



ADDENDUM #3:

DATE: August 14, 2019

JOB: Fayetteville Regional Airport – Airline Terminal Improvements – Part 2; APN 1808

OWNER: City of Fayetteville

ARCHITECT: Gordon Johnson Architecture

The following items or modifications to the original Plans and Specifications shall be included as part of the contract work. All General Provisions, Supplemental General Provisions, or Project Special Provisions shall remain as originally specified unless otherwise noted herein.

Respective Bidders shall include the provisions of this Addendum in their proposal and shall make a notation in the proposal that these provisions have been included.

GENERAL

- 1) No new items.

PROJECT MANUAL

- 1) **Section 05311 Steel Decking** – Delete all references to “acoustical decking” from this and all sections.
- 2) **Sections 238216, 275116, 281500, & 282000** – See attached revised specifications sections and RMF Engineering write-up dated August 14, 2019 for a description of all specifications changes.

DRAWINGS

- 1) **Sheet A3.04** – This drawing has been reissued (attached).
- 2) **Sheet A3.05** – This drawing has been reissued (attached).
- 3) **Sheet A4.01; Detail 2** – Note stating toilets to remain will be removed and reinstalled to facilitate installation of new in-wall plumbing and new wall finishes. New terrazzo flooring will also replace tile flooring to be removed. Terrazzo flooring at toilet room entry area is to remain.
- 4) **Sheets S0.01, S0.03, S1.01, S1.02, S1.03, S5.00, S6.00, S7.01, S8.00, & S8.11** – Note clouded revisions on these structural drawing sheets (attached).
- 5) **Sheets P, M, E, & T** - See attached RMF Engineering write-up dated August 14, 2019 for a description of all drawing changes. All drawing changes are identified with clouds and revision dates (attached).

End of Addendum #3



RMF Engineering
Reliability. Efficiency. Integrity.

August 14, 2019

Gordon Johnson Architecture
654 Hay Street, Suite 4
Fayetteville, NC 28301

Attention: Mr. Gordon Johnson

**Reference: Fayetteville Regional Airport
Airline Terminal Improvements – Part 2**

Dear Mr. Johnson:

Please include the following items in Addendum No. 3 for the referenced project:

Substitution Requests

1. Dunham Bush is an acceptable manufacturer of central station air handling units pending compliance with the drawings and specifications.
2. Patterson Kelley is an acceptable manufacturer of condensing boilers pending compliance with the drawings and specifications.
3. Grooved steel piping systems are an acceptable alternative for chilled and heating water piping in the mechanical rooms only and in compliance with appropriate specification sections. Acceptable manufacturers are Anvil, Victaulic, Gruvlok, Grinnell and Anvil. System layouts along with product layouts will require approval prior to installation.

Contractor Questions

1. There are three horizontal air handlers presently installed above the corridor between the main terminal and the new terminal. Those units are not shown on the demolition drawings. Also those units are installed ABOVE a bunch of conduit and chilled water piping. The new chilled water and hot water piping does not connect with those units. What are we to assume? Removing those units, piping and duct work will be very expensive. What areas are they presently serving? The new plan omits them.
Response: Drawings are being provided in this addendum showing the removal of these units.
2. In the bid documents we didn't find any allowances for temporary heating or cooling. The present mechanical room will be completely gutted during this process. What are the procedures for shutting down areas in the airport? Does the mechanical engineer have a plan for how we should complete this work? At some point in this project either temporary chillers or boilers will need to be installed to keep the

airport in operation. Also, if any temporary is required, will it need to be tied to emergency power?

Response: Conditioned air will be temporarily supplied from the older 2nd floor rooftop unit. Temporary ductwork will pass from the existing spiral duct through the existing escalator area and connect to ductwork within the ceiling of the baggage claim area. Similarly, the ticketing wing will be temporarily conditioned by the existing HVAC unit serving that area of the building.

3. There are new chemical pot feeders specified in section 23 21 13. The pot feeders were replaced under Part 1. Are these to be replaced in Part 2?

Response: The contractor may salvage the existing pot feeders for re-use in Part 2. However, if the pot feeders and their associated components become damaged during construction, the contractor shall replace them at no cost to the owner.

4. There is no spec for outdoor duct insulation in 23 07 13 if any of that will be required.

Response: We are not showing outdoor ductwork on the plans.

5. Drawing M7.01 – Mechanical Schedule Indicates that AHU-1 is a VAV AHU with 2” ESP. Shouldn’t that be 4” supplying air to the VAV boxes?

