

LOWER SAN JOAQUIN RIVER  
FLOOD CONTROL PROJECT

OPERATION AND MAINTENANCE  
MANUAL

FOR

MARIPOSA AND EASTSIDE BYPASS  
AUTOMATIC CONTROL STRUCTURES  
AND APPURTENANCES

PART II

THE RECLAMATION BOARD

1969

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APPENDIXES

- A List of Manufacturers' Operation, Maintenance, and Parts Manual
- B Check Lists

INTRODUCTION

1000

Reference

1100

Chapter 1000 -- Introduction of Part I, "General Data and  
and Operation and Maintenance Manual for Levees, Irrigation  
and Drainage Structures, Channels and Miscellaneous Facili-  
ties", applies to this manual.

GENERAL

2000

Reference

2100

Chapter 2000 -- General of Part I, "General Data and Operation and Maintenance Manual for Levees, Irrigation and Drainage Structures, Channels and Miscellaneous Facilities", applies to this manual.

DESCRIPTION

3000

General

3100

The Mariposa Bypass and Eastside Bypass control structures and appurtenances are located at the junction of the Mariposa and Eastside Bypasses. These two structures control the division of flows of the Eastside Bypass. See photo following this section.

The Mariposa Bypass control structure is situated at the head of Mariposa Bypass. The structure is divided into fourteen equal bays, with four bays gated at each end and six center bays ungated. A patrol bridge crosses the top of the structure, providing continuity of the left bank levee of the Eastside Bypass and also connecting the left and right bank levees of the Mariposa Bypass. Located several hundred feet downstream on the left bank levee, Mariposa Bypass is the control structure's Float Well No. 3. The water surface elevation at the Float Well No. 3 is sensed and transmitted to the control cubical. The control cubical, with associated electrical equipment that provides regimentation of the gates of the structures, is situated on the left abutment.

The Eastside Bypass control structure is located in the channel of the Eastside Bypass 1100 feet downstream of the junction with the Mariposa Bypass. The structure is divided into six equal bays that are gated. Approach embankments connect the ends of the structure into the levee system. A patrol bridge has been provided across the top of the structure connecting the left and right bank levees of the Eastside Bypass.

Two concrete block buildings with a chain link fence enclosure are situated on the left approach embankment. One building is called the Control Building and the other is the Fuel Tank Storage enclosure. Located in the Control Building are an engine generator that supplies emergency power for both control structures and an electrical panel with the necessary devices for controlling the gates of the Eastside Bypass control structure. Associated with the electrical panel of the Control Building is Float Well No. 2 on the right bank levee, Eastside Bypass, 710 feet upstream of the control structure; and Float Well No. 1 in the stream gaging station, Eastside Bypass near El Nido, approximately 10 miles upstream. Float Well No. 1 must be connected to the Control Building by telephone lease line or other means for the automatic equipment to function.

Electrical energy (Contact Pacific Gas and Electric Company, Merced Office.) is supplied to both control structure installations from a service pole located on the landward side of the levee and adjacent to the left abutment of the Mariposa Bypass control structure. Underground conduit with wires is laid from the service pole to Mariposa Bypass Control cubical, from control cubical to downstream bridge railing; then across Mariposa Bypass on outside bridge railing to Eastside Bypass levee; then down the crown of the Eastside Bypass with pull boxes every 200 feet to the Control Building. Paralleling the above-mentioned electrical conduit is a 3/4-inch conduit for the proposed telephone line from Eastside Bypass near El Nido Float Well.

General (Continued)

3100

Pacific Gas and Electric Company supplies 120/240, 1-phase, 3-wire, 60-cycle service at the service pole. The pole is Class 6, Douglas Fir, creosote pressure treated, and extends approximately 20 feet above grade. Located on the pole is a meter and service circuit breaker. The main service circuit breaker is a 50-ampere, two-pole, 240-volt A.C., E frame breaker with solid neutral. The ground wire is attached to a ground rod  $3/4$  inch in diameter and eight feet long driven at the base of the pole.

FW #3



CONTROL HOUSE

E.S.B.P.

E.S.D.P. CONTROL STRUCTURE

710'

C.F.W. #2

TEMPORARY EMBANKMENT HAS BEEN REMOVED

MARIPOSA D.P.

MARIPOSA D.P. CONTROL STRUCTURE

POWER POLE

## Mariposa Bypass Control Structure

3200

The structure is concrete with both open and gated bays and a concrete bridge across the top. The width of the structure across the channel is 297.83 feet and is divided into 14 equal bays, 20 feet wide, with four bays gated at each end and six center bays ungated. The piers which form the bays rest on piles with a concrete spillway slab between the piers. The spillway is 16.25 feet in length and has a horizontal crest at elevation 92.50 feet. The spillway chute has three chute blocks per bay and joins the apron slab at elevation 85.00 feet. The apron slab or spillway bucket is level at elevation 85.00 feet and measures 50 feet in width with a lip at the downstream end at elevation 87.00 feet.

A concrete cutoff wall extends to elevation 82.00 feet below the spillway crest and elevation 80.00 feet below the lip of the apron. A hydraulic cutoff wall has been constructed from the centerline of the left bank Mariposa Bypass levee and extends under the left abutment, spillway crest, right abutment, and terminates at the north end of the upstream right abutment wing wall. The top and bottom profiles of the hydraulic cutoff wall varies in elevation from 82.00 feet to 89.00 feet and 72.00 feet to 62.00 feet, respectively. Concrete wing walls extend upstream and downstream from each abutment retaining wall.

An underdrain extends between the pile cap of each pier directly under the joint of the chute and apron slab. The

drain consists of processed drain rock material and a 6-inch diameter drain pipe. The drain pipe outlet is at the toe of the center chute block of each bay.

There is a 10-foot wide channel transition strip of stone protection adjacent to the spillway crest, and a 20-foot wide channel transition strip immediately downstream from the energy dissipator lip and apron slab. Also, stone channel and slope protection extends up and downstream from the left and right abutments of the structure.

The centerline of the roadway deck is offset to the downstream side of the centerline of the piers which the roadway concrete slab rests on. The roadway deck is 16 feet in width with a concrete curb on each side. A metal railing is attached to the outside edge of the curbs by metal beam rail posts. Expansion hinge joints are located approximately 88 feet from the ends of the bridge span.

Float Well No. 3. The Mariposa Bypass control structure's float well consists of a 48-inch diameter, 14-gauge galvanized corrugated metal pipe with a 5-foot square concrete footing. The float well has two intake pipes with the top pipe at elevation 96.5 feet and the other located directly below. Static tube assembly at the end of the intake pipes point downstream. At the top of the float well is a steel floor with a hatch cover. A steel ladder attached to the inside of the float well extends from the hatch opening to a point one and one-half feet above the bottom of the float well. A

five-foot four-inch square Armco prefabricated galvanized metal recorder house is attached to the top of the float well. Connecting the recorder house to the top of the levee is an expanded metal grating walkway with steel pipe handrails.

Mechanical Installation. There are eight radial gates total, arranged in two sets of four gates per set; each set is located at the four end bays of the structure. Each set is driven by one motor. The automatic control is arranged so that all gates operate in unison.

3210

Radial Gates. Each radial gate measures 19 feet 11 inches x 7 feet 0 inches. The gate consists of a 1/4-inch steel skin plate attached to a girder frame. Extending from the girder frame are two radial arms with a steel plate and trunnion hub welded to the end of each radial arm. The radius from the skin plate to the center of the trunnion hub bearing bushing is 10.0 feet. The trunnion hub is connected to and pivots on a trunnion bracket assembly which is anchored to the wall of the pier. When fully closed, the gates rest on sill plates in the crest of the spillway.

3211

The radial gates were fabricated and installed by the Armco Company.

Hoist Machinery. The radial gate hoist machinery, of which there are two sets -- one for each group of gates, operates one group of four gates as one and consists of the following items: Gear motor and brake, roller chain drive

3212

Hoist Machinery. (Continued)

3212

assembly-limit switch, flexible coupling, single helical worm gear reducer and 24-inch diameter removable hand wheel, and motor and reducer support base; included with the foregoing are the chain enclosure, coupling guard, and motor reducer guard; symmetrical about the centerline of the motor and reducer, and normal to, in their order of installation, are the floating shaft assembly, wire rope drum, ball bearing pillow block and support base, line shaft, ball bearing pillow block and support base, wire rope drum, floating shaft assembly, wire rope drum, ball bearing pillow block and support base, line shaft, ball bearing pillow block and support base, and at the end a wire rope drum; included with the foregoing are coupling and drum guards. Wire ropes, 1/2-inch in diameter are connected to each end of each radial gate and to its respective wire rope drum of the hoist assembly.

The gate hoist machinery was fabricated and assembled by the Armco Company. The make and model of specific components are as follows:

1. Gear Reducer - Philadelphia Gear Corp., Type HAT, size 975, Single Helical Worm, AGMA service factor of 1 - output rating 70,000-inch pounds @ 0.25 R.P.M. and an input rating of 3/4 H.P @ 56 R.P.M.

2. Steel Sprockets - Morse - Type B, 24 teeth, 3.074-inch O.D. dia. shaft, key way for 1/4-inch square key set screw in hub, chain included.

Hoist Machinery. (Continued)

3212

3. Steel Sprockets - Morse - ditto #2 above except bored for 1/2-inch dia. shaft and key for No. 3 Woodruff key.

4. Link - Belt Pillow Block - self aligning Ball Bearing Type No. P.255 for 3 7/16-inch dia. shaft.

5. Limit Switch - Cutler Hammer - Bulletin 10316H168, Nema 1V, rotating shaft type with 480 turns maximum between limits and adjustable to 18 turns minimum between limits.

6. Couplings - Thomas Flexible Coupling Co. No. 200 AMR with covers. One end bored for 1 3/4-inch shaft and key way 3/8" x 3/16". Other end for 1 1/4-inch shaft and key way 1/4" x 1/8". Both ends with set screw over key way.

7. Couplings - Thomas Flexible Coupling Co. No. 450 Special SN Coupling (at gear reducer) including shaft assembly. One end bored for 3 5/8-inch shaft and key way 7/8" x 7/16". Other end for 3 7/16-inch shaft and key way 7/8" x 7/16". Both ends with set screw over key ways.

8. Couplings - Thomas Flexible Coupling Co. No. 450 Special SN Coupling (Outboard location) including shaft assembly. Both ends bored for 3 7/16-inch shaft and key way 7/8" x 7/16". Both ends with set screw over key way.

The gate hoist assembly is accessible for maintenance from the bridge or platform adjacent to the motor and reducer. The access platform has a pipe handrail for safety reasons.

Electrical Installation. The electrical installation in general consists of a service pole (see General 3100); lighting and power system; in the hoist assembly, the motor and brake; and the automatic control cubicle with its associated equipment.

3220

Lighting and Power Outlets. A light standard with 300-watt floodlight is located at the access platform of each gate hoist assembly. These floodlights are controlled from a circuit breaker on the panel mounted inside the front door of the Control Cubicle enclosure. On the light standards are 15-ampere, 125-volt A.C., duplex three-wire grounding-type receptacles. The Control Cubicle enclosure is illuminated by a 25-watt lamp with switch on the front panel. A convenience outlet is also included in this enclosure. The gaging station shelter house has a 100-watt lamp with switch on the front wall on the right hand side of door opening, convenience outlets on the inside left and right walls, and a circuit breaker load center as the shelter house's electrical service.

3221

Gear Motor. The gear motor that drives the hoist assembly is a single-phase, 60-cycle, 220-volt and has an output rating of  $3/4$  horsepower at approximately 56 R.P.M. The motor has an integrally mounted disc-type magnetic brake.

3222

1. Gearmotor and Brake - Electra Parallel Shaft Class 1, totally enclosed constant speed, continuous duty 55°C rise with Stearns Style R motor mounted enclosed-type brake.

Gear Motor. (Continued)

3222

Motor 3/4 H.P. @ 56 R.P.M. output, 60 cycles, 220V, single phase. Floor mounted with concentric output shaft. Motor suitable for reversing nonplugging service, full voltage starting, continuous duty rating and capable of 30 starts per hour, Nema IV output shaft is extended.

Automatic Control System. The automatic control

3223

system equipment is a product of the Honeywell Company. The system consists of a signal transmitter complete with float system, which is located in the gaging station shelter house. The transmitter is rated for 110-volt, single-phase, 60-cycle, with a damping float system and cable.

Control Cubicle. The Control Cubicle is

3223.1

located at the south end of the control structure. The sheet metal enclosure, which houses the signal receiver and motor controller, is mounted on structural steel angles which are anchored to a concrete pad. See photo following this paragraph of control panel. Mounted inside the enclosure is the following equipment:

One circular scale liquid level indicator, for indicating 95.5 to 97.5 feet. Indicator has a sensitivity adjustable between  $\pm 0.02$  foot and  $\pm 0.10$  foot.

Two magnetic reversing full voltage motor starters for the 3/4 HP motors. Starters have two overload relays and heaters.

Control Cubicle. (Continued)

3223.1

Two "Raise - Lower" push button stations for manual operation of gates -- one for each set of four gates.

Two "Automatic - Manual", 2-position selector switches for manual or automatic operation of the gates.

