SECTION 13 01 00
BAGGAGE CLAIM CONTROL SYSTEM

PART 1- GENERAL

1.1 REQUIREMENTS
A. The General and Supplementary Conditions and Division 1 govern this Section.
B. Refer to Section 130100 "General Requirements" for requirements applying to all sections of Division 13 including, but not limited to, the following:
   1. Inspection of the Site
   2. Verification of Utilities
   3. Requirements of Regulatory Agencies
   4. Drawings
   5. Safety Devices
   6. Guarantee

1.2 WORK INCLUDED
A. Furnish and install four (4) complete conveyor control systems, one (1) per carousel conveyor feed system.
B. Furnish, install and program a safety programmable logic controller (PLC).
C. Furnish, install and program Operator Interface (OI) in door of main PLC panel.
D. Furnish, install and configure photo eyes, emergency stop pushbuttons, alarm lights and all field devices.
E. Furnish and install all control, power and communication wiring required to facilitate a complete and operational system.
F. Develop all PLC control logic and all HMI/OI applications.
G. The contractor shall prepare all control wiring diagrams and electrical interlocking diagrams and network architecture diagrams.
H. Provide onsite testing, commissioning and startup.

1.3 REFERENCE STANDARDS
A. All work must be performed in accordance with the requirements of the following pertinent standards and legal codes and ordinances:
   3. Occupational Safety and Health Act (OSHA).
   7. For work not specifically listed above, use the standards and codes of the National

1.4 QUALITY ASSURANCE

A. The Contractor's attention is directed to the fact that all specified equipment and systems shall form a completely integrated system and, as such, the control system integrator shall become familiar with requirements necessary to provide equipment specified for the system regardless of manufacture, and shall be responsible to the Contractor for the complete and satisfactory operation of the entire plant instrumentation and control system.

1. These specifications cover the intended function of the equipment, but do not necessarily cover all details necessary for a complete, operable and functional system. The Contractor shall supply all devices and appurtenances necessary to provide a complete, operable and satisfactory system as indicated or specified.

B. Instrumentation and Control System Integrator:

1. It is the intent of these documents that the Contractor be a qualified Instrumentation and Control System Integrator who shall provide the system as specified and indicated.
2. The Instrumentation and Control System Integrator shall design and furnish a complete, integrated and functionally operating system, warranted to perform the intended functions as herein specified.
3. Provide or supply all hardware and software specified herein or required and provide all required and specified collateral services in connection with the system such as testing, calibration, start-up, operation and maintenance manuals, and operator training without additional cost to the Owner.
4. Provide system integration for all control systems furnished as packaged control systems with equipment.
5. The Instrumentation and Control System Integrator shall be responsible to obtain all necessary data from individual manufacturers to determine the necessary interface requirements for operation, control and/or monitoring between the various process manufacturers' equipment and the system being supplied by the Instrumentation and Control System Integrator.
6. Shall provide personal superintendence and direction of the work, maintaining and supplying complete supervision over and coordination between all subcontractors.
7. Shall be responsible for defining the limits of the subcontractor’s work.
8. Shall be responsible for setting of instruments (including alarms, etc. as provided under other sections).

1.5 SUBMITTALS

A. Comply with pertinent provisions of Section 130100.

B. Within fourteen (14) calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Proposed construction schedule.
2. Contact information for the Contractor's project manager and field superintendent for the project.

C. Within thirty (30) calendar days after the Contractor has received the Owner's Notice to Proceed submit:
1. Bill of materials of equipment indicating quantity, manufacturer and model number.
   Component manufacturing data sheet indicating pertinent data and identifying each component by item number and nomenclature as indicated on the drawings and in the specifications. Include technical data for operator workstations, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, enclosures and operator interface units.

2. Instrumentation list with element name, type of device, manufacturer, model number.

3. Component drawing showing dimensions, mounting and external connection details.

4. System wiring schematics, each on a single drawing with full description of operation. Component identification on the schematic shall be as indicated above.

5. A system schematic of the hardware with the component manufacturing data sheets for each item, including all system peripherals. Drawing package shall include panel fabrication drawings, panel interior wiring schematics, network one line diagram with IP addresses, power wiring (instruments and panels), input/output (IO) field termination schematics.