Response: The calculated external static pressure is 2”; however, the ductwork from the AHU to the VAV terminals should be constructed to 4” pressure class.

6. Specification section 233113 – Metal ducts on page 13 indicates that the pressure class of 2” for supply ducts connected to VAV AHU’s to VAV boxes. Shouldn’t that be 4” pressure class for that duct?

Response: Correct, ductwork from the AHU’s to the VAV terminals shall be constructed to 4” pressure class.

7. Specification section 233113 – Metal Ducts does not have a section for the flat oval duct shown on the mechanical drawings.

Response: Flat oval ducts shall be constructed to round duct specifications. Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

8. Drawing E6.02 indicates the new generator is to be interconnected to the existing generator. The future generator underground conduits that was installed in part 1 were installed in the same electrical trough on the exterior wall of D109 as the existing generator conduits. Also part 2 drawing E6.02 does not show electrical room D107B which has the future ATS (1B-ATS-SB2) that was installed in part 1 drawing E6.02 rev 16 dated 12-3-18. Please confirm if the intent is for the new generator to serve ATS (1B-ATS-SB2) in electrical room D107B. if not, please provide details on how to interconnect Gen-2 to Gen1.

Response: The new second generator for this contract will be fully paralleled with the existing generator.

9. The circuits feeding the removed pole lights continue through to the remaining parking lot poles. Are there any details or drawings showing what and how to re-route the circuits to keep the existing parking lot lights to remain operational?

Response: Contractor shall coordinate with the civil drawings. How to keep existing-to-remain parking lot lights operational is a means and methods item and must be determined by contractor.



10. The existing camera system is located in room E218 and the existing PA system is located in room B121. Will these systems move to secure areas?
Response: The PA system headend will relocate to room B130. The camera system will relocate to a lockable cabinet in room B130.
11. Where will the new camera and public address wiring terminate to the head-end electronics?
Response: The camera wiring will terminate in a dedicated patch panel and will utilize the backbone cabling to communicate. The public address cabling will utilize the airport's IP network to communicate. Refer to specifications and details on the T-series drawings.
12. Some of the panels schedules show the AIC rating to be 100,000. Currently the max AIC rating that was required in part 1 was 65,000. Please confirm if the panels listed at a AIC rating of 100,000 are necessary or if they can be reduced to 65,000.
Response: Panel AIC rating can be reduced to 65,000 where indicated on revised panel schedules.
13. Please confirm if new parking lot lighting will be installed back in the locations of the demoed lighting shown on Drawing C1.0 Note 16. We are not able to find any notes where new lighting will be installed or if the demoed lights are to be re-installed. Please confirm the intent for the lighting in this area
Response: Contractor shall coordinate with civil drawings for locations of demo and new lighting locations. Lights to be removed in areas affected by site renovations are to be reinstalled where possible on new pole bases. Locations of pole bases shall be coordinated with civil drawings.
14. Under Section 28 Section 2.3, the card readers listed are not compatible with the current Johnson Controls P2000 system nor the soon to be upgraded P2000 V5 system.
Response: Card readers and other specified access control devices shall be compatible with the upgraded Johnson Controls system.
15. Under Section 282000 the Video Surveillance system appears to be specifying an analog system with DVR's instead of expanding the recently installed, IP based, Johnson Controls P2000 VMS system.
Response: Video surveillance system shall be compatible with the Johnson Controls system.

Fire Protection Specifications

1. N/A.

Plumbing Specifications

1. N/A.

HVAC Specifications



1. 238216 – Air Coils
 - a. Added specification for the added electric duct heater.

Electrical Specifications

1. N/A.

Telecommunications Specifications

1. 275116 – Public Address Systems
 - a. Revise requirements for spare products to be submitted.
 - b. Revise system description.
 - c. Add requirements for speakers.
 - d. Remove sections of public address systems that do not directly apply to this project.
 - e. Add requirements for labeling.
2. 281500 – Access Control Hardware Devices
 - a. Revise system description.
 - b. Add requirements to integrate with existing Johnson Controls system.
 - c. Remove sections of specifications that do not directly apply to this project.
 - d. Updated current editions of standards.
 - e. Add requirements for labeling.
 - f. Remove references to cable management software.
3. 282000 – Video Surveillance System
 - a. Revise system description.
 - b. Remove sections of specifications that do not directly apply to this project.
 - c. Updated current editions of standards.
 - d. Add requirements for labeling.
 - e. Define system as being IP-based vs analog.
 - f. Update required resolutions of cameras and screens.