One set of relays, including two time delay relays -- one adjustable for controlling the motor running time per step, and one adjustable from 1 to 15 minutes for allowing the water level to become constant after each step of gate operation.

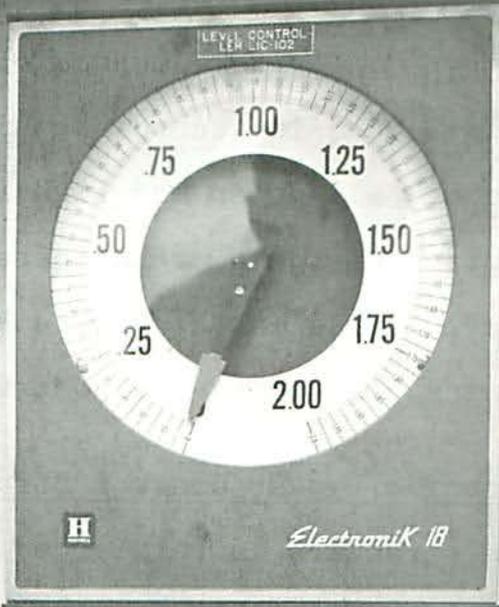
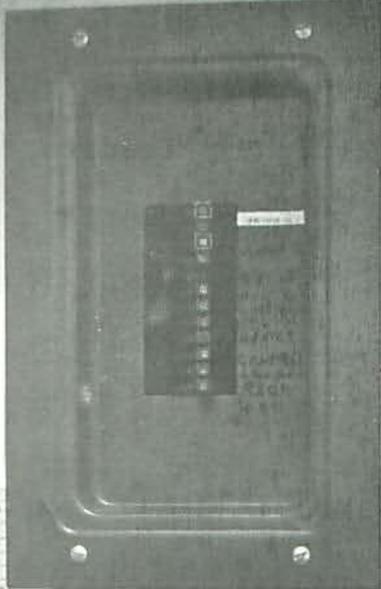
One space heater, 120-volt, to eliminate condensation within the enclosure. The heater is of sufficient size to maintain a temperature of at least 10<sup>o</sup>F above the ambient temperature which may vary from 20<sup>o</sup>F to 130<sup>o</sup>F. Included is a thermostat for operating the above heater.

One set terminal blocks with 15 percent spare terminals.

The Control Cubicle has two 2-pole, 50-ampere main breakers, one for normal and one for emergency power supply, and are mechanically interlocked so that only one can be closed at any one time. The panel board has the following branch breakers:

Three 2-pole, 20-ampere for motor and gauging station circuits.

Six single-pole, 20-ampere for floodlight spaces, and miscellaneous circuits.



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TIMER T-1  
MOTOR RUN TIME

TIMER T-2  
DELAY TIME



NORMAL POWER

EMERGENCY POWER



120 VAC OUTLET



PANEL LIGHTS



GATE MOTOR NO 1



GATE MOTOR NO 2

CONTROL PANEL -  
MARIPOSA BYPASS  
CONTROL STRUCTURE

Push Button Stations. There is a push button station 3224  
for each set of gates located on each light standard. See  
photo of push button station following this page.

Wiring. Conductors of branch circuits have been 3225  
color coded in accordance with N.E.C. In addition to color  
coding, all power and lighting branch circuits, feeders, and  
control circuits are numbered at all terminals, junction boxes,  
panel boards and control enclosures. Check the point to point  
wiring diagram in the contractor's manuals for reference.

Eastside Bypass Control Structure. 3300

The structure is reinforced concrete with six gated bays. The  
structure is 130.5 feet wide, from outside of one abutment wall  
to the outside of the other. Forming the bottom is a 2-foot  
thick floor slab 69.5 feet in length. The top of the slab is  
elevation 84.0 feet. The slab extends 12 feet behind the abut-  
ment walls into the approach embankment. A cutoff wall extends  
below the slab along the upstream and side edges to elevation  
77.0 feet. Along the downstream edge of the slab the cutoff  
wall extends to elevation 79.0 feet.

Piers rise 19 feet above the floor slab. The piers form 20-foot  
wide bays. The floor slab between the piers from upstream end  
to downstream has the following items: Stop log support slot;  
sill plate; and near the downstream end of the piers there are  
six floor blocks, two feet square and four feet high equally  
spaced across the floor slab of each bay. In the nose of the  
piers and abutment walls are vertical stop log grooves. Timber

PUSH BUTTON STATION

GATE HOIST MACHINERY

MARKED BY PASS  
CONT. STRUCTURE



fillers, three inches by six inches by four feet in length, creosote treated redwood, have been placed in the lower portion of the groove to ensure a snug fit for the metal stop logs when in place. The timber fillers are counter-sunk and bolted on 1-foot centers. Trunnion blocks are located on each wall of the piers and outside abutment wall. Six 1 1/8-inch diameter anchor bolts extend from each trunnion block to which the gate hinge pin assembly is bolted.

A hoist operating platform, 9 feet 2 inches wide, extends between the abutment walls across the top of the upstream end of the piers. Removable pipe handrail panels are on the upstream edge and fixed panels between the hoist machinery on the downstream edge of the platform. Also extending across the top of the downstream end of the piers is a roadway, 16 feet in width, with curbs and metal beam guard railing. Through the curbs are 8-inch diameter semicircular drain openings, one per bay.

Retaining walls extend 63.5 feet from the upstream end of each abutment wall and parallel to the crown of the approach embankment. Wing walls 58.5 feet in length extend downstream from the end of the abutment walls. The face of the wing walls are at a 30-degree angle to the centerline of the channel. Fixed pipe handrails extend along the top of the retaining walls; across the top of the abutment walls, between the retaining wall and hoist operating platform and the platform and the roadway; and a 14-foot section on top of the wing walls, adjacent to the roadway.

Approach embankments connect the structure to the levee system. These embankments are 252.25 feet in length from the abutment walls to the center of the adjacent levee. The crown is 51.33 feet wide and surfaced with 4 inches of crushed mineral aggregate. The side slopes of the embankments are on 3 to 1 slope.

The channel invert adjacent to the structure has a 3-1/2-foot thick cover of stone protection extending 24 feet upstream and 40 feet downstream to the ends of the wing walls. This cover consists of a 6-inch thick well-graded mineral aggregate, 2 inches maximum, filter blanket; 1-foot thick well-graded cobbles, 1-1/2-inch to 8 inches maximum; and a top coarse 2 feet in depth of well-graded quarry rock, 8 inches to 24 inches maximum. Stone protection 1-1/2 feet in thickness has been placed on the berm and embankment slope adjacent to the retaining walls, on the embankment directly behind the wing walls, and left bank of the channel to a point 400 feet downstream.

A 7-foot high chain link fence, with three strands of barbed wire at the top, enclose the two buildings on the left embankment. The area of the enclosure measures 22 feet by 40 feet. Metal posts are set in concrete. A double 20-foot gate provides access to the enclosure. The gate has a plunger rod locking device. The District shall provide a lock for the gate.

Control Building. The Control Building is 12 feet by 16 feet hollow concrete block, grout filled, wall construction with concrete floor slab. The roof consists of metal decking with 6-inch metal fascia, 1-inch thick rigid insulation and built up composition roofing with 3-1/4-inch aluminum gravel stop fascia. A block interior wall divides the building into two portions with the engine generator in the front part and the electrical panel in the rear. There are two exterior doors and a hollow metal interior door joining the two rooms. The door to the engine generator room is louvered hollow metal, and there is a hollow metal door to the electrical panel room. The left wall has two 32-inch by 12-inch aluminum louvers providing ventilation for the engine generator room. An aluminum louver in the right wall provides a discharge opening for the radiator air exhaust duct.

3301

Fuel Tank Storage Enclosure. Fuel Tank Storage Enclosure is 10 feet 8 inches by 14 feet 8 inches hollow concrete block, grout filled and mortar cap, wall construction with concrete floor slab. The top of the enclosure is 8 feet high and is open.

3302

Float Well No. 2. The float well on the right bank Eastside Bypass, 710 feet upstream of the structure, is a 48-inch diameter, 14-gauge galvanized corrugated metal pipe. A concrete slab 5 feet square by 1-1/2 feet thick with top at elevation 84.00 feet supports the float well. Two intake pipes are at elevation 94.0 feet and 95.0 feet, respectively, with the lower intake pipe about 1 foot above original ground.

3303

Float Well No. 2. (Continued)

3303

The static tube assembly at the end of the intake pipe points downstream. At elevation 103.00 feet is the top of the float well and the steel floor and hatch cover. A steel ladder on the inside of the float well extends from the hatch opening to a point 1-1/2 feet above the bottom of the float well. Attached to the top of the float well is a recorder house, 48-inch corrugated metal pipe, 8 feet in height with a 14-gauge galvanized steel, cone-shaped roof. The door is attached with three hinge bars and hasp and lock bar. The District shall provide a lock for the installation.

A walkway 47 feet in length extends from the crown of the levee to the float well. Two steel channel beams are attached to an angle ring at the top of the float well, supported at one-third points by steel pipe with concrete footing and anchored on the levee crown to a concrete footing. Steel angle spacers 3 feet in length, 8 feet on center, have been welded to the channel beams which provide deck support for expanded metal grating walkway. A 1-inch steel pipe handrail has been provided on each side of the walkway with the end handrail bracket bolted to the recorder house.

Stone protection has been placed around the float well at ground level, 1 foot high and at a 10-foot radius. This blanket of cobbles is well graded from 1-1/2 inches to 8 inches maximum.

Float Well No. 1. Float Well No. 1 is a Department of Water Resources telemetering and stream gaging station.

3304

Mechanical Installation. The mechanical equipment consists of six radial gates, one for each bay of the structure. Each gate is controlled by its own set of hoist machinery. Also included is the engine generator and fuel system.

3310

Radial Gates. Each radial gate measures 19 feet 10-1/2 inches x 13 feet 7-1/2 inches. The gate consists of a 1/4-inch steel skin plate attached to a girder frame. Extending from the girder frame are two radial side arms with trunnion hubs. The radius from the center of the bushing of the trunnion hub to the skin plate is 18.0 feet. The trunnion hub is connected to the gate hinge pin assembly which is anchor bolted to the trunnion block on the side of the pier or abutment wall. Grease piping is connected to the center of the hinge pin. The 1/2-inch galvanized steel piping extends up the pier or abutment from the hinge pin's assembly to the top of the curb of the roadway. A standard hydraulic grease fitting is attached to the end of the piping. Steel cable attachments are welded to the face of the skin plate. When fully closed, the gate rests on a stainless clad steel sill plate imbedded in the top of the floor slab.

3311

Hoist Machinery. The radial gate hoist machinery consists of a gear motor and brake, flexible coupling on the high-speed shaft of the reducer, parallel shaft speed reducer, spring-set shoe brake, and limit and speed switch. The drive unit support base is anchor bolted to the hoist platform.

3312

### Hoist Machinery. (Continued)

3312

Attached to the low-speed shafts of the reducer are the following items: Flexible coupling, self-lubricated type; drum shaft; pillow block bearing provided with grease fitting; 21-inch pitch diameter wire rope drum with grooves; and on the outside a pillow block bearing provided with grease fitting. The wire rope is  $3/4$  inches in diameter and securely clamped to the drum at one end. Two dead wraps of the rope remain on the drum when the gate is in the down position and when in full open position the rope will not overwind. The end of the wire rope is attached to an open bridge socket which is bolted to the cable attachment on the skin plate of the radial gate.

