**SECTION 13110**

**SECURITY SYSTEM**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Access Control System Equipment:

1. Access Control Panels.
2. Card Readers.
3. Request-to-Exit Devices

B. Intrusion Detection Equipment:

1. Alarm Contacts.
2. Alarm Horns.

C. Intercom Equipment:

1. Video/Audio/Control two station intercom system.

D. Contractor shall coordinate all design, installation and relocation required for security access card reader system, intrusion detection equipment and intercom equipment with Johnson Controls (sole source) per this specification section. The security system must be designed and installed by Johnson Controls and shall include all necessary tie-ins to and programming of the existing Johnson Controls Security Systems to ensure a completely functional system. This shall include, but not limited to, control panels (CK7XX), conduit, wiring, card readers and all necessary door hardware and devices for a complete system.

E. Provide a complete security system for the areas shown on the design plans and as stated in this specification, including all necessary upgrades as required by authorities having jurisdiction and Clark County Building Department.

F. Contractor shall coordinate, furnish and install all card access devices required by the Baggage Handling System contractor.

G. Contractor is responsible for obtaining all applicable Building Department and Owner's approval of plans and specifications for the security system.

### 1.2 RELATED SECTIONS

A. Section 08710 - Door Hardware.

B. Section 08710S – Door Hardware Schedule.

C. Section 08715 - Delayed Egress Emergency Exit Hardware.

D. Section 13000 – Fire Monitoring System/Building Management Control System (BMCS).

E. Section 16123 – Building Wire and Cable.

F. Section 16130 - Raceway and Boxes.

G. Section 16472 – Telecommunications Infrastructure

## 1.3 REFERENCES

Comply with all applicable codes and standards and the most current issue of the following publications, including all amendments thereto of the issue that is current on the date of contract award. Applicable requirements of the following publications shall apply to the work under this specification as if fully written herein. Where conflicts exist between the Technical Specification and the referenced publications, local codes shall govern.

American Standards Association (ASA).
Institute of Electrical and Electronic Engineers (IEEE).
National Fire Protection Association (NFPA).
National Electrical Manufacturers Association (NEMA).
Underwriters Laboratories, Inc. (UL).
Federal, State and Municipal Building Codes and all other Authorities having jurisdiction.
National Electrical Code (NEC).
Insulated Power Cable Engineers Association Specification (IPCEA).
American Society for Testing Materials Specification (ASTM).
Occupational Safety and Health Administration (OSHA).
National Electrical Safety Code (NESC).

A. Special attention shall be made to the following specific codes, standards, and publications where applicable:

| Sponsor | Number | Title |
|---|---|---|
| ANSI | B20.1 | Conveyor Safety. |
| ASTM | F.1468-93 | Standard Practice For Evaluation. |
| EIA | 232-D | Interface between Data Terminal Equipment and Data Circuit-Termination Equipment Serial Binary Data. |
| EIA | RS-310-C | Racks, Panel, and Associated Equipment. |
| FAR | 107 | Airport Security. |
| FAR | 108 | Airline Security. |
| NFPA | 72-D | Installations, Maintenance and Use of Proprietary Protective Signaling Systems. |
| NFPA | 75 | Protection of Electronic Computer Data Processing Equipment. |
| NFPA | 77 | Static Electricity. |
| NFPA | 78 | Lightning Protection Code. |
| UL | 294 | Access Control System Units. |
| UL | 611 | Central Station Burglar Alarm Units and Systems. |
| UL | 634 | Intrusion Detection Units. |
| UL | 681 | Installation and Classification of Mercantile and Bank Burglar Alarm Units. |
| UL | 796 | Electrical Printed-Wiring Boards. |
| UL | 1076 | Proprietary Burglar Alarm Units and Systems. |

## 1.4 DEFINITIONS AND ABBREVIATIONS

A. Terms and abbreviations used in this specification document that are specific to the project, system, and equipment are defined as follows:

B. Definitions:

1. Availability - Percentage of a specified time interval that a system's operational functions are unimpaired.

2. Maintainability - Probability that a failed item or system is restored to an operational-state in time that the item or system availability objectives are met.

