PORT OF MOBILE
ALABAMA PORT AUTHORITY

TECHNICAL SPECIFICATIONS

Project: BU3 (Barge Unloader 3) Controls Upgrade at McDuffie Coal Terminal

The following is a listing of the components supplied as part of the electrical package:

Item 1 - Bucket Elevator Motor

1 **Existing motor is a 350 HP, 1800 RPM, 460 Volt, 3 Ph, 60 Hz, continuous, NEMA Design C TEFC, squirrel cage induction motor.**

New motor shall be 350HP 1800RPM 460 Volt 3Ph, 60 HZ Nema Design B. The motor shall have a cast iron frame and shall be complete with: Class H insulation with an 125° C temperature rise based on a 40° C ambient; anti-friction re-greaseable bearings; 1.15 service factor; 120 volt AC space heaters with leads terminated in a separate conduit box; Winding temperature switch, oversized cast iron main lead conduit box.
A new delayed fill fluid coupling shall be supplied for mounting between the new motor and the existing gear reducer. The contractor shall design, supply and install any modifications required to the existing motor base to accept the new fluid coupling and motor.

Item 2 - Boom Hoist Motor

Existing motor is a 75 HP, 1800 RPM, 460 Volt, 3 Ph, 60 Hz, continuous, NEMA Design D, 5-8% slip, TEFC, squirrel cage induction motor.

New Motor be a 100HP, 1800RPM, 460 Volt, 3 Ph, 60Hz, Nema Design B, Inverter duty. The motor shall have a cast iron frame and shall be complete with: Class H moisture-resistant insulation with an 125° C temperature rise based on a 40° C ambient; anti-friction greaseable bearings; 1.0 service factor; 120 volt AC space heaters with leads terminated in a separate conduit box; oversized cast iron main lead conduit box; winding temperature switch; and double shaft extensions with the tapered shaft opposite the drive end suitable for accepting the 13-inch brake wheel of Item No. 4. It is the contractors responsibility to remove the existing motor and brakes, design and install any base modifications for the new motor Item 2 and the new Brakes Item 4.

Item 3 - Trolley Rack Motor

3.1 20 HP, 1800 RPM, 460 Volt, 3 Ph, 60 Hz continuous, inverter duty, NEMA Design B, TEFC squirrel cage induction motor. The motor shall have a cast iron frame and shall be complete with: Class H moisture-resistant insulation with an 125° C temperature rise based on a 40° C ambient; anti-friction greaseable bearings; 1.0 service factor; 75 LB. FT disc brake; 120 volt AC space heaters with leads terminated in a separate conduit box; oversized cast iron main lead conduit box; It is the contractors responsibility to remove the existing motor and brake, design and install any base modifications required for the new motor.

Item 4 - Boom Hoist Brakes

4.1 Pintsch Bubenzer Model 81-VAL EBA13-50/6
13" Dumper Drive Drum Brake
Max brake torque: 750 ft-lb
AISE mounting dimensions
Eldro Ed50/6 Thruster
460VAC supply voltage
External brake spring (adjustable to 50% of max)
Automatic wear compensator
Manual release handle
Organic, non-asbestos brake linings
Stainless steel spindle and pivot pins
Adjustable centering
Released Indicating GO Switch

One 13" brake drum to have a tapered hub to fit Boom Hoist Motor (Item 2)
One 13" brake drum to have a straight bore to fit existing reducer shaft. It is the contractors responsibility to measure the existing reducer shaft and have the new brake wheel bored for an interference fit.

Item 5 - Trolley Motor Controller

5.1 AC Drive system to provide adjustable speed control of the 20 HP, 1800 RPM motor from a 480 Volt, 3 Ph, 60 Hz supply. The drive will include the following features:

- **Direct Torque Control of the 20 HP, 1800 RPM motor over a constant torque speed range of 180 to 1800 RPM.**
- **Adjustable linear acceleration and deceleration rates for smooth trolley operation.**
  The Drive shall be capable of regenerating power to the AC feed.
- **Drive shall communicate via an Ether Net link to the Control Logix Processor (Item21)**
- **Provisions for a hardwired emergency stop contact in the drive's permissive circuit.**
- **Provision for energizing the motor's 120 VAC, 120-watt space heater when the drive is de-energized.**
- **Panel enclosure to be free-standing modified NEMA 12 with cabinet blower and filtered louvers. Modular Style Enclosure are NOT acceptable.**

Item 6- Trolley Master Switch

6.1 Mill duty, 5 step reversing, master switch with spring returned to the center. The switch will be mounted on the right-hand operator's console for direction and speed control of the trolley during manual operation.