Fire Protection Drawings

1. N/A.

Plumbing Drawings

1. P1.00A
 - a. Locations for SP-1 and SP-2 now shown in correct locations to match the PD

Piping on sheet P1.01A and the foundation drawings.

2. P1.00B
 - a. Locations for SP-1 & SP-2 moved in order to match the piping on sheet P1.01A and the foundation drawings.
3. P1.00C
 - a. Location of SP-4 shifted away from building exterior.
4. P1.01C
 - a. Piping associated with SP-4 shifted to align with new location of SP-4

HVAC Drawings

1. MD1.01A
 - a. Existing AHU's are shown to be demolished, along with all associated ductwork and piping.
2. MD1.01B
 - a. Existing AHU's are shown to be demolished, along with all associated ductwork and piping.
3. MD1.01C
 - a. Existing AHU's B-12 and B-13 are now shown to be removed.
 - b. Drawing note 3 was added describing the removal and replacement of AHU's B-12 and B-13.
4. M1.01A
 - a. Select diffuser designations were corrected/modified.
 - b. Select ductwork upstream of VAV boxes was modified to show correct sizes.
 - c. Transfer duct sizes have been added.
5. M1.01B
 - a. Select diffuser designations were corrected/modified.
 - b. Transfer duct size for Office C101 has been added.
 - c. Duct sizes and supply grille designations have been added for Lounge B122, Electrical B126 and Electrical B127.
6. M1.01C
 - a. DSS-7 was added to Temporary Office D103. CU-7 has been located outside the space and requires two new 4" concrete bollards be added.
 - b. AH-B-12 & AH-B-13 have been replaced.
 - c. 3.5kW duct heater has been added.
7. M1.02A
 - a. Volume dampers have been added to the return ductwork in the office space area.

8. M1.02C
 - a. Volume dampers have been added to the return ductwork in the office space area.
9. M1.11C
 - a. Refrigerant and condensate piping has been added for DSS-7.
 - b. Thermostat location for DSS-7 has been added.
 - c. Piping connections to AHU-B-12 and AHU-B-13 have been added.
 - d. Thermostat location for 3.5kW duct heater has been added.
10. M7.01
 - a. AHU-B-12 and AHU-B-13 have been added to the air handling unit schedule.
 - b. DSS-7 and CU-7 have been added to the ductless split system schedule.
11. M7.02
 - a. Air device schedule was updated to show 6" wide liner slot diffusers.
 - b. Air device 133 & 134 have been added.
 - c. Air device 132 size was corrected.

Electrical Drawings

1. ED1.01C
 - a. Update drawing to show demolition work in temporary office area.
2. ED2.01C
 - a. Update existing work.
 - b. Show demolished air handling units.
3. ED2.02A
 - a. Update drawing to show additional demolition work and notes.
4. ED2.02B
 - a. Update drawing to show additional demolition work notes.
5. ED2.02C
 - a. Update drawing to show additional demolition work.
6. E1.01C
 - a. Update drawing to show additional scope in temporary office area.
 - b. Add connection for split system.
7. E1.02A
 - a. Update drawing to show corrected circuit numbers and notes.
8. E1.02B
 - a. Update drawing to show corrected circuit numbers and notes.
9. E1.02C
 - a. Update drawing to show circuits.

10. E1.11A
 - a. Update drawing to show lighting controls.
11. E1.11B
 - a. Update drawing to show lighting controls.
12. E1.11C
 - a. Update drawing to show additional scope in temporary office area.
 - b. Extend viewport and move note for rotunda lighting inside view.
13. E1.12A
 - a. Update drawing to show lighting controls and update lighting layout in conference room.
14. E1.12B
 - a. Update drawing to show lighting controls and update lighting layout as shown.
15. E1.12C
 - a. Update drawing to show lighting controls.
16. E6.02
 - a. Update riser diagram to correct panelboard sizes, feeders, and room names.
17. E7.01
 - a. Update schedule to show equipment connection changes as shown.
18. E7.02
 - a. Update lighting fixture schedule to show “not used” fixtures and update catalog numbers as shown.
19. E7.03-E7.06
 - a. Update all panel schedule to show additional spare breakers and to correct sizes.