D. Provide Operation and Maintenance manuals complying with provisions of Section 130100.

E. Provide to Engineer for approval any changes, additions, corrections, etc. required to the Bid Documents that are needed to accommodate the system being proposed. The changes, additions, corrections, etc. shall be at the Contractor's expense and shall be included in his Bid.

1.6 COORDINATION OF WORK

A. The Contractor shall be responsible for reviewing the contract documents that could affect this portion of the work.

B. Specifications, especially electrical and wiring requirements, have been formulated in an attempt to satisfy the conditions for any system proposed. However, a vendor may find that some changes or additional conduit and wiring from that indicated may be required to accommodate particular equipment being proposed. Should this be the case, the vendor shall include in his bid price, all changes or additional requirements necessary for the system. After award of contract, revised drawings must be submitted for approval indicating any changes prior to any changes being implemented.

C. The Contractor shall coordinate with the Owner all plant outages seven (7) calendar days prior to proposed outage. The Contractor shall not shutdown any portion of the facility without prior written approval of the Owner.

1.7 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Comply with pertinent provisions of the contract documents.

B. Schedule the delivery of the equipment to coordinate with the project completion schedule.

1. Each item of equipment to be tagged with identifying number shown on the Shop Drawings.

C. Contractor's attention is directed to the fact that equipment has delicate components and extreme care shall be taken in handling to avoid internal and/or external damages.

D. Damaged, remanufactured and/or used equipment shall not be accepted.

E. Equipment not for immediate use shall be stored inside a building, with enclosures under
protective coverings and shall be fully protected from moisture, extreme heat and vibration.

1.8 WARRANTY

A. The warranty period shall be defined as One (1) year from date of Notice of Substantial Completion.

B. Systems supplier shall provide onsite service with a 4-hour response time in normal working hours, seven (7) days per week for the length of the warranty period.

1. For any warranty visit during this period, provide the Owner and Engineer with a written report stating the reason for equipment failure and recommendations to prevent recurrence.

1.11 INSTRUCTIONS TO OWNER

A. Following items shall be required.

1. After system commissioning and acceptance by Owner, the Contractor shall provide one (1) session, sixteen (16) hours of instruction to the Owner during the normal day. Instruction manuals shall be submitted to Owner’s representative and approved prior to training sessions. Manuals shall be distributed at the training sessions. Instruction of operating personnel while commissioning/troubleshooting the system shall not be accepted as the Owner’s training.

2. The Contractor shall give detailed instruction to the Owner’s maintenance and engineering personnel on operation of the Control System. The manual prepared by the Contractor shall be used in instruction. Refer to paragraph “Instructions and Service” for additional requirements.

a. Submit lesson plans to the Owner’s representative for the training phases to include type of training to be provided and a list of reference material for review and approval by the Owner.

b. Training Program: Accomplish the training program as specified. A training day is defined as 8 hours of instruction including two 15-minute breaks and excluding lunch time, Monday through Friday. Conduct onsite training after acceptance run of system at a time mutually agreeable between the Contractor and the Owner. Training shall be provided to designated operating personnel identified by Owner in the functional operations of system and the procedures that personnel will follow in systems operation. This phase of training shall include but not be limited to:

1) Operation of equipment.
2) Setpoint adjustments.
3) Diagnostics
4) Failure recovery procedures
5) Alarm response
6) Maintenance and calibration

PART 2 - PRODUCTS

2.1 GENERAL

A. The Contractor shall furnish and install a complete, tested and operational control system for each Concourse B Baggage Claim conveyor and carousel system (four) including all equipment, wiring and appurtenances necessary for a complete system. The Contractor shall furnish and install a new safety programmable logic controller (PLC), operator interface (OI),
emergency stop switches (E-Stop), jam switches/photo eyes, alarm lights and horns, safety motor contactors and control/motor starter enclosures associated with Concourse B Baggage Claim conveyors and carousels. The control system shall be coordinated with the conveyor system contractor. The new PLC systems (four) shall receive a dry contact closure from the existing access control system to initiate start and stop sequences of all conveyors and carousels. **This dry contact shall input shall be provided by Schneider Electric. Call Ray Epperly with Schneider Electric @ 919-463-3334.** Each carousel and associated conveyor system shall have its own safety PLC system and operate autonomously from others.

The Contractor shall furnish audible and visual notification prior to starting any conveyor or carousel. The carousels and conveyors shall be equipped with emergency stop pushbuttons at locations coordinated with the Owner and in compliance with code. The system shall control carousels baggage access doors and meet security requirements of the Owner.

