, and similar fasteners, use a wrench of suitable size to insure proper wrench leverage without possibility of undesired overstressing of the threads.

(c) Where excessive wear of a structural member is indicated, proper steps should be taken to build up by welding, or to replace unit, whichever is most practicable, exercising extreme care to employ the proper procedures so as not to distort or weaken the leaf assembly.

(d) When applying lubricant to the trunnion bearings, check to insure that the lubricant is reaching the bearing surfaces, including the yoke rings. Lubricant for the tainter gate trunnion bearings, shall be lead impregnated, lime soap grease of No. 3 consistency containing no graphite, shall not be corrosive to metal and shall provide a non-rupturing film capable of operating with a bearing pressure of 7,000 pounds per square inch without causing undue wear. These bearings should be lubricated just before and just after the operation is completed; also, periodically between operations in order to force out any abrasive material that may have worked into the bearings. These trunnion bearings should be lubricated more frequently when the bearing is below the water surface in the channel.

(e) Abnormal leakage by the gate seals may be due, to improper adjustment of the seals, or to a damage to the seal. It is usually more practical to replace a damaged seal with a complete new seal than attempt to repair the damaged section. When ordering a new seal section, specify a length slightly longer than that actually required to allow for fitting in the field; when installing seal sections the joints should be vulcanized in accordance with seal manufacturers recommendations and not merely glued together. Abnormal leakage past the top seal may possibly be corrected by the adjustments provided.

(f) Any debris lodged around the gate that might foul its movement or damage the rubber seal shall be removed.

(g) Refer to the inspection report for other points requiring maintenance; also, refer to the contract plans and specifications and pertinent shop drawings especially where relative major maintenance operations are involved.

(3) Hoist assembly.

(a) Gear reducer assemblies. The gear reducer housings shall at all times be filled to the proper level with high grade of lubricant, for the operating temperatures and type of service, that meets the specification prescribed by the manufacturer of the respective units, or if none, consult reputable suppliers of lubricants such as the major oil companies. The oil should be of a type and grade that will not cause excessive power loss through the respective reducers when operating during relative cold weather. Do not dilute the oil with kerosene or diesel fuel. The lubricant used in the reducers should be of a recommended type, which will equal or exceed AGMA specifications on quality. The pour point of any lubricant used must be below the minimum expected ambient temperature at the reducer in order to insure that a free flow of oil is immediately established. It is important to keep the oil level in the gear reducers at the level indicated on the respective oil gage supplied with the reducer to protect against corrosion during long non-operating periods, in addition to satisfying maximum operating demands for lubricant. Under average conditions, changing oil annually will be satisfactory. Evidence of contamination, as shown by sludge formation, free water content, or an unusual color change, are indications that an oil change is required. Since the life of any machine is partly dependent upon the manner in which it is supported and aligned, considerable care should be given to the mounting and aligning of the gear reducer units. The foundation for the units should be level and flat to assure even bearing for all the mounting feet. Where a flat machined surface is not used, each foot must be carefully shimmed to carry its share of the load. Failure to properly shim a unit may cause the housing to distort when the foundation bolts are tightened, and, if the error is large, it may result in a fractured housing. Each reducer unit must be accurately aligned with respect to the units to which its input and output shafts are connected.

(b) Operations. Before operating the hoist, a check inspection shall be made to insure that the drive shaft and other bearings are lubricated adequately. When the hoist is operating under load, it is advisable to occasionally feel the bearing housings to determine any abnormal warm operation and any signs of smoke, unusual noise, loose metal particles around the shaft or other signs of improper operation shall be noted and proper corrective action taken; lubricant

applied to the fittings may not be reaching the bearing surfaces. Before applying grease to the pressure fittings provided, the fitting should first be wiped clean to prevent the possibility of abrasive materials being forced into the bearing; also, after applying the grease, the fitting shall be wiped clean. Oil and grease seals shall be replaced with new units when there is an indication of failure; however, a relative small amount of seepage is no particular cause for concern.

(c) Drive shaft. Close attention shall be given to the hoist drive shaft between piers to insure that the bearings are being held securely by their respective supporting brackets and that they are in true alignment one with the other; observation of these units from a distance is not adequate. Insure that the lubricant is reaching the bearing. Frequent lubrication should be the practice, even though not justified by actual operation as this will tend to force out any abrasive material that may have worked into the bearing from the outside.

(d) Hoisting ropes. The hoisting ropes should be coated with a film of waterproof type grease. Excessive accumulation of dirt and grit on the rope and drum assemblies should be removed. The hoisting ropes should require very little attention; however, any rope showing signs of abnormal wear, kinking or other damage should be removed and replaced with a new rope of the same type. When the hoist is under load, a periodic check should be made to insure that each rope is taking its proportionate part of the load. Means for adjusting the tension of each rope is included as part of rope anchorage assembly located near the bottom at each end of the gate; the actual tension in the rope to be checked with an approved strain gage. It is recommended that the rope anchor to the gate leaf including the rope tension adjustments be coated with a film of water repellent type rust preventative and lubricant such as Dearborn Chemical Company NO-OX-ID Type "E" or equivalent; also, the hoisting ropes should be similarly coated.

(e) Open gear sets. The open gear sets shall be kept well lubricated and any accumulation of dirt and other abrasive materials, especially on the contact surfaces of the teeth should be periodically removed, the frequency required depends on prevailing conditions in the area. The teeth should be coated with a film of lubricant especially prepared for the service. Insure that the gear teeth are bearing uniformly across the entire width of the contact surface; if not the gear or pinion shaft may not be properly aligned.

(f) Controls. The hoist operating controls, including the main control limit switch unit, will be maintained in proper operating condition at all times. All electric wiring shall be

free from shorts or grounds. The motor shall be checked while the hoist is operating to insure that the bearings are receiving proper lubrication. Sluggish operation or failure of the cut-out coupling to readily engage or disengage may be due to misalignment of the drive shafts or damage or misalignment within the coupling unit.

d. Fire protection. Refer to applicable provisions of "Recommended Good Practices of the National Board of Fire Underwriters", and applicable safety manuals. Fire extinguishers have not been provided, because their use would not be effective in preventing damage to machinery and electrical equipment by fire. Proper emphasis shall be directed to strictly enforce all fire prevention rules by frequent and careful inspections. No combustible materials shall be allowed to accumulate on or around the pumping plant. Any rags, paper, or other combustible materials containing oil, paint or cleaning fluid shall not be allowed to accumulate, not even for a period of one day. Oil and grease dripping or other undesired accumulations shall be promptly removed. During any welding operations performed be especially careful to remove or properly isolate any material that might so ignite or damage by the welding procedure. Take prompt corrective action relative to any electrical equipment which shows signs of sparking. Approved fire prevention instructions and warnings shall be properly posted.

e. Electrical system.

(1) General. Give particular attention to the items listed on the inspection report and perform such maintenance required in accordance with the best standard practice for the service with due consideration of all safety precautions. Only qualified mechanics and electricians experienced in the type of equipment involved shall be allowed to perform such maintenance. Maintenance of the power line is the responsibility of the Utility Company. A large percentage of electrical failures are due to mechanical failures. Generally, no simple device is available for locating the source of or analyzing a noise problem with the consequence that the action taken must depend primarily upon the judgment and experience of the maintenance personnel. When cleaning any part of electrical equipment, use ample precautions to prevent explosions, fires or toxic conditions. Use only approved cleaners with relative low flash points.

(2) Main switch boards.

(a) General. Main switch boards, panel boards, switches, controllers, and appurtenances shall be kept clean and free from dust preferably by blowing with dry compressed air if available. Care should be taken to insure that the air does not contain moisture. Air should not be used for cleaning instruments. Air in excess of 30 pounds should not be used on insulation or coils such as motors or solenoids.

Doors of all cabinets shall be kept closed to exclude dust. Switches shall be kept mechanically and electrically operable at all times.

(b) Circuit breakers. Periodically inspect, test, adjust and overhaul, if required, circuit breakers about once each year. Before attempting these or similar maintenance operations, first insure that power is disconnected from the board; also, consult the applicable catalogs and technical bulletins supplied by the manufacturer of the equipment for a detailed description of the unit and recommended procedures for operation and maintenance.

(c) Starters.

1. Carefully investigate all points noted on the inspection reports as requiring attention. Before removing cover to inspect or to adjust, make sure that disconnecting switch is open and control circuit is de-energized.

2. Insure that all parts are clean and move freely.

3. Any excess deposits should be removed from the inside surfaces of the arc boxes adjacent to the contacts, and any broken arc boxes should be replaced.

(d) Electrical contacts.

1. Copper contacts. If excessive heating is noticed during the inspection period, the most likely point of high resistance (and resultant heating) is where the movable tips make contacts with the stationary tips. If this condition is noticed, dress the contacts with a few strokes of a file. Since copper oxide has a very high resistance and forms on copper contacts rapidly at a high temperature, a few strokes with a file will remove the oxide and reduce the resistance to a low value again. It should be pointed out, however, that contact tips which have been roughened by ordinary service do not have to be kept smoothed so that they will carry the load. A roughened tip will carry current just as well as a smooth tip; however, if large projections should appear on a tip because of unusual arcing, they should be removed. Contacts plated with a small layer of silver should be cleaned with a clean cloth or brush dipped in cleaning fluid. After being cleaned polish the contacts with a clean dry cloth. The brown discoloration that is found on silver and silver-plated contacts is silver oxide which is a good conductor. It should be left alone unless the contacts must be cleaned for some other reason. When corroded, contacts should be cleaned with No. 0000 sandpaper. This must be done very carefully so as not to remove too much of the silver plating. After the corrosion has been removed, polish the contacts with a clean, dry cloth making certain that

all abrasive particles are removed and that the shape of the contact has not been changed. Silver-plated contacts that are badly burned or pitted should be replaced. In the event no replacement is on hand at the site, the contacts may be dressed with sandpaper until the burned or pitted spots are removed. If the burns or pits can not be removed by using sandpaper, then use a burnishing tool very carefully. In only extreme emergencies will the use of a file on silver-plated contacts be permitted. In no instance shall highly abrasive materials, such as emery cloth, heavy sandpaper or carborundum paper be used for surfacing relay contacts. In adjusting the contact pressure, refer to the manufacturer's recommendations and check by the spring balance or other approved methods. In case the contact pressure is below the minimum value required, adjust or install a new spring. Low pressure should be avoided to minimize possibility of excessive heating of the contacts. On multiple pole devices, the spring tension on all poles should be approximately the same and if one is considerably lower than the others, the spring should be replaced.

2. Avoid the use of lubricant on contacts or bearings of a contactor as oil quickly collects dust and unless parts are frequently cleaned, will interfere with the operation of the contactor.

3. Maintain the contact gap in accordance with the manufacturer's instructions.

4. Failure to close may be due to one of the following:

a. Operating coil may be open-circuited.
b. Lead wires to operating coil may be loose or disconnected.

c. Excessive mechanical friction.
d. Power off or voltage below normal.

5. Failure to open may be due to one of the following:

a. Mechanical interference or friction.
b. Welded contacts.
c. Broken contact spring.

(e) Wiring connections. All wiring connections in the rear of the switch boards shall be inspected yearly especially before

the winter pumping season in order to insure that there are no loose contacts and that proper clearances are maintained. All parts of the panel board should be kept clean. Branch circuit breakers which are not normally required to be closed shall be kept in the "OFF" position. The bus voltage should be checked periodically for phase balance and especially after utility service has been restored following an outage.

(3) Misceallaneous.

(a) Lighting. The lighting circuits shall be maintained in operable condition at all times. Lamps which have burned out shall be replaced without delay. The lighting fixture shall be cleaned at least once a year, removing all dust and insects. Keep an adequate supply of fuses and light bulbs on hand at all times.

(b) Maintain all other electrical equipment clean, adequately lubricated and in proper operating condition at all times in accordance with best practice for the service, with particular attention to those items noted on the inspection report.

(4) Cleaning electrical equipment.

(a) Compressed air. Air pressure used for cleaning electrical equipment should not exceed 30 p.s.i. When using compressed air certain precautions should be exercised as set forth in (2) above.

(b) Vacuum. This method of cleaning is especially applicable in removing copper dust and other waste materials.

(c) Solvent. If dry cloth or compressed air is not sufficient to remove gummed dirt or grease from electrical apparatus, use carbon tetrachloride as a solvent for cleaning. Moisten the cloth sparingly with carbon tetrachloride and wipe off the dirt from the parts to be cleaned. Be sure to have adequate ventilation and avoid inhaling the fumes. Never use gasoline, benzene or benzol for cleaning as these solvents are highly inflammable; their vapors are explosive, and may be corrosive or will dissolve certain types of insulation.

6-04. Records.

a. Procedures for inspection, maintenance, and testing of the pumping plant equipment and appurtenances shall include requirements set forth in this manual. Inspection Check list, Lubrication Schedule, and other descriptive material contained in Section III of this manual will serve as a guide in meeting these requirements, and in the maintenance of required records and logs.

b. Maintenance card or cards should be kept for each major piece of equipment for recording a summary of, test results, inspection and repairs, and any pertinent comments regarding the condition of the

equipment. Such cards should be kept up to date and filed at an approved location so as to be readily available to those responsible for inspection, testing and maintenance. A data card should be prepared for each piece of equipment or component thereof consistent with the maintenance program breakdown to provide a record of project equipment. The data card records should indicate all name plate data and other historic information that would indicate, at least, but not necessarily be limited to, source of manufacture, physical characteristics, date of purchase, cost of procurement and list of spare parts available.

c. A copy of the inspection and maintenance records shall be filed with the State Department of Water Resources.