Telecommunications Drawings

1. T0.01
 - a. Updated symbols and descriptions as they apply to this work.
2. TD1.02C
 - a. Show locations of current security rack, and define work to be done with said rack.
3. TP1.01B
 - a. Clarify that PA system headend is intended to be IP-based.
4. TP1.01C
 - a. Define location of local PA system equipment for Concourse B.
5. TP1.02A

- a. Show additional speaker locations.
- 6. TP1.02B
 - a. Show additional speaker locations.
- 7. TP1.02C
 - a. Define zoning of speaker locations.
 - b. Show wall-mounted gate microphones.
- 8. TY1.01A
 - a. Add cameras to interior and exterior of building.
 - b. Tag cameras with camera ID.
- 9. TY1.01B
 - a. Add cameras to interior and exterior of building.
 - b. Tag cameras with camera ID.
- 10. TY1.01C
 - a. Add access controls to Telecom Room D127.
 - b. Add general note to reroute existing camera cabling to Telecom Room D127.
- 11. TY1.02A
 - a. Add camera coverage where necessary.
- 12. TY1.02B
 - a. Add camera coverage where necessary.
- 13. TY1.02C
 - a. Add camera coverage where necessary.
 - b. Add general note to reroute existing camera cabling to Telecom Room D127.
- 14. TY1.02D
 - a. Add camera coverage where necessary.
- 15. T4.01
 - a. Revise size of airline cabinets.
 - b. Revise rack layout to more accurately represent intent.
- 16. T4.02
 - a. Sheet added, including enlarged plan of Telecom Room D127.
- 17. T5.01
 - a. Access control details added.
 - b. Access control details revised to more accurately represent intent.
- 18. T5.02
 - a. Add additional faceplate layouts.
- 19. T5.03
 - a. Add outlet box detail.
 - b. Add cable tray mounting detail.
- 20. T5.04



- a. Sheet added, including PA headend information.
21. T6.01
- a. Revised cable sizes and quantity of mounting hardware.
22. T6.02
- a. Sheet added to include security general notes and camera schedule.

Sincerely yours,

Teresa M. White
Electrical Designer

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

SECTION 238216 - AIR COILS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following types of air coils that are not an integral part of air-handling units:
 - 1. Hot-water.
 - 2. Chilled-water.
 - 3. Electric.
- B. Related Sections include the following:
 - 1. Division 23 Sections for air coils that are integral to air-handling units.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each air coil. Include rated capacity and pressure drop for each air coil.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which coil location and ceiling-mounted access panels are shown and coordinated with each other.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For air coils to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

1.5 PROJECT CONDITIONS

- A. Altitude above Mean Sea Level: 830 feet.

PART 2 - - PRODUCTS

2.1 WATER COILS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Aerofin Corporation.
 - 2. Carrier Corporation.
 - 3. Coil Company, LLC.
 - 4. Dunham-Bush, Inc.
 - 5. Heatcraft Refrigeration Products LLC; Heat Transfer Division.
 - 6. Super Radiator Coils.
 - 7. Trane.
 - 8. USA Coil & Air.
- B. Performance Ratings: Tested and rated according to ARI 410 and ASHRAE 33.
- C. Minimum Working-Pressure/Temperature Ratings: 200 psig, 325 deg F.
- D. Source Quality Control: Factory tested to 300 psig.
- E. Tubes: ASTM B 743 copper seamless, 0.75-inch diameter with a minimum 0.049 inch thick.
- F. Fins: Aluminum, minimum 0.010 inch thick.
- G. Headers: Seamless copper tube with brazed joints, with drain and air vent toppings prime coated.
- H. Frames: Galvanized-steel channel frame, for heating minimum 0.079-inch thick for slip-in mounting.
- I. Frames: ASTM A 666, Type 304 stainless steel for cooling, minimum 0.0625-inch thick for slip-in mounting.
- J. Hot-Water Coil Capacities and Characteristics: Refer to Schedules.
- K. Chilled-Water Coil Capacities and Characteristics: Refer to Schedules.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

2.2 ELECTRIC COILS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide one of the following:
 - 1. Brasch Manufacturing Co., Inc.
 - 2. Chromalox, Inc., Wiegand Industrial Division; Emerson Electric Company.
 - 3. Dunham-Bush, Inc.
 - 4. INDEECO.
 - 5. Trane.
- D. Coil Assembly: Comply with UL 1995.
- E. Heating Elements: Coiled resistance wire of 80 percent nickel and 20 percent chromium; surrounded by compacted magnesium-oxide powder in tubular-steel sheath; with spiral-wound, copper-plated, steel fins continuously brazed to sheath.
- F. Heating Elements: Open-coil resistance wire of 80 percent nickel and 20 percent chromium, supported and insulated by floating ceramic bushings recessed into casing openings, and fastened to supporting brackets.
- G. High-Temperature Coil Protection: Disk-type, automatically reset, thermal-cutout, safety device; serviceable through terminal box without removing heater from duct or casing.
 - 1. Secondary Protection: Load-carrying, manually reset or manually replaceable, thermal cutouts; factory wired in series with each heater stage.
- H. Frames: Galvanized-steel channel frame, minimum 0.064 inch thick for slip-in mounting.
- I. Control Panel: Remote mounted with disconnecting means and overcurrent protection. Include the following controls:
 - 1. Magnetic contactor.
 - 2. Mercury contactor.
 - 3. Toggle switches; one per step.
 - 4. Step controller.
 - 5. Time-delay relay.
 - 6. Pilot lights; one per step.
 - 7. Airflow proving switch.
- J. Refer to Division 23 Section "Instrumentation and Control for HVAC" for thermostat.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

