

STRUCTURE 6

This structure is a three unit pumping plant located in the alignment of the Hillsboro Canal, at its intersection by Levee 6 and Levee 7, about 20 miles southeast of the town of Belle Glade in the South-Central section of Palm Beach County. The pumping station consists of reinforced concrete and concrete block masonry superstructure with three Nordberg Manufacturing Co. 135-inch diameter vertical lift pumps each rated for 975 c.f.s. at 8.3 foot static head. Each pump unit is driven by a Caterpillar 3606, 1240 horsepower, in-line Diesel engine connected to pump through right-angle VBHX gear transmission manufactured by Brad Foote Gear Works. Priming of main pumps is accomplished by an electric motor-driven L-6 Nash Hytor Vacuum Pump. Power for the station is furnished by two 100 KW Detroit Diesel generators. A Kranco 20 ton electrically-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 for inspection and maintenance and an electric motor-driven trash rake for removing debris from the intake bay trash rack.

PURPOSE

The purpose of the pumping station is to pump surplus water via the Hillsboro Canal from Lake Okeechobee and the agricultural area northwesterly of the pumping station into Conservation area 1, at the rate of 3/4 inch per day from the 146 sq. mile tributary drainage area. Implementation of the Everglades Forever Act, principally construction of STA 2 in 2001, increased the effective service area of S-6 and diverted the outflow from WCA 1 to WCA 2A. Most of the water which now moved to WCA 2A is treated in STA 2 to remove nutrients. Emergency water supply to WCA 1 (untreated water) can be made in conjunction with G-338.

OPERATION

The pumping station will be operated whenever the water level in the Hillsboro Canal exceeds the optimum level of 12.5 feet unless the excess water is needed to utilize conservation storage in Lake Okeechobee and there is available pumping capacity at pumping station 2 or potential gravity discharge through S-351 to remove flood water from the agricultural area between S-2 and S-6 at a desirable rate. The pumping station will also be operated upon request of the District Engineer, Jacksonville District, to provide regulatory discharge from Lake Okeechobee

when canal capacity is not needed for removal of surplus water from the agricultural area. The pumps should be started and stopped slowly, one pump at a time, so that high velocities and surges will not occur in the Hillsboro Canal.

The attached Operations 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 terms of engine speeds which are indicated on the engine tachometer. The rated speed was 514 r.p.m. After repowering was completed on May 20, 1991, an engine speed of 700 r.p.m. is equivalent to the old rated speed in terms of pump operation. At this speed, each pump has a design capacity of 975 c.f.s. or greater with pool to pool heads not in excess of 8.3 feet and intake pool gauge between El. 12.5 and 8.0. Experience indicates, however, that actual capacities obtainable are about 85 percent of those shown on the Operation Chart.

In order to preclude possible damage to the canal system resulting from excessive velocities, no pumping should be conducted with the water surface in the intake bay below a gauge reading of 10.0 feet in original design. It is contemplated, however, that at a later date there may occur an eventual subsidence of the peat overlayer throughout the drainage area, making desirable operation of the pumps with intake surface levels approximately two feet below the original normal drawdown limit of El. 10.0. The pumping machinery has, therefore, been designed to permit operation at rated conditions of head and capacity with intake water surface down to El. 8.0. The present drawdown limit is El. 9.0. Pump may be overheated if head > 7.0 feet.

If, during a pumping operation, the water surface on the intake bay falls below El. 9.0 as indicated by the staff gauge, the speed of all pumps then operating should be reduced to not less than 500 r.p.m. If this does not restore the water surface in the intake pool to El. 9.0, 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 into the sump chambers.

The pumps installed in pumping station 6 are free of harmful criticals throughout the normal operating speed range between 500 and 700 r.p.m., inclusive.

The pumps can syphon water from WCA 1 for water supply to the EAA; however, the weed problem often prevents syphoning all three units together.

FLOOD DISCHARGE CHARACTERISTICS

Discharge Rate 2925 cfs
Headwater Elevation 12.5 feet
Tailwater Elevation 20.8 feet

DESCRIPTION OF STRUCTURE

Type 3 pumping units in a reinforced concrete and concrete block structure

Number of Pumps 3

Size and Type of Pumps 135 inch vertical propeller

Design Rating 975 cfs each

Impeller Speed 88 rpm

Pump Manufacturer Nordberg Manufacturing Co.

Engine Make and Model Caterpillar 3606, 6-cylinder in-line diesel

Engine Horsepower 1240

Engine Speed 700 rpm (was 514 rpm before repower)

Gates (per bay)

Number two

Location Downstream end of discharge tubes

Type vertical lift gates with flap gates for backflow protection

Size 10.3 feet high by 21 ? feet wide

Lifting Mechanism direct drive electric motor gear
connected to stem lifts

Date of Transfer: April 30, 1957

Dewatering Facilities (per bay)

Storage On-site

Type bulkhead gates

Size and number

Number 8

Length 32'-7"

Height 2'-11½"

Width 2'-0"

POWER SOURCE

Normal Prime Movers: Diesel generator

Station Power: Commercial electricity

Emergency Diesel engine driven electric generators

HYDRAULIC AND HYDROLOGIC MEASUREMENTS

Water Level On-site, analog & remote digital headwater & tailwater recorder

Gate Position None

Rain Gauge: Remote, digital recorder

Engine Tachometer: Digital, on-site and remote

For siphon per unit, use:

$$Q = CA\sqrt{(2gTail-Head)}$$

$$= 0.27(99.4)(8.02)\sqrt{Tail-Head}$$

$$= 215.2\sqrt{Tail-Head}$$

Based on actual measurements at S-2. The measurements varied widely.