SECTION VII

HYDROLOGIC FACILITIES

7-01. Description of Hydrologic Facilities. The hydrologic facilities for the project consist of a gaging station to measure water levels in Wetherbee Lake. The components of this station are:

- a. A weight driven Steven's Type A-35 water level recorder located on the pump platform near the navigation gate.
- b. An 18-inch stilling well suspended from the pump platform.
- c. Staff gages on both sides of the navigation gate set to mean sea level datum.

7-02. Operation and Maintenance of Hydrologic Facilities. The several components of the gaging stations shall be operated as follows:

- a. The water stage recorder shall be operated continuously and charts filed for permanent retention by the California State Department of Water Resources.
- b. The water stage recorder shall be serviced by qualified personnel at regular intervals in accordance with the manufacturers "Instruction for Installing and Operating" furnished with the recorder.
- c. Staff gages shall be inspected annually to assure their serviceability. Gage sections shall be cleaned, secured, and replaced as necessary.
- d. The stilling well shall be inspected annually and any damage thereto repaired. Inlets shall be flushed if any indication of stoppage occurs.

EXHIBIT B

Determination of Drainage

Pump Capacity

Walthall Slough

EXHIBIT B

TITLE 33 - NAVIGATION AND
NAVIGABLE WATERS
(as of 1 January 1962)

Chapter 11 - Corps of Engineers
Department of the Army
PART 208 - Flood Control Regulations
MAINTENANCE AND OPERATION OF FLOOD
CONTROL WORKS

Pursuant to the provisions of section 3 of the Act of Congress approved June 22, 1938, as amended and supplemented, (Sec. 3, 49 Stat. 1871 as amended; 33 U.S.C. 701c), the following regulations are hereby prescribed to govern the maintenance and operation of flood control works:

AUTHORITY: §§ 208.10 to 208.81 issued under sec. 7, 48 Stat. 809; 33 U.S.C. 709. Additional authority is cited in parentheses following the sections affected.

§ 208.10 Local flood protection works; maintenance and operation of structures and facilities.

(a) General. (1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all

contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

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

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

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

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

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

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

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

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

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

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

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

(d) Drainage structures—(1) Maintenance. Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

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

(ii) Inlet and outlet channels are open;

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

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

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

(2) Operation. Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures

in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition.

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

- (i) No parts are missing;
- (ii) Metal parts are adequately covered with paint;
- (iii) All movable parts are in satisfactory working order;
- (iv) Proper closure can be made promptly when necessary;
- (v) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency.

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

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

(f) *Pumping plants*—(1) *Maintenance.* Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubricants for all types of machines, fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at

least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any

equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

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

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

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

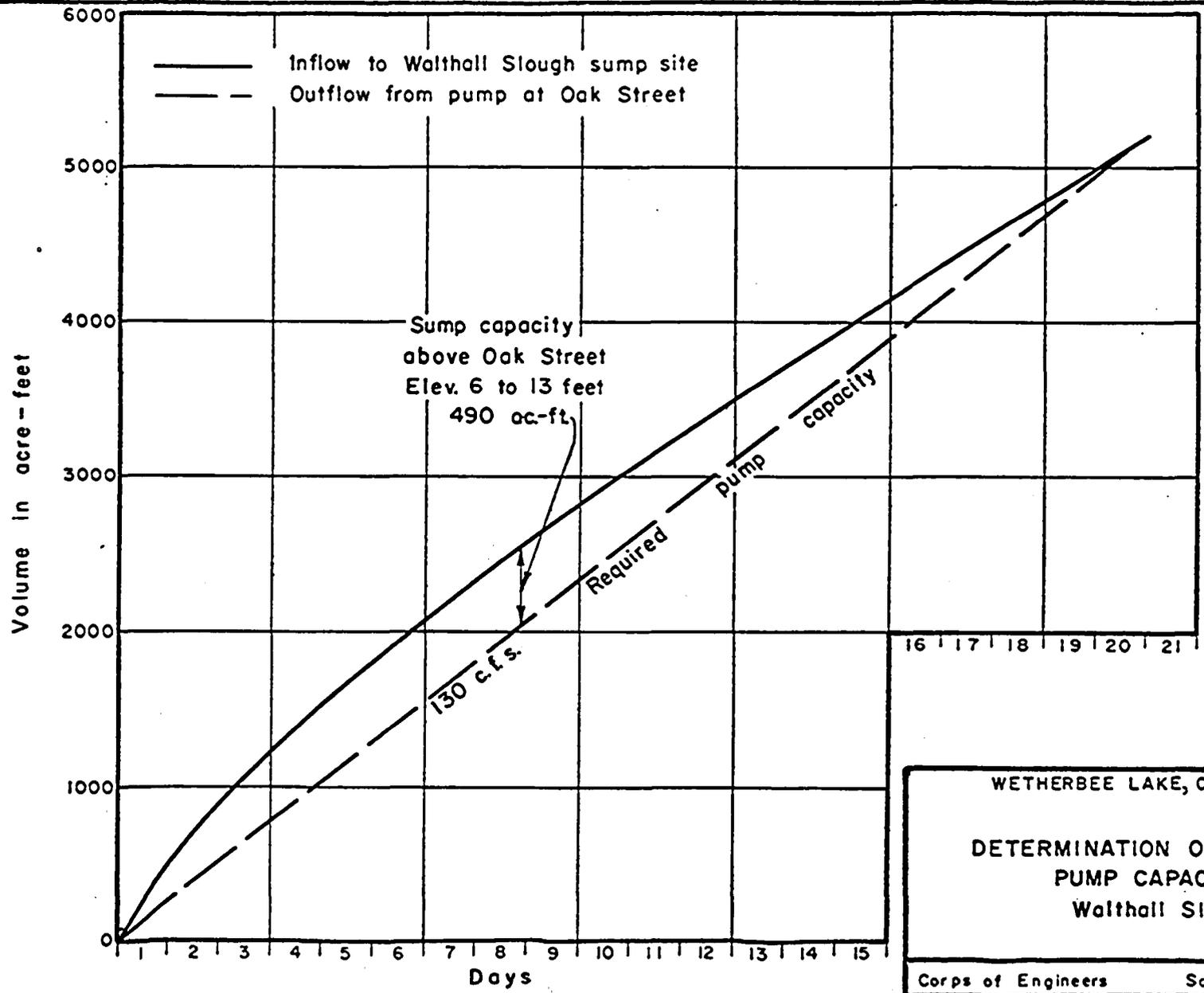
Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank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

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

(h) *Miscellaneous facilities*—(1) *Maintenance.* Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior run-off during flood

periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows.

(2) *Operation.* Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor. (Sec. 3, 49 Stat. 1371, as amended; 23 U.S.C. 701c) [9 P.L. 999, Aug. 17, 1944; 9 P.L. 110209, Aug. 23, 1944]



WETHERBEE LAKE, CALIFORNIA

DETERMINATION OF DRAINAGE
PUMP CAPACITY
Walthall Slough

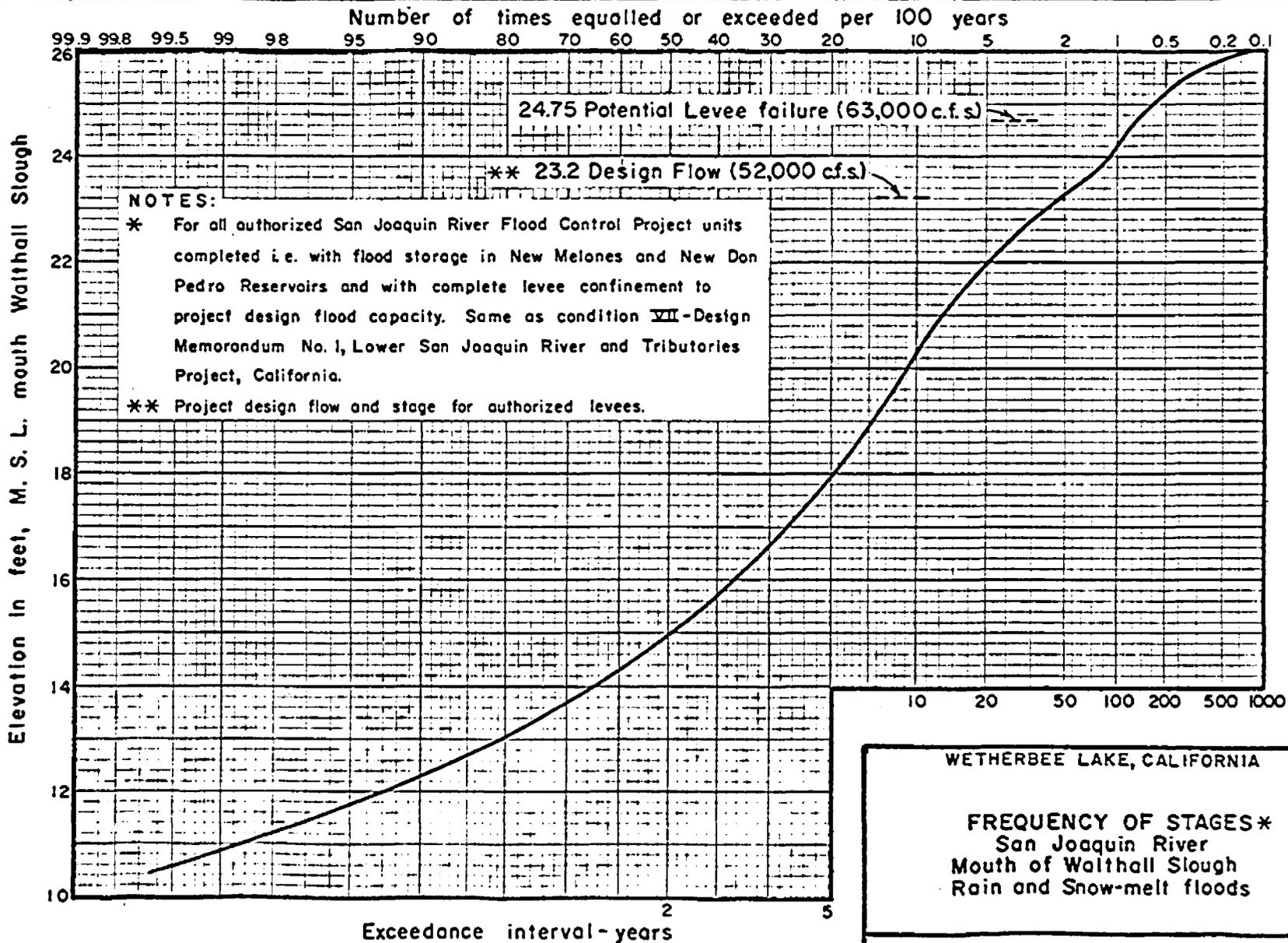
Corps of Engineers Sacramento, California

Prepared by: E.K.R. Date: 11 Dec. 1959

EXHIBIT R

EXHIBIT C
Frequency of Stages
San Joaquin River

EXHIBIT C



WETHERBEE LAKE, CALIFORNIA

FREQUENCY OF STAGES*
 San Joaquin River
 Mouth of Walthall Slough
 Rain and Snow-melt floods

Corps of Engineers Sacramento, California

Prepared by: E.K.R. Date: 15 Dec. 1959

EXHIBIT D

**"As Constructed" Drawings and
Specifications**

EXHIBIT D

EXHIBIT D

"As Constructed" Drawings

(See Separate Folder for the following Contract Drawings)

(Drawings No. 7-4-1643)

<u>File No.</u>	<u>Title</u>
1643/15	Navigation Gate Structure & Pumping Plant - General Plan & Sections
1643/16	Pumping Plant - Plan & Sections
1643/17	Pumping Plant - Sections
1643/18	Pumping Plant - Reinforcement No. 1
1643/19	Pumping Plant - Reinforcement No. 2
1643/20	Pumping Plant - Miscellaneous Details No. 1
1643/21	Navigation Gate Structure - Plan & Sections
1643/22	Navigation Gate Structure - Sections
1643/23	Navigation Gate - Tainter Gate, Structural
1643/24	Bridge Deck - Plan, Sections
1643/25	Navigation Gate - Operating Machinery Assembly
1643/26	Navigation Gate - Hoisting Rope Anchor
1643/27	Navigation Gate - Side Plate and Roller Plate
1643/28	Navigation Gate - Gate Roller
1643/29	Navigation Gate - Trunnion & Lubrication Details
1643/30	Navigation Gate - Tainter Gate, Hanger & Support

1643/31

Navigation Gate - Seals & Appurtenant
Details

1643/32

Navigation Gate - Top Seal, Bearing
Plate Assembly & Gate Stop

1643/33

Pumping Plant - Miscellaneous Details
No. 2

1643/34

Pumping Plant - Floatwell Details

1643/35

Site Plan, Navigation Gate Electrical
Plan & Conduit Layout

1643/36

Pumping Plant - Electrical Plan &
Conduit Layout. Navigation Gate -
Electrical Control System

1643/37

Pumping Plant & Navigation Gate -
Electrical Wiring & Equipment Details

EXHIBIT E

Manufacturer's Data

EXHIBIT E

EXHIBIT E

Manufacturer's Data

(See the following Manufacturer's Data under separate cover)

<u>Item & Dwg No.</u>	<u>Manufacturer</u>	<u>Description</u>
1. Pumps		
4 MS 261A	Cascade Pump Co.	Calculation Sheets
2 J 143	" " "	Pump
2. Hoists		
G-207-35-2E	Pacific Coast Engineering Co.	Gate Hoist
G-207-3-2D	" "	Gate Hoist
G-207-31-2C	" "	Gate Hoist
G-207-7-1D	" "	Limit switch mounting
3. Motors		
Cat. GEH-1897B	General Electric Co.	Induction Motors
114B3158AR	" " "	" "
297HA466	" " "	" "
Sh. 3140pp9	Westinghouse Electric Corporation	Hoist Motor
421C593	" "	Type DK-73 Magnet Brake
Bul. 3100	" "	Relays, Brakes
Bul. 16-301	" "	" "
Bul. 5200	" "	" "

4. Speed Reducers

D-55001

Hewitt-Robins, Inc.