- K. Thermostats: Wall-mounted thermostats, with temperature range from 60 to 90 deg F, and 2.5 deg F throttling range.
- L. Capacities and Characteristics: Refer to Schedules.

PART 3 - - EXECUTION

3.1 EXAMINATION

- A. Examine ducts, plenums, and casings to receive air coils for compliance with requirements for installation tolerances and other conditions affecting coil performance.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before coil installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install coils level and plumb.
- B. Install coils in metal ducts and casings constructed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."
- C. Install stainless-steel drain pan under each cooling coil.
 - 1. Construct drain pans according to ASHRAE 62.
 - 2. Construct drain pans to extend beyond coil length and width and to connect to condensate trap and drainage.
 - 3. Extend drain pan upstream and downstream from coil face.
 - 4. Extend drain pan under coil headers and exposed supply piping.
- D. Install moisture eliminators for cooling coils. Extend drain pan under moisture eliminator.
- E. Straighten bent fins on air coils.
- F. Clean coils using materials and methods recommended in writing by manufacturers, and clean inside of casings and enclosures to remove dust and debris.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

general arrangement of piping, fittings, and specialties.

- B. Install piping adjacent to coils to allow service and maintenance.
- C. Connect water piping with unions and shutoff valves to allow coils to be disconnected without draining piping. Control valves are specified in Division 23 Section "Building automation System," and other piping specialties are specified in Division 23 Section "Hydronic Piping."
- D. Connect refrigerant piping according to Division 23 Section "Refrigerant Piping."
- E. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- F. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Operational Test: After electrical circuitry has been energized, operate electric coils to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION 238216

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

SECTION 275116 - PUBLIC ADDRESS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Preamplifiers.
 - 2. Power amplifiers.
 - 3. Microphones.
 - 4. Volume limiter.
 - 5. Control console.
 - 6. Equipment cabinet.
 - 7. Telephone paging adapters.
 - 8. Tone generator.
 - 9. Noise-operated gain controllers.
 - 10. Microphone and headphone outlets.
 - 11. Conductors and cables.
 - 12. Pathways.

1.3 DEFINITIONS

- A. Channels: Separate parallel signal paths, from sources to loudspeakers or loudspeaker zones, with separate amplification and switching that permit selection between paths for speaker alternative program signals.
- B. VU: Volume unit.
- C. Zone: Separate group of loudspeakers and associated supply wiring that may be arranged for selective switching between different channels.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Power, signal, and control wiring.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

1. Include plans, elevations, sections, and attachment details.
 2. Include details of equipment assemblies. Indicate dimensions, weights, required clearances, method of field assembly, components, and location and size of each field connection.
 3. Console layouts.
 4. Control panels.
 5. Rack arrangements.
 6. Calculations: For sizing backup battery.
 7. Wiring Diagrams: For power, signal, and control wiring.
 - a. Identify terminals to facilitate installation, operation, and maintenance.
 - b. Single-line diagram showing interconnection of components.
 - c. Cabling diagram showing cable routing.
- C. Delegated-Design Submittal: For supports and seismic restraints for control consoles, equipment cabinets and racks, and components indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Detail fabrication and assembly of supports and seismic restraints for control consoles, equipment cabinets and racks, and components.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings are shown and coordinated with each other, using input from installers of the items involved.
- B. Qualification Data: For Installer.
- C. Seismic Qualification Certificates: For control consoles, equipment cabinets and racks, accessories, and components, from manufacturer.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation. Include qualification data for testing agency.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For public address systems to include in emergency, operation, and maintenance manuals.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