3. Reliability - Probability that a system or item of equipment performs as intended during a unit interval of time.

C. Abbreviations:

1. AFF: Above Floor Finish
2. ANSI: American National Standard Institute
3. ASCII: American Standard Code for Information Interchange
4. AOA: Aircraft Operations Area
5. ATP: Acceptance Test Plan
6. BMS: Balanced Magnetic Switch
7. CPU: Central Processing Unit
8. CCTV: Closed Circuit Television
9. EMI: Electromagnetic Interference
10. FAA: Federal Aviation Administration
11. FAR: Federal Aviation Regulation
12. IATA: International Air Transport Association
13. ICAO: International Civil Aviation Organization
14. ICEA: Insulated Cable Engineering Association
15. IDS: Intrusion Detection System
16. ISA: Instrument Society of America
17. LAS: IATA Symbol for McCarran International Airport
18. LCC: Life Cycle Costs
19. LED: Light Emitting Diode
20. MHz: Megahertz
21. MRT: Mean Restoral Time -- The mean interval between failure and restoral to operational status; includes MTTR travel time and response time.
22. MTBF: Mean Time Between Failures -- The mean interval that is the sum of MTTF and MRT.
23. MTTF: Mean Time To Failure -- The mean interval between placing a specific piece of equipment or system in service and its operational failure.
24. MTTR: Mean Time To Repair -- The mean interval during which the repair process is successfully performed.
25. O&M: Operations and Maintenance
26. PTZ: Pan, Tilt, Zoom
27. QA: Quality Assurance
28. QC: Quality Control

29. REX: Request to Exit
30. RFI: Radio Frequency Interference
31. SCC: Security Control Center
32. SCP: Security Control Panel
33. UBC: Uniform Building Code
34. UPS: Uninterrupted Power Supply
35. VDT: Video Display Terminal

## 1.5 SYSTEM DESCRIPTION

A. Electronic Security:

1. The Security Management System (SMS) shall be capable of integrating multiple building functions including but not limited to: access control, alarm management, intrusion detection, elevator control, video imaging and badging, and CCTV switcher control.

2. The system shall be at the time of bid, if required, listed by Underwriters Laboratories listed for UL 294 Access Control Systems, and UL 1076 Proprietary Burglar Alarm Systems. PC's, and all control panels furnished on the job shall carry the UL 294 and UL 1076 labels as required.

3. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of control panels, card readers, and sensors.

4. The system shall incorporate the necessary hardware, software, and firmware to collect, transmit, and process alarm, tamper and trouble conditions, access requests, and advisories in accordance with the security procedures of the facility. The system shall control the flow of authorized personnel traffic through the secured areas of the facility.

B. Software Requirements

1. System Software

a. Contractor shall provide all necessary software modules and hardware upgrades to the host server(s) to control all of the devices detailed in this specification and associated drawings.

C. Access Control and Alarm Equipment:

1. Furnish, install, and test new electronic security equipment at designated Airport locations as shown on the drawings.

2. New electronic security equipment shall include access control and intrusion detection provisions and be provided with the capability to be interfaced with the existing CCTV system. All equipment provisions are to be applied to interior and/or exterior locations.

3. Electric locks, request-to-exit (REX) devices, time-delay exiting devices, and specific door alarm contacts as required shall be included with the door hardware under this contract as specified in Section 08710 – Door Hardware.

4. Distributed Security Control Panels (SCPs) shall be microprocessor-controlled solid state electronic devices. Each SCP shall include a real-time clock/calendar that shall be updated once every 24 hours by the CPU. The SCP shall monitor security system portal status and associated facility security devices and facility interface device status, intrusion detection system (IDS) zone status and associated sensors status. The SCP shall communicate the status to the Airport access control CPU. The SCP shall be able to support at least eight (16) card readers. The SCP shall provide support to electric locking devices, related door hardware (i.e., electric locks, REX units, and alarm contacts) and alarm horns. The SCP shall be housed in a tamper-alarmed enclosure.

5. Door intrusion detection magnetic switches shall be located within the door hardware to detect a 1/4 inch or less of separating relative movement between the magnet and the switch housing. Upon detecting such movement, the devices shall transmit alarm signals to the SCP and existing security system CPU.

6. The new ACS system equipment shall consist of the following major components:

   a. Card readers.
   b. Door contacts.
   c. Request-to-exit buttons.
   d. Alarm horns.
   e. Security control panels.
   f. Power supplies and standby batteries.
   g. Interfaces and cabling.
   h. Intercoms.
   I. Client Workstations

D. Intercom Equipment:

1. Furnish, install, and test intercom system equipment at designated Airport locations as shown on the drawings.

2. The new intercom system equipment shall provide audio-visual communication consisting of the following major components:

   a. Flush mounted audio-visual door station.
   b. Master audio-visual station

## 1.6 DESIGN REQUIREMENTS

A. General:

1. Ensure that all security equipment and related materials and colors to be installed in public occupancy areas are to coordinated and approved by Owner prior to installation.

B. Access Control and Alarm Equipment:

1. Designated doors, as shown on the drawings, shall be provided with new access control card readers, request-to-exit (REX) devices, electric locks and time-delay exiting hardware, and intrusion detection door alarm contacts. When persons use their assigned access control card credentials at designated and authorized doors, the electric locks shall be released and alarm contacts shunted to permit entry. Use of REX devices shall release electric locks and shunt alarm contacts to permit authorized passage through the portal.