Speed Reducer

5018-6 (R-1)

DeLaval - Holroyd, Inc.

Parts List

3810-1

" " "

Worm Gear Speed Reducer

5. Controls

3500B001

Automatic Control Co.

Float Controls

71355-1

" " "

Trans. Plugs

G207-3-1C

Petersmith Controls

Gate Control Station

" "

Materials List

6. Miscellaneous

Bul. 10316

Cutler-Hammer

Limit Switch

Publ. 8018

" "

" "

17000 ED 36

" "

" "

DML-417

Philadelphia Gear Corporation

Couplings

SP-10300

Zurn

"

C-620829-C

"

"

C-620829-D

"

"

Bul. T-5300

Hevi-Duty

Transformers

Bul. B 7356

Westinghouse Electric Corporation

Pushbuttons

Bul. 71260

Syntron

Rectifiers

EXHIBIT F

**Photographic Prints of
Structure**

EXHIBIT F



FIG. NO. 1

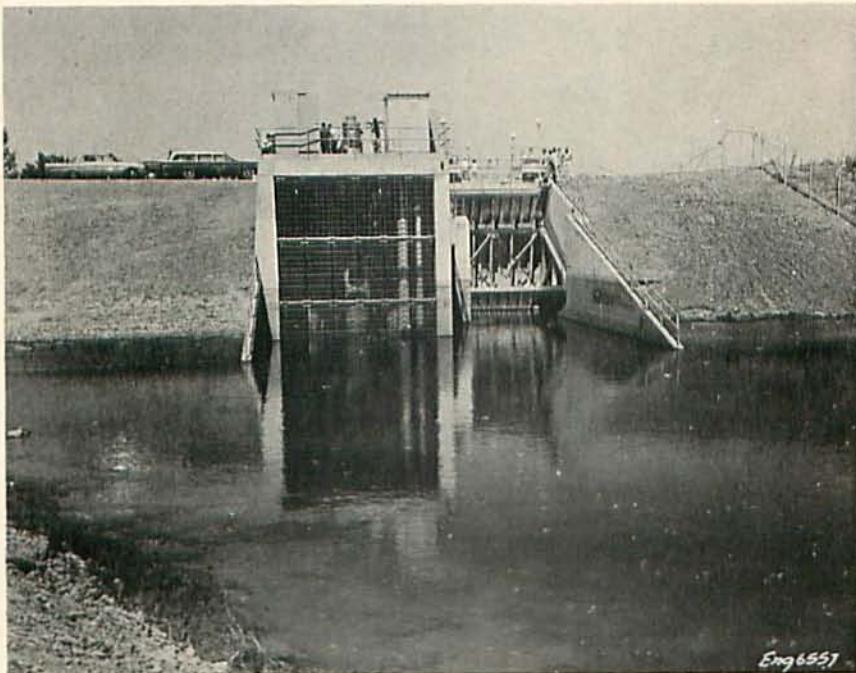


FIG. NO. 2
PUMPING PLANT AND
NAVIGATION CHANNEL INSTALLATION

EXHIBIT F
PLATE I

Hoist Electric Brake

Drive Shaft and Guard

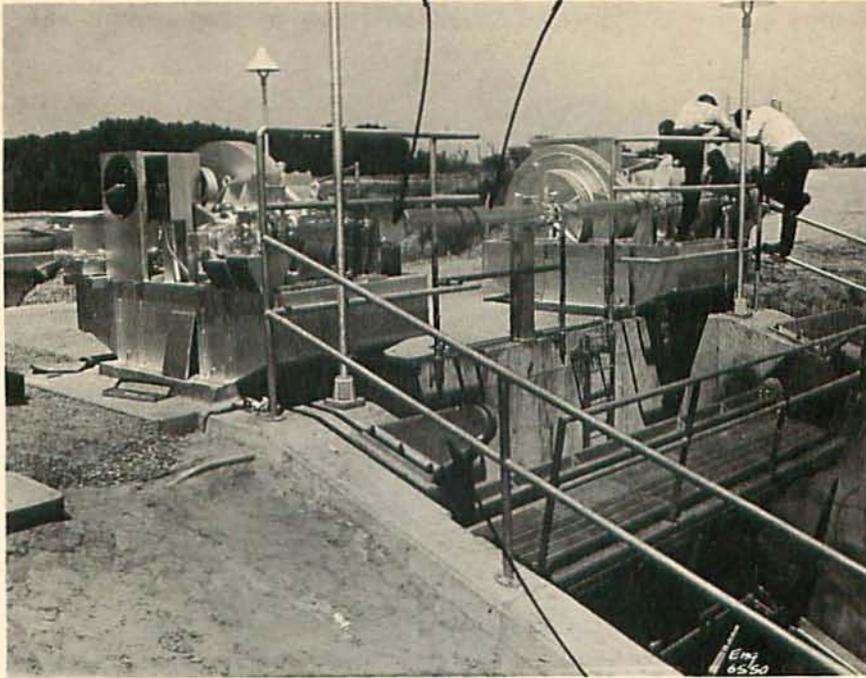


FIG. NO. 3

Service Anchor

Storage Cabinet

Hoisting Rope Drum



FIG. NO. 4

NAVIGATION CHANNEL
GATE HOIST

EXHIBIT F
PLATE II

*Main Gear and Pinion Set
with Guard Cover*

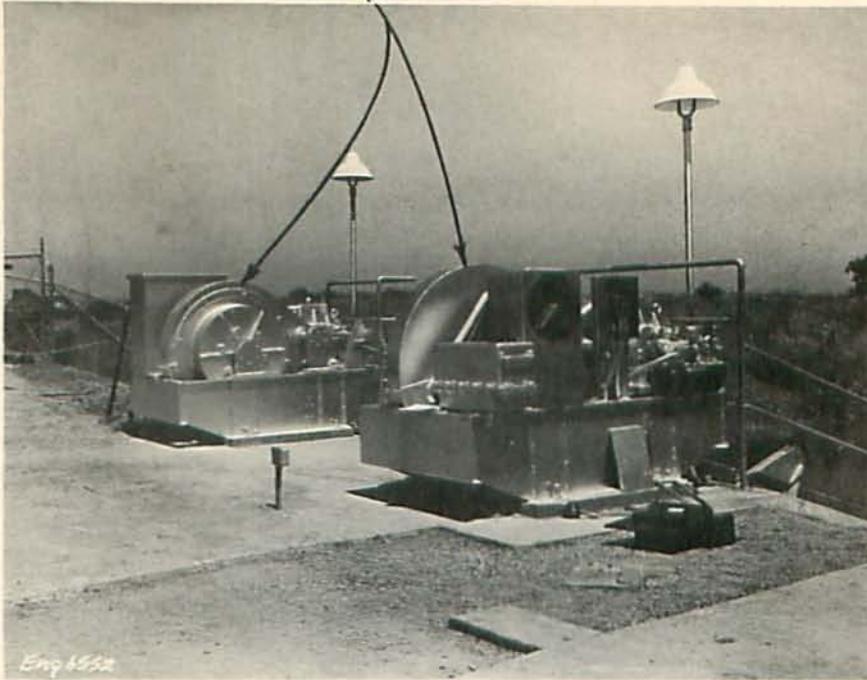
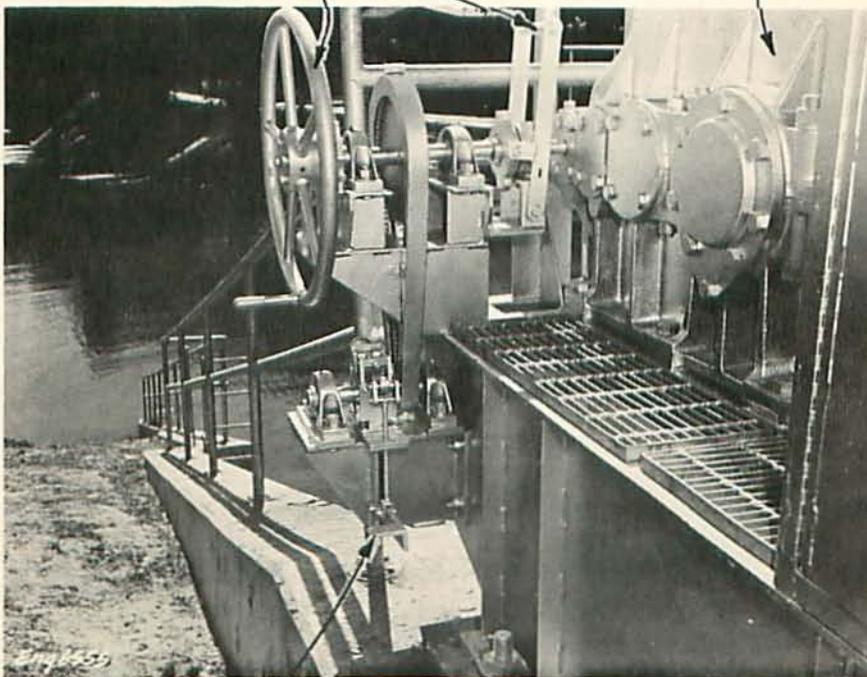