1. In addition to items specified in Section 017700 "Closeout Procedures" include the following:
 - a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
 - b. Operating instructions laminated and mounted adjacent to operating console location.
 - c. Training plan.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Microphone: One.
 2. Speakers: Three of each type.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
 1. Personnel certified by NICET as Audio Systems Level III Technician.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Valcom.
 2. Bogen.
 3. Atlas Sound.
- B. Source Limitations: Obtain public address system from single source from single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with NFPA 70.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

2.2 FUNCTIONAL DESCRIPTION OF SYSTEM

A. System Functions:

1. Selectively connect any zone to any available signal channel.
2. Selectively control sound from microphone outlets and other inputs.
3. "All-call" feature shall connect the all-call sound signal simultaneously to all zones regardless of zone or channel switch settings.
4. Telephone paging adapter shall allow paging by dialing an extension from any local telephone instrument and speaking into the telephone.
5. Produce a program-signal tone that is amplified and sounded over all speakers, overriding signals currently being distributed.
6. Reproduce high-quality sound that is free of noise and distortion at all loudspeakers at all times during equipment operation including standby mode with inputs off; output free of nonuniform coverage of amplified sound.

2.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports and seismic restraints for control consoles, equipment cabinets and racks, and components, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Seismic Performance: Supports and seismic restraints for control consoles, equipment cabinets and racks, and components shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified."

2.4 SYSTEM DESCRIPTION

- A. Compatibility of Components: Coordinate component features to form an integrated system. Match components and interconnections for optimum performance of specified functions.
- B. Equipment: Comply with UL 813. Equipment shall be modular, using solid-state components, and fully rated for continuous duty unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.
- C. Furnish and install a zoned paging/background music system with all equipment, including, but not limited to, volume controls, wiring, controllers, IP gateways, speakers, horns, and all other equipment necessary to provide a complete and operable system for the specified project. System shall integrate with the existing system utilized in Concourse A.
- D. The system shall include a programmable microprocessor based zone paging system comprised on wall-mounted equipment where possible. The system's paging shall be accessed through the facility's IP system.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

2.5 PREAMPLIFIERS

- A. Preamplifier: Integral to power amplifier.
- B. Output Power: Plus 4 dB above 1 mW at matched power-amplifier load.
- C. Total Harmonic Distortion: Less than 1 percent.
- D. Frequency Response: Within plus or minus 2 dB from 20 to 20,000 Hz.
- E. Input Jacks: Minimum of three. One matched for low-impedance microphone; one USB port; and the other matchable to DVD or CD player, or radio tuner signals without external adapters.
- F. Minimum Noise Level: Minus 55 dB below rated output.
- G. Controls: On-off, input levels, and master gain.

2.6 POWER AMPLIFIERS

- A. Mounting: Console.
- B. Output Power: 70-V balanced line. 80 percent of the sum of wattage settings of connected for each station and speaker connected in all-call mode of operation, plus a 25 percent allowance for future stations.
- C. Total Harmonic Distortion: Less than 3 percent at rated power output from 50 to 12,000 Hz.
- D. Minimum Signal-to-Noise Ratio: 80 dB, at rated output.
- E. Frequency Response: Within plus or minus 3 dB from 20 to 12,000 Hz.
- F. Output Regulation: Less than 2 dB from full to no load.
- G. Controls: On-off, input levels, and low-cut filter.
- H. Input Sensitivity: Matched to preamplifier and to provide full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on speaker microphone or handset transmitter.

2.7 SPEAKERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering the following products that may be incorporated into the work include, but are not limited to the following product descriptions:
 - 1. 8” dual input, amplified, round white ceiling speakers. Speaker shall include all amplification.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

- a. Provide any required back box and support bridge to install the speaker per the manufactured instructions and best trade practices.
 - b. Speaker locations and quantities shall be capable of providing a uniform sound pressure level of 100 decibels within the space.
 - c. Locate the speakers uniformly within the space and without conflict with other ceiling systems and devices.
 - d. Where the serving area exceeds 100 square feet, provide the required number of speakers to obtain the SPL as specified above
2. In general-purpose areas without finished lay in ceilings, provide 5-watt amplified pendant speakers.

2.8 MICROPHONES

A. Paging Microphone:

1. Type: Dynamic, with cardioid polar characteristic.
2. Impedance: 250 ohms.
3. Frequency Response: Uniform, 50 to 15,000 Hz.
4. Sensitivity: Minus 70 dB.
5. Output Level: Minus 58 dB, minimum.
6. Cable: Braided shield cable with Amphenol XLR connectors. Coordinate impedance with microphone impedance.
7. Mounting: Wall-mounted with press-to-talk switch.