Photo eyes and jam switches shall be located at every change of direction or elevation and as coordinated with conveyor system contractor. Emergency stop pushbuttons/cables shall meet OSHA and NFPA 70E code requirements. The system reset after a tripped emergency stop pushbutton shall require reset/restart confirmation from the OI, not just resetting the tripped E-Stop pushbutton.

The OI shall display status of each motor, E-Stop, photo eyes/jam switches and provide detailed descriptive alarm messages. Upon initialization of any alarm or E-Stop an audible alarm shall sound and alarm beacon illuminate. The control panel shall be equipped with a hardwired alarm silence and alarm reset pushbuttons. Alarms shall require manual reset, automatic resetting of alarms shall not be allowed.

E-Stops shall include redundant contacts with each E-stop contacts connected directly to safety PLC inputs providing a redundant self-checking system. Installing E-Stop wiring in series or looping through all switches shall not be permitted.

Safety motor contactors shall be installed in series with motor contactor used for start/stop control. Safety contactors shall be monitored.

**B.** All equipment and materials shall be new, unused and proved by previous use of similar products to be completely suitable for the service intended.

**C.** All of the equipment shall be the manufacturer’s latest and proven design. Specifications and drawings call attention to certain features but do not purport to cover all details entering into the design of the Control system. The completed system shall be compatible with the functions required and other equipment furnished by the Contractor.

**D.** All electrical components of the system shall be powered by 24vdc, except as otherwise indicated or specified.

**E.** All contacts for control, remote motor operated, or electrically operated equipment shall be rated not less than 10 amperes on 120V unless otherwise specified herein.

**F.** All systems and individual components, whether panel or field mounted units, shall be protected from voltage and/or current surges which may originate as a result of lightning or other external causes.

1. Protective equipment to be provided by the Control System supplier and installed in accordance with his recommendations.
2. Schematics of the instruments submitted for approval to the Engineer shall indicate how this protection will be provided and identify the items of equipment which shall
be used for this purpose.

G. The Contractor shall maintain a red-line mark-up of drawings onsite during construction containing all field modifications. The Contractor shall develop record drawings from red-line mark-ups.

H. It is the intent of these specifications that no proprietary hardware or software shall be used. All hardware and software shall be standard off the shelf equipment and software.

I. The Memphis Airport Authority shall own all final developed PLC control logic, operator interface applications and Human Machine Interface applications. The programs/applications shall be turned over to the Owner in the programming software format with all documentation and no password protection.

2.2 AUTOMATIC CONTROL SYSTEM HARDWARE

This Programmable Logic Controller (PLC), Input/Output modules and communication modules shall be manufactured by Rockwell Automation / Allen-Bradley (no exceptions) as specified herein.

A. The Safety PLC shall be an Allen-Bradley Compact GuardLogix 5370 catalog number 1769-L33ERMS as a minimum.
   1. Digital input modules shall be 16 point 24 vdc digital input modules.
   2. Digital output modules shall be 8 point individually isolated output modules.
   3. Analog input modules shall be 8 channel modules.
   4. Analog output modules shall be 8 channel modules.
   5. Power supply shall be 24vdc input and provide 4A @ 5vdc and 2A @ 24vdc.
   6. Communication modules as required.

2.3 OPERATOR INTERFACE TERMINAL

A. The Main PLC Panel mounted Operator Interface Terminal shall be Allen-Bradley PanelView Plus 7 Standard Terminal, Touch Screen, 10.4 inches, TFT Color, Single Ethernet, 24V DC, Windows CE OS License, 2711P-T10C21D8S.

2.4 GENERAL CONTROL PANEL REQUIREMENTS:

A. Control (PLC) panels shall be designed with a control section containing only 24 vdc power sources.

B. Power sources greater than 24 vdc shall be mounted in separate disconnect enclosures with 24 vdc power supplies to feed PLC panel. The panel shall be equipped with external indication of power supply status with external test ports that meet the requirements of NFPA 70E.

C. Assembled control panels shall be UL508A listed and labeled.

D. All wiring shall be run in white plastic wire duct with covers. Wire duct shall be sized so that no section of duct is more than 40% filled by cross-sectional area.