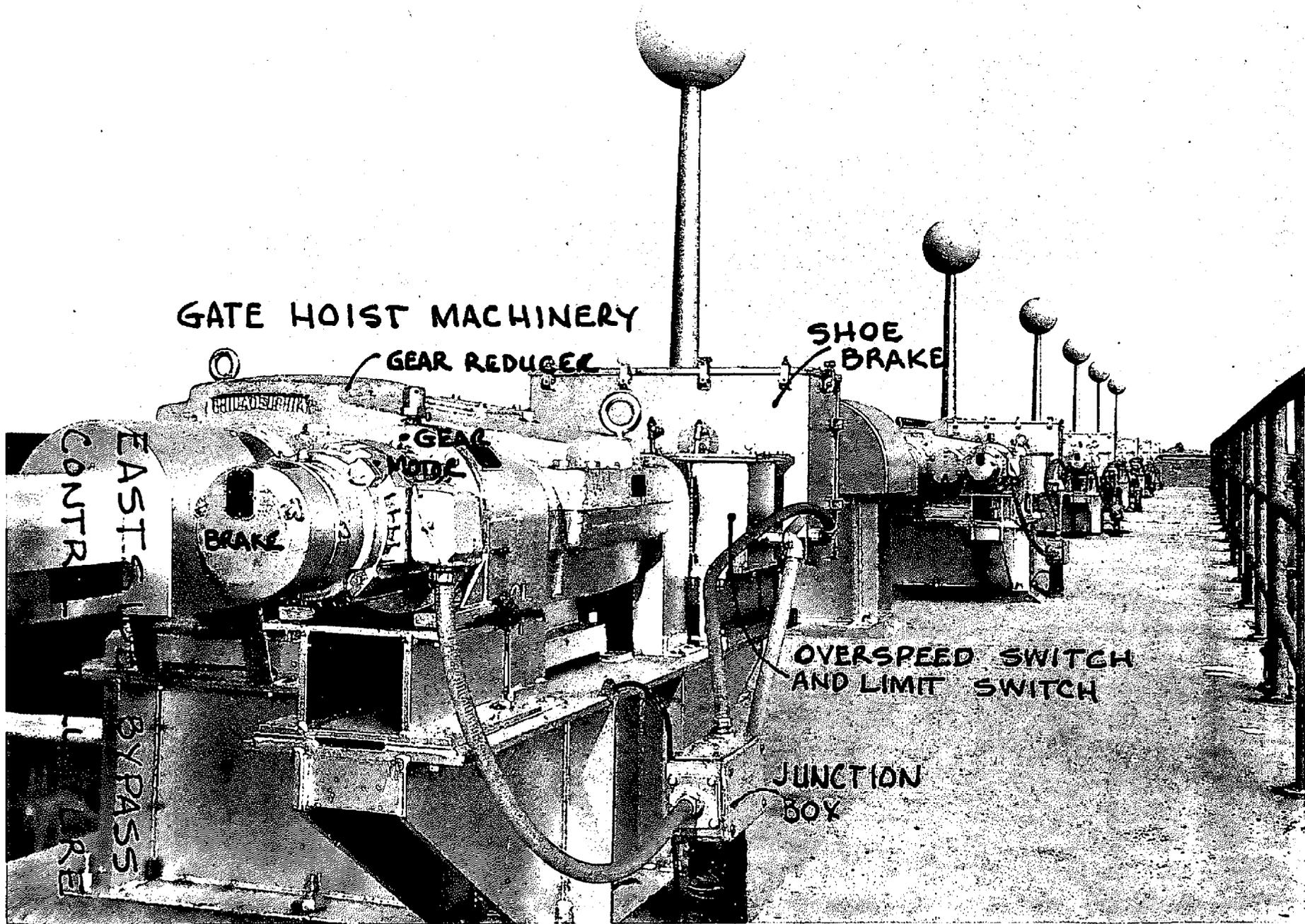
The drum support base is anchor bolted to the hoist platform. Covers have been provided for the drums, spring-set shoe brake, and limit and speed switch. A safety guard has been furnished for the shaft and couplings. The covers and safety guards are bolted to the support bases. See photo of hoist machinery following this page.

### Standby Engine Generator Set. The Standby

3313

Engine Generator Set consists of a water-cooled engine, cooling system, fuel system, exhaust system, main generator, instrument panel, and accessories. The engine generator is mounted on a one-piece structural steel base, with vibration dampers, and anchor bolted to concrete base.

The engine generator set has adequate continuous duty capacity to supply the cumulative demand of one radial



GATE HOIST MACHINERY

GEAR REDUCER

SHOE BRAKE

EAST  
CONTR

BRAKE

GEAR  
MOTOR

OVERSPEED SWITCH  
AND LIMIT SWITCH

JUNCTION  
BOX

BYPASS

RE

Standby Engine Generator Set. (Continued)

3313

gate hoist motor running, one radial gate hoist motor starting, and a 3 KW station service load. The set provides continuous electric output from the main generator at 440-volt, 3-phase, 3-wire, 60-cycle. The synchronous speed will not exceed 1,800 R.P.M.

Engine. The engine is an International

3313.1

Harvester, Model 15U135B, propane gas fueled, 4-cycle, valve-in-head, water cooled with 4 cylinders. The engine has a maximum piston stroke to cylinder bore ratio of 1.25 and compression ratio of 6.25. The engine is connected directly to the generator with a semiflexible coupling. The engine has a replaceable air filter, automatic choke, full pressure lubrication with gear-driven oil pump, full flow oil filter with replaceable element, radiator, radiator fan, water pump, 12-volt battery ignition with generator and automatic regulator, oil pressure gauge, thermostatically-controlled water jacket heater, cranking limiter, automatic over-speed shutdown, high water temperature cutout, and low oil pressure actuated shutoff switch. A multiviscosity oil is used for engine lubrication. The engine is equipped with an adjustable, centrifugal governor which will compensate quickly for changes in load and will maintain generator speed regulation within 3 cycles per second from no load to rated load.

Fuel System. The engine fuel system is com-

3313.2

plete with storage tank, fuel piping from the fuel tank to engine, converter with integral primary and secondary regulators,

Fuel System. (Continued)

3313.2

filter, solenoid shut-off valve, and all the necessary components required to complete the fuel system. The fuel system is a liquid withdrawal type for use with commercially available propane gas.

The storage tank has a 140-gallon gross volume. The tank is equipped with pressure gauge, and filling, liquid shut-off and relief valves. The tank is securely attached to a structure steel support base which is anchor bolted to the floor slab of the enclosure. The converter is securely mounted on the engine generator and uses the engine cooling water as a heat source. The solenoid shut-off valve is energized from the starting battery. A flexible connection is in the fuel line adjacent to the fuel converter.

Exhaust System. The engine exhaust piping and

3313.3

components are arranged to discharge the engine exhaust gases outside of the building. There is a flexible connection in the piping adjacent to the engine and muffler strapped to the ceiling near the discharge point through the wall. The horizontal portion of the exhaust piping slopes downward the discharge end to prevent water from entering the engine.

Generator. The main generator is an alter-

3313.4

nating-current type employing a direct-connected excitation system, with the necessary excitation system components. The voltage rating of the generator is 480-volt, 3-phase, 3-wire, 60-cycle. At rated capacity the generator is capable of

Generator. (Continued)

3313.4

delivering 100 percent full-load amperes continuously at rated voltage and frequency. Voltage regulation is within plus or minus 3 percent between no load and rated load while operating at rated frequency. The rated temperature rise of the generator is 50°C. A 480-volt, 3-phase, time curve, circuit breaker is mounted on the unit.

Instrument Panel. An instrument panel is

3313.5

securely mounted on the engine generator and contains an oil pressure gauge, water temperature gauge, battery-charging rate ammeter, battery-charging rate adjusting rheostat, indicating tachometer, voltmeter, ammeter, engine "Start-Stop-Check" selector switch, and a running time meter which registers the total number of hours the engine generator has operated. See photo of instrument panel following this page.

Accessories. Accessories and appurtenances of

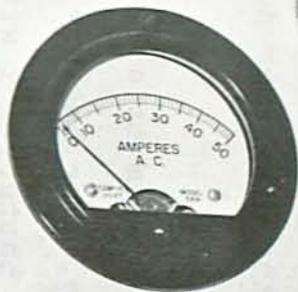
3313.6

the engine generator set include the starting battery, battery cables, battery hydrometer and filler radiator discharge duct, fire extinguisher, and tools.

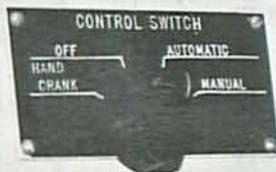
The battery for the ignition system is a 12-volt, D.C., heavy-duty, 120-ampere hour type. The battery is enclosed in a glass fiber impregnated resin battery box with removable cover. The battery hydrometer is mounted on the wall in a plastic case. The battery filler is a four-quart capacity with filler case and built-in glass cage.

The radiator discharge duct connects the engine radiator air discharge opening to the louvered opening in the

FAIRBANKS MORSE



EXCITER RHEOSTAT



RESET

PANEL LIGHT

NON-STOP  
HAND CRANK

12 AMP FUSE



START  
HAND CRANK

INSTRUMENT PANEL  
ENGINE-GENERATOR SET

Accessories. (Continued)

3313.6

outside wall. The duct includes a flexible section for vibration dampening and gradually increases to the size of the wall opening. The duct is 24-gauge galvanized steel with flanges at the radiator and the wall opening to provide an airtight connection. The flexible section of the duct is Ventglas.

The fire extinguisher is a 15-pound carbon dioxide, CO<sub>2</sub>-type and is mounted on the wall of the engine generator room.

Electrical Installation. The electrical installation in general consists of lighting, power and grounding systems; and electrical control panel, level transducers, and associated equipment.

3320

Lighting and Power System. Located on the handrail at each hoist machinery installation are a light standard; column lite floodlight, 175-watt mercury vapor lamp; duplex convenience outlet, Condulet with snap cover plate, weather-proof and lockable. The District shall furnish locks, seven total.

3321

Situated on the hoist platform at each gate hoist is a junction box. Distributed from the junction box are wires in flexible conduit for power and control of the following equipment: Overspeed switches, shoe brake, motor, dish brake, and limit switch.

The Control House has two 100-watt lighting fixtures in each room, controlled by 3-way switches located at each door. A 100-watt outside lighting fixture, adjacent to the

Lighting and Power System. (Continued)

3321

door of the control panel room, and controlling switch located on the wall inside of the door. Duplex convenience outlets are located on each side of the interior wall adjacent to the connecting door opening.

Located in the float well recorder houses are an overhead lamp with wall switch, duplex convenience outlet, junction box and a one-pole, 240-volt A.C., 15-ampere circuit breaker.

Grounding System. A grounding grid connects the

3322

engine generator, ground bus in control cabinet, hoist machinery, handrails, platform gratings, grounding grid at Mariposa Bypass Control Structure and other features. A grounding electrode is located in the approach embankment adjacent to the control building.

Service Pole for Float Well No. 1. The service

3323

pole is located on the landward side of the levee. The pole is creosote pressure treated, Douglas Fir. Located on the pole are a service head, meter socket, 100-ampere manual circuit closing. A ground rod, 3/4 inch x 8 feet galvanized steel is embedded in the ground adjacent to the pole.

Automatic Control System. The automatic control

3324

system is a product of the Honeywell Company. The system consists of a water surface level indicator transducer with float system, resistance-current transducer and current-to-current transducer located in the shelter house at Float Well No. 1.

The water surface elevation is transmitted to the control house via telephone lines. Located in the shelter house at Float Well No. 2 are a water surface level indicator transducer and resistance-current transducer. This equipment is wired directly to the control house. The above control equipment is rated for 110-volt, single-phase, 60 cycle.

Control Cabinet. The necessary electronic equipment to operate the motors of gate hoist machinery is situated in the control cabinet located in the Control Building. The cabinet measures 7 feet x 7 feet x 30 inches deep. A copper ground bus is provided to which the housing, framework, cable support, and noncurrent carrying metallic parts of all equipment and conduits have been grounded. A space heater, 100 watt, with thermostat is provided to maintain the internal temperature in the cabinet at an adjustable valve between 30° and 120°F.

3324.1

The equipment located on the face of the panel board to operate the gates are as follows:

Two water surface level indicators for Float Wells No. 1 and No. 2 located at the top of panel board. The range of the scale of the indicators are 76 feet to 114 feet for Float Well No. 1 and 76 feet to 106 feet for Float Well No. 2.

Located below the water surface level indicators are six selector switches with lights, one for each motor.

Control Cabinet. (Continued)

3324.1

These switches are for manual control of the gates at the Control House. Located in the next role below, from left to right, are a lockable "Stop" pushbutton; selector switch with operational mode control settings of automatic, manual, and local; and lights to indicate when Float Well No. 1 is "out of service". See photo of control panel following this page.

Equipment to receive the transmitted signals from the float wells and condition it for use with the other instruments to control the gates are located within the cabinet. A change in water surface elevation at Float Well No. 1 will result in a proportional change in water surface elevation at Float Well No. 2. Three proportionality constants have been provided, each adjustable over the range of the equipment. This is necessary as the stage-discharge curves have different characteristics for the channel at the two float wells.