FIG. NO. 5

*Manually Operated
Drive and Clutch*

Secondary Reducer



Foot Brake

FIG. NO. 6

NAVIGATION CHANNEL
GATE HOIST

*Main Limitswitch
Assembly*

*Primary Gear Reducer
and Hoist Motor*

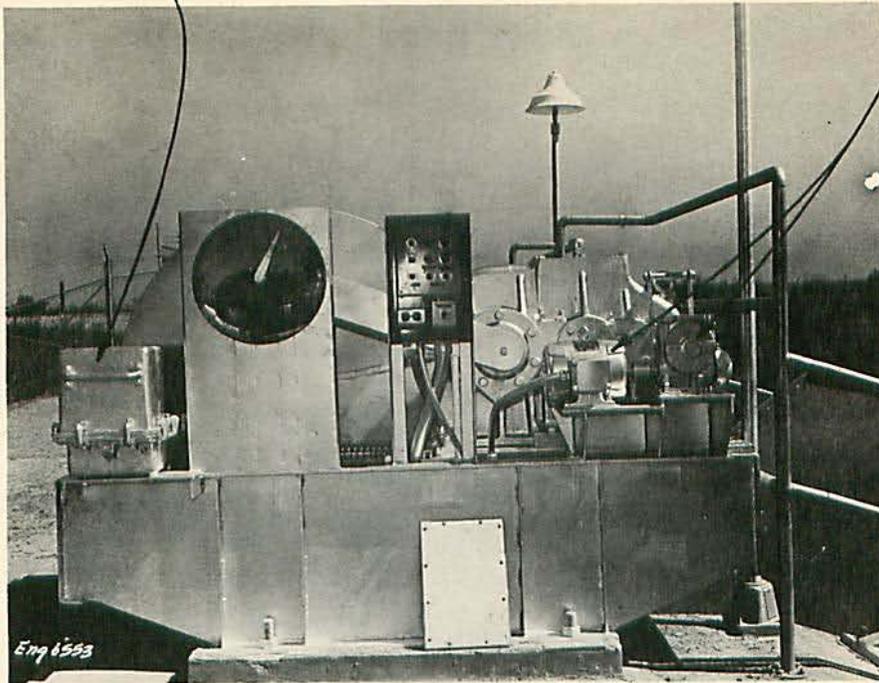


FIG. NO. 7

*Gate Position
Indicator*

*Electric Push Button
Control Station*

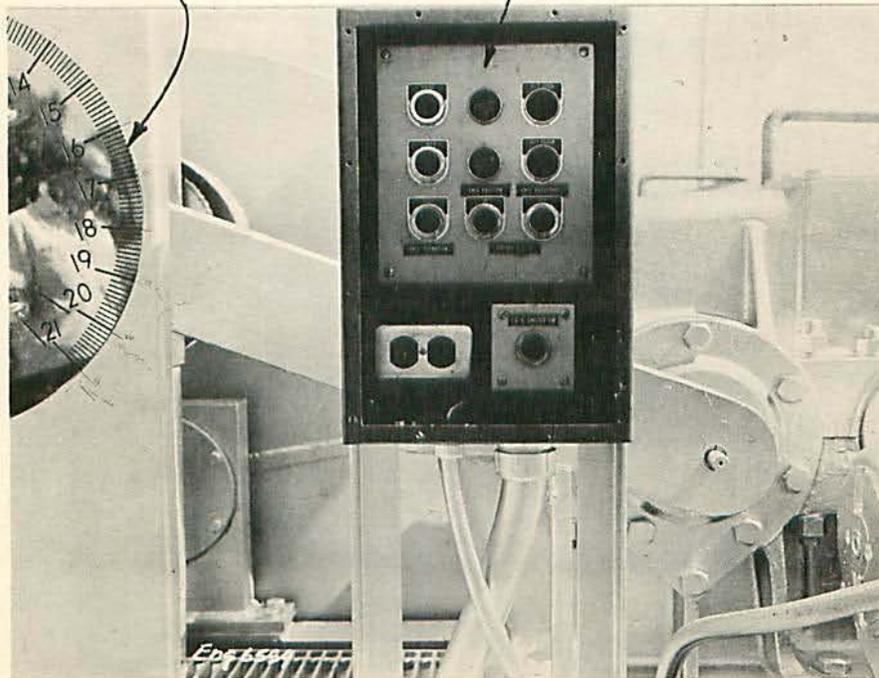


FIG. NO. 8

NAVIGATION CHANNEL
GATE HOIST

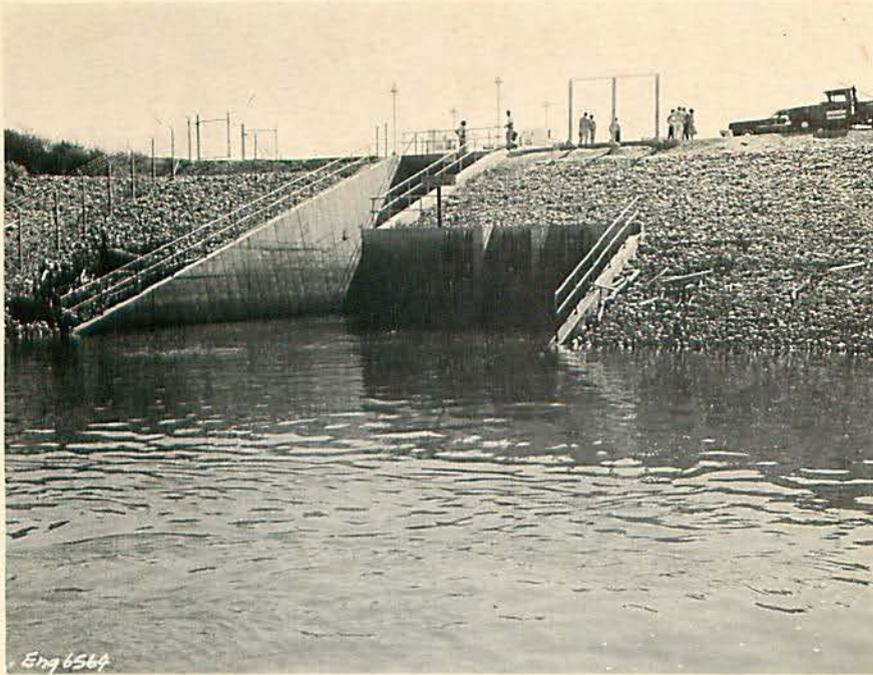
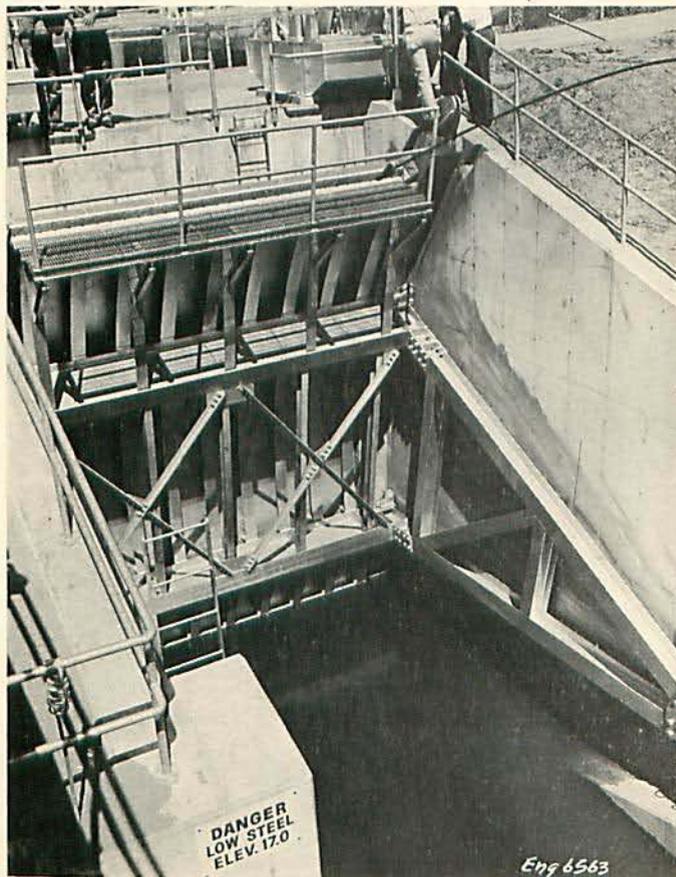


FIG. NO. 9
RIVER END NAVIGATION CHANNEL
AND PUMP DISCHARGE



Top Gate Seal

FIG. NO. 10
NAVIGATION CHANNEL GATE

*Floatwell
Instrument House*

*Electrical
Switch Gear
Cabinet*

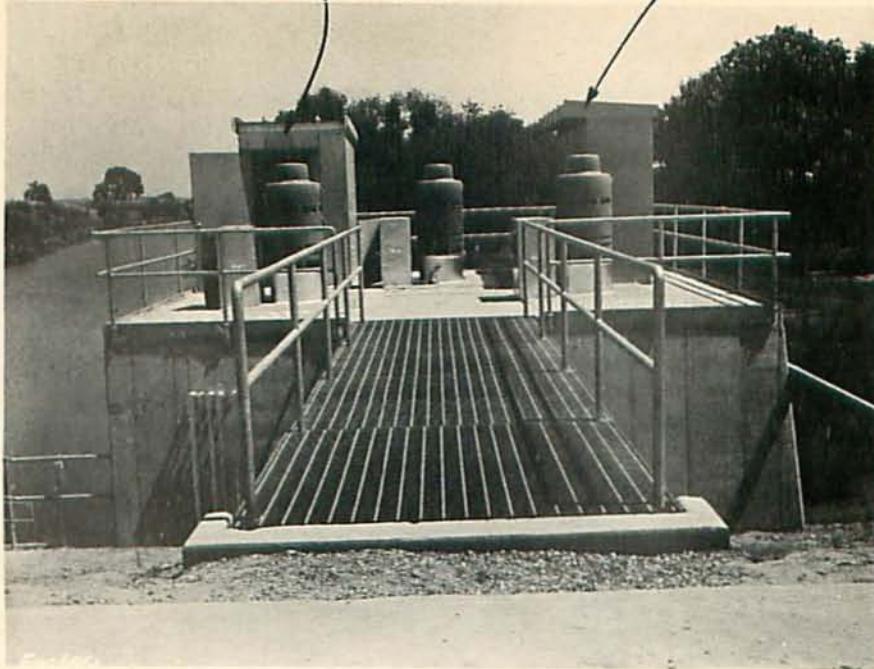


FIG. NO. 11

*Pump Lubricator
Cover*

Pump Motor

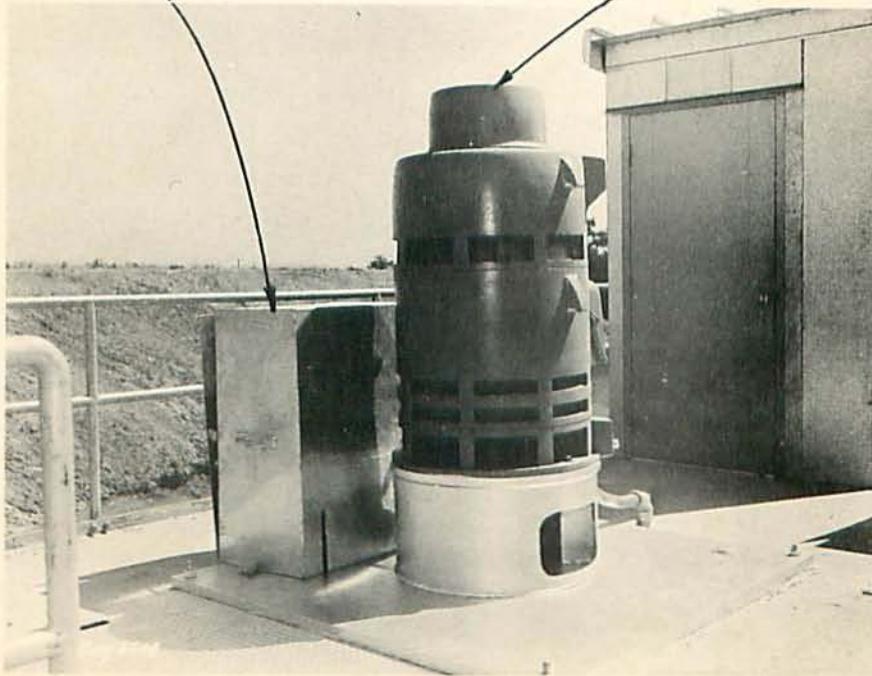
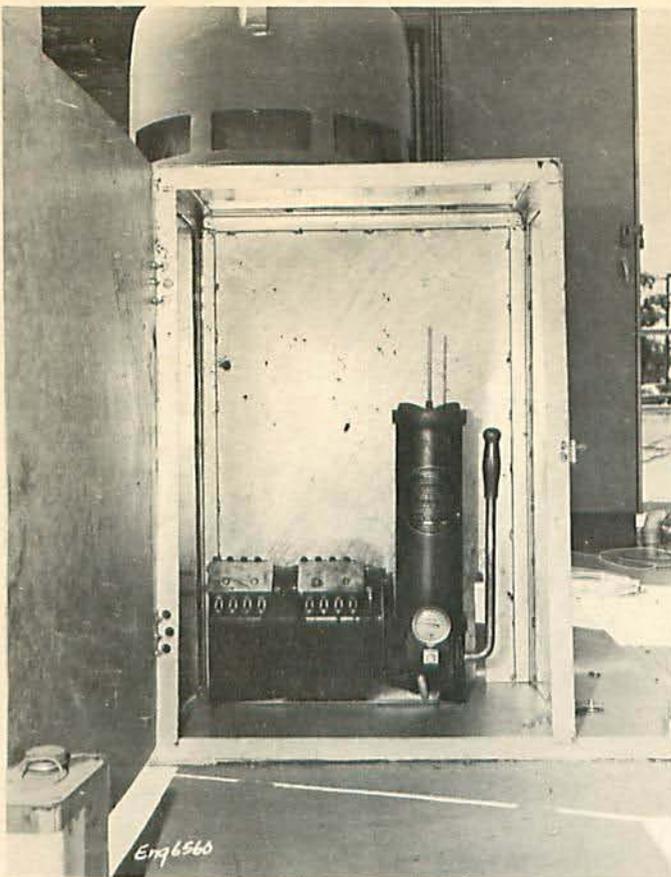