2. All access control card readers, electric locks and time-delay exiting hardware, REX devices, and door alarm contacts shall be linked to designated and new Security Control Panels.

3. Alarm horns shall be integrated within the Airport's security system. When an alarm is annunciated at a specific door, an authorized access control card holder shall be able to silence the alarm when presenting a valid card at that door.

4. The new access control card readers and SCPs shall conform to existing card reader equipment and be interfaced with the Airport's access control system.

5. All doors provided with delayed egress release exiting equipment shall be interfaced with the fire alarm system.

6. All wall mounted card readers shall not exceed 45 inches AFF and installation shall comply with ADA requirements.

7. Data signals to and from the designated doors shall be linked to new SCPs. The SCPs shall receive downloaded programming information from the Airport's existing access control CPU. The SCPs shall also transmit door activity data to the Airport's access control CPU.

8. Communications between the existing access control CPU and new Security Control Panels (SCP) shall be full duplex. Loss of a channel shall annunciate a communications failure alarm at the Airport Operations Security Control Center.

9. Security Contractor shall coordinate the locations of all door power supplies and Johnson Controls, Inc. S300-RDR2 panels with Owner.

10. All overhead roll-up doors, bag belt doors and loading bridge doors shall be provided with extended alarm shunt capabilities. The alarm shunt time shall be adjustable from 30 minutes to eight (8) hours.

C. Intercom Equipment:

1. Provide audio-visual communication between designated doors and master stations.

2. Provide door release controls from the master station to designated doors.

D. Cabling:

1. Cabling shall comply with Owner's standards and meet the manufacturer's minimum requirements for the device(s) served by each cable type.

2. Cabling shall be sized to provide 95% of the source voltage at each device when operating at its maximum amperage.

## 1.7 SUBMITTALS

A. General:

1. Submit color samples of all equipment items and materials.

B. Access Control and Alarm Equipment:

1. Shop drawings:

a. Provide shop drawings that are applicable and pertain to access control and alarm system provisions.

2. Installation drawings:

a. Block diagram.
b. Connection of all new access control and alarm equipment with new Security Control Panels (SCPs), including block diagrams and wiring diagrams.
c. Connection of new SCPs with the existing access control CPU, including block diagrams and wiring diagrams.
d. Details of connections to power sources, including primary and secondary power supplies, uninterrupted power supplies, and grounding.
e. Details of surge protection device installation.
f. Equipment mounting details.
g. Details of interconnections with the new and existing intrusion detection and CCTV equipment.
h. Details of interconnection to data transmission media and data communication network including all hardwire and fiber optic systems.

3. Manufacturers' Data:

a. Security Control Panels.
b. Card Reader devices.
c. REX devices and related interfaces.
d. Electric locks and Time-Delay exiting hardware and related interfaces.
e. Door alarm BMS contacts and related interfaces.
f. Alarm horns and related interfaces.
g. Uninterruptible power supplies.
h. Any other equipment installed as part of the system.

4. Manuals:

    a. Equipment.
    b. Operation.
    c. Maintenance.

C. Intercom System:

1. Shop Drawings

    a. Provide shop drawings that are applicable and pertain to the intercom system provisions.

2. Installation Drawings

    a. Drawings shall be provided which show mounting details for all intercom system equipment.

3. Provide Manufacturers' data, including technical descriptions and catalog cuts.

4. Manuals.

    a. Equipment.
    b. Operation.
    c. Maintenance.

## 1.8 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of all security equipment and related furnishings.

B. Revise shop drawings to reflect actual installation and operating functions.

C. Contractor shall provide Owner with two (2) sets of Project Record Drawings. These drawings shall be reproducible prints that accurately reflect the equipment as installed. The drawings shall be size E. Owner agrees to provide to Contractor one (1) set of reproducible architectural drawings for the site affected by the work.

## 1.9 QUALIFICATIONS

A. Contractor Qualifications: Engage an experienced installer who is a factory-authorized service representative to perform the work of this Section.

## 1.10 REGULATORY REQUIREMENTS

A. Conform to Federal ADA requirements for provisions for the physically handicapped.

B. Conform to all Federal, State, and Municipal Building Codes and all other authorities having jurisdiction.

## 1.11 SEQUENCING AND SCHEDULING

A. Coordinate with other crafts and disciplines to support the construction schedule.

## 1.12 DELIVERY, STORAGE AND HANDLING

A. Do not store security system equipment at the site.

B. All security system equipment shall be protected from dust, damage, and other construction site hazards during installation.

## 1.13 ENVIRONMENTAL REQUIREMENTS

A. All security system equipment items shall be free of all Radio Frequency Interference (RFI) and Electro Magnetic Interference.