E. All wiring shall be such that analog signal, AC power and control signals and communications signal are all routed, ducted, bundled or installed in conduit separate raceways. No mixing of services shall be allowed.

F. All analog signal and communications cable shall be 100% shielded.

G. Terminals (excluding ground terminals) shall be high density (maximum 0.25” wide, finger safe, single circuit, multi-rail mount, 600V AC/DC, 30 A and suitable for wire size up to #12 AWG. Terminals for 120 VAC wiring shall be white, 24 VAC wiring shall be gray and 24 VDC shall be blue. Terminals shall be Allen-Bradley No. 1492-
H. Ground terminals shall be single circuit (green/yellow color code) grounding terminal blocks, maximum 0.50" wide, wire size up to #16 AWG and be 35mm DIN rail mount. Terminals shall be Allen-Bradley No. 1492-WG4 or approved equal.

I. Fused terminals shall be single circuit fusible terminal block with neon blown fuse indicator, 300V AC/DC, 12 A, suitable for wire size up to #12 AWG and be 35mm DIN rail mount. Fused terminals shall be Allen-Bradley No. 1492-H4 or approved equal.

J. Circuit Breakers shall be single circuit thermal magnetic type, finger safe screw terminal, 277V AC, amp rating as indicated on contract drawings, suitable for wire size up to #6 AWG and be 35mm DIN rail mount. Circuit breakers shall be Allen-Bradley 1492-SP1C-XXX or approved equal.

K. Ethernet switches shall be Allen-Bradley/Cisco Stratix or approved equal.

L. Selector switches shall be 30.5 mm Type 4X, maintained position, watertight and oil tight with standard knob operators and the number of positions required by the Cycles of Control and contract documents. Each switch position shall activate a contact closure dedicated to that position. Selector switches shall be Allen-Bradley 800T or approved equal.

M. Pushbuttons shall be 30.5 mm Type 4X, momentary spring return, watertight and oil tight with flush head unit. Depressing the switch shall activate contact closure. Button color codes shall be as follows:

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START: Green
STOP: Red
All Others: Black
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N. Pilot light units shall be 30.5 mm Type 4/13, 24 VDC LED, water tight and oil tight. Pilot light color code shall be as follows:

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RUN: Green
STOP: Red
POWER ON: Amber
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P. Relays shall be 24 VDC as required high density terminal block relays with Silver Ox contacts. Relays shall be Allen-Bradley 700-HL or approved equal.

Q. Large control enclosures shall be free-standing, single access, NEMA 12 carbon steel enclosures of a size sufficient to provide 20% unused panel space. The enclosures shall be constructed of 12 gauge carbon steel, seams continuously welded and ground smooth, no holes or knockouts, with lifting eyes, 3-point latching operated by oil-tight key-locking handle. Enclosures shall be complete with lights and large (24"X24") fold out shelf attached to interior of door. Enclosures shall be Hoffman or approved equal.

R. Safety contactors shall be Allen-Bradley IEC 100S/104s safety contactors appropriately sized for the controlled motor. Safety contactors shall be installed in series with motor control contactor with the safety contactor being monitoring by the safety PLC.

S. Motor control contactors shall be appropriately sized for the controlled motor with electronic overload relays. Motor control contactors shall be Allen-Bradley IEC Bulletin 100 contactors or approved equal.

T. Emergency stop pushbuttons shall be mushroom head illuminated, with redundant contacts and legend plate. Redundant contacts shall be wired directly and individually to safety PLC inputs, no series wiring of E-Stop contacts shall be allowed.

U. All field wiring shall be terminated by the Contractor.
2.5 ELECTRICAL CONTROL WIRING

A. All field wiring shall comply with National Electrical Code and Division 26 "Electrical".
B. All control wiring shall be furnished and installed by Division 26.
C. All wiring shall be in conduit as specified in Division 26.
D. Wire color code shall be as follow:

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>120 VAC power</td>
</tr>
<tr>
<td>White</td>
<td>120 VAC neutral</td>
</tr>
<tr>
<td>Green</td>
<td>Ground</td>
</tr>
<tr>
<td>Red</td>
<td>120 VAC PLC input wiring</td>
</tr>
<tr>
<td>Orange</td>
<td>120 VAC PLC output wiring</td>
</tr>
<tr>
<td>Blue</td>
<td>24 VDC positive</td>
</tr>
<tr>
<td>White/Blue Strip</td>
<td>24 VDC negative</td>
</tr>
<tr>
<td>Yellow</td>
<td>Circuit conductors which remain energized when supply disconnecting means is off.</td>
</tr>
</tbody>
</table>

Field control wiring shall match the above color code.