The level indicators are also adjustable as to time, level, and ratio within the cabinet. Limit switches will stop each motor at the limits of its gate's travel and provide contacts for other control functions. An overload relay is provided in each of the three power leads. Electrical and mechanical interlocks have been provided on the starters. A list of the equipment in the cabinet is as follows:

FLOAT WELL N° 1



AMP



AMP

FLOAT WELL N° 2



AMP



AMP

CONTROL PANEL OF EASTSIDE BYPASS CONTROL HOUSE



GATE 1



GATE 2



GATE 3



GATE 4



GATE 5



GATE 6



FUNCTION SELECTOR SWITCH



STOP



FLOAT WELL N° 1 IN SERVICE



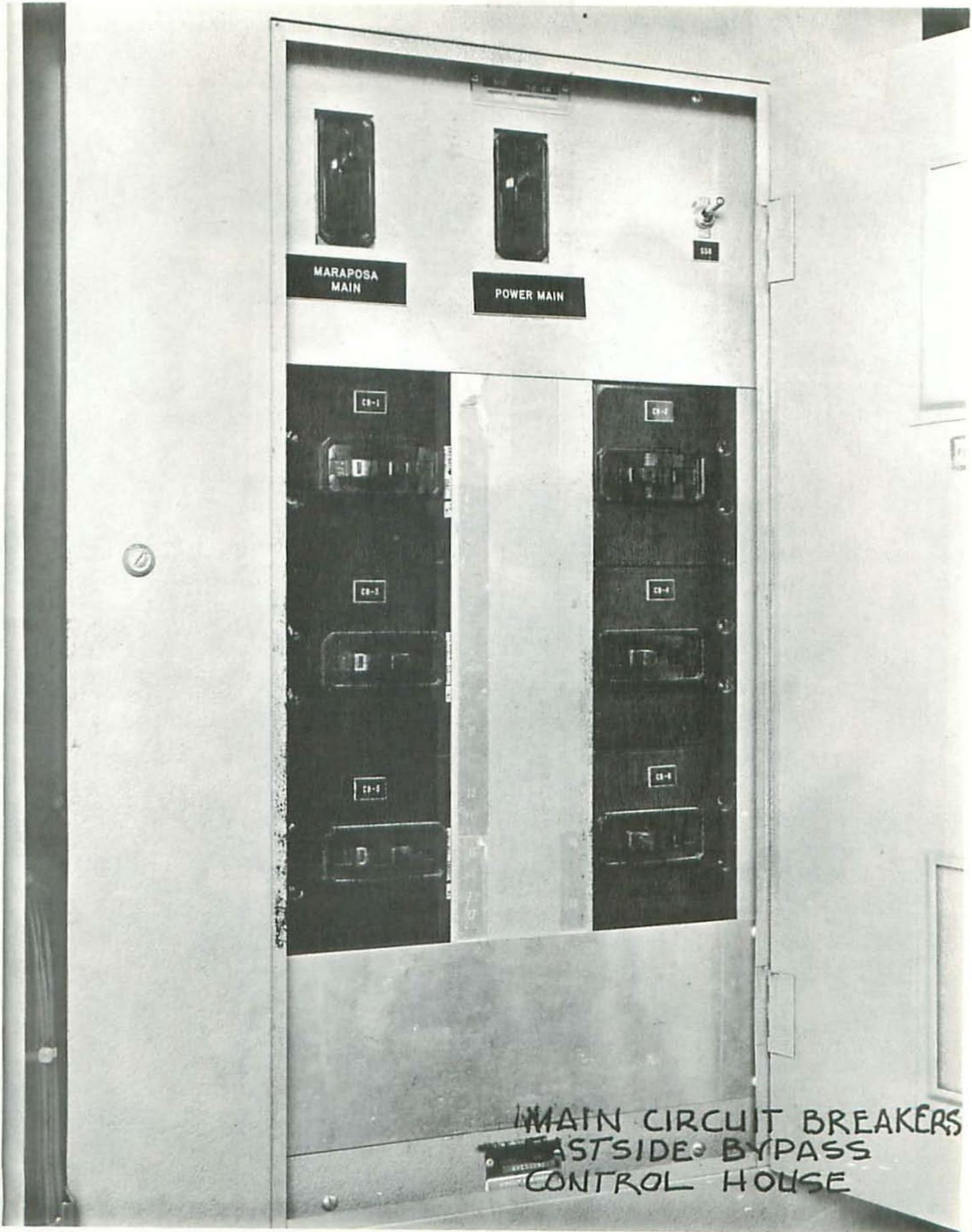
FLOAT WELL N° 2 OUT OF SERVICE

Control Cabinet. (Continued)

3324.1

<u>Quantity</u>	<u>Description</u>
2	Level Indicator
1	Monitor Relay
2	Ratio and Bias Auxiliary
1	Transistorized Amplifier- Controller
6	Starter, Reversing, Nema Size 1, 3 Overloads
6	Circuit Breaker, 3 Pole, 15 Amp, 600 Volt
1	Circuit Breaker, 2 Pole, 50 Amp, 600 Volt
1	Circuit Breaker, 3 Pole, 70 Amp, 600 Volt, with external operator
1	Contractor, 30 Amp, 2 Pole with 2 auxiliary contacts
6	Relay, Time Delay on Energizing with Instantaneous Contacts
2	Relay, Time Delay on Energizing and on De-energizing
2	Stepping Switch, 120 V.A.C.
6	Relay, Auxiliary, 10 Amp, 300 Volt
--	Resistors, 1 percent
--	Potentiometer, Precision
1	Emergency Power Transfer Switch, with Controls
1	Distribution Panel, 120 Volt Service, 70 a mains, S.N. with 8-20a, 1 Pole
1	Space Heater, 100 Watt, 120 A.C.
1	Thermostat

See photos of circuit breakers following this page.



MARAPOSA  
MAIN

POWER MAIN

CB-1

CB-1

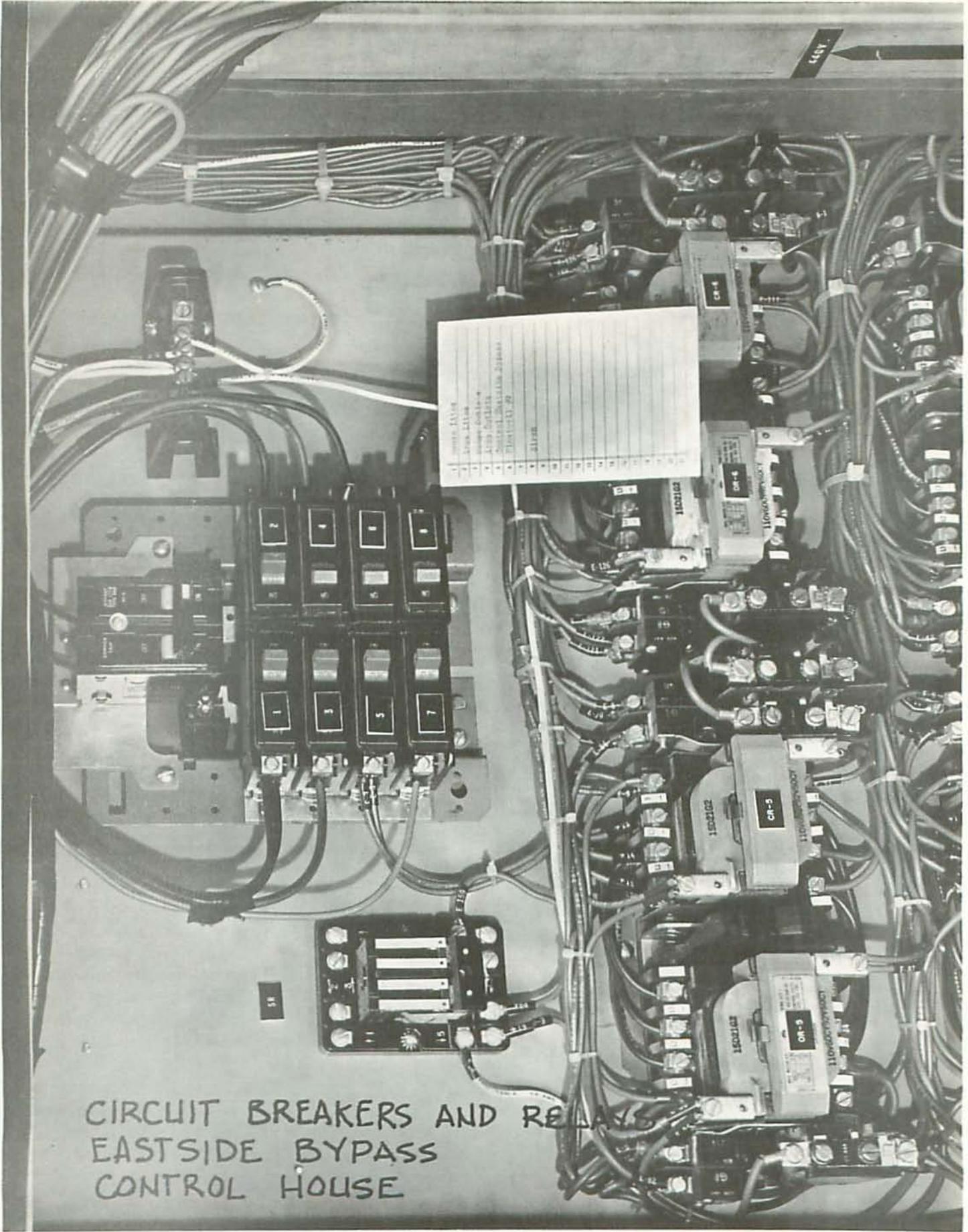
CB-2

CB-2

CB-3

CB-3

MAIN CIRCUIT BREAKERS  
EASTSIDE BYPASS  
CONTROL HOUSE



1. Alarm - Alarm  
2. Alarm - Alarm  
3. Alarm - Alarm  
4. Alarm - Alarm  
5. Alarm - Alarm  
6. Alarm - Alarm  
7. Alarm - Alarm  
8. Alarm - Alarm  
9. Alarm - Alarm  
10. Alarm - Alarm  
11. Alarm - Alarm  
12. Alarm - Alarm  
13. Alarm - Alarm  
14. Alarm - Alarm  
15. Alarm - Alarm  
16. Alarm - Alarm  
17. Alarm - Alarm  
18. Alarm - Alarm  
19. Alarm - Alarm  
20. Alarm - Alarm

CIRCUIT BREAKERS AND RELAYS  
EASTSIDE BYPASS  
CONTROL HOUSE

Transfer Switch. The Transfer Switch located in the control cabinet provides controls for starting the engine generator and transferring the load from the normal power source. Also provided is a battery charger with meter and current adjusting rheostat, a clock exerciser, and a cranking limiter. See photo of transfer switch following this page. For other electrical equipment for the engine generator see paragraph 3313.

3325

Manual Control Stations. Manual control has been provided for each motor at the control cabinet (see paragraph 3324.1) and at the motors. Located on the handrail at each motor are a selector switch, 3 position spring return with enclosure and legend plate; and pushbutton, lockable, red button with enclosure and legend plate. See photo of Manual Control Station following this page.

3326

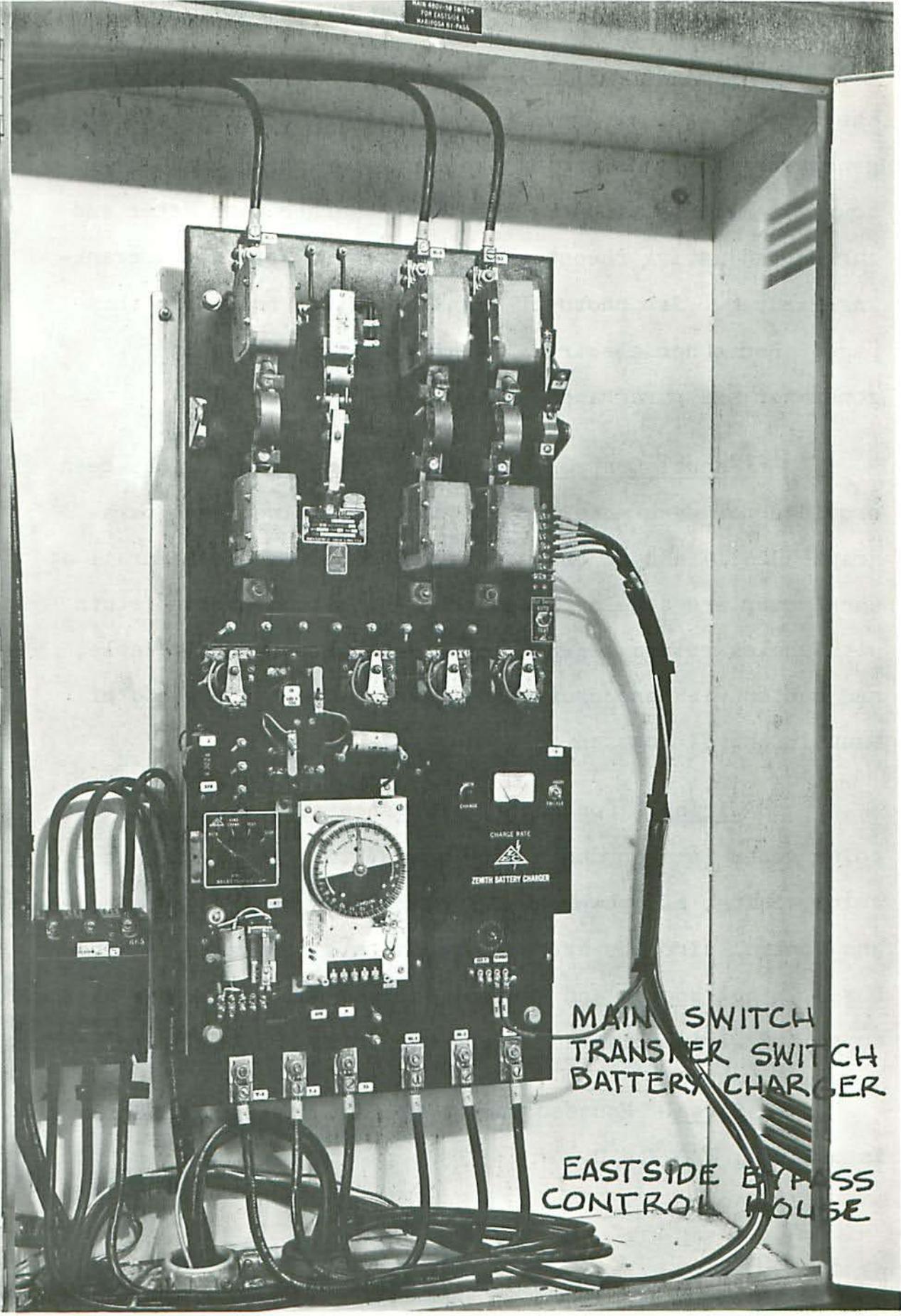
Wiring. Conductors of branch circuits have been color coded in accordance with the N.E.C. In addition to color coding, all power and lighting branch circuits, feeders, and control circuits are numbered at all terminals, junction boxes, panel boards and control enclosures. Check the "point to point" wiring diagram in contractor's manuals for reference.