## 1.14 WARRANTY

A. Warranty Requirements: In accordance with General Conditions.

B. Maintenance Requirements During Warranty Period:

The following requirements shall apply to the Contractor responsible for performing security equipment related maintenance services of all items covered under warranty:

1. Major System Failures: Contractor's maintenance personnel shall respond to all system failures within two (2) hours from the time Owner attempts to notify the designated Contractor representative that remedial maintenance for the failures is required. All failures shall be corrected within eight (8) hours of the arrival on site of Contractor's maintenance personnel. For the purpose of this contract, failures are defined as follows:

    a. Complete failure of the components controlling the system security equipment or interfacing with existing system equipment.
    b. Complete or partial failure of a SCP, resulting in the loss of monitoring or reporting capability.
    c. Complete failure of the security equipment, resulting in loss of all system capability.
    d. Failure of security equipment, resulting in loss of use of installed access control stations (Card Readers).

2. Minor System Failures

    a. All other failures shall be considered minor failures. Contractor's maintenance personnel shall respond on-site to all minor system failures within four (4) hours from the time Owner notifies or attempts to notify the designated Contractor representative that remedial maintenance for minor failures is required. Minor failures shall be corrected within twenty four (24) hours of the arrival on site of Contractor's maintenance personnel.
    b. Owner agrees to call a Contractor-provided telephone number to effect Contractor notification of maintenance problems. Owner shall make

reasonable repeat attempts to make notification. However, response time requirements shall be measured from the time of the first attempt by Owner to notify Contractor.

3. Spare Parts:

a. Maintain an inventory of security equipment spare parts, materials, consumables, and any other system item in order to meet the specified warranty maintenance requirements and keep the security equipment in a continuous operational mode during the warranty period.

## 1.15 MAINTENANCE SERVICE

A. Furnish service and maintenance of the security system equipment and related components for one year from date of Completion. Contractor shall provide separate, written maintenance agreement to Owner upon Completion of the project covering the one-year maintenance requirements.

B. Examine security system equipment and related components semi-annually. Clean and adjust equipment as required. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original equipment.

C. Provide emergency call-back service at all hours for this maintenance period.

D. Maintain locally, near the Place of the Work, an adequate stock of parts for replacement or emergency purposes. Have personnel available to ensure the fulfillment of this maintenance service, without unreasonable loss of time.

E. Perform maintenance work using competent and qualified personnel, under the supervision and in the direct employ of the Security Contractor.

F. Maintenance service shall not be assigned or transferred to others.

## 1.16 EXTRA MATERIALS

A. No extra materials are to be provided under this contract.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. Access Control System Equipment – Johnson Controls, Inc.

B. Intrusion Detection Equipment – Sentrol, Inc. or approved equal.

C. Motion Detection Equipment – Bosch DS938Z or approved equal.

D. PIR REX device – Detections Systems DS150i or approved equal.

E. Door Control Equipment – SDC Security Door Controls or approved equal

F. Intercom Equipment – Aiphone or approved equal.

G. Wire and Cable – West Penn or Belden.

H. UPS – Powerware or APC.

I. KVM Switch – HP, Blackbox or approved equal.

## 2.2 MATERIALS

A. Color and Finish Selection:

B. In all public areas and in all other areas visible from public areas or from the exterior of the building, colors and finishes shall match the custom color and finish samples on file with Owner. In all other areas, colors and finishes shall be selected by Owner from the manufacturers' standard color and finish schedule. For such areas, submit manufacturer's standard color and finish schedule(s).

## 2.3 EQUIPMENT

A. Electronic Security Equipment:

1. Security Control Panels :

a. General:

1) The communication protocol shall be compatible between the Security Control Panels (SCP), their associated security equipment terminal devices, facility interfaces, and the CPU.
2) The SCPs shall interface with facility interface devices. Life safety functions on emergency doors shall be preserved.
3) SCPs shall interface with facility security devices as identified in this specification.

b. The SCPs shall contain an eight (8) hour UPS. The UPS shall be provided as a separate unit mounted in a separate enclosure with required stand-by batteries.

c. The SCPs shall be Card Key Model SK721-A Intelligent Network Controllers.

2. System Card Readers:

a. Card reader devices shall be installed at locations as shown on the drawings. The card readers shall be connected to Johnson Controls, Inc. S300-DIN-RDR2SA panels. The card reader/S300-DIN-RDR2SA devices shall include the following requirements:

1) Card readers shall be a complete card access station. The readers shall be of the smartcard or proximity type, with or without

fingerprint identification and with or without (PIN) Personal Identification Number.

2) Card readers shall be capable of being integrated with the alarm subsystem such that a valid access control card credential results in the credential holder being granted ingress/egress as appropriate. Any attempt to force open doors or tampering with security devices, shall result in an alarm annunciation and create a record in the history file.

3) Tamper switches shall be provided for each SCP. The switches shall annunciate an alarm whenever the SCP access cover is opened or removed.