Item 6- Master Switches

6.1 Trolley Master Switch - Mill duty, 5 step reversing, master switch with spring returned to the center. The switch will be mounted on the right-hand operator's console for direction and speed control of the trolley during manual operation.

6.2 Boom Hoist Master Switch - Mill duty, 5 step reversing, master switch with spring returned to the center. The switch will be mounted on the Leftt-hand operator's console for direction and speed control of the Boom Hoist Motor

6.3 Barge Haul Master Switch - Mill duty, 5 step reversing, master switch with spring returned to the center. The switch will be mounted on the left-hand operator's console for direction and speed control of the barge haul.

Item 7 - Motor Control Center

7.1 NEMA Class I, type B, motor control center in a NEMA 12 gasketed enclosure rated at 600 volts for use on a 480 volt, 3 phase, 60 Hertz power system. The bus shall be capable of withstanding 42K RMS amperes symmetrical short circuit current. The center will include the following:

A) One (1) - Incoming Line Section

B) One FVNR starter for (Item1) Bucket ladder motor
Must include an electronic overload and control module which will control the starter. Overload module must communicate to the PLC (Item 21) via an Ether Net link. A hardwired contact from the Emergebcy Stop Relay will be uses as a run permissive.

C) Six (6) - Feeder Breakers - 600 Volt, 3 Pole

1 - Boom Hoist Controller feeder (150 AF)
1 - Barge Haul Controller feeder (225 AF)
1 - Trolley Controller feeder (100 AF)
1 - Operator's Cab feeder (100 AF)
1 - Maintenance Hoist feeder (100AF)
1 - Spare (100 AF)

D) One (1) - 30KVA, 480-208/120V, 3 PH, distribution transformer with primary MCB.

E) One (1) - 20 circuit, 3PH, Type distribution panel with the main MCB.

Item 9 - Bucket Elevator Incremental Encoder

9.1 Model XR45GAYAY7PGA000 Avtron Incremental Encoder
Contractor must design, supply and install a mounting to the Bucket Ladder Drive on the load side of the fluid coupling.

Item 10 - Conveyor Zero Speed Switch

10.1 Speed responsive switch in a NEMA 4 enclosure for surface mounting. Contacts are set to open at 500 RPM at decreasing speed.

Item 11 - Conveyor Rope Pull Switch

11.1 Conveyor Components Company Model PCD-4SL Rope operated pull switch with indicating lite NEMA 4 enclosure.

Item 12 - Conveyor Chute Plug Switch

12.1 Conveyor Components Tilt Probe system consisting of a Model Ct-105 controller and a Ct200-SG probe High-level, fail-safe tilt switch probe . The probe will be used as an input to the PLC.

Item 13 - Conveyor Misalignment Switches

13.1 Conveyor Components Company Model TA-2 Belt misalignment switches with 1 normally closed contact in a NEMA 4 enclosure. Each switch is to be furnished with a roller arm.

Item 14 - Conveyor Jog Station

14.1 Heavy duty, single-unit pushbutton station with one normally open contact in a NEMA 4 enclosure.

Item 15 – Conveyor Start Warning Horn

15.1 High power, vibratory, horn for operation on 120 VAC.

Item 16 - Trolley Overtravel Limit Switches

16.1 Topworx Model 11-61523-A4 Go latching Magnetic proximity limit switch in a NEMA 4X enclosure to limit trolley travel in each direction. Requires an AMC5 magnet as a tripping device.

Item 17 - Boom Hoist Encoders

17.1 Boom Hoist Absolute Encoder - Sick Model AFM60A-S1IB018X12 Ethernet Absolute Encoder Multi turn absolute Ether Net . Encoder must be mounted in a NEMA 4X enclosure. Contractor to design, Supply, and Install required mounting bracket to the existing Boom Hoist Rope Drum.