3327

Siren. Mounted on the roof of the Control Building is a Siren, 120 V.A.C.

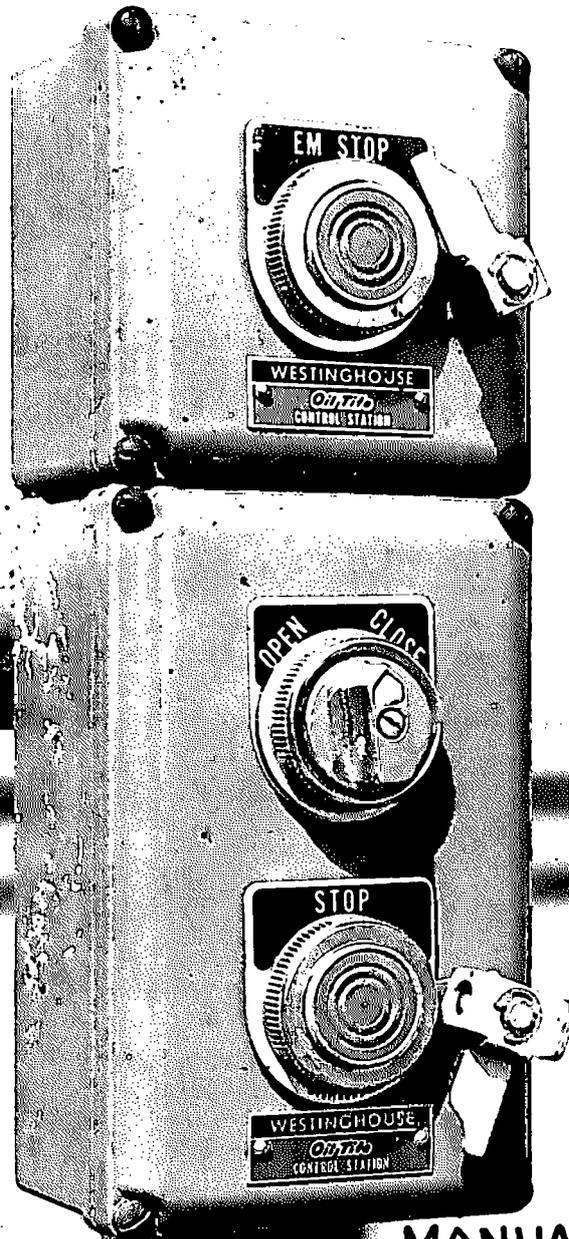
3328

MAIN BATTERY SWITCH  
FOR EASTSIDE A  
MARITIME BY PASS



MAIN SWITCH  
TRANSFER SWITCH  
BATTERY CHARGER

EASTSIDE BYPASS  
CONTROL HOUSE



MANUAL CONTROL  
STATION  
EASTSIDE BYPASS  
CONTROL STRUCTURE

## MAINTENANCE

4000

### General

4100

The maintenance and service on the mechanical and electrical facilities shall be scheduled and prosecuted just prior to the fall detailed inspection made by personnel of the State Department of Water Resources. This inspection shall include the testing of the gate units several times through the full range of operation. Suggested inspection forms are included in Appendix B.

Since adequate operation of the mechanical and electrical equipment is vital for the proper functioning of gate units, controls and appurtenances shall be maintained in good operating condition. The subject of maintenance and procedures can only be briefly touched upon and should be expanded and improved upon as continued experience is gained in operation of the equipment.

All damaged or unserviceable parts shall be repaired or replaced without delay. Before attempting repairs, the applicable "As-Built drawings", shop drawings, specifications, as well as catalogs, descriptive data, parts lists, and operation and maintenance procedures supplied by the manufacturers of the equipment installed (see Appendix A) should be carefully reviewed. Full use shall be made of all pertinent technical data furnished with the respective units.

Use high-grade lubricants which are suitable for the service. The manufacturers of the various components of equipment have

General (Continued)

4100

furnished the initial supply of lubricants for their respective machinery. In all instances lubricant specifications shall be in accordance with the equipment manufacturers' recommendation, or if none, in accordance with the best practice for the service.

Painting and recoatings required should be performed in accordance with the original contract specifications. Where replacements are made, the replacement parts shall be equal in quality to those originally installed or of a suitable later improved design.

Mariposa Bypass Control Structure

4200

The District shall maintain the facilities described in Chapters 3100 and 3200 of this manual. The structure and appurtenances shall have a good general appearance and function properly. The entrance and exit of the structure, spillway slab and spillway bucket shall be clear of any foreign objects or debris. Check to see if the concrete is spalling, eroding, cracking excessively, or reinforcing bars are exposed; metal work is not damaged or in need of refinishing; embankment and slope protection adjacent to the structure or appurtenant to, are free of uncontrolled weed growth, and not in need of reshaping or repair. If any item is in need of repair or maintenance, include required work in the next scheduled maintenance activity.

Mechanical. Give particular attention to the items listed on the inspection report and perform maintenance in accordance with the maintenance and service standards as set forth in the maintenance manuals (see Appendix A) furnished by the contractor.

All repairs shall be performed by a qualified mechanic experienced in the type of equipment involved.

Schedule one lubrication service in October of each year and others as prescribed by the manufacturer of each type of equipment. The Superintendent shall make a lubrication chart showing the item to be serviced, type and weight of lubricant to be used, amount applied, and frequency of application.

Electrical. Give particular attention to the items listed on the inspection report and perform maintenance in accordance with the maintenance and service standards as set forth in the maintenance manuals (see Appendix A) furnished by the contractor.

All repairs shall be performed by a qualified electrician experienced in the type of electrical equipment involved. Arrangements can be made with Honeywell for servicing of the instrumentation for a fixed labor charge plus parts required.

The servicing of the instrumentation should be scheduled by the end of October and March. These scheduled servicings should give assurance that the complete electrical equipment of the system is in first-class condition prior to the rainfall runoff and snowmelt runoff flood periods. The servicing

Electrical. (Continued)

4220

shall include all electrical components and wiring serviced and maintained as set forth in the operation and maintenance manuals supplied by the manufacturer.

Eastside Bypass Control Structure

4300

The District shall maintain the facilities described in Chapters 3100 and 3300 of this manual. The structure and appurtenances shall have a good general appearance and function properly. The entrance and exits of the structure, and spillway slab shall be clear of any foreign objects or debris. Check to see if the concrete is spalling, eroding, cracking excessively, or reinforcing bars are exposed; metal work is not damaged or in need of refinishing; embankment and slope protection adjacent to the structure or appurtenant to, are free of uncontrolled weed growth, and not in need of reshaping or repair. If any item is in need of repair or maintenance include required work in the next scheduled maintenance activity.

Mechanical. Give particular attention to the items

4310

listed on the inspection report and perform maintenance in accordance with the maintenance and service standards as set forth in the maintenance manuals (see Appendix A) furnished by the contractor.

All repairs to the gates and gate hoist machinery shall be performed by a qualified mechanic experienced in the type of equipment involved.

Mechanical. (Continued)

4310

Each gear motor and speed reducer has a nameplate showing correct type, weight and amount of oil or grease to be used in each particular unit. The grease to be used for lubrication of the hinge pin is Lubriplate No. 630 AA. For the lubrication of bearings and other items consult the manufacturer's maintenance manuals (see Appendix A).

Schedule one lubrication service in October of each year and others as prescribed by the manufacturer of each type of equipment. The Superintendent shall make a lubrication chart showing the item to be serviced, type and weight of lubricant to be used, amount applied, and frequency of application.

Electrical. Give particular attention to the items listed on the inspection report and perform maintenance in accordance with the maintenance and service standards as set forth in the maintenance manuals (see Appendix A) furnished by the contractor.

4320

All repairs shall be performed by a qualified electrician experienced in the type of electrical equipment involved. Arrangements can be made with Honeywell for servicing of the instrumentation for a fixed labor charge plus parts required.

The servicing of the instrumentation should be scheduled by the end of October and March. These scheduled servicings should give assurance that the complete electrical equipment of the system is in first-class condition prior to the rainfall runoff and snowmelt runoff periods. The servicing shall include all electrical components and wiring serviced and

Electrical. (Continued)

4320

maintained as set forth in the operation and maintenance manuals (see Appendix A) supplied by the manufacturers.

Control Building and Fuel Tank Storage Enclosure. The

4330

following good housekeeping practices and procedures shall be observed at the Control Building and Fuel Tank Storage

Enclosure:

1. Keep structures in repair inside and out, painting as required.
2. Keep area within fence in neat and orderly condition and free of weeds.
3. Keep Control Building and Enclosure clean and free of fire hazards.
4. In the Control Building arrange and store any supplies, materials, and tools in an orderly manner.
5. Do not store gasoline, paint, oils, or other inflammables in the fenced area.
6. Keep wiping rags in covered metal containers outside of Control Building.
7. Keep floors free of debris.
8. Area must be maintained as safe place to work.
9. Buildings and gates shall be kept locked when vacated.

Standby Engine Generator Set. The Standby Engine

4331

Generator Set shall be maintained as set forth in the maintenance manuals (see Appendix A) supplied by the manufacturers

Standby Engine Generator Set. (Continued)

4331

of the various components of equipment. All repairs shall be made by a mechanic or electrician experienced in the types of equipment to be repaired.

Schedule one maintenance and lubrication service in October of each year and others as prescribed by the manufacturer of each type of equipment. The Superintendent shall make a maintenance and lubrication chart showing the items to be maintained, type of replacement, frequency of maintenance and replacement, and type and weight of lubricant to be used, amount applied, and frequency of application.

x

OPERATION

5000

General

5100

The maximum design flow in the Eastside Bypass upstream from the control structures during flood conditions is 16,500 cfs. The system has been designed so that the first 8,500 cfs of flow is passed through the Mariposa Bypass control structure. It is the objective of the radial gate control to divert the flow in excess of 8,500 cfs through the Eastside Bypass control structure. To limit the maximum flow in the Mariposa Bypass to 8,500 cfs, the control system of the Mariposa Bypass control structure is capable of maintaining the water surface, at Float Well No. 3, at elevation 96.3 feet. Control will be accomplished as follows for rising stages.

Normal Flows

<u>Eastside Bypass (Upstream Flow)</u>	<u>Eastside Bypass Control Structure</u>	<u>Mariposa Bypass Control Structure</u>
0-8,500 cfs	0 cfs Gates closed.	0-8,500 cfs Gates open.
8,500-16,500 cfs	0-8,000 cfs Open gates as re- quired to pass excess flow and maintain constant pool eleva- tion at FW#2.	8,500 cfs Close gates as re- quired to maintain constant 8,500 cfs flow. (Elev. 96.3 at FW#3.)

Control for falling stage is similar to the above, except that gate movements are in the opposite direction.

Abnormal flows in the Eastside Bypass, that is flows over 16,500 cfs, shall be divided through the two structures. Flows which will encroach to within one foot of the levee top are

39,000, 23,000, and 30,000 cfs, respectively, for the upstream flow in the Eastside Bypass, downstream flow in the Eastside Bypass, and the downstream flow in the Mariposa Bypass.

Abnormal Flows

<u>Upstream Flow Eastside Bypass</u>	<u>Downstream Flow Eastside Bypass*</u>	<u>Downstream Flow Mariposa Bypass</u>
16,500-39,000 cfs	12,000-23,000 cfs	8,500-30,000 cfs

1. Manual operation is necessary for passing abnormal flows through the structures.

2. See rating curves at the end of this chapter for a relation between the flow and corresponding float well elevations.

\*Includes discharges from Merced Stream Group Project inflow. (Deadman, Owens, and Duck Creeks) just downstream of the Eastside Bypass Control Structure.

Operation Instructions for the Mariposa Bypass and Eastside Bypass Control Structures

1. Everyday obtain elevation and corresponding flow at Float Well No. 1. Also request any flow changes at Float Well No. 1 from the State Flood Control Center should they occur between the regular reading times.

2. The first 8,500 cfs shall be passed through the Mariposa Bypass Control Structure.

3. If the flow is greater than 8,500 cfs, the amount above 8,500 cfs shall be discharged through the Eastside Bypass Control Structure.

Operation Instructions for the Mariposa Bypass  
and Eastside Bypass Control Structures (Continued)

5200

4. For a given flow at Float Well No. 1, <sup>(ES Bypass in El Nido)</sup> greater than 8,500 cfs, subtract the elevation difference in the table below to obtain the required water surface for Float Well No. 2.

<u>Flow at Float Well No. 1 in CFS</u>	<u>Elevation Difference in Feet*</u>
8,500 to 10,500	7.0
10,500 to 12,500	6.7
12,500 to 14,500	6.4
14,500 to 16,500	6.1
16,500 to 18,500	5.8

\*Make adjustments by actual experience

5. Adjust the gates on the structures until the correct pool elevation is reached with the stage of 96.3 feet for a flow of 8,500 cfs maintained at Float Well No. 3.