4) Card readers shall monitor the door via the ACS.

5) Card readers for doorways shall be mounted onto walls. Weather protection shall be provided by Contractor for each card reader installed in an exposed location. Any mounting of card reader, in a surface fashion, shall first be approved by Owner.

b. System Interface Requirements:

1) Card reader/S300-DIN-RDR2SA shall provide a signal that is compatible with SCP signal requirements. Card readers shall interface with SCPs, and the existing access control CPU application software, and database.

c. Performance Requirements

1) Card readers shall be able to operate in areas of high EMI/RFI emissions. Specifically, equipment shall be unaffected and fully functional in an airport environment that includes radio and radar emissions from airport and aircraft equipment, especially from aircraft operating on ramp areas.

2) Communications protocol shall be compatible with each SCP.

3) The card readers shall have a visual indicator display.

4) The card readers shall respond to passage requests by generating a signal to the SCPs.

5) Card reader/S300-DIN-RDR2SA shall be interfaced, as shown in the drawings, with the electric locks, request-to-exit (REX) devices, time-delay exiting hardware, and alarm contacts under this contract as specified in Section 08712, Door Hardware.

6) The card readers shall be BQT Solutions MiPass Series 5 or 7 smart card contactless reader on all Priority 1-4 doors as applicable. BQT Series 5 shall be used on all Priority 4 doors and select Priority 3 doors as applicable. BQT Series 7 shall be used on all Priority 1 and 2 doors and select Priority 3 doors as applicable. Sagem Morpho MA500 or MA500W Biometric reader with integral smart card contactless reader shall be used on all Priority 0 doors. Sagem Morpho MA500 shall be used on all interior Priority 0 doors and Sagem Morpho MA500W shall be used on all exterior Priority 0 doors.

7) The terminal interface shall be Johnson Controls, Inc. S300-DIN-RDR2SA with an eight (8) hour UPS. Emergency power will serve as primary power source, a separate UPS shall be provided for stand-by power purposes.

3. Magnetic Switches:

   a. Magnetic Switches shall provide a signal that is compatible with SCP signal requirements.

   b. Operation:
      1) The switches shall consist of a switch assembly and an actuating magnetic assembly. The magnet assembly shall house the actuating magnet. Each switch mechanism shall be provided with an over current protective device, rated to limit current to 80 percent of the switch capacity. Switches shall be rated for a minimum lifetime of one million operations.
      2) The housings of surface mounted switches and magnets shall be made of nonferrous metal and shall be weatherproof. The housings of door recess mounted switches and magnets shall be made of nonferrous metal or plastic.
      3) Spacers shall be nonferrous material.
      4) Exposed fasteners shall be tamper resistant.

4. 360 degree Motion Detector:

   a. Motion Detectors shall be furnished and installed at exterior locations as shown in the drawings and interfaced with the access control system.

5. Alarm Horns:

   a. Alarm horns shall be furnished and installed at interior and exterior locations as shown in the drawings and interfaced with the appropriate door alarm contacts. The alarm horns shall be vandal resistant. When mounted at exterior locations, the alarm horns shall be capable of withstanding weather conditions to include but not be limited to humidity, rain, snow, and ice.

   b. The alarm horns shall be integrated within the Airport's security system. When an alarm is annunciated at a specific door, an authorized access control card-holder shall be able to silence the alarm when presenting a valid card at that door.

6. Intercom Equipment:

   a. System Configuration:

      1) Configure the system as described and shown. The system shall be fully functional and configured for the requirements of the site.

b. Intercom Locations:

1) Intercoms shall be installed at locations as shown on the drawings.

c. System Performance Requirements:

1) Door locations shall communicate with the Master station. A chime shall sound at the master station and a color video picture of the caller shall be displayed.
2) The door shall be unlocked by depressing the door unlock button on the Master station. This shall be connected to a 12VDC relay that shall activate the request-to-exit function of the card reader at the door.

7. Wire and Cable:

a. Provide all wire and cable. All wire and cable components shall be able to withstand the environment the wire or cable is installed in for a minimum of 20 years.
b. RG 59/U coaxial signal cable shall have shielding which provides a minimum of 95 percent coverage, a solid copper center conductor of not less than 22 AWG, polyethylene insulation, and a non- contaminating polyvinyl chloride (PVC) jacket. RG 11/U coaxial cable shall have shielding which provides a minimum of 95 percent coverage, with center conductor of 18 AWG or larger polyethylene insulation, and a non- contaminating PVC jacket.
c. Interconnecting cable carrying digital data between equipment located at the Security Control Center or at secondary control/monitoring sites shall be not less than 22 AWG and shall be stranded copper wire for each conductor. The cable or each individual conductor within the cable shall have a shield that provides 100 percent coverage. Cables with a single overall shield shall have a tinned copper shield drain wire. Plenum or riser cables shall be ANSI-C2 CL2P certified.
d. Low voltage conductors (50 volts and less) shall be of solid, soft drawn copper, with PVC insulation having a nominal thickness of not less than 1/32 of an inch and conforming to NFPA 70. Cable conductors shall be no smaller than l8 AWG. Cables shall be twisted pair construction. The cable or each individual conductor within the cable shall have a shield that provides 100 percent coverage. Cables with a single overall shield shall have a tinned copper shield drain wire. Plenum or riser cables shall be ANSI-C2 CL2P certified.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Survey all existing security and fire/life safety provisions to determine system interfacing requirements.