17.2 Boom Hoist Motor Encoder - Model XR45GAYAY7PGA000 Avtron Incremental Encoder. Contractor to design, Supply, and Install required mounting bracket to the Boom Hoist Motor Brake

Item 18 - Boom Nose Protection Limit Switch

18.1 Heavy-duty limit switch in a NEMA 4 enclosure complete with spring return and roller lever.

Item 19 - Trolley Sequencing Re-Set Limit Switch

19.1 Topworx Go momentary magnetic proximity switch with one normally open contact in a NEMA 4X enclosure.

Item 20 - Trolley Incremental Encoder

20.1 Model XR45GAYAY7PGA000 Avtron Incremental Encoder. Contractor to design, Supply, and Install required mounting bracket

Item 21 - Programmable Controller Equipment Need to Talk about PLC

21.1 Allen-Bradley Control Logics Processor L7 or L8 based programmable controller equipment including all of the necessary I/O devices required for controlling the functions of the barge unloader. The mcc building will contain the processor with EEPROM backup and a 7 slot I/O rack. The other racks will be located in the Trolley Controller and the left operator's consoles. A 19" Hope Industrial color HMI panel (HIS-ML19-STAH) with an onlogic ML500G-30 will be mounted in the operator's cab right console for machine set-up and alarm functions.

Network to be Ethernet/ IP.

Item 22 - Operator's Cab Equipment Need to talk about Cab Controls

Set of operators' control consoles including heavy-duty oil-tight pushbuttons, indicating lights, selector switches, and master switches mounted and wired to remote I/O racks within each console. The consoles will include at least the following:

- **"Start-Stop" buttons for the bucket elevator will be on the HMI**
- **"Start-Stop" buttons for gathering conveyor will be on the HMI**
- **"Interlock-Bypass" switch for the barge haul will be on the HMI**
- **"Local-Remote" switch for the barge haul will be on the HMI**
- **HMI panel**
- **Alarm horn**
- **"Hoist-Lower" pushbuttons for the boom hoist (Master Switch)**
- **Trolley "Auto-Manual" switch will be on the HMI**
- **Trolley "Auto-Start"-auto Stop "buttons will be on the HMI**
- **Trolley master switch will be on the HMI (Master Switch)**
- **Barge Haul master switch will be on the HMI (Master Switch)**
- **"Independent-Tandem" selector switch for the barge haul will be on the HMI**
- **Barge Haul "Independent" control pushbuttons will be on the HMI**
- **Barge Haul "Trim Speed" switch will be on the HMI**
- **"Emergency Stop" mushroom head pushbutton**
- **"Emergency Stop Reset" Lighted pushbutton, Pushbutton to light when Emergency Stop is reset**

Item 23 – Boom Hoist Motor Controller

23.1 AC Drive system to provide adjustable speed control of the 100 HP, 1800 RPM motor from a 480 Volt, 3 Ph, 60 Hz supply. The drive will include the following features:

- **Direct Torque Control of the 20 HP, 1800 RPM motor over a constant torque speed range of 180 to 1800 RPM.**
- **Adjustable linear acceleration and deceleration rates for smooth hoisting operation.**
  The Drive shall be capable of regenerating power to the AC feed.
- **Drive shall communicate via an Ether Net link to the Control Logix Processor (Item21)**
- **Provisions for a hardwired emergency stop contact in the drive's permissive circuit.**
- **Provision for energizing the motor's 120 VAC, 120-watt space heater when the drive is de-energized.**
- **Panel enclosure to be free-standing modified NEMA 12 with cabinet blower and filtered louvers. Modular Style Enclosure are NOT acceptable.**

Item 24 – Factory Acceptance Test

- **A factory acceptance test is required.**
- **For Factory acceptance test the PLC shall be connected to the actual Trolley Motor Drive and Boom Hoist Motor Drive.**
- **Test motors shall be connected to each drive**
- **Speed and direction of each motor must be controlled by the proper master switch.**
- **HMI graphics will be test for operation with the PLC and Drives**

Item 25—Operator Chair (Option 1)

25.1 Optional operator's chair should accommodate a rotating base, flip-up console, VNSO controllers, NSO-0 Rotary switch, 30.5mm control devises and adjustable headrest. The chair should be full functionally allowing the operator to run the entire machine from the chair.