6. For abnormal flow divide the amount greater than 16,500 cfs between the two structures.

7. These flows and stages can be set by using the rating curves for Float Well No. 1 and No. 3.

8. This procedure can most efficiently be followed if a chart similar to the one at the end of this chapter is prepared and kept up-to-date.

Mariposa Bypass Control Structure

5300

The first 8,500 cfs of flow in the Eastside Bypass upstream of the structure is passed through the Mariposa Bypass control structure.

4/

Automatic Control System. The automatic control cubicle and associated equipment contain the necessary features to control the Mariposa Bypass water level at elevation 96.3 feet corresponding to a flow of 8,500 cfs. The equipment has been preset to the desired adjustments so that the automatic control devices will cause the gates to function as designed. Proper adjustment of the settings for this system can best be done under actual flow conditions and once effected will provide accurate and reliable results. The automatic control operates for normal flows only.

The transmitter and damping float system located in the gaging house, which has been preset, functions so as to activate the gate hoist motors with a change of plus or minus 0.02 foot in the water elevation at the gaging station. This sensitivity is adjustable to a value of plus or minus 0.10 foot. When power resumes after a failure the transmitter and receiver elements automatically correct themselves to correspond with the water level.

After an activating impulse has been received by the controller in the automatic control cubicle, an adjustable timer (T-1), which has been preset, limits the hoist motor running time to give a gate movement of 0-0.055 foot. An additional adjustable timer (T-1), which has been preset, provides a delay of 0-15 minutes between hoist motor operations to permit the effect of each step of gate operation on the water flow to be felt at the gaging station. The gate operator motors and gearing are so arranged that the gates

Automatic Control System. (Continued)

5310

will open or close a distance of 0.00915 foot for each second of motor running time. Thus, for a gate movement of 0.05 foot, the motors run for 5.46 seconds.

The automatic control is arranged so that all gates will operate in unison. The total vertical gate travel is 5.2 feet between the fully open and fully closed positions.

Turn System Off or On. To turn the electrical

5311

control system off, place the lever of the main circuit breaker which is located on the service pole to "off" position. It will also be necessary to disengage the engine generator set. To turn the system on, place this lever of the main circuit breaker to the "on" position. If the main circuit or any secondary circuit breakers have been thrown, move the levers as far as they will go in the "off" position so that the circuit breaker will reengage, and then place the lever in the "on" position.

The automatic control system shall be left "on" at all times, except when shutoff for making repairs, maintenance or manual operational checks. The reason the system should be operational at all times is that at any time of the calendar year condensation can form in the automatic control enclosure. Condensation will cause corrosion of the electrical equipment and wiring, thus allowing the possibility of the system to malfunction. A space heater, 120-volt, is provided to eliminate condensation forming within the enclosure. The heater has a range of  $0^{\circ}$ - $120^{\circ}$ F and setpoint  $10^{\circ}$ F differential.

Emergency Power. During storm periods power failures 5312  
are quite common and unpredictable. Emergency power has been  
provided for this system if the normal source of power supply  
to the service pole is interrupted. The emergency power source  
is the standby engine generator set.

Manual Operation. To operate the gate units independ- 5320  
ently of the Automatic Float System or in the event of an  
Automatic Control System malfunction and the water stage at  
the gaging station cannot be maintained at 96.3 feet, which  
corresponds to a flow of 8,500 cfs (see rating curves at end  
of this chapter), the gates can be lowered by manual operation  
to satisfy the above condition. Each set of gates is operated  
by separate controls under manual operation.

Manual operation is necessary for passing abnormal flows  
through the structure.

Return the system to automatic control when it is no  
longer necessary to operate under manual control.

Automatic Control Cubicle Push Button Station. A 5321  
push button station for manual operation on each set of gates  
is located in the lower right-hand corner of the panel board.

To place the equipment in manual operation condi-  
tion, turn the selector switches on the panel board from  
"Auto" position to the "Hand" position. Each hoist motor  
can now be operated independently. Motor No. 1 operates the  
gate hoist at the south end of the structure and Motor No. 2  
operates the gate hoist at the north end.

Automatic Control Cubicle Push  
Button Station. (Continued)

5321

To raise gates depress "Raise" buttons No. 1 and No. 2 and gates will continue to rise until the push button is released or the gates exceed the limits of the open position. Each gate unit is lifted by depressing its respective push button. (Selector switches in "Hand" position.)

To lower gates depress "Lower" buttons No. 1 and No. 2 and gates will continue to lower until the push button is released or the gates come to rest on the sill plates. Each gate unit is lowered by depressing its respective push button. (Selector switches in "Hand" position.)

Push Button Stations. A push button station for each gate operator motor is located inside the box attached to its respective light standard pole. To place the equipment in manual operation condition turn the selector switches on the panel board of the Automatic Control Cubicle from "Auto" position to the "Hand" position.

5322

To raise gate unit depress the "Raise" button and unit will continue to rise until the push button is released or the gates exceed the limits of the open position. (Selector switches in "Hand" position.)

To lower gate unit depress the "Lower" button and unit will continue to lower until the push button is released or the gates come to rest on the sill plates. (Selector switches in "Hand" position.)

Handwheel Operation. Each gate hoist assembly reducer has a handwheel attachment provided so that the gate unit can be lowered to maintain a water surface stage of 96.3 feet at the gaging station.

When all other methods of lowering the gates have been exhausted, each gate hoist assembly can be operated by handwheel. The handwheel operation will only lower the gate unit, it will not raise them.

To operate the gate hoist assembly, remove the section of bridge guard rail in front of the reducer (nine bolts are at each end of this section); remove the expanded metal guard over the reducer and motor; and then remove the shaft cover plate at the bridge side of the reducer. Place the handwheel on the shaft of the reducer. The two handwheels can be stored in the gaging station house so that they are always available when needed. To release the motor brake, remove the plexiglass cover plate on the back of the brake housing at the rear of the motor. The motor brake is then released by depressing the lever in the brake housing. Turn the handwheel in a clockwise direction, thus lowering the gate unit to the desired adjustment. To brake the gate hoist assembly, raise the lever in the brake housing.

When electrical power is restored or it is no longer necessary to operate the gate units with the handwheel, remove the handwheel from the shaft of the reducer unit, replace the cover plates on the reducer and brake housing, and return the handwheels to storage in the gaging station house.

Eastside Bypass Control Structure

5400

Normal flows in excess of 8,500 cfs in the Eastside Bypass upstream of the structures shall be passed through the Eastside Bypass control structure. The initial position of the gates shall be closed.

Automatic Control Operation. The necessary automatic controls have been incorporated into the system to operate the gates of the control structures under the normal flow operation conditions as set forth in Section 5100 above.

5410

Equipment setting is as follows:

<u>Equipment</u>	<u>Position</u>
Normal Power	On
Engine Generator Selector Switch	Automatic
Control Panel Selector Switch	Automatic
Float Well No. 1 Power	On

Gate Operation. The time interval for gate movement increments is adjustable between 5 and 60 seconds; the equipment is set for 20 seconds. Time interval between gate movements is adjustable between 1/4 and 10 minutes; the equipment is set for 1-2/3 minutes. The gates are set to move one at a time, always starting with Gate No. 3 when they are all at the bottom, or Gate No. 6 when they are all at the top. The gates are raised in the order 3, 4, 2, 5, 1, 6, and continuing 3, 4, etc., and are lowered in the order 6, 1, 5, 2, 4, 3, and continuing 6, 1, etc. There is one increment between the highest and the lowest gates on the structure when they are moved by manual control.

5410.1

Turn System Off and On. To turn the electrical control system off, place the lever of the main circuit breaker to "off" position. It will also be necessary to disengage the engine-generator set. The power to the control panel can also be interrupted by depressing the red emergency stop button on the face of the control panel. Following is the equipment setting for power off:

<u>Equipment</u>	<u>Position</u>
Red Emergency Stop Button	Depressed and Locked
Or	
Main Circuit Breaker	Off
Engine-Generator Set Selector Switch	Off

Following is the equipment setting for power on:

<u>Equipment</u>	<u>Position</u>
Red Emergency Stop Button	Unlocked
Main Circuit Breaker	On
Engine-Generator Set Selector Switch	Automatic

If the main circuit or any secondary circuit breakers have been thrown, move the levers as far as they will go in the "off" position so that the circuit breaker will reengage, and then place the lever in the "on" position.

The automatic control system shall be left "on" at all times, except when shut off for making repairs, maintenance, or when operating under manual control. The reason the system should be operational at all times is that flows, minimum releases from Friant, and drainage return are in the

river channel at all times of the year. Also, at any time of the calendar year, condensation can form in the control cabinet enclosure. Condensation will cause corrosion of the electrical equipment, terminals and wiring, thus allowing the possibility of the system to malfunction. A space heater, 120-volt, is provided to eliminate condensation forming within the enclosure.

Siren. A siren is mounted on the roof of the Control Building. The siren will sound when there is a loss of signal from Float Well No. 1. The siren will continue to sound until the system is switched to manual control. 5412

Manual Operation. The gates can be controlled individually from either the control panel in the control house or at the gate hoist installation. To operate from the control panel place the Function Selector Switch to MANUAL. The Function Selector Switch is placed on LOCAL for control at the gates. 5420

Each gate is controlled by a selector switch with settings of OPEN or CLOSE. When a switch is activated either to OPEN or CLOSE the gate hoist operates for 20 seconds moving the gate 0.5 foot.

When opening the gates on a raising stage they shall be moved one at a time. Wait for about 2 minutes between gate settings for the change to affect Float Well No. 2. Start with Gate No. 3, raise in the order, 3, 4, 2, 5, 1, 6, 3, 4, etc.

Manual Operation. (Continued)

5420

Keep one increment between the highest and lowest gates on the structure as it will be easier to control the water surface elevation at Float Well No. 2 in this manner.

See Operation Instructions, Section 5200 for details on operation criteria of the Eastside Bypass control structure.

Emergency Power. The engine-generator located in the control house will provide adequate electrical energy to operate the two control structures and appurtenant equipment if there is an interruption of the power supply. The transfer switch transfers the load to the engine-generator when there is a power failure.

5430

There are two-four position selector switches to control the engine-generator. One is situated on the transfer switch and the other on the engine-generator panel.

The AUTO position will start the engine and transfer the load to the generator when power is cut-off. When power returns the transfer switch resets the load to normal power source and the engine-generator is shutdown. The switches shall be left in the AUTO position.

Set the switch to the STOP position and the engine-generator will not be able to start. When making repairs or performing maintenance to the gates and equipment set the switches to STOP before cutting out the power.

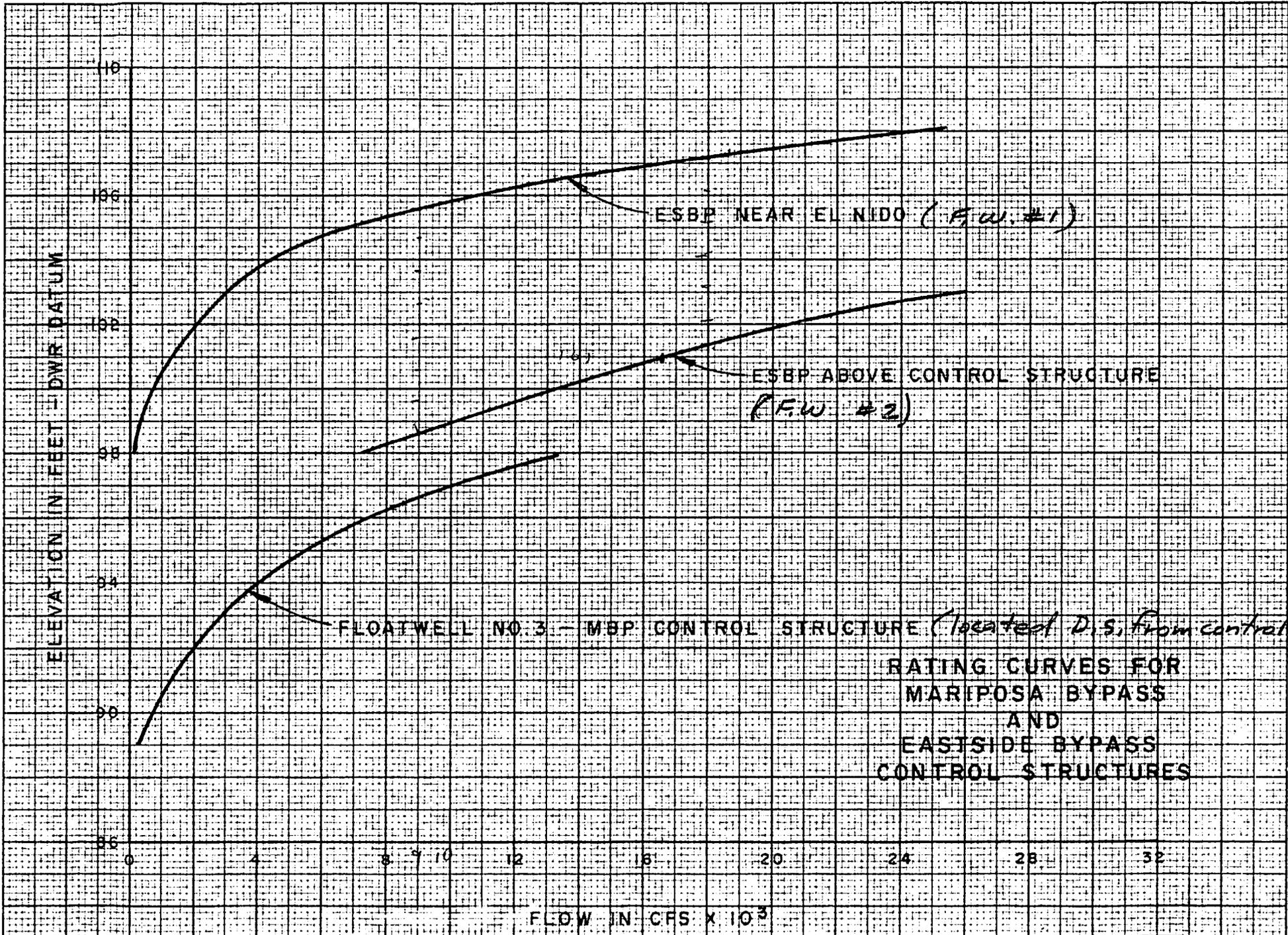
The TEST position will start the engine but will not transfer the load.

