

C7. MECHANICAL AND ELECTRICAL DESIGN.

C7.1 Mechanical Requirements.

C7.1.1 Gate Operation. Gate operation will be two speeds with a time dependent speed ramp at start, stop and speed changes. A slow gate speed of 3.5 degrees per minute will be use for heads over 1/2 foot and a high speed of 35 degrees per minute will be use for heads of 1/2 feet or less. As with all other sector gates in NOD, the lock operator will open the gates a small amount to permits filling or emptying the chamber. The gates will then be fully opened when the heads are equalized to within 1/2 foot

C7.1.2 Gate Operating Loads. The gate operating loads consist of hinge, pintle and seal friction and hydrodynamic loads. Hydrodynamic loads are obtained from WES report titled "Filling Characteristics, Algiers Lock Intracoastal Waterway Gulf Section Louisiana" and from appendix "Forces on Sector Gates" published in April 1951. Three load cases will be considered. Case 1 is a maximum direct head of 23.8 feet and gate operating speed of 3.5 degrees per minute. Case 2 is a maximum reverse head of 8 feet and a gate operating speed of 3.5 degrees per minute. Case 3 is a balance head with a gate operating speed of 35 degree per minute

C7.1.3 Gate Operating Machinery. The gate operating machinery will be a rack and pinion gear drive. The rack will be attached to the gate along the outside radius of the gate's skin plate. The pinion will be attached to and driven by a low speed high torque hydraulic motor mounted on the lock wall. Each gate will be equipped with its own hydraulic power supply. The hydraulic power supply for the motor will consist of a variable delivery pressure compensated pump driven by an electric motor. A second smaller motor and pump will be provided as an auxiliary supply.

C7.1.4 Water System. A water system will be provided for small fires, such as guide wall fires, and for general wash down. The system shall consist of a single 15-horsepower motor driven pump with an operating pressure of 100 psi at 50 gpm. Hose reels with 100-foot hoses will be placed near each gate bay and at 200-foot increments along the lock walls.

C7.2 Electrical Requirements.

C7.2.1 General.

C7.2.1.1 Scope. The design for the lock includes provisions for power, control, lighting, emergency power and grounding.

C7.2.1.2 Design Criteria. The various sub-systems are designed to use standard equipment, material and products of the electrical industry. In the selection of the materials and equipment, special consideration was given to ease of operation, reliability and maintenance. The standards of the National Manufacturers Association (NEMA), the Institute of Electrical and Electronics Engineers (IEEE), and the American National Standards Institute (ANSI) will be used as guides in the selection of all electrical equipment. The design of circuits, grounding system and conduit systems will conform to the 1999 National Electrical Code and the National Electrical Safety Code.

C7.2.2 Power Source. Electric service for the lock will be provided by Point Coupee Power Co. and emergency power by a 250kW diesel engine generator set.

C7.2.3 Power Distribution.

C7.2.3.1 General. The electrical service will be rated 400 amps, three phase, four wire, and 277/480 volts. Emergency power will be derived from a 250 kW diesel engine generator set installed in the powerhouse. The unit will be of sufficient capacity to operate the gates, supply essential power to the control houses, generator building, shop building, and maintain site lighting. The service will include an automatic transfer switch to control the emergency generator in the event the commercial power supply fails. Provisions shall be made for shore power for floating maintenance units in the proximity of each gate bay.

C7.2.3.2 Grounding. The lock grounding system will be grounded in accordance with the National Electrical Code. The grounding system will consist of copper ground rods interconnected with copper conductors. All jumpers and grounding electrode conductor connections will be done by exothermic weld. All electrical equipment, machinery, and exposed metal will be bonded to the grounding electrode system.

C7.2.3.3 Emergency Generator. Standby generation will be supplied from a diesel driven generator set located in the lock generator building. The fuel supply for the generator will be provided from a main station tank to a skid mounted day tank. Alarms will be locally annunciated on the generator, shop building and within the control rooms.

C7.2.3.4 Voltage Drop Requirements. Conductors will be sized to prevent the voltage drop from exceeding three percent at the farthest utilization point on each circuit.

C7.2.4 Control System. The lock will use a Programmable Logic Controller (PLC) with panel mounted touch screens. PLC rack will be located in control house #1.

C7.2.5 Conduit and Boxes.

C7.2.5.1 Conduit. All wiring will be installed in rigid metal conduit except that motors and other electrical equipment subject to vibration will be connected with liquid-tight flexible metal conduit.

C7.2.5.2 Pull and Junction Boxes. All pull boxes and junction boxes will be of cast metal of sufficient thickness or provided with bosses to accommodate the required threads for the conduit connections of size specified.

C7.2.5.3 Outlet Boxes. All outlet boxes for receptacles, switches, and lighting fixtures will be of cast metal with bosses drilled and tapped or with threaded hubs of sizes specified. The edges will be designed to take a heavy cover gasket with four or more screws for attaching covers or fixtures.

C7.2.6 Lighting System. High Intensity Discharge lighting will be used for general site lighting. Lights will be controlled with lighting contactors. Illumination levels will be approx. 5 foot-candles. Navigation lights will be installed on dolphins and guide walls. Interior lights for office spaces will be fluorescent fixtures with t-8 lamps and electronic ballast. Illumination levels will be in accordance with the Illumination Engineering Society of North America (IES).

C7.2.6.1 Lighting.

- a. Interior Lighting. Interior lighting will be fluorescent or HID as specified:
- b. Exterior Lighting. All exterior lighting fixtures will be provided with vandal-proof shields. Navigational lights will be installed, as required, on dolphins, guide walls, and the floodgate structure. Details of navigational aids and lighting are shown. Exterior lighting will be HID.
- c. Emergency Lighting. The lock will be provided with emergency lighting units operated from a 12-Volt DC battery that will remain at full charge at all times by a battery charger that will be fed from the distribution panelboard.

C7.2.6.2 Receptacles. Three pole duplex receptacles will be provided at appropriate points in the walls of the Lock Office. Receptacles will be 120 VAC, 15/20 ampere 3 wire and GFI where specified.

C7.2.7 Ventilation. A small ventilator will be furnished for the restroom.

C7.2.8 Communications. An outlet box will be provided in the office walls for telephone connections. A conduit from the outlet box will be stubbed outside of the lock and capped.

C7.2.9 Grounding System. The lock electrical system will be ground in accordance with the National Electric Code. The grounding system will consist of copper ground rods interconnected with copper conductors to form a ground mat under the pumping station. All jumpers and grounding electrode conductor connections will be done by exothermic weld. All electrical equipment, machinery and exposed metal will be bonded to the grounding electrode system.