2.6 ELECTRIC/ELECTRONIC INPUT DEVICES

A. The system shall maintain the specified analog end-to-end accuracy throughout the warranty period from sensor to controller readout.

2.7 SOFTWARE DEVELOPMENT

The graphical user interface shall be a layered system starting from with a main menu of the facility and screens. Each area plan shall have active indication of motor run status, sensor run status, E-Stop status, etc. at the location of each sensor. From each area screens each system shall be selectable, which when selected shall to a detailed representation of the equipment in the system. All labeling of equipment and instruments shall match identification on contract drawings. A common navigation/information bar shall be present at the bottom of all screens.

A. Overall site screen shall include the approximate location of selected equipment labeled to match the contract drawings.
B. Area screens shall include the approximate location of all major equipment and instrumentation sensors. Equipment and instruments shall be labeled as on the contract drawings. The sensors shall also have active indication of the current value being sensed by the sensor.
C. The detailed system screens shall show all sensors and automatic control devices. There shall be active indication of sensed values by each sensor. The current status of all gates (open/closed) and motors (running/stopped) shall be indicated. Each controlled device shall be a selectable item, which when selected shall display an H-O-A mode selector for the device. Modes for controlled devices shall be as follows:

<table>
<thead>
<tr>
<th>Mode Type</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Speed Motors</td>
<td>Run-Off-Auto</td>
</tr>
<tr>
<td>Reversing Motors</td>
<td>Forward-Reverse-Off-Auto</td>
</tr>
<tr>
<td>Variable Speed Motors</td>
<td>Manual-Off-Auto</td>
</tr>
</tbody>
</table>

There shall be a "MANUAL-OFF-AUTO" selector for each major piece of equipment which
shall transfer all controlled devices for the piece of equipment to the selected mode.

D. General screen features:
1) All screens shall display current time, date and logged-in user.
2) All screens shall display any active alarms.
3) All screens shall have a common navigation bar allowing one touch access to the alarm screen, log-in screen, home screen and trend screen directory.

E. Alarm conditions shall be reported at Operator Interface display and shall be globally acknowledged.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Refer to Section 13010, "General Requirements – CONTROL System" for requirements applying to all sections of Division 13 including, but not limited to, the following:

1. Coordination
2. Workmanship, Materials And Equipment
3. Manufacturer’s Recommendations
4. Protection Of Work
5. Utility Connections
6. Patching
7. Painting and Identification
8. Adjustments
9. Contractors Test and Balance
10. Clean-Up

3.2 FIELD DEVICE IDENTIFICATION

A. All wiring shall be labeled to match control wiring diagrams, labels shall be attached at each conductor termination point.

3.3 MARKING

A. Junction box covers will be marked to indicate that they are a part of the control system.

3.4 IDENTIFICATION

A. All control wires and cables shall be labeled. Wire, cable, terminal and fuse labels shall consist of the complete wire number matching exactly the number shown on the control wiring diagrams, custom printed on a single pressure sensitive, self-adhesive tape which wraps the entire circumference of the wire or cable. Hand writing or combining multiple labels to make the number shall not be permitted.

3.5 CONTROL DIAGRAMS

A. Control diagrams shall show all control wiring, except that a common symbol may be used for a common electrical control power supply.

B. Diagrams shall show all interlock wiring or control wiring to control equipment whether equipment is furnished as part of Section 130100 or by others. Any wiring other than power wiring (line to disconnect to starter to motor) shall be shown except the following:

1. Internal wiring of packaged factory pre-wired equipment.
3.6 SYSTEM TEST AND STARTUP

A. The Contractor shall verify each field instrument wiring termination and submit termination verification report.

B. The Contractor shall provide personnel onsite during IO checkout and system startup.

3.7 RECORD DOCUMENTS

A. Furnish as-built control wiring diagrams in AutoCAD format, one (1) 11x17 set in each control panel and two (2) 24x36 sets.

B. Furnish all PLC logic programs fully documented in the programming software electronic format with no passwords.

C. Furnish all HMI backup files fully documented in programming software electronic format with no passwords.

END OF SECTION