Engine. Check the oil and water level of the engine 5431  
and the water level of the battery at least once a month.  
Also check to see if the engine is operating as set forth in  
the manufacturer's manual.

Clock Exerciser. The clock exerciser will start 5432  
the engine, run it for 15 minutes, and then stop it. The  
equipment has been set to occur once every seven days.

Fuel Tank. The L.P.G. storage shall be at full 5433  
capacity at the beginning of the flood season. A full tank  
of fuel will run the engine-generator under full load for  
a period of about 48 hours. Add fuel as required during  
the flood season.





RATING CURVES FOR  
MARIPOSA BYPASS  
AND  
EASTSIDE BYPASS  
CONTROL STRUCTURES

**APPENDIX A**

**LIST OF MANUFACTURERS' OPERATION, MAINTENANCE,  
AND PARTS MANUALS**

APPENDIX A

LIST OF MANUFACTURERS' OPERATION, MAINTENANCE  
AND PARTS MANUALS

<u>D.W.R. File No.</u>	<u>Title</u>
	1. Eastside Bypass Control Structure
B10-256	Engine-Generator and Transfer Switch
B10-258	Radial Gate Hoists (Eastside Bypass Control Structure)
B10-257A	Control System (Eastside Bypass Control Structure)
	2. Mariposa Bypass Control Structure
B4-163	Honeywell Manual Control System

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The above manufacturers' manuals are an integral  
part of this manual.

**APPENDIX B**

**CHECK LISTS**

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## APPENDIX B

### Check Lists

Forms suggested as check lists for reporting inspections of the control structures and appurtenances will be found in this section. These forms should be used on each inspection to insure that the structures are in good condition and working at all times. It is suggested that a mechanical and electrical inspector assist the Department of Water Resources inspectors when performing inspection on the control structures and appurtenances.

Suggested Check List For  
Mariposa Bypass Control Structure

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

Instructor \_\_\_\_\_

Date \_\_\_\_\_

Superintendent \_\_\_\_\_

Item	Remarks
<b>A. Concrete Structure</b>	
1. Piers	
2. Spillway and Apron Slab	
3. Retaining and Wing Walls	
4. Bridge Deck & Metal Railing	
5. Drainage Facilities	
6. Stone Protection	
<b>B. Mechanical Installation</b>	
1. Radial Gate Unit No. 1	
(a) each radial gate	
(b) skin plates	
(c) girder frame	
(d) radial arms	
(e) trunnion bracket assembly	
2. Radial Gate Unit No. 2	
(a) each radial gate	
(b) skin plates	
(c) girder frame	
(d) radial arms	
(e) trunnion bracket assembly	

Instructions for Completing Sheet B-1  
(To be printed on back of Sheet B-1)

Item A Note conditions of concrete structure and signs of abnormal cracks or settlement or other conditions requiring maintenance.

Item B (1 & 2) All nuts and bolts connecting the radial arms to the girder frame and the trunnion bracket assembly shall be sufficiently tight. The complete gate units shall be carefully inspected for signs of rust as well as condition of all coated surfaces. The general alignment of the gates between the piers shall be noted and any sign of distortion of the gate units. It shall be noted if the gates move freely when being lowered or hoisted without a tendency to bind at any point.

The trunnion hub and thrust bearing unit shall be checked, to the extent practical without disassembly, for signs of abnormal wear, or signs of misalignment. Also note any other condition requiring maintenance.

Suggested Check List (Continued)

Item	Remarks
B. Mechanical Installation	
3. Gate Hoist Assembly No. 1	
(a) gear motor	
(b) brake	
(c) limit switch	
(d) roller chain drive assembly	
(e) flexible coupling	
(f) worm gear reducer	
(g) motor and reducer support base	
(h) line shafts	
(i) floating shaft assemblies	
(j) couplings	
(k) ball bearing pillow blocks	
(l) ball bearing bases	
(m) wire rope drums	
(n) wire rope	
(o) coupling and drum guards	
(p) motor and reducer guards	

Suggested Check List (Continued)

Item	Remarks
B. Mechanical Installation	
4. Gate Hoist Assembly No. 2	
(a) gear motor	
(b) brake	
(c) limit switch	
(d) roller chain drive assembly	
(e) flexible coupling	
(f) worm gear reducer	
(g) motor and reducer support base	
(h) line shafts	
(i) floating shaft assemblies	
(j) couplings	
(k) ball bearing pillow blocks	
(l) ball bearing bases	
(m) wire rope drums	
(n) wire rope	
(o) coupling and drum guards	
(p) motor and reducer guards	

Instructions for Completing Sheets B-3 and B-4  
(To be printed on back of Sheets B-3 and B-4)

Item B  
(3 & 4)

Carefully inspect all components for signs of rust as well as condition of painted and coated surfaces. Note any parts in need of cleaning, lubrication, and any other condition requiring maintenance.

Carefully inspect the gear motor and reducer to ensure that they are being properly lubricated and the oil is at the proper level. While the motor is operating note any unusual noise or vibration which would indicate bearings require attention or some loose part must be immediately corrected. Note any oil leaking by the oil seals, or any oil on the outside or inside of the motor housing.

Carefully check to ensure that all nuts and bolts of the couplings are sufficiently tight and that all components are properly attached to their support bases.

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

Ensure that all guards provided for the motor gear and reducer assembly and other rotating parts are in place, in good condition and securely fastened to their supports.

Suggested Check List (Continued)

Item	Remarks
C. Electrical Installation	
1. Gaging Station House and Equipment	
(a) enclosure	
(b) outlets and lighting	
(c) damping float system	
(d) level indicator unit	
2. Automatic Control Cubical and Equipment	
(a) enclosure	
(b) outlets and lighting	
(c) curcuit breakers	
(d) motor starters, relays	
(e) heater	
(f) terminal blocks	
(g) control unit	

Instructions for Completing Sheet B-6  
(To be printed on back of Sheet B-6)

Item C  
(1)

Carefully inspect all parts for signs of rust as well as condition of painted and coated surfaces. Note any parts in need of cleanings, and any other condition requiring maintenance.

Check all outlets and lighting to verify their proper functioning.

Insofar as practical inspect the float well for any indication of debris which may interfere with operation of float including possible restriction of water inlets.

Remove the cover of the level indicator unit and inspect the mechanism for proper functioning. Check electrical wiring and connections from receiver unit. Ensure 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 counterweight.

(2)

Carefully inspect all parts for signs of corrosion as well as condition of painted and coated surfaces. Note any part in need of cleaning, and any other condition requiring maintenance.

Check all outlets and lighting to verify their proper functioning. Check all circuit breakers to make sure they operate properly and check contacts of circuit breakers, relays, and motor starters for signs of wear.

Note any sign of condensation to ensure heater is functioning properly. Make sure wiring is properly connected to terminal blocks (using insulated screw-driver) and control unit.

Suggested Check List (Continued)

Item	Remarks
C. Electrical Installation	
3. Push Button Station No. 1	
(a) light standard	
(b) outlets and lighting	
(c) push button	
4. Push Button Station No. 2	
(a) light standard	
(b) outlets and lighting	
(c) push button	

Instructions for Completing Sheet B-8  
(To be printed on back of Sheet B-8)

Item C  
(3 & 4)

Carefully inspect all parts for signs of rust as well as condition of painted and coated surfaces. Note any parts in need of cleaning, and any other condition requiring maintenance.

Check all outlets, lighting, and push buttons to verify their proper functioning.

Suggested Check List (Continued)

Item	Remarks
D. Operational Check of Radial Gates	
1. Manual Operation Unit No. 1 & No. 2	
2. Push Button Stations	
(a) local control unit No. 1 and No. 2	
(b) control cubical unit No. 1 and No. 2	
3. Automatic	

Instructions for Completing Sheet B-10  
(To be printed on back of Sheet B-10)

- Item D
- (1) Check manual operation by lowering each set of gates by means of the handwheel on the gear reducer.
  - (2) Check all push button station operations by a complete raising and lowering of each set of gates.  
  
The limit switches should be adjusted so that they interrupt the motor current when the gates are completely closed and when the gates are completely open. The full open position corresponds to a vertical movement of the lower edge of the skin plate of 5.2 feet.
  - (3) Check automatic operation of the gates by simulating a raise in the water level by raising the float momentarily the minimum amount required for sensitivity (.02 foot). With this momentary rise, the system should make one complete cycle, lowering all of the gates .05 foot vertically (motor running time of about 5.46 seconds). Try again for .025 foot (2.78 seconds).  
  
Simulate a drop in water level by lowering the float momentarily the minimum amount as above.  
  
Simulate a continual rise in water level by raising the float and holding in raised position. The system should keep on cycling, lowering the gates .025 to .050 foot (depending on the setting of the timer) each cycle.  
  
Check sensitivity of transmitter float system at .06 foot and .10 foot. Repeat lowering checks for both settings.  
  
Check adjustment of float transmitter. The 0-2 foot scale reading should be adjustable between elevations 94.0 to 97.5 feet with zero feet from elevation 94.0 to 95.5 feet, and two feet from elevation 96.0 to 97.5 feet.  
  
Check indicator sensitivity by moving float .02 foot and noting change in indicator at gaging station and at control cubicle.

Suggested Check List (Continued)

Item	Remarks
E. The Automatic Control System and Gates Should be Adjusted and Left in the Following Condition:	
1. Timer "T1" - (Motor Running Time) 5.46 seconds	
2. Timer "T2" - (System Cycle) one (1) minute	
3. Zero reading of indicators: at elevation 95.5 feet	
4. Two (2) foot reading of indicators: at elevation 97.5 feet	
5. Sensitivity of Transmitter Float System: .02 foot	
6. Main Circuit Breaker: "ON" position	
7. Panel Board Circuit Breaker: "Normal Power" position	
8. Selector Switches: "Auto" position	
9. Gate Units: Full Open position	

Instructions for Completing Sheet B-12  
(To be printed on back of Sheet B-12)

Item E After inspection has been completed, return equipment and installation to automatic condition. If adjustments have been made to system enter change to respective component in remarks column.

Suggested Check Lists For  
Eastside Bypass Control Structure

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

Instructor \_\_\_\_\_

Date \_\_\_\_\_

Superintendent \_\_\_\_\_

Item	Remarks
<b>A. Concrete Structure</b>	
1. Piers	
2. Floor Slab	
3. Retaining and Wing Walls	
4. Abutment Walls	
5. Bridge Deck	
6. Metal Beam Guard Rail	
7. Hoist Operating Platform	
8. Pipe Handrails	
9. Embankments	
10. Surfacing	
11. Stone Protection	
<b>B. Radial Gates</b>	
1. Gate No. 1	
(a) skin plate	
(b) girder frame	
(c) radial arms - 2	
(d) hinge pin grease piping - 2	
(e) hinge pin assembly - 2	
(f) side arm hinge - 2	
(g) cable attachments - 2	
(h) wire rope - 2	
(i) gate sill plate	

Suggested Check Lists (Continued)

Item	Remarks
2. Gate No. 2	
(a) skin plate	
(b) girder frame	
(c) radial arms - 2	
(d) hinge pin grease piping - 2	
(e) hinge pin assembly - 2	
(f) side arm hinge - 2	
(g) cable attachment - 2	
(h) wire rope - 2	
(i) gate sill plate	
3. Gate No. 3	
(a) skin plate	
(b) girder frame	
(c) radial arms - 2	
(d) hinge pin grease piping - 2	
(e) hinge pin assembly - 2	
(f) side arm hinge - 2	
(g) cable attachment - 2	
(h) wire rope - 2	
(i) gate sill plate	

Suggested Check Lists (Continued)

Item	Remarks
4. Gate No. 4	
(a) skin plate	
(b) girder frame	
(c) radial arms - 2	
(d) hinge pin grease piping - 2	
(e) hinge pin assembly - 2	
(f) side arm hinge - 2	
(g) cable attachment - 2	
(h) wire rope - 2	
(i) gate sill plate	
5. Gate No. 5	
(a) skin plate	
(b) girder frame	
(c) radial arms - 2	
(d) hinge pin grease piping - 2	
(e) hinge pin assembly - 2	
(f) side arm hinge - 2	
(g) cable attachment - 2	
(h) wire rope - 2	
(i) gate sill plate	

Suggested Check Lists (Continued)

Item	Remarks
6. Gate No. 6	
(a) skin plate	
(b) girder frame	
(c) radial arms - 2	
(d) hinge pin grease piping - 2	
(e) hinge pin assembly - 2	
(f) side arm hinge - 2	
(g) cable attachment - 2	
(h) wire rope - 2	
(i) gate sill plate	

Instructions for Completing Sheets B-14, B-15, B-16, & B-17  
(To be printed on back of sheets B-14, B-15, B-16, & B-17)

- Item A Note conditions of concrete structure and signs of abnormal cracks, spalling, or settlement; condition of metal hardware, embankments and surfacing, and stone protection; or other conditions requiring maintenance.
- Item B All nuts and bolts connecting the radial arms to the girder frame and the hinge pin assembly shall be sufficiently tight. The complete gate shall be carefully inspected for signs of rust as well as condition of all coated surfaces. The general alignment of the gate between the piers shall be noted and any sign of distortion of the gate. It shall be noted if the gate moves freely when being lowered or hoisted without a tendency to bind at any point.

