

Pump Station S-2

This structure is a four unit pumping plant located in the alignment of Lake Okeechobee South Shore Levee at the intersection of the Hillsboro and the North New River Canals with Lake Okeechobee, in the western section of Palm Beach County, 3.5 miles northwest of Belle Glade, Florida, and consists of reinforced concrete and concrete block masonry superstructure. The pumping station is equipped with four Fairbanks Morse 144 inch diameter vertical lift pumps, each rated for 900 c.f.s. at 7.2 foot static head. Each pump unit is driven by a Fairbanks Morse Model 38D8- 1/8, 1160 Horsepower opposed piston Diesel engine connected to the pump through right-angle type gear transmission manufactured by Farrel-Birmingham Company. Priming of the main pumps is normally accomplished by an electric motor-driven Nash Model Vacuum Pump. Power for the station is supplied by two Cummins, Model 6CTA 9.3-G2, 150 KW AC generators. A Wright 10-ton manually operated overhead bridge crane is provided for general service and maintenance. Other station equipment includes a station service water system for washdown, a dewatering system for the intake bays to speed up the dewatering operation for inspection or maintenance, and an electric motor-driven trash rake for removing debris from the intake bay trash rack.

PURPOSE

The purpose of the structure is to pump surplus water into Lake Okeechobee via the Hillsboro and North New River Canals from the agricultural area south and east of the structure at the rate of 3/4 inch per day from the 180 sq. mile tributary drainage area.

OPERATION

The pumping station will be operated whenever water level at any point in the Hillsboro or North New River Canals within the agricultural area south of the structure exceeds the optimum elevation of 12.5 feet unless the water level in Lake Okeechobee is low enough to permit quantity discharge into the lake through the nearby S-351 at a desirable rate. The water surface should not be drawn down below elevation of 10.0 feet at the structure. Under design head of 7.2 feet pool to pool the pumping station capacity is 3,600 cubic feet a second.

At present, the station is operated according to the EAA Interim Action Plan, and

because of water quality concerns in Lake Okeechobee, S-351 shall be closed during S-2 pumping operations. The pumps should be started and stopped slowly, one at a time, so that high velocities and surges will not occur in the Hillsboro or North New River Canals.

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 625 r.p.m. At this speed, the pumps will pump 900 c.f.s. or greater with pool to pool heads not in excess of 7.2 feet and intake pool stage between elevation 13 and 9.5. Should pumping be required at pool to pool heads, between 7.2 and 10.0 feet, such pumping may be accomplished at rated speed and a resultant reduced flow, provided at the 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. If, during a pumping operation, the water surface should be drawn down below 10.0 on the intake bay gauge, the speed of all pumps then operating should be reduced to not less than 540 r.p.m. If this does not restore the water surface in the intake pool to elevation 10.0, one or more of the pumping units should be shut down until the minimum pool elevation is re-established.

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.

The pumps installed in Pumping Station 2 have criticals at 399 engine r.p.m. and at 500 r.p.m. For this reason, the pumps should not be operated continuously between speeds of 360 to 540 r.p.m. indicated on the engine tachometer. All operations through this speed zone, either accelerating or decelerating, should be made as quickly as possible.

Per Corps of Engineers letter of 3/4/83, the pumping system could be safely used for back-

siphoning during head differentials of up to 7 feet.

FLOOD DISCHARGE CHARACTERISTICS

Discharge rate 3600 cfs

Headwater Elevation 13.0 feet

Tailwater Elevation 19.2 feet

DESCRIPTION OF STRUCTURE

Type 4 pumping units in a reinforced concrete and concrete block structure

Number of Pumps 4

Size and Type of Pumps 144 inch vertical propeller

Design Rating 900 cfs each

Impeller Speed 75 rpm

Pump Manufacturer Fairbanks Morse

Engine Make & Type Fairbanks Morse, 8 cylinder, opposed piston diesel

Engine Horsepower 1160 each

Engine Speed 625 rpm

Gates (per bay)

Number 2

Location downstream end of discharge tubes

Type vertical lift gates with flap gates for backflow protection

Size 10.33 feet high by 21 feet wide

Lifting Mechanism direct drive electric motor gear connected to stem lifts

Dewatering Facilities (per bay)

Storage on site

Type _____

Number 6

Length 32'-7"

Width 1'-9"

Height 3'-2"

Date of Transfer: February 1, 1957

POWER SOURCE

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

HYDRAULIC AND HYDROLOGIC MEASUREMENTS

Water Level Remote digital recorders and staff gauges at upstream and downstream
Gate Position Recorder None
Engine Tachometer: Digital, on-site and remote, recorder