FIG. NO. 12

PUMPING PLANT

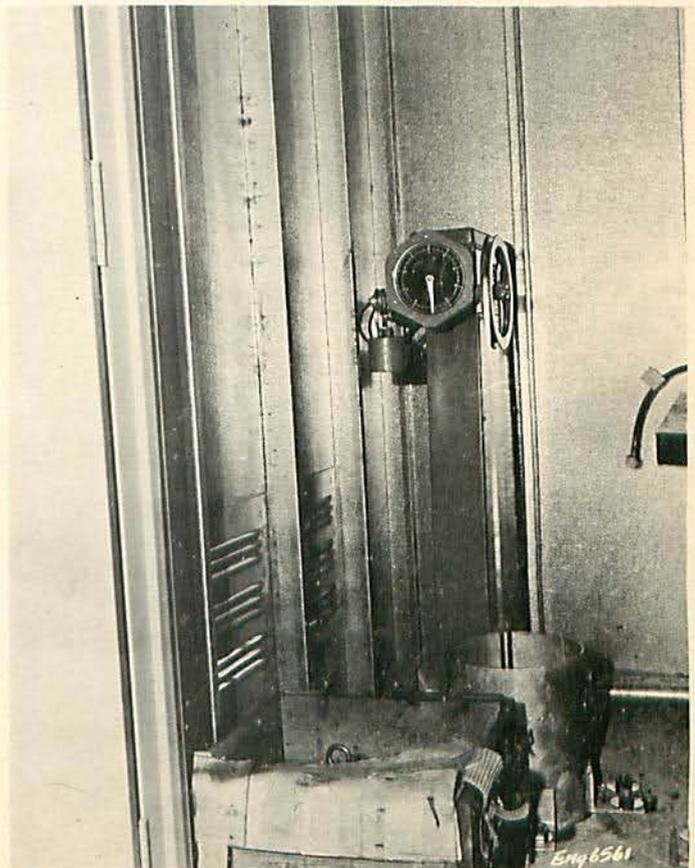


PUMP PRESSURE
LUBRICATION CONTROL

FIG. NO. 13

PUMP CONTROLLER

FIG. NO. 14



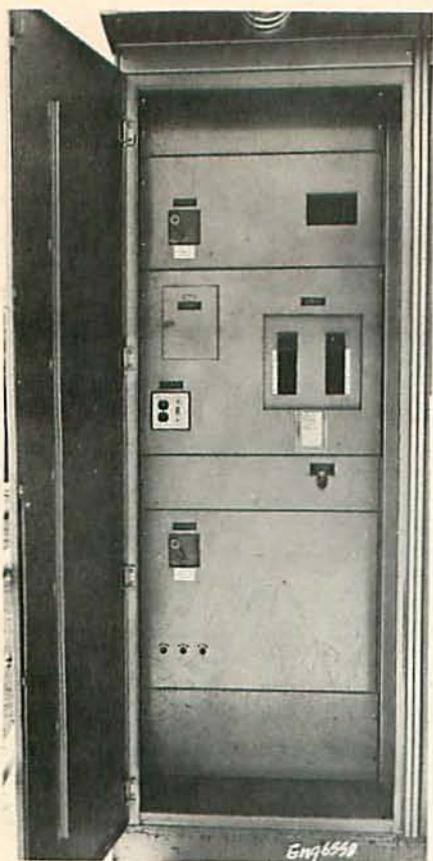


FIG. NO. 15

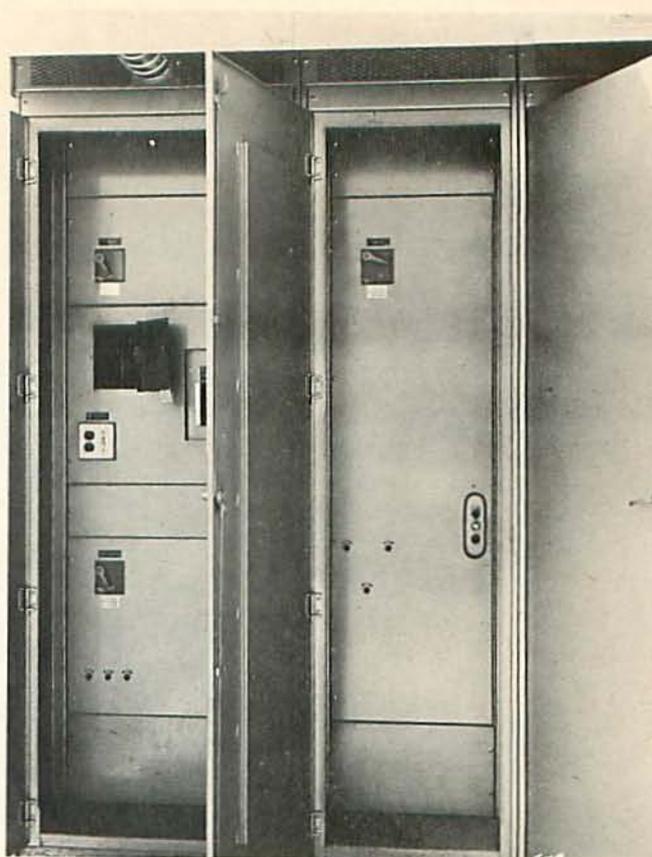


FIG. NO. 16

ELECTRICAL SWITCH GEAR

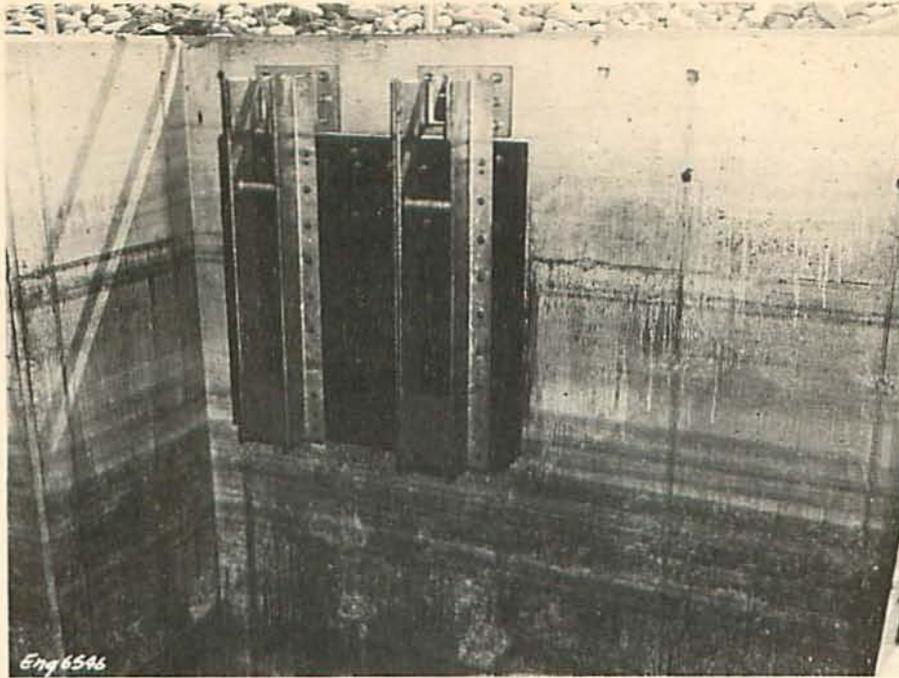


FIG. NO. 17



FIG. NO. 18
PUMP DISCHARGE PIPE LINE
FLAP GATES

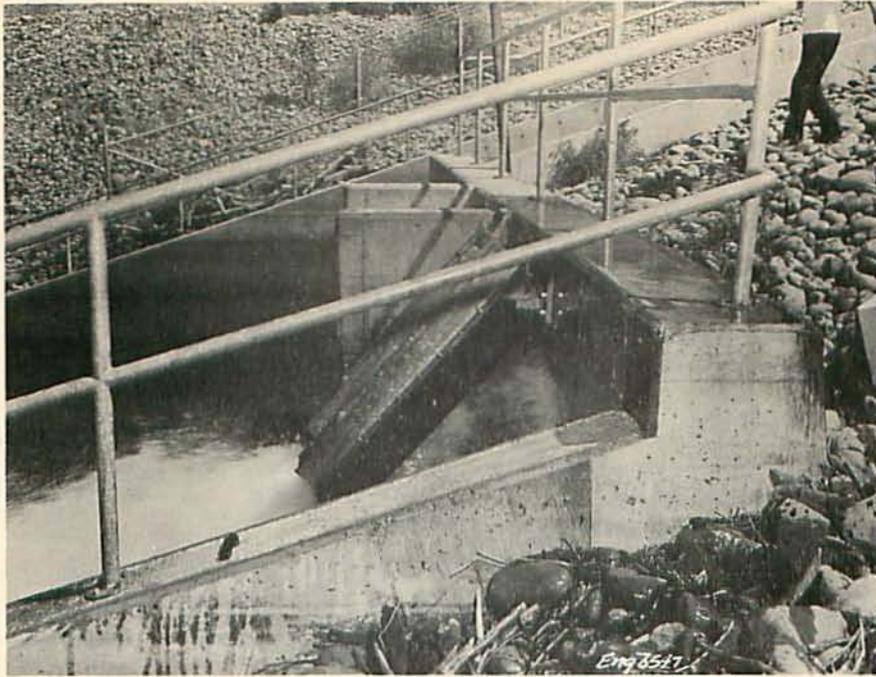


FIG. NO. 19



FIG. NO. 20
PUMP DISCHARGE PIPE LINE
FLAP GATES

EXHIBIT G

**Letter of Acceptance by
State Reclamation Board**

EXHIBIT G

19 AUG 1963

SFICKO-C

The Reclamation Board
State of California
1215 "O" Street
Sacramento 14, California

Gentlemen:

Reference is made to the joint inspection made on 14 August 1963 of flood control work pertaining to the Lower San Joaquin River and Tributaries Project for the purpose of transferring it, upon completion, to the State of California for operation and maintenance.

The above work, designated as Unit No. 73, consisting of a navigation gate structure and pumping plant in Walthall Slough, was completed on 15 August 1963, in accordance with Specification No. 2735, Contract No. DA-04-167-CIVERT-62-68, and Drawing No. 7-4-1643.

The flood control work described above now meets the requirements of the Lower San Joaquin River and Tributaries Project. Therefore, said flood control work together with the waterway banks contiguous thereto, are hereby transferred to the State of California for operation and maintenance.

It is to be noted that the above described work, together with flood control work designated as Unit No. 68 previously transferred to you by letter dated 11 January 1963 completes all work under the above designated specification, drawing and contract.

The maintenance work required under the provisions of the Lower San Joaquin River and Tributaries Project shall be performed in accordance with existing Flood Control Regulations, inclosed herewith, which have been prescribed by the Secretary of the Army pursuant to Section 3 of the Act of Congress approved 22 June 1936, as amended and supplemented by a Standard Operation and Maintenance Manual for the Lower San Joaquin River and Tributaries Project. As provided under Paragraph 208.10(10) of these regulations, a supplement to the Standard Operation and Maintenance Manual covering the above unit of work will be furnished to you upon completion.

Unit 3a

SPKCO-C
The Reclamation Board

19 AUG 1963

A copy of this letter is being transmitted to the Department of
Water Resources.

Sincerely yours,

ROBERT E. MATHE
Colonel, CE
District Engineer

C. R. TEAGLE
Lt Col, CE
Deputy District Engineer

Copy furnished:
Dept Water Resources
23rd & "H" Streets
Sacramento, California

O.C.E.
S.P.D.

cc: Engr Div-Prog Dev Br
Engr Div-Lev & Channels
Northern Area Office
F&A Branch

LJK
KRISTOF/pp

THOMPSON

HAYES

MATHE

Unit 3a

THE RECLAMATION BOARD

121 STREET • SACRAMENTO

95814

STANLEY W. KRONICK, *President*J. J. MADIGAN, *Vice Pres.*WALLACE McCORMACK, *Secy.*

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CHARLES J. MATHEWS

HAROLD J. O'BANION

MAX S. VANN, SR.

COL. A. E. McCOLLAM, *General Manager*

September 12, 1963

Refer to: 7400.37.304

District Engineer
Corps of Engineers
U. S. Army
P. O. Box 1739
Sacramento 8, California

Gentlemen:

Reference is made to your letter of August 19, 1963, concerning transfer to the State of California of the navigation structure, pumping plant and levee work on the San Joaquin River Flood Control Project in the Weatherbee Lake area which was completed under Specification No. 2735.

The Reclamation Board, at its meeting of September 5, 1963, formally accepted the above referred to work for operation and maintenance.

Sincerely yours,

A handwritten signature in cursive script that reads "A. E. McCollam".

A. E. McCOLLAM
General Manager

HSH:gg

EXHIBIT H

Mechanical-Electrical Equipment

Lubrication Schedule

EXHIBIT H

EXHIBIT H

Mechanical-Electrical Equipment

Lubrication Schedule

PROJECT: Lower San Joaquin River Pumping Plant and Navigation Channel

<u>Item</u>	<u>Lubricant</u>	<u>Period Every</u> (During pumping Operations)
-------------	------------------	--

1. Pumping Plant

Note: (Use manufacturers recommendations if different from that indicated below-See Name Plate Data)

a. *Pumps
(1) Drainage Pumps

Pump bearings

Chevron Duralith EP-1	Check twice daily; add as required.
--------------------------	--

b. *Main Pump Motor

Chevron OC-Turbine Oil No. 9 (See name plate data.)	Check daily; add as required. Change oil at least twice yearly.
---	---

For oil use only oxidation corrosion inhibited turbine oil having a viscosity of 150 SSU at 100 degrees F and 45 SSU at 210 degrees F with motor standstill.

c. Flap Gates

Hinge

Water Proof Grease W.P. No. 1	Apply to pin when assembling and coat outside after assembly.
----------------------------------	---

Miscellaneous

Rust preventative lubricant NO-OX-ID type E	As required.
---	--------------

d. Water Surface Recorder

Manufacturers Recommendations	
----------------------------------	--

2. Navigation Channel Gate and Hoist

Note: (Use manufacturers recommendations if different from that indicated below)

*Check equipment and lubricant manufacturers recommendations.

ItemLubricantPeriod: Every
(During pumping Operations)a. Gate Trunnion

(1) Bearing

Lead impregnated, lime soap grease of No. 3 consistency, containing no graphite. It shall not be corrosive to metal and shall provide a non-rupturing lubrication film capable of operating with bearing pressure of 7,000 pounds per sq. inch.

Before and after operation otherwise monthly to force out abrasive materials if under water every 2 weeks.

(2) Yoke ring

Same as above.

(3) Miscellaneous surfaces requiring rust preventative applications

NO-OX-ID of suitable grade for the service

Annually

b. Hoist

(1) *Primary Reducer worm Drive

AGMA No. 7 compounded viscosity 125 to 150 SSV at 210 degrees F, for ambient 25 degrees to 100 degrees F.

6 months

(2) *Secondary Reducer Helical Drive

AGMA No. 4 oil; 700 to 1000 SSU at 100 degrees F. (Approx. 40 SAE) for ambient 25 degrees to 100 degrees F.

6 months

High quality straight mineral oil. Check manufacturer's recommendations.