2.9 VOLUME LIMITER/COMPRESSOR

A. Minimum Performance Requirements:

1. Frequency Response: 45 to 15,000 Hz, plus or minus 1 dB minimum.
2. Reduction Ratio: Automatically vary compression ratio, and attack and release times for voice and music inputs.
 - a. Compression Ratio Range: 3:1 to 10:1 minimum.
 - b. Averaging Compressor Attack Time: Up to 500 milliseconds.
 - c. Signal Fast Compression Attack Time: Less than 10 milliseconds.
 - d. Release time: Up to 500 milliseconds.
3. Distortion: 0.5 percent, maximum.
4. Rated Output: Minimum of plus 14 dB.
5. Inputs: Minimum of two inputs with variable front-panel gain controls and VU or decibel meter for input adjustment.
6. Rack mounted.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

2.10 TELEPHONE PAGING ADAPTER

- A. Adapters shall accept voice signals from telephone extension dialing access and automatically provide amplifier input and program override for preselected zones.
 - 1. Minimum Frequency Response: Flat, 200 to 2500 Hz.
 - 2. Impedance Matching: Adapter matches telephone line to public address equipment input.
 - 3. Cabinet mounted.

2.11 TONE GENERATOR

- A. Tone generator shall provide clock and program interface with public address system.
- B. Signals: Minimum of seven distinct, audible signal types including wail, warble, high/low, alarm, repeating and single-stroke chimes, and tone.
- C. Pitch Control: Chimes and tone.
- D. Volume Control: All outputs.
- E. Activation-Switch Network: Establishes priority and hierarchy of output signals produced by different activation setups.
- F. Mounting: Cabinet.

2.12 OUTLETS

- A. Volume Attenuator Station: Wall-plate-mounted autotransformer type with paging priority feature.
 - 1. Wattage Rating: 10 W unless otherwise indicated.
 - 2. Attenuation per Step: 3 dB, with positive off position.
 - 3. Insertion Loss: 0.4 dB maximum.
 - 4. Attenuation Bypass Relay: SPDT. Connected to operate and bypass attenuation when all-call, paging, program signal, or prerecorded message features are used. Relay returns to normal position at end of priority transmission.
 - 5. Label: "PA Volume."
- B. Microphone Outlet: Three-pole, polarized, locking-type, microphone receptacles in single-gang boxes. Equip wall outlets with brushed stainless-steel device plates. Equip floor outlets with gray tapered rubber or plastic cable nozzles and fixed outlet covers.

2.13 CONDUCTORS AND CABLES

- A. Jacketed, twisted pair and twisted multipair, untinned solid copper.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

1. Insulation for Wire in Conduit: Thermoplastic, not less than 1/32 inch (0.8 mm) thick.
2. Microphone Cables: Neoprene jacketed, not less than 2/64 inch (0.8 mm) thick, over shield with filled interstices. Shield No. 34 AWG, tinned, soft-copper strands formed into a braid or approved equivalent foil. Shielding coverage on conductors is not less than 60 percent.
3. Plenum Cable: Listed and labeled for plenum installation.

2.14 PATHWAYS

- A. Conduit and Boxes: Comply with Section 270528 "Pathways for Communications Systems." Flexible metal conduit shall not be used.
 1. Outlet boxes shall be not less than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

PART 3 - EXECUTION

3.1 WIRING METHODS

- A. Wiring Method: Install cables in pathways and cable trays except within consoles, cabinets, desks, and counters, and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal pathway and cables except in unfinished spaces.
 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 2. Comply with requirements for pathways and boxes specified in Section 270528 "Pathways for Communications Systems."
- B. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 INSTALLATION OF PATHWAYS

- A. Comply with requirements in Section 270528 "Pathways for Communications Systems." for installation of conduits and wireways.
- B. Install manufactured conduit sweeps and long-radius elbows whenever possible.

3.3 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Cable Installation Requirements:

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

1. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.
 2. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.
 3. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 4. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
 5. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 6. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.
- C. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate pathways or, where exposed or in same enclosure, separate conductors at least 12 inches (300 mm) apart for speaker microphones and adjacent parallel power and telephone wiring. Separate other communication equipment conductors as recommended by equipment manufacturer.

