

## Pump Station S-4

This structure is a three unit pumping station located in the alignment of Lake Okeechobee South Shore Levee at the intersection of L-D1 and C-20 in Glades County about 3 miles northwest of Clewiston, Florida. It consists of reinforced concrete and concrete block masonry superstructure.

The pumping station is equipped with three Fairbanks Morse 132 inch diameter vertical axial flow pumps, each rated for 935 cfs. at 7.0 foot static head. Each pump unit is driven by a Fairbanks Morse Model 38D8 - 1/8, 1600 Horsepower diesel engine. Emergency power for the station is furnished by three 100KW AC Caterpillar D333 generators.

### PURPOSE

The purpose of the structure is to pump surplus water into Lake Okeechobee via the L-D1, C-20, C-21 and Industrial Canals from the agricultural area generally south of the structure. This surplus consists of seepage through the Herbert Hoover Dike and runoff at the rate of 3/4 inch per day from the 112 sq. mile tributary drainage area, and at the rate of 2.5 inches per day from the 4.3 sq. mile urban drainage area of the city of Clewiston.

### OPERATION

Two types of operation will prevail - normal operation and hurricane operation. The latter will take precedence if, and only if, a hurricane alert is declared.

The operation of S-4 is related to the operation of the various features in the S-4 basin, which is summarized in the following table.

LAKE OKEECHOBEE STAGE	GATE STATUS				NORMAL RANGE S-4 HW
	S-310	LD-1 Culverts	S-235	S-169	
OVER 15.5	CLOSED	CLOSED	FULL OPEN	AUTO	11-14
14 - 15.5	FULL OPEN	CLOSED	FULL OPEN	CLOSED	11-14
13 - 14	FULL OPEN	CLOSED	FULL OPEN	CLOSED	11-14
BELOW 13	FULL OPEN	FULL OPEN	CLOSED	FULL OPEN	BELOW 13

Regardless of the status or stages at any of these structures, however, pumping at S-4 is

initiated only when its headwater stage reaches 14.0.

At any time of the year and at any Lake stage, the hurricane operation will be as follows:

When a hurricane alert is proclaimed, S-235, S-310 and the drainage culverts through L-D1 will be fully closed, pumping initiated at S-4, and the headwater stage brought down to and maintained at elevation 10.0.

The Operation Chart defines the entire recommended range over which pumping can be accomplished. Inasmuch as the reduction ratio between engine and pump is fixed, all pump rotative speeds are expressed in the engine speed which is indicated on the engine tachometer. The rated speed is 755 rpm. At this speed, each pump will discharge 935 cfs or greater with pool to pool heads not in excess of 7.0 feet and intake pool stage between elevation 13 and 9.5. Should pumping be required at pool to pool heads between 7.0 and 10.0 feet, such pumping may be accomplished at the rated speed and a resultant reduced flow, provided that at higher heads the engine temperatures do not exceed permissible maximums. Should this occur, the engine speed should be reduced. No pumping should be conducted with the water surface in the intake bay below a gauge reading of 9.5 feet because, under this extreme suction lift condition, pitting of the propellers is likely to occur.

The pumps in this station are designed to pump drainage water containing a negligible amount of sediment or other material which might damage the surface of the pump or the bearings. All pump bearings are designed for grease lubrication and to exclude dirt and grit. However, the quantity of water being pumped by the station should be reduced at any time the water in the suction bay becomes moderately silted or if it appears that the approach velocities are carrying a bottom load of sand or silt into the sump chambers.

#### **FLOOD DISCHARGE CHARACTERISTICS**

Discharge rate	<u>2805</u> cfs
Headwater Elevation	<u>13.0</u> feet
Tailwater Elevation	<u>19.2</u> feet

**DESCRIPTION OF STRUCTURE**

Type Three pumping units in a reinforced concrete and concrete block structure.

Number of Pumps	<u>3</u>
Size & Type of Pumps	<u>144 inch vertical axial flow</u>
Design Rating	<u>935 c.f.s. each</u>
Impeller Speed	<u>78 r.p.m</u>
Pump Manufacturer	<u>Fairbanks Morse</u>
Engine Make & Type	<u>Fairbanks Morse, 8 cylinder diesel</u>
Engine Horsepower	<u>1600 each</u>
Engine Speed	<u>775 r.p.m</u>
Gate (per bay)	
Number	<u>2</u>
Location	<u>Downstream end of discharge tubes</u>
Type	<u>Vertical lift gates</u>
Size	<u>10.33 feet high by 13.75 feet wide.</u>
Lifting Mechanism	<u>Direct drive electric motor gear connected to stem lifts</u>

**DEWATERING FACILITIES (per bay)**

Storage	<u>on-site</u>
Type	<u>Box girders</u>
Size and Number	
Number	<u>5</u>
Length	<u>32' -8"</u>
Width	<u>1' -7"</u>
Height	<u>3' -11"</u>

Power Source

Normal                      Prime Movers: Diesel engine  
                                    Station Power: Commercial electricity  
Emergency                Diesel engine driven electric generators

Date of Transfer:                July 11, 1975

**HYDRAULIC AND HYDROLOGIC MEASUREMENTS**

Water Level    On-site, staff gauge and remote upstream and downstream  
                                    digital recorder

Gate Position Recorder                None

Engine Tachometer:    Digital, on-site and remote recorders