(3) *Indicator Reducer

Manufacturers Recommendations

(4) Drive Motor

(See Electrical)

6 months

(Note: *Oil in gear reducers should be drained at least every two years and replaced with clean oil. Investigate economics of reclaiming existing oil. At least every six months carefully remove drain plug to allow accumulated water to drain off.)

* Check equipment and lubricant manufacturers recommendations.

<u>Item</u>	<u>Lubricant</u>	<u>Period Every</u> <u>(During pumping operations)</u>
(5) Line shaft, bearings	Chevron Dureplex Medium	6 months and before use
(6) Miscellaneous couplings	Manufacturers Recommendations	6 months and before use
(7) Open gears	No. 185 as supplied by Lubrication Engineers, Inc., Fort Texas, or similar & equal suitable for the service	6 months, apply with brush or knife
(8) Hoist ropes	Dearborn Chemical Co. NO-OX-ID, type E or waterproof grease No. 2 or equivalent	6 months
(9) Miscellaneous surfaces requiring rust preventative applications	NO-OX-ID, of suitable grade for the service for film of waterproof grease	

3. Electrical Equipment-General

Note: (Use manufacturers recommendations if different from that indicated below)

a. Switches	General Electric Co. Trancil oil	3 months
b. Rotary switch	Light coat of vaseline	After cleaning and dressing
c. Switch hinge pins	Trancil oil with graphite	6 months
d. Relays	General Electric Special relay oil	6 months
e. Pushbutton stations	Petrolatum as required	6 months
f. Thermostat contacts	Light coat of vaseline	After cleaning and dressing

<u>Type</u>	<u>Lubricant</u>	<u>Period Every</u> (During pumping Operations)
g. Motors		
(1) Anti-friction bearings	Oil: Turbine oil No. 11 Grease: Chevron Duraplex Med	6 months Check when operating
(2) Ring bearings	Turbine Oil No. 15	6 months Check when operating
(3) Anti-friction	Bearings that are packed on 6 months or longer basis recommend Chevron Industrial grease Medium or equivalent	
h. Instrumentation		
	Manufacturers Recommendations	Manufacturers Recommendations
i. Transformer		
	General Electric Co. Transformer oil	Check level every year. Check oil for need of filtering.
j. Cleaning solvent		
	"Stoddard" solvent or a mixture of carbon tetrachloride and petroleum	6 months

(Note: When cleaning any part of electrical equipment, use ample precaution to prevent explosions and fires.)

4. General Notes

a. The above lubrication schedule is prepared as a general guide. It should be revised and expanded as experience is gained in the operation of the particular units of equipment. Refer to catalog data and manuals supplied with equipment for location of lubrication points and pertinent data.

b. When contracting for lubricants recommend using U. S. Government Military, Federal and AGMA specifications when available. Any reputable supplier of suitable lubricants can advise as to what specifications corresponds to branded products listed or recommended for a particular application, or if none, approved brands of other manufacturer. The brand names indicated are to facilitate identification only as to type and grade of lubricant recommended for a particular application, and is not intended to limit the procurement of lubricants to any one particular supplies.

c. Manufacture of lubricants specified above.

- (1) UNO - Union Oil Co.
- (2) NO-OX-ID - Dearborn Chemical Co.

- (3) Chevron - Standard Oil Co. of California
- (4) Tranoil - General Electric Co.
Special oil for electrical equipment.
- (5) RPM - Standard Oil Co. of California
- (6) "Stop-Rust" - The Delta Mfg. Co., Milwaukee, Wisconsin
- (7) Stoddard Solvent - Described in U. S. Bureau of Standards
as "Commercial Standard GS-3-28"

d. Electrical equipment shall be lubricated only when recommended by the equipment manufacturers or in accordance with best accepted practice for the service. Where lubrication is required, lubricate adequately but sparingly, wiping off any excess lubricant, as oily surfaces collect dust and may result in an arc between live parts.

e. The above schedule is provided as a general guide in the absence of specific recommendations from the manufacturer of the respective items of equipment. Use only the best grades of lubricants and of the type and in accordance with the manufacturer's recommendation where available. When in doubt consult with one of the manufacturers of lubricants suitable for the service.

f. Daily checks pertain to actual operating periods. Check should also be made periodically during any extended periods when equipment is not operated.

g. Lubricant storage and handling. Lubricant reserves should be kept in closed containers and stored in a clean, well-ventilated, dry place. Lubricants shall be kept free from grit or other foreign material, at all times. When applying lubricant with a pressure grease gun, the fittings shall be wiped clean just before and just after the application.

EXHIBIT I

Mechanical-Electrical Equipment

Inspection Check List

EXHIBIT I

EXHIBIT I

Mechanical-Electrical Equipment

Inspection Check List

PROJECT: Weatherbee Lake Pumping Plant and Navigation Gate

INSPECTOR: _____

DATE: _____

<u>ITEM</u>	<u>PERIOD</u>	<u>REMARKS</u>
1. <u>Pumping Plant</u>		
a. <u>Pumps</u>		
(1) <u>Lubrication</u>	Monthly-Daily when operating	
Adequacy		
Functioning of oiling system.		
Condition of lubrica- tion lines fittings; pipes, anchors; feed oiler; oil reservoir; oil level.		
Adequacy of supply of lubricant on hand.		
(2) <u>Functioning of Pump</u>		
Smoothness of operation unusual vibration and/or noise.	8 hours*	
Pump RPM		
Capacity		
Drive shaft vibration when running	Daily	
Bearing wear	Annually	

* During periods of pumping operations.

<u>ITEM</u>	<u>PERIOD</u>	<u>REMARKS</u>
(3) <u>Adjustment</u> Check Adjustment (See Pump Manual) Miscellaneous	Yearly	
(4) <u>Condition of Pump</u> Bearings Drive shaft Drive shaft connections Grease packing rings	Yearly	
(5) <u>Pump anchorage</u>	Weekly*	
(6) Debris in pumping pit around pump suction	Daily*	
(7) <u>Discharge line</u> Discharge pipes Pipe couplings Flap gates Air reliefs	6 months	
(8) <u>Condition of metal work</u>	6 months	
(9) <u>Miscellaneous</u>		
b. <u>Pump Motors</u>		
(1) <u>Lubrication</u> Adequacy Bearing temp., noise, vibration. Functioning of bearing Lubricant piping, fittings Note signs of oil leakage at any point	Daily* Daily* 8 hours* 8 hours* 8 hours*	

* During periods of pumping operations.

<u>ITEM</u>	<u>PERIOD</u>	<u>REMARKS</u>
(2) <u>Motor Operation</u>		
Note any indication of excessive temperature rise under load	Daily*	
Abnormal vibration and/or noise	Daily*	
Check function of motor controls	Daily*	
Note any failure of motor to pull in throughout the load range	Daily*	
Inspect for moisture inside the motor housing	3 months	
Motor base anchorage	3 months	
(3) <u>Drive shaft & coupling</u>		
Inspect for functioning and condition	Monthly	
(4) Note accumulations of oil on or around the motor	Daily*	
(5) <u>Metal Work</u>		
Note rust spots wear & condition of paints	6 months	
(6) <u>Spare Parts</u>		
Adequacy of supply	6 months	
c. <u>Float wells and house</u>		
Float wells	Month	
House and appurtenances	Month	
W. S. recorder	Month	
Pump controller	Month	

* During periods of pumping operations.

<u>ITEM</u>	<u>PERIOD</u>	<u>REMARKS</u>
d. <u>Trash Racks</u>		
Condition of metal work	Annually	
Anchorage	Annually	
Note debris in rack & pool that should be removed	Daily*	
e. <u>Flap Gates</u>		
Condition of seals	6 months	
Condition of metal work	6 months	
Functioning during operation	Daily	
Note any indication of leakage when closed	Daily*	
Miscellaneous		
f. <u>Pump Discharge Pipes</u>		
Air release pipes	6 months	
Miscellaneous	6 months	
2. <u>Channel Gate and Hoist</u>		
a. <u>Gate Leaf and Seals</u>		
(1) <u>Leaf</u>	6 months	
(a) Bolts and nuts		
(b) Metal work		
(c) Corrosion & wear		
(d) Alignment of gate		
(e) Gate travel stops		
(f) Miscellaneous		

* During periods of pumping operations.

<u>ITEM</u>	<u>PERIOD</u>	<u>REMARKS</u>
(2) <u>Seals</u>	6 months	
(a) Condition		
(b) Anchor bolts		
(c) Bearing plates		
(d) Leakage		
(e) Miscellaneous		
b. <u>Gate Trunnion and Appurtenances</u>	3 months	
(1) Lubrication	3 months	
(2) Pins and bushings	3 months	
(3) Bolted connections, cap screws, etc.		
(4) Condition of metal work		
(5) Trunnion interference		
(6) Trunnion lubrication		
(7) Miscellaneous		
c. <u>Trunnion anchorage</u>	6 months	
d. <u>Thrust beam anchorage</u>	6 months	
e. <u>Concrete structure around gate</u>	3 months	
f. <u>Radical Crest Gate Hoist</u>		
(1) <u>Hoisting ropes and drums</u>	3 months	
(a) Worn surfaces		
(b) Corrosion		
(c) Lubrication		
(d) Operation		
(e) Rope connection to the gate leaf		
(f) Miscellaneous		

<u>ITEM</u>	<u>PERIOD</u>	<u>REMARKS</u>
(2) <u>Couplings</u>	3 months	
(a) Bolts & nuts, tightness		
(b) Condition of metal surface		
(c) Lubrication		
(d) Alignment		
(3) <u>Primary Reducer</u>	3 months	
(a) Oil seal leakage		
(b) Anchorage		
(c) Oil level		
(d) Oil leakage		
(e) Condition of metal surface		
(f) Operation		
(g) Miscellaneous		
(4) <u>Secondary Reducer</u>	3 months	
(a) Anchorage		
(b) Oil level		
(c) Oil leakage		
(d) Condition of metal surfaces		
(e) Operation		
(f) Miscellaneous		
(5) <u>Guards</u>	3 months	
(a) Alignment		
(b) Nuts & Bolts, tightness		
(c) Condition of metal surfaces		
(d) Miscellaneous		

<u>ITEM</u>	<u>PERIOD</u>	<u>REMARKS</u>
(6) <u>Gate Position Indicator</u>	3 months	
(a) Functioning		
(b) Lubrication		
(c) Condition metal surfaces		
(7) <u>Motor</u>	3 months	
(a) Lubrication		
(b) Paint, etc.		
(c) Smoothness of operation		
(d) Miscellaneous		
(8) <u>Controls</u>		
(a) Functioning		
(b) Lubrication		
(c) Miscellaneous		
(9) <u>Main Control Limit Switch Assembly and Slack Rope Limit Switch</u>	3 months	
(a) Functioning		
(b) Lubrication		
(c) Paint		
(d) Miscellaneous		
(10) <u>Drive Shaft Assembly</u>	3 months	
(a) Bearing bracket		
(b) Bearing housing		
(11) <u>Hand Wheel Control</u>	3 months	
(a) Operation		
(b) Brake		

<u>ITEM</u>	<u>PERIOD</u>	<u>REMARKS</u>
(c) Lock		
(d) Electrical switch control		
(12) <u>Trial Run</u>	3 months	
<p>During the trial run check functioning of the hoist and controls, also check lubrication of hoist master drive shafts, operation of hoisting ropes on drums and note any indication that load is not evenly distributed between ropes.</p>		
(13) <u>Hoisting Rope Tension</u>		
<p>Check load distribution between ropes approximately yearly or more frequent if justified.</p>		

3. Electrical Systems

a. Main Switch Board

- | | |
|--|---------|
| (1) Inspect all equipment and note need for cleaning | Monthly |
| (2) Check switches and controls to insure that they are mechanically operable | Monthly |
| (Note indications of sluggish operation or sparking) | |
| (3) Note any instruments such as motors, recorders, etc., which are not registering properly | Weekly |
| (4) Check supply of recording charts and need for changing chart | Weekly |
| (5) Inspect for indications of: | Daily* |
| Loose connections
Insulation deterioration
Unusual odors
Mechanical failures | |

* During periods of pumping operations

<u>ITEM</u>	<u>PERIOD</u>	<u>REMARKS</u>
(6) Report any failure of the controls to control the operation of the units for which they are intended	Daily*	
(7) Inspect relays, etc., making full use of manufacturers descriptive data	6 months	
(8) <u>Circuit Breakers</u>	6 months	
(a) Condition of oil		
(b) Condition of contacts		
(c) Functioning of the operating mechanism		
(d) Lubrication of pins and bushings		
(e) Tightness of bolts, nuts, cotters, etc.		
(f) Evidence of heating		
(g) Condition of bushings		
(h) Miscellaneous		
(9) <u>Starters</u>	6 months	
(a) Check all connections		
(b) Check to insure that all moving parts move freely		
(c) Check adjustment and condition of contact tips		
(d) Check functioning of start and stop buttons & overload relay		
(e) Miscellaneous		

* During periods of pumping operations

<u>ITEM</u>	<u>PERIOD</u>	<u>REMARKS</u>
(10) <u>Contactors</u>	6 months	
(a) Check for proper functioning, including opening and closing operation		
(b) Inspect contacts		
(c) Check adjustment of contact gap		
(d) Check contact pressure		
(e) Miscellaneous		
b. <u>Miscellaneous</u>	6 months	
(1) <u>Lighting System</u>		
(a) Check light fixtures and controls for proper functioning		
(b) Check adjustment of flood light	Every month	
(c) Inspect circuit breakers	Every month	
(d) Check supply of fuses and light bulbs on hand	Every month	
(2) <u>Pump Motor Controls</u>		
Check the entire electric system provided for operating the main pumping units	Yearly	
(3) <u>Power Supply</u>		
Generally inspect the Power Co.'s transmission line installations in the vicinity of the pumping plant	Monthly	

<u>ITEM</u>	<u>PERIOD</u>	<u>REMARKS</u>
(4) <u>Miscellaneous</u>		
(a) <u>Fire Protection Equipment</u>		
Note any possible fire hazards in and around the pumping plant and other installations		
(b) <u>Staff Gages</u>		
Condition of woodwork		
Are all in place		
Condition of painted surfaces		
(c) <u>Pumping Plant Structure</u>		
Note need for policing the area around the pumping plant and other installations	Monthly	
Painting: Check all metal work and note rust spots need for painting or other maintenance	Annually	
Hazards: Check all covers to insure that they are in place	Monthly	
Water State Recorder (General)	Monthly	
Miscellaneous		

NOTE:

1. The period indicated is to serve as a general guide. (More Frequent inspections shall be made if operating experience and type of service for a particular period justifies.)
2. Under "Remarks" briefly indicate maintenance, adjustment, required and other pertinent remarks.
3. When required maintenance, has been completed, indicate date and initial.
4. Daily inspections are applicable only to periods of pumping operations; and when pumps are operating continuously during flood conditions should be made at least once every 8-hour shift.