The hinge pin and side arm hinge shall be checked, to the extent practical without disassembly, for signs of abnormal wear or signs of misalignment. Check to make sure the hinge pin is receiving lubrication. Also note any other condition requiring maintenance.

Suggested Check Lists (Continued)

Item	Remarks
C. Gate Hoist Machinery	
1. Gate Hoist Unit No. 1	
(a) gear motor	
(b) brake	
(c) spring-set shoe brake	
(d) limit and speed switch	
(e) parallel shaft speed reducer	
(f) flexible couplings - 3	
(g) drive unit support base	
(h) shafts	
(i) pillow block bearings - 4	
(j) wire rope drums - 2	
(k) drum support bases - 2	
(l) limit and speed switch enclosure	
(m) shaft and coupling safety guards - 2	
(n) drum covers - 2	
(o) wire ropes - 2	

Suggested Check Lists (Continued)

Item	Remarks
2. Gate Hoist Unit No. 2	
(a) gear motor	
(b) brake	
(c) spring-set shoe brake	
(d) limit and speed switch	
(e) parallel shaft speed reducer	
(f) flexible couplings - 3	
(g) drive unit support base	
(h) shafts	
(i) pillow block bearings - 4	
(j) wire rope drums - 2	
(k) drum support bases - 2	
(l) limit and speed switch enclosure	
(m) shaft and coupling safety guards - 2	
(n) drum covers - 2	
(o) wire ropes - 2	

Suggested Check Lists (Continued)

Item	Remarks
3. Gate Hoist Unit No. 3	
(a) gear motor	
(b) brake	
(c) spring-set shoe brake	
(d) limit and speed switch	
(e) parallel shaft speed reducer	
(f) flexible couplings - 3	
(g) drive unit support base	
(h) shafts	
(i) pillow block bearings - 4	
(j) wire rope drums - 2	
(k) drum support bases - 2	
(l) limit and speed switch enclosure	
(m) shaft and coupling safety guards - 2	
(n) drum covers - 2	
(o) wire ropes - 2	

Suggested Check Lists (Continued)

Item	Remarks
4. Gate Hoist Unit No. 4	
(a) gear motor	
(b) brake	
(c) spring-set shoe brake	
(d) limit and speed switch	
(e) parallel shaft speed reducer	
(f) flexible couplings - 3	
(g) drive unit support base	
(h) shafts	
(i) pillow block bearings - 4	
(j) wire rope drums - 2	
(k) drum support bases - 2	
(l) limit and speed switch enclosure	
(m) shaft and coupling safety guards - 2	
(n) drum covers - 2	
(o) wire ropes - 2	

## Suggested Check Lists (Continued)

Item	Remarks
5. Gate Hoist Unit No. 5	
(a) gear motor	
(b) brake	
(c) spring-set shoe brake	
(d) limit and speed switch	
(e) parallel shaft speed reducer	
(f) flexible couplings - 3	
(g) drive unit support base	
(h) shafts	
(i) pillow block bearings - 4	
(j) wire rope drums - 2	
(k) drum support bases - 2	
(l) limit and speed switch enclosure	
(m) shaft and coupling safety guards - 2	
(n) drum covers - 2	
(o) wire ropes - 2	

Suggested Check Lists (Continued)

Item	Remarks
6. Gate Hoist Unit No. 6	
(a) gear motor	
(b) brake	
(c) spring-set shoe brake	
(d) limit and speed switch	
(e) parallel shaft speed reducer	
(f) flexible couplings - 3	
(g) drive unit support base	
(h) shafts	
(i) pillow block bearings - 4	
(j) wire rope drums - 2	
(k) drum support bases - 2	
(l) limit and speed switch enclosure	
(m) shaft and coupling safety guards - 2	
(n) drum covers - 2	
(o) wire ropes - 2	

Instructions for Completing  
Sheets B-19, B-20, B-21, B-22, B-23, & B-24

(To be printed on back of  
Sheets B-19, B-20, B-21, B-22, B-23, & B-24)

Item C Carefully inspect all components for signs of rust as well as condition of painted and coated surfaces. Note any parts in need of cleaning, lubrication, and any other condition requiring maintenance.

Carefully inspect the gear motor and reducer to ensure that they are being properly lubricated and the oil is at the proper level. While the motor is operating note any unusual noise or vibration which would indicate bearings require attention or some loose part must be immediately corrected. Note any oil leaking by the oil seals, or any oil on the outside of the reducer housing.

Carefully check to ensure that all nuts and bolts of the couplings are sufficiently tight and that all components are properly attached to their support bases.

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

Ensure that all guards provided for the motor gear and reducer assembly and other rotating parts are in place, in good condition and securely fastened to their supports.

Suggested Check Lists (Continued)

Item	Remarks
D. Float Wells and Equipment	
1. Float Well No. 1	
(a) metal walkway	
(b) shelter house	
(c) float well	
(d) static tubes	
(e) intake pipes	
(f) outlet and light	
(g) level indicator transducer and float system	
(h) resistance - current transducer	
(i) current to current transducer	
2. Float Well No. 2	
(a) metal walkway	
(b) shelter house	
(c) float well	
(d) static tubes	
(e) intake pipes	
(f) outlet and light	
(g) level indicator transducer and float system	
(h) resistance - current transducer	

Instructions for Completing Sheet B-26  
(To be printed on back of Sheet B-26)

Item D Carefully inspect all parts for signs of rust as well as condition of painted and coated surfaces. Note any parts in need of cleaning, and any other condition requiring maintenance.

Check all outlet and lighting to verify their proper functioning.

Insofar as practical inspect the float well for any indication of debris which may interfere with operation of float including possible restriction of static tubes and intake pipes.

Remove the cover of the level indicator unit and inspect the mechanism for proper functioning. Check electrical wiring and connections from receiver unit. Ensure 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 counterweight.

Suggested Check Lists (Continued)

Item	Remarks
E. Control House and Fuel Tank Storage Enclosure	
1. Embankment	
(a) slopes	
(b) surfacing	
2. Fence	
(a) fabric	
(b) posts	
(c) gate	
3. Control Building	
(a) concrete floor	
(b) enclosure walls	
(c) doors	
(d) roof	
4. Engine Generator Set	
(a) engine	
(b) fuel system	
(c) exhaust system	
(d) generator	
(e) instrument panel	
(f) assessories	
5. Electrical	
(a) lights and outlets	
(b) control cabinet	
6. Fuel Storage Enclosure	
(a) floor slab	
(b) enclosure walls	
(c) storage tank	
(d) fuel lines	

Instructions for Completing Sheet B-28  
(To be printed on back of Sheet B-28)

- Item E
- (1) Note the condition of the embankment slopes and surfacing. If maintenance is required include work in next scheduled maintenance activity.
  - (2) Check the chain link fence and gate including fabric, posts, etc., to make sure the fabric is properly connected to the posts, the gate functions properly. Note any parts in need of painting, and any condition requiring maintenance.
  - (3) Check the control building enclosure including the floor, walls, doors, and roof. Note any items in need of painting, and any condition requiring maintenance.
  - (4) Check the engine radiator and battery water level and crank case oil level. Check to see that the maintenance checks and lubrication schedules recommended by the manufacturer have been adhered to. Through a visual inspection see that the engine-generator set components are clean, properly secured in place, and not in need of repair and replacement. Note any parts in need of painting, replacement, and any condition requiring maintenance.
  - (5) Check all outlets and lighting to verify their proper functioning. Check all circuit breakers to make sure they operate properly and check contacts of circuit breakers, relays and motor starters for signs of wear.  
  
Note any sign of condensation to ensure heater is functioning properly. Make sure wiring is properly connected to terminal blocks (using insulated screwdriver) and control unit.
  - (6) Check the fuel storage enclosure including the floor, walls, and doors. Note any items in need of painting and any condition requiring maintenance.  
  
Check the storage tank anchorage, fuel line and tank. Note any item in need of repair, replacement, or painting, and any condition requiring maintenance.

Suggested Check Lists (Continued)

Item	Remarks
F. Manual Control Stations Electrical Installation	
1. Gate Hoist No. 1	
(a) light standard	
(b) outlets	
(c) junction box	
2. Gate Hoist No. 2	
(a) light standard	
(b) outlets	
(c) junction box	
3. Gate Hoist No. 3	
(a) light standard	
(b) outlets	
(c) junction box	
4. Gate Hoist No. 4	
(a) light standard	
(b) outlets	
(c) junction box	
5. Gate Hoist No. 5	
(a) light standard	
(b) outlets	
(c) junction box	
6. Gate Hoist No. 6	
(a) light standard	
(b) outlets	
(c) junction box	

Instructions for Completing Sheet B-30  
(To be printed on back of Sheet B-30)

Item F. Check each light standard and convenience outlet to verify their proper functioning. Note any condition in need of repair or maintenance.

Suggested Check Lists (Continued)

Item	Remarks
G. Operational Check of Radial Gates and Engine Generator Set	
1. Manual Control	
(a) Control at Gate Hoist	
Gate No. 1	
Gate No. 2	
Gate No. 3	
Gate No. 4	
Gate No. 5	
Gate No. 6	
(b) Control at Panel	
Gate No. 1	
Gate No. 2	
Gate No. 3	
Gate No. 4	
Gate No. 5	
Gate.No. 6	
2. Automatic	
3. Engine Generator Set	

Instructions for Completing Sheet B-32  
(To be printed on back of Sheet B-32)

- Item G  
(1) Check all gates from the manual control at each unit by a complete raising and lowering of each set of gates. Also check each gate stop button

Check all gates from the manual control at the panel in the Control House by a complete raising and lowering of each set of gates. Also check each gate by stop button.

The limit switches shall be adjusted so that they interrupt the motor current when the gates are completely closed and when the gates are completely open. The full open position corresponds to a vertical movement of the lower edge of the skin plate of 18.0 feet.

- (2) Check automatic operation of the gate by simulating a raise in the water level by dialing the water surface indicators of Float Well No. 1 and No. 2. The minimum amount required for sensitivity is       feet. Gate No. 3 should rise 0.5 feet.

Simulate a drop in the water level by dialing the water surface indicator of Float Well No. 1 and No. 2 the minimum amount as above.

Simulate a continual rise in water level by dialing the water surface indicators of Float Well No. 1 and No. 2. The system should keep on cycling, raising the gates in the order 3, 4, 2, 5, 1, 6, 3, 4, etc., in 0.5 feet increments. After one cycle of the gates, lower the gates by dialing the water surface indicators to the minimum water surface level.

- (3) Check the functioning of the engine-generator set by cutting out the normal power source. When the engine-generator is supplying power, operate the gates under manual control. Check to make sure the engine-generator is operating within the limits as set forth by the manufacturers operators' manual.

Suggested Check Lists (Continued)

Item	Remarks
H. Control System, Engine Generator Set and Gates shall be adjusted and left in the following condition:	
1. Timer (Motor Running Time) adjustable between 5 and 60 seconds	20 Seconds
2. Timer (Gate movement interval) adjustable between $\frac{1}{4}$ to 10 minutes	100 Seconds
3. Level Indicator F.W. #1 Zero Reading at Elev. _____	
4. Level Indicator F.W. #2 Zero Reading at Elev. _____	
5. Function Selector Switch "Automatic" Position	
6. Normal Power Source "On"	
7. Space Heater Thermostat	Initial Setting - 70° F
8. Engine-Generator Selector Switch "Start" Position	
9. Gates - All gates left in closed position	

Instructions for Completing Sheet B-34  
(To be printed on back of Sheet B-34)

Item H After inspection has been completed, return equipment and installation to automatic condition. If adjustments have been made to system enter change to respective component in remarks column. Also note any item in need of repair or maintenance.