B. Examine the existing access control system to determine the presence of additional ports to support new access control requirements. If new ports are required, furnish, install, and test the additional ports.

C. Inspect the jobsite and survey the conditions to be encountered during performance of the work. This shall be accomplished prior to starting the work. Failure of Contractor to become familiar with the site conditions shall not relieve Contractor of responsibility for full completion of the work in accordance with the contract provisions.

D. Verify that all conduit, wires, cables, security equipment are installed and ready for connection and integration with the rest of the system.

E. Examine area to be protected and verify that environmental characteristics will not affect effective communication and interfacing. Report observed problems in writing.

F. Determine that power supplies, conduit, wires, cables, connections, and equipment are ready for installation and interfacing before attempting installation.

G. Check all power and communications cabling for continuity before making connections.

H. Visually inspect each piece of equipment, determine defects, and correct.

I. Make arrangements through Owner and inspect locations where installation work will be performed. Verify that conditions found are in accordance with drawings and are acceptable for Contractor's installation work. Report any discrepancies in writing to Owner, stating suggested means of correction. As may be required, inspect existing inside and outside cable plant to determine system runs and interface conditions. Coordinate with OWNER to establish interfaces.

## 3.2 PREPARATION

A. Arrange for temporary electrical power for installation work and testing of security system components.

## 3.3 INSTALLATION

A. Compliance:

1. Install the equipment in accordance with the contract documents, all applicable codes and standards and the Manufacturer's written instructions. The installed system shall meet all applicable equipment and performance requirements.

B. Standardization:

1. Standardize the installation practices and material to provide uniform materials and procedures to the maximum extent possible.

C. Locations:

1. Locate pull boxes, wire-ways or other items requiring inspection, removal, or replacement conveniently and accessibly with reference to the finished facilities.

D. Electrical Service:

1. Installation of electrical service to equipment shall conform to specific UBC Codes and Standards, NFPA 70, and other applicable requirements.

E. Electrical Equipment Inspection:

1. Provide electrical equipment inspection in accordance with NEMA PB 2.1 Part VII.

F. Installation Requirements:

1. Install all system components, including furnished equipment, and appurtenances in accordance with the manufacturer's instructions, and as shown, and shall furnish all necessary interconnections, services, and adjustments required for a complete and operable system as specified and shown. Control signal, communications, and data transmission line grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.

2. Install the security system equipment in accordance with the standards for safety, NFPA 70, UL 681, UL 1037 and UL 1076, and the appropriate installation manual for each equipment type. Components within the system shall be configured with appropriate service points to pinpoint system trouble in less than 20 minutes.

3. All wiring, including low voltage wiring outside the control console, cabinets, boxes, and similar enclosures, shall be installed in rigid galvanized steel conduit conforming to UL 6 (when outdoors), or electric metallic tubing (EMT) when indoors. Minimum conduit size shall be 3/4 -inch. All other electrical work shall be as specified with electrical specifications and drawings that are part of the contract document and as shown. Grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.

   a. Detailed shop drawings shall be provided as part of the submittal process. The shop drawings shall include, but not be limited to exposed conduit and devices, including hangars, brackets, back boxes and related equipment.

4 All equipment connected to alternating current circuits shall be protected from power line surges. Equipment protection shall meet the requirements of ANSI C62.41. Fuses shall not be used for surge protection.

5. All inputs shall be protected against surges induced on device wiring. Outputs shall be protected against surges induced on control and device wiring installed outdoors and as shown. All communications equipment shall be protected against surges induced on any communications circuit. All cables and conductors, except fiber optics, which serve as communications circuits from the existing access control

CPU to field equipment, and between field equipment, shall have surge protection circuits installed at each end. Protection shall be furnished at equipment, and additional triple electrode gas surge protectors rated for the application on each wire-line circuit shall be installed within 3 feet of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following two wave-forms:

a. A 10 microsecond rise time by 1000 microsecond pulse width wave-form with a peak voltage of 1500 volts and a peak current of 60 amperes.
b. An 8 microsecond rise time by 20 microsecond pulse width wave-form with a peak voltage of 1000 volts and a peak current of 500 amperes.