EXHIBIT J

Sample Log Form, Recording and
Reporting Operation of Pumping
Plant During Flood Period

EXHIBIT J

SAMPLE LOG FORM FOR RECORDING AND REPORTING
OPERATION OF PUMPING PLANT DURING EXTREME EMERGENCY FLOOD CONDITIONS

DATE: _____ PLANT: _____ SUPERINTENDENT: _____

Pump No.	Start			Stop			Remarks*
	Time	Water Level		Time	Water Level		
		Sump	River		Sump	River	

*Brief note under Remarks with reference to more detailed comments on an attached sheet. Service interruptions, if any: abnormal high temperature of motor; abnormal noise; improper functioning of automatic controls and appurtenances, including time duration and cause. This form should be used only when operators are on duty continuously.

SAMPLE LOG FORM FOR RECORDING AND REPORTING
OPERATION OF PUMPING PLANT DURING PERIODIC VISITS

DATE: _____ PLANT: _____ SUPERINTENDENT: _____

Pump No.	Time	Pump Operating (yes - no)	Water Level		Remarks*
			Sump	River	

*Brief note under Remarks with reference to more detailed comments on attached sheet describing any unusual or abnormal conditions observed.

OPERATION OF AUXILIARY EQUIPMENT AND MISCELLANEOUS
PLANT FACILITIES DURING PERIODIC VISITS

DATE: _____

PLANT: _____

SUPERINTENDENT: _____

Item No.	Description	Time	Remarks*
1.	Pump controller and indicator		
2.	Automatic float operated water level recorder		
3.	Main switch board		
4.	Flapgates in pump discharge lines		
5.	Trash racks		
6.	Slide gates in discharge conduits		
7.	Power supply		
8.	Lighting		
9.	Miscellaneous		

*Brief note under Remarks and reference to more detailed comments on an attached sheet with appropriate cross references. See EXHIBITS for a guide as to breakdown of the respective items checked. Note in particular any abnormal noise, malfunctioning of equipment or any condition that develops that may or does impair the operation of the plant or unit thereof. This form should also be used for recording applicable comments on unusual occurrences when operators are on duty continuously.

(Attachment for Sheet 1 of EXHIBIT J)
OPERATION OF PUMPING PLANT DURING EXTREME EMERGENCY FLOOD CONDITIONS

DATE: _____ PLANT: _____ SUPERINTENDENT: _____

Pump No.	Time	Remarks (Reference Sheet 1 of Exhibit J)

(Attachment for Sheet 2 or 3 of EXHIBIT J)
OPERATION OF PLANT DURING PERIODIC VISITS

DATE: _____ PLANT: _____ SUPERINTENDENT: _____

Item No.	Time	Remarks (Reference Sheet 2 or 3 of Exhibit J)

EXHIBIT K

Operation and Control

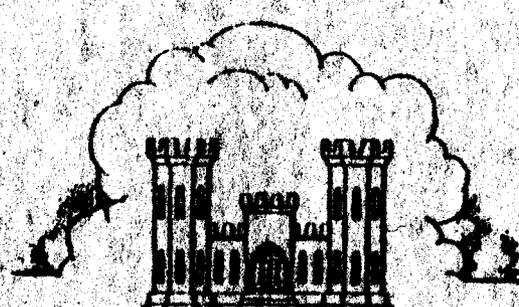
Diagram

EXHIBIT K

SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE
MANUAL

LOWER SAN JOAQUIN RIVER AND
TRIBUTARIES PROJECT, CALIFORNIA

INTERIM INSTRUCTIONS AND INFORMATION
WETHERBEE LAKE PUMPING PLANT
AND NAVIGATION GATE



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

SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE MANUAL
LOWER SAN JOAQUIN RIVER AND
TRIBUTARIES PROJECT, CALIFORNIA

INTERIM INSTRUCTIONS AND INFORMATION
WETHERBEE LAKE PUMPING PLANT
AND NAVIGATION GATE

U. S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA
SEPTEMBER 1963

SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE MANUAL
LOWER SAN JOAQUIN RIVER AND TRIBUTARIES PROJECT
INTERIM INSTRUCTIONS AND INFORMATION
WETHERBEE LAKE PUMPING PLANT
AND NAVIGATION GATE

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EXHIBITS

<u>Exhibit</u>	<u>Subject</u>	<u>Page</u>
A	Flood Control Regulations	Sheets 1 and 2
B	Letter of Transfer to the State Reclamation Board	Sheets 1 and 2
C	Operation and Control Diagrams	1 sheet

SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE MANUAL
LOWER SAN JOAQUIN RIVER AND TRIBUTARIES PROJECT

INTERIM INSTRUCTIONS AND INFORMATION
WETHERBEE LAKE PUMPING PLANT
AND NAVIGATION GATE

SECTION I

INTRODUCTION

1-01. Purpose. - The purpose for this interim report is to furnish temporary instructions and information that will assist local interests in the operation of the Wetherbee Lake Pumping Plant and Navigation Gate until such time when the operation and maintenance manual for this unit will be issued. The complete manual will be issued at the earliest practicable date.

1-02. Location. - The area covered by this report is a portion of the San Joaquin Valley floor drained by Walthall Slough, a former distributary channel of the Stanislaus River. The area is located in San Joaquin County about 4 miles southwest of Manteca. The lower section of this slough is called Wetherbee Lake, a boating and sports fishing resort area. The Pumping plant and navigation gate are located at the lower end of Wetherbee Lake near the right bank of the San Joaquin River and 0.8 miles upstream from Mossdale Bridge (U. S. Highway No. 50).

1-03. Project Works. - The project works covered by this report is a part of the Lower San Joaquin River and Tributaries Project as authorized by the Flood Control Act of 22 December 1944, Public Law 534, 78th Congress, 2nd Session, Section 10 and consists of the pumping plant and navigation gate at Wetherbee Lake.

1-04. Assurances Provided by Local Interests. - Assurance of cooperation by local interests is provided by State legislation as contained in Chapters 1 and 2, Part 4, Division 5 of the State Water Code (see paragraph 2-02a of the Standard Manual).

1-05. Transfer to the State Reclamation Board. - Responsibility for operating and maintaining the navigation structure and pumping plant in Walthall Slough was officially transferred to the State Reclamation Board by letter dated 19 August 1963, as shown on the attached letter, EXHIBIT B.

SECTION II

FEATURES OF THE PROJECT SUBJECT TO FLOOD CONTROL REGULATIONS

2-01. Regulations. -

a. The Pumping Plant and Navigation Gate structures are subject to the same regulations as the adjoining levees and channels. General information applies to all units of the project and should conform with Section 208.10, Title 33 of the Code of Federal Regulations as approved on 9 August 1944 and published in the Federal Register of 17 August 1944. A revised copy, as of 1 January 1962, is inclosed with this report as EXHIBIT A.

b. For pertinent requirements of the Code of Federal Regulations see the following:

- (1) For drainage structures see paragraph 208.10 (d) of EXHIBIT A.
- (2) For closure structures see paragraph 208.10 (e) of EXHIBIT A.
- (3) For pumping plants see paragraph 208.10 (f) of EXHIBIT A.

2-02. Description of Equipment. -

a. Navigation Gate: A tainter gate is installed in the lower end of Wetherbee Lake to permit boat passage between Wetherbee Lake and the San Joaquin River during safe water conditions. During flood conditions, the gate is closed to prevent water in the river from backing up into the lake. The gate is provided with a motor operated hoist which has provisions for a hand crank.

The controls for operating the gate are located in a sheet metal inclosure adjacent to the gate position indicator. To operate the gate, the screw fastened cover must be removed, and the appropriate raise or lower button must be momentarily pressed, and then released. The gate will continue to travel until stopped by depressing the stop-button. The limit switches are set at the bottom, one foot from the top, and the top. The travel of the gate can be determined from the gate position indicator. Interlocks are provided to prevent the motor from turning in the event the hoist cables become slack, or the manual hand crank is engaged. If a slack in the cable occurs, the gate may be raised by pressing the LSSC and raise push-buttons simultaneously.

b. Pumping Plant: Three pumps are used to transfer water from the lake into the river in the event (the navigation gate is closed and) the water level in the lake becomes too high. These pumps, rated 22,500 GPM at 16' TDH are connected to 125 H.P Motors. The motors are provided with reduced voltage starters and Hand-Off Automatic switches mounted in the switchboard. The starters for pumps 1, 2, and 3 are provided with 10, 11, and 12 minute time delays respectively in order to prevent simultaneous starting and cycling of the pumps.

The pumps can be started manually by placing the H-O-A switch in the Hand Position. When placed in the Automatic position, the starting of the pumps is controlled by the float switch.

c. Float Switch: A six stage float switch is mounted over the float-well inside the metal house. Each pump has two switches controlling its starting and stopping. Three of the stages are used for summer operation, and start the pumps when the lake level reaches 12.1, 12.3 and 12.5 feet respectively on the gage. The other three stages are set for lake levels of 6.1, 6.3, and 6.5 feet and are used during the winter. A summer-winter selector switch on the switchboard determines which three stages will be used. Each pump will stop when the lake level has been drawn to an elevation 1 foot below its start setting.

2-03. Procedures Used in Operating Equipment. -

a. Summer Operating (May through September) -
Frequent visits to the site will be required as necessary in order to observe changes in the water elevation in the lake. Under normal conditions, this elevation will be below 12 feet, the gate will be left open, and the pumps will be turned off. During the summer, if the water level reaches a 12 foot elevation, the gate shall be closed, the summer-winter switch shall be turned to the summer position, and pumps 1 and 2 will be turned to automatic, pump 3 will not be used. As soon as the water drops below 12 feet, pumps 1 and 2 shall be turned off, and the gate is raised.

b. Winter Operation (October through April) -
During the winter months the gate shall be closed whenever the stage in San Joaquin River adjacent to Wetherbee Lake is forecasted to, or actually exceeds 12.0 feet. This 12.0 foot stage corresponds to a ~~23.0~~ 24.5 foot stage at the upstream Vernalis gage, for which official forecasts are made by the joint Federal-State River Forecasting Unit in Sacramento. Accordingly, whenever an official forecast is issued of stages in excess of ~~23.0~~ 24.5 feet at Vernalis the operator shall close

the gate as soon as practicable. When the gate is closed, the summer-winter selector switch shall be placed in the winter position and all pumps set for automatic operation. This operation condition shall persist until the stage in San Joaquin River at the gate has receded to 10.0 feet or less, and there is no forecasted rise above 12.0 feet in San Joaquin River at the gate. Then the pump shall be shut off, the gate opened to and held at about 1.0 foot opening until the water surfaces in the river and lake have equalized, thereafter the gate shall be raised to the full open position until further closure becomes necessary.

c. Pump Operating Conditions -

	<u>Summer</u> (May - Sept.)	<u>Winter</u> (Oct. - April)
(1) Minimum starting static head	12.6	12.6
(2) Normal starting static head	12.6	16.6
(3) Maximum operating static head	13.6	19.6
(4) Capacity at Maximum operating static head - GPM	22,500	19,500
(5) Number of pumps operating	2	3
(6) Maximum motor horsepower	125	125

2-04. Preventive Maintenance. - Periodic visits shall be made to the site, as required, in order to perform proper maintenance on all items of equipment.

It shall be the duty of the local agency responsible for maintenance to keep in contact with the State Department of Water Resources Flood Operation Center during all periods of flood danger, and maintain a patrol of the project works in their area during periods of flood in excess of a reading of 14.0 on the gage located on the right bank of the San Joaquin River immediately downstream from the Mossdale Bridge on U. S. Highway No. 50.

The Flood Operation Center is responsible for Data Collection and issuance of a joint forecast with the U. S. Weather Bureau and coordinates with the Sacramento District

Engineer, and other agencies to keep appraised 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.

SECTION III

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

3-01. Repair of Damage. - 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 Superintendent will contact a representative of the Department of Water Resources, State of California, who coordinates maintenance of project works of the Sacramento River Flood control Project. The State representative will give assistance or advise, or will determine appropriate action to be taken.

3-02. Applicable Methods of Combating Floods. - For applicable methods of combating flood conditions, reference is made to Section VIII, of the Standard Operation and Maintenance Manual, where the subject is fully covered.

**TITLE 33 - NAVIGATION AND
NAVIGABLE WATERS
(as of 1 January 1962)**

**Chapter II - Corps of Engineers
Department of the Army**

**PART 208 - Flood Control Regulations
MAINTENANCE AND OPERATION OF FLOOD
CONTROL WORKS**

Pursuant to the provisions of section 3 of the Act of Congress approved June 22, 1936, as amended and supplemented, (Sec. 3, 49 Stat. 1371 as amended; 33 U.S.C. 701c), the following regulations are hereby prescribed to govern the maintenance and operation of flood control works:

AUTHORITY: §§ 208.10 to 208.01 issued under sec. 7, 56 Stat. 890; 33 U.S.C. 709. Additional authority is cited in parentheses following the sections affected.

§ 208.10 Local flood protection works; maintenance and operation of structures and facilities.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all

contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

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

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

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

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

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

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

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

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

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

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

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

(d) **Drainage structures.** (1) **Maintenance.** Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

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

(ii) Inlet and outlet channels are open;

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

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

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

(2) **Operation.** Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures

in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition.

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

- (i) No parts are missing;
- (ii) Metal parts are adequately covered with paint;
- (iii) All movable parts are in satisfactory working order;
- (iv) Proper closure can be made promptly when necessary;
- (v) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency.

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

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

(f) **Pumping plants**—(1) **Maintenance.** Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubricants for all types of machines, fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at

least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any

equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

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

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

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

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

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

(h) **Miscellaneous facilities**—(1) **Maintenance.** Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior run-off during flood

periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows.

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

(Sec. 3, 49 Stat. 1671, as amended; 33 U.S.C. 701c) [O.F.R. 0093, Aug. 17, 1944; O.F.R. 10909, Aug. 22, 1944]

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19 August 1963

The Reclamation Board
State of California
1215 "O" Street
Sacramento 14, California

Gentlemen:

Reference is made to the joint inspection made on 14 August 1963 of flood control work pertaining to the Lower San Joaquin River and Tributaries Project for the purpose of transferring it, upon completion, to the State of California for operation and maintenance.

The above work, designated as Unit No. 73, consisting of a navigation gate structure and pumping plant in Walthall Slough, was completed on 15 August 1963, in accordance with Specification No. 2735, Contract No. DA-04-167-CIVENG-62-68, and Drawing No. 7-4-1643.

The flood control work described above now meets the requirements of the Lower San Joaquin River and Tributaries Project. Therefore, said flood control work together with the waterway banks contiguous thereto, are hereby transferred to the State of California for operation and maintenance.

It is to be noted that the above described work, together with flood control work designated as Unit No. 68 previously transferred to you by letter dated 11 January 1963 completes all work under the above designated specification, drawing and contract.

The maintenance work required under the provisions of the Lower San Joaquin River and Tributaries Project shall be performed in accordance with existing Flood Control Regulations, inclosed herewith, which have been prescribed by the Secretary of the Army pursuant to Section 3 of the Act of Congress approved 22 June 1936, as amended and

EXHIBIT B
Sheet 1 of 2

SPKKO-C
The Reclamation Board

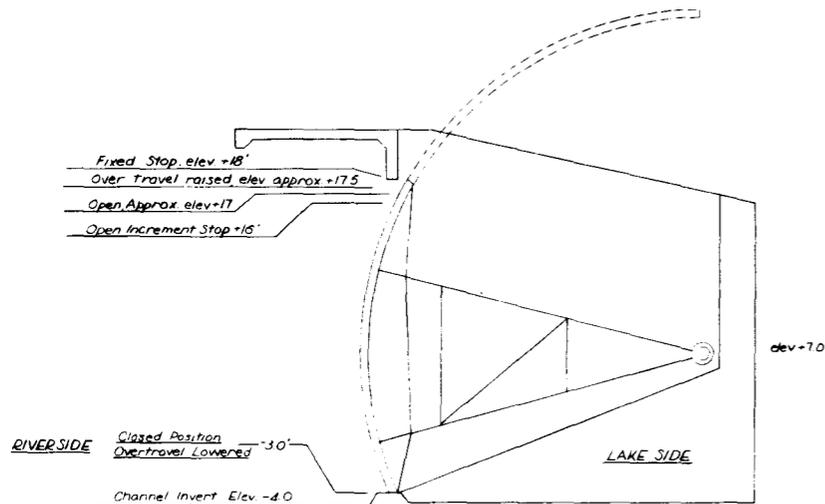
19 August 1963

supplemented by a Standard Operation and Maintenance Manual covering the above unit of work will be furnished to you upon completion.

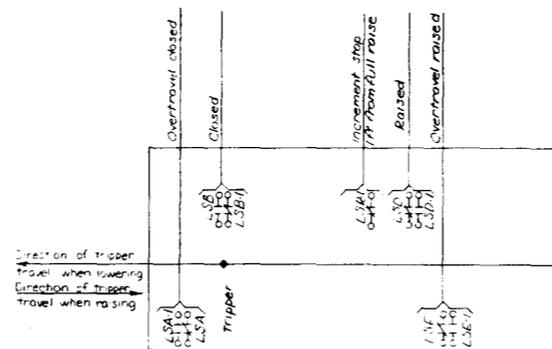
A copy of this letter is being transmitted to the Department of Water Resources.

Sincerely yours,

/s/ Robert E. Mathe
ROBERT E. MATHE
Colonel, CE
District Engineer



GATE POSITIONS



ARRANGEMENT OF ELEMENTS IN LIMIT SWITCH ASSEMBLY

CONTRACT DESIGNATION	CIRCUIT DUTY	GATE POSITION					DIRECTION OF TRAVEL TO OPER SWITCH
		OVER TRAVEL CLOSED	CLOSED	INCREMENT STOP	RAISED	OVER TRAVEL RAISED	
LSA LSA1	STOP MOTOR OVER TRAVEL CLOSED	///					DOWN
LSB	STOP MOTOR GATE CLOSED	///					DOWN
LSB1 LSD1	CLOSED GREEN LIGHT RAISED	///					DOWN AND UP
LSD	STOP MOTOR GATE RAISED		///				UP
LSE LSE1	STOP MOTOR OVERTRAVEL RAISED		///				UP
LSR-1	INTERRUPTED RAISING		///				UP
LSR-2	INTERRUPTED RAISING		///				UP

MACHINERY LIMIT SWITCH SEQUENCE OF OPERATION

DESCRIPTION OF CONTROL SYSTEM

1. Scheme of Operation

a. General The scheme of operation of the control system for the navigation gate is as indicated by the schematic control wiring diagram and as specified below.
 b. Control Points The operation of the gate hoist motor is controlled by a push-button type master control station, located on the gate hoist, with momentary contacts designated "RAISE", "LOWER", and "STOP" and red pilot lights for overtravel indication.

c. Operation Features

- (1) Momentary actuation of the "RAISE" and "LOWER" contacts of the master control station provides seal-in operation of the control circuit.
- (2) A limit switch with contacts actuated by the movement of the operating elements of the gate hoist machine, automatically controls, as indicated, the sequence, incremental operation and the stopping of the operations initiated manually from the master control station. The limit switch is so connected to the hoist machine that the contacts providing the incremental control automatically stops the gate 1 ft below the normal open position. Further gate operation to normal open position is accomplished by energizing raise push-button.
- (3) Momentary actuation of the "STOP" contact of the master control station during any operation automatically de-energizes the control circuit, stops the hoist motor and sets the brake.

2. Sequence of Operation

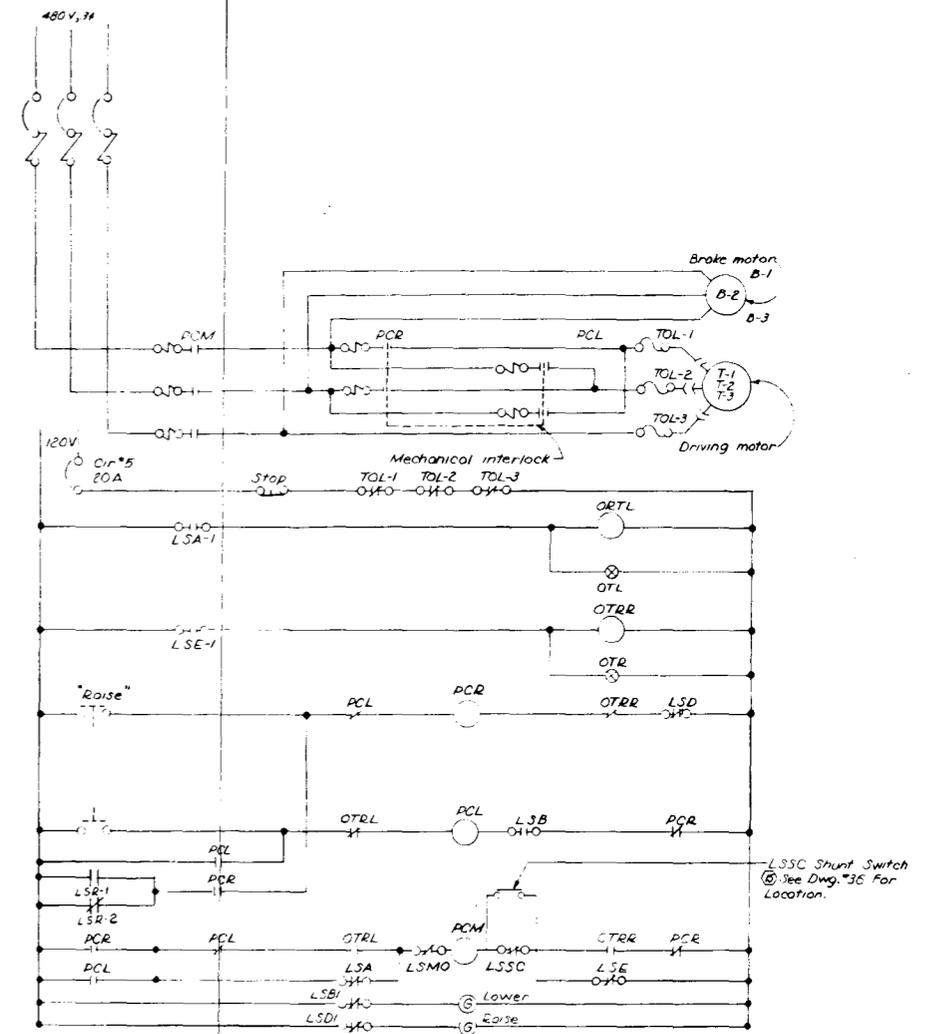
a. Raising When the "RAISE" contact of the master control station is actuated, held momentarily and released, the hoist motor starts and runs until the gate has raised approximately one foot below the normal open position, at which point the increment limit switch automatically de-energizes the control circuit, stops the hoist motor and sets the brake. The gate continues to rise when the "RAISE" button contact is again pushed, held momentarily and released. The gate motor starts and runs until the gate reaches the raised position where the limit switch automatically de-energizes the

control circuit, stops the hoist motor and sets the brake.

b. Lowering When the "LOWER" contact of the master control station is actuated, held momentarily and released, the hoist motor starts and runs until the gate reaches the normal closed gate position, at which point the limit switch automatically de-energizes the control circuit, stops the hoist motor and sets the brake.

c. Backout from Overtravel If during normal operation, the gate motor should fail to stop when the gate reaches the normal raised or closed positions, the overtravel limit switch contacts stops the hoist motor after overtravel by de-energizing the "main" or "line" contactor of the controller with red pilot indicating direction of overtravel. To operate the gate after overtravel, the opposite direction of travel pushbutton is energized to permit operation of the gate only in the direction away from the overtravel position. Attainment of normal raised or lowered gate position is indicated by de-energization of overtravel relay and red pilot lights.

(1) If neither normal or overtravel limit switches stops gate raising operation, a fixed gate stop will block further gate travel in the raising direction. If neither stops the hoist gate lowering operation after the gate reaches full closed position the Slack-Rope limit switch will stop the hoist motor.



SCHEMATIC CONTROL WIRING DIAGRAM

REVISION	DATE	DESCRIPTION	BY	DT
U. S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS SACRAMENTO, CALIFORNIA				
DRAWN BY: DJM		SAN JOAQUIN RIVER & TRIBUTARIES PROJECTS CALIFORNIA		
CHECKED BY: RGW		WETHERBEE LAKE PUMPING PLANT AND NAVIGATION GATE		
PREPARED BY: CHIEF, ELEC. UNIT		OPERATION AND CONTROL DIAGRAMS		
SUBMITTED BY: CHIEF, MECH. ELEC. SECTION		APPROVAL RECOMMENDED: _____ DATE: _____		
APPROVED: _____		DATE: _____		
PREPARED UNDER THE DIRECTION OF: ROBERT E. MATHE		SCALE: NONE	SPEC. NO.	
FILE NO.		SHEETS SHEET NO.		