8. Calibrate all equipment.

9. Inspect each component, determine obvious defects, and correct.

10. All electrical work shall be in accordance with Section 16000.

11. Test ground rods in accordance with IEEE No. 142.

12. Perform tests as recommended by manufacturer or as required to ensure the security equipment is operating properly and meets specified requirements.

13. Correct all deficiencies detected and retest affected components.

14. Record test data, tabulate, and write narrative describing tests, results, deficiencies found, corrective measures, and results of retesting. Certify that the security equipment has been tested and is ready for performance verification testing.

15. Use Permanent Room Numbers as indicated on the Room Finish Schedules for construction period identification of rooms and building spaces. All required shop drawings and submittals, including manuals and Project Record Drawings shall identify rooms and spaces using the Permanent Room Numbers. Permanent identification devices including signage, equipment nameplates, and panels shall use the Permanent Room Numbers.

16. Coordinate delays egress emergency exist hardware requirements with Division 8.

G. Marking:

1. Equipment Name Plates: The following requirements shall apply:

a. General. Attach a permanent, corrosion-resistant name plate to each equipment component showing the manufacturer's name, address, serial number and equipment rating. Each name plate shall be clearly visible on the exterior of equipment. Components located within equipment enclosures shall also be provided with name plates.
b. Location and Fastening. Provide nameplates to identify all equipment components. Provide each panel assembly with a name plate on the interior of equipment enclosures, indicating number of equipment and unit

of assembly. Fasten name plates securely with slotted stainless steel screws. The use of adhesive for fastening name plates will not be permitted.

2. Control and Display Labels:

a. Use. Each control, display and any other item of equipment that must be located, identified, read or manipulated shall be appropriately and clearly labeled to permit rapid and accurate identification of its operating state of position.
b. Orientation. Orient labels and information thereon horizontally so that they may be read quickly and easily. Vertical orientation shall be used only where space is limited.
c. Locations. Locate labels so that there is no confusion as to which item they identify. Labels shall not obscure any other information required by the operator. Controls shall not obscure labels. The location of labels shall be consistent.

## 3.4 FIELD QUALITY CONTROL

A. General:

1. Conduct an Installation Test and total Acceptance Test upon completion of equipment installation. Testing shall be coordinated as necessary, to demonstrate that all interfaces have been successfully implemented.

B. Installation and Acceptance Test Procedures and Reports:

1. General: Installation and acceptance tests shall be conducted in the normal operational environment to the maximum extent possible. The tests shall represent operation in the normal mode in which each system will operate. If interfaces are incomplete, provide simulation of those interfaces so that the system may be tested as a complete and stand-alone entity. Perform all equipment repair and/or adjustment that may be required during acceptance testing.

2. Availability Tests: Installation and acceptance testing shall include conducting individual availability tests for each equipment item. Requirements for availability tests are as follows:

a. Availability shall be determined in accordance with Quality Assurance procedures, except for the test duration as specified herein.
b. The availability tests shall consist of the equipment being operated as a complete stand-alone entity with the exception that incomplete interfaces may be simulated. In all other respects, the equipment shall be operated in the mode that would normally prevail.
c. The duration of each availability test, as a minimum, shall consist of a 5 day period with the availability ratios of 100% being met or exceeded over the total period.
d. Demonstration of equipment reliability shall be accomplished as part of, and in support of, availability testing. This demonstration shall verify that

predicted reliability has been realized by measured Mean Time Between Failure (MTBF).

e. Demonstration of equipment maintainability shall also be accomplished as part of, and in support of, availability testing. In this demonstration, verify that the objectives of the maintainability program have been realized by measured Mean Time To Repair (MTTR). The maintainability demonstration shall include preparation and use of a failure log.

f. Equipment preventive maintenance or service shall be excluded from measurement of maintainability. However, Contractor shall conduct at least one period of preventive maintenance during availability testing to demonstrate compliance with the maintenance plan.

g. Submit availability test reports to Owner for review. Test reports shall include tabulations of MTBF and MTTR.

C. System Commissioning:

1. General: Contractor shall be responsible for ensuring that the installation and related interfaces is completed and operational at least thirty (30) days prior to scheduled beneficial occupancy. In the event the installation and related interfaces is not completed and operational by the scheduled beneficial occupancy date, Contractor shall establish and submit a security plan to Owner that complies with FAR Part 107.14 and related Owner security requirements. The security plan shall be submitted to Owner and FAA for approval. The security plan, revisions, and security measures to be deployed until such time the new security equipment is completed and operational shall be at Contractor's expense.

   a. After all installation and acceptance test requirements specified have been complied with, the equipment shall be commissioned. After commissioning has been completed, Owner will take possession of the equipment and utilize it in accordance with the conditions described in the contract documents.

2. Prerequisites To System Commissioning:

   a. Outstanding work items that may exist, such as facility interfaces, project record drawings, and/or in-process change orders, shall be documented and submitted to Owner for review prior to start of equipment commissioning. Documentation of outstanding work items shall take the form of punch lists of critical action items lists that describe the work, the expected completion schedule, and the impact upon operation. Depending upon the nature of the outstanding work item, Owner may grant a waiver to accomplish partial commissioning of any of the equipment. Completion of waived outstanding work items shall then be assigned to the post-commissioning operations and maintenance.

3. Commissioning Procedure:

   a. The commissioning procedure shall be witnessed by Owner. The commissioning procedure shall be conducted by Contractor and shall consist of a detailed inspection, and physical accounting of each

equipment item. An operational demonstration shall then be conducted in which the equipment shall function in the normal operational mode, and shall operate completely error-free in terms of hardware and software performance. Occurrence of any equipment failure shall terminate the demonstration. The demonstration shall restart and run for a period of time designated by Owner after the failure has been corrected. Except for any outstanding work items as previously described, this shall complete the commissioning procedure.

## 3.5 OPERATIONS AND MAINTENANCE DOCUMENTATION

Provide Owner with applicable Operations and Maintenance (O&M) manual(s) that describe the equipment installed under this contract. The O&M manual(s) shall, as a minimum, consist of an operations section, a maintenance section, and a drawings section when necessary.

A. Documentation: Except as otherwise specified, all documentation shall contain sufficient written text and illustrations necessary to present a full description of the equipment, including an overview, concept of operation and/or maintenance, operating instructions using all functions and capabilities, and interfaces with other systems/subsystems. The requirements are as follows:

1. System Description:

a. Describe as Installed. Fully describe the equipment as installed. Present a complete, organized, and comprehensive overview of the entire equipment. Information presented shall include, but not be limited to the following:

1. Equipment overview description, theory of operation.
2. Overview of recommended equipment operating policies.
3. Summary plans, layouts, and block diagrams, as appropriate.
4. Interrelationships overview of each item of equipment with other systems and subsystems, equipment, utilities, or other installations.
5. Significant characteristics of the equipment.
6. Other information, as necessary, to achieve a thorough understanding of the operation of the equipment.

b. Equipment Functions. Provide a full and comprehensive discussion of the function of each primary item of equipment.

c. Equipment Illustrations. Provide line drawings, renderings or photographic illustrations of each item of equipment. Illustrations shall include assemblies, subassemblies, and major components. All operating features shall be clearly identified by name and location on the equipment.

d. Special or Non-Standard Installations. In situations where off-the-shelf items of equipment are combined into special or non-standard installations, provide separate sections containing complete operation related information for each non-standard or specialized configuration of equipment as installed.

e. Operating Instructions. Operating instructions shall be clear, simple, and concise for each item of equipment to be used by operating personnel for day-to-day operation. It shall be in such format that photocopy of operating instructions for the item of equipment could be provided to operation for use. Operating instructions shall consist of:

1. Warning Information. Provide emergency or special warnings, instructions and procedures pertaining to the equipment.
2. System Operation. Provide sequential, step-by-step instructions on how to properly perform all operational tasks and procedures associated with equipment operation, in any mode, under both normal and abnormal and emergency conditions. Also, instructions on how the operator may test the equipment to verify correct operation, detect and identify malfunctions, and return the equipment to normal operation.
3. Equipment Performance. Provide equipment operational limitations and how it shall be operated to obtain the best performance. If applicable, also provide instructions on how to modify equipment performance to suit individual needs or conditions.

f. Drawings. Provide all drawings, illustrations, and equipment related reference materials not provided elsewhere within the manual(s). This documentation shall be assembled in the manner specified herein, shall be listed in Table of Contents, and shall contain the following information as a minimum:

1. Mechanical drawings showing dimensions.
2. Schematic drawings and diagrams for each item of equipment.
3. Equipment schematic drawings.
4. Contractor shall ensure that the latest project record drawings are incorporated in all final copies of manuals as part of the Completion of Work; and shall update these in all copies to reflect any changes made during Maintenance.
5. Interface drawings.
6. Other related documentation.

## 3.6 PROTECTION

A. Fragile Items:

1. Handle any fragile items with care using protective coverings to avoid damage to sensitive instrument relays, and other devices, and to avoid contamination by dirt and debris.

B. Weather and Construction Protection:

1. During installation, provide adequate temporary dust and weather protection for all equipment. Reinstall covers each time any adjustments are made on the equipment.

2. Field mounted instruments and accessories shall be properly protected.

## 3.7 SCHEDULES

A. Verify schedules and the commissioning date in which work will be performed. Immediately bring to the attention of Owner any schedule slippage or change in start-up/ commissioning date that will affect Contractor's schedule.

**END OF SECTION 13110**