3.4 INSTALLATION

- A. Coordinate layout and installation of system components and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
- B. The system shall allow for the fire alarm system to override all paging and background music.
- C. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
- D. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.
- E. Equipment Cabinets and Racks:
 1. Group items of same function together, either vertically or side by side, and arrange controls symmetrically. Mount monitor panel above the amplifiers.
 2. Arrange all inputs, outputs, interconnections, and test points so they are accessible at rear of rack for maintenance and testing, with each item removable from rack without disturbing other items or connections.
 3. Blank Panels: Cover empty space in equipment racks so entire front of rack is occupied by panels.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

- F. Volume Limiter/Compressor: Equip each zone with a volume limiter/compressor. Install in central equipment cabinet. Arrange to provide a constant input to power amplifiers.
- G. Wall-Mounted Outlets: Flush mounted.
- H. Floor-Mounted Outlets: Conceal in floor and install cable nozzles through outlet covers. Secure outlet covers in place. Trim with carpet in carpeted areas.
- I. Conductor Sizing: Unless otherwise indicated, size speaker circuit conductors from racks to loudspeaker outlets not smaller than No. 18 AWG and conductors from microphone receptacles to amplifiers not smaller than No. 22 AWG.
- J. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.
- K. Speaker-Line Matching Transformer Connections: Make initial connections using tap settings indicated on Drawings.
- L. Connect wiring according to Section 271500 "Communications Horizontal Cabling".
- M. Install labeling according to requirements in Section 270553 "Identification for Communications Systems".

3.5 FIRESTOPPING

- A. Comply with TIA/EIA-569-C; Annex A, "Firestopping."
- B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.6 GROUNDING

- A. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- B. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.
- C. Install grounding electrodes as specified in Section 270526 "Grounding and Bonding for Communications Systems."

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

1. Schedule tests with at least seven days' advance notice of test performance.
 2. After installing public address system and after electrical circuitry has been energized, test for compliance with requirements.
 3. Operational Test: Perform tests that include originating program and page messages at microphone outlets, preamplifier program inputs, and other inputs. Verify proper routing and volume levels and that system is free of noise and distortion.
 4. Signal-to-Noise Ratio Test: Measure signal-to-noise ratio of complete system at normal gain settings as follows:
 - a. Disconnect microphone at connector or jack closest to it and replace it in the circuit with a signal generator using a 1000-Hz signal. Replace all other microphones at corresponding connectors with dummy loads, each equal in impedance to microphone it replaces. Measure signal-to-noise ratio.
 - b. Repeat test for each separately controlled zone of loudspeakers.
 - c. Minimum acceptance ratio is 50 dB.
 5. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 50, 200, 400, 1000, 3000, 8000, and 12,000 Hz into each preamplifier channel. For each frequency, measure distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is 3 percent total harmonics.
 6. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at five locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dB. In addition, the levels between locations in same zone and between locations in adjacent zones must not vary more than plus or minus 3 dB.
 7. Power Output Test: Measure electrical power output of each power amplifier at normal gain settings of 50, 1000, and 12,000 Hz. Maximum variation in power output at these frequencies must not exceed plus or minus 1 dB.
 8. Signal Ground Test: Measure and report ground resistance at public address equipment signal ground. Comply with testing requirements specified in Section 270526 "Grounding and Bonding for Communications Systems."
- C. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.
- D. Public address system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.
1. Include a record of final speaker-line matching transformer-tap settings and signal ground-resistance measurement certified by Installer.
- 3.8 STARTUP SERVICE
- A. Perform startup service.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville

Fayetteville, North Carolina

Gordon Johnson Architecture

AP#1808

July 15, 2019

1. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements.
2. Complete installation and startup checks according to manufacturer's written instructions.

3.9 ADJUSTING

- A. On-Site Assistance: Engage a factory-authorized service representative to provide on-site assistance in adjusting sound levels, resetting transformer taps, and adjusting controls to meet occupancy conditions.
- B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.10 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain the public address system and equipment.

END OF SECTION 275116

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

SECTION 281500 - ACCESS CONTROL HARDWARE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Card readers, credential cards, and keypads
 - 2. Cables
 - 3. Transformers

1.3 DEFINITIONS

- A. Credential: Data assigned to an entity and used to identify that entity.
- B. HSPD-12: Homeland Security Presidential Directive 12, Policy for a Common Identification Standard for Federal Employees and Contractors
- C. Identifier: A credential card; keypad personal identification number; or code, biometric characteristic, or other unique identification entered as data into the entry-control database for the purpose of identifying an individual. Where this term is presented with an initial capital letter, this definition applies.
- D. Location: A Location on the network having a PC-to-controller communications link, with additional controllers at the Location connected to the PC-to-controller link with a TIA 485-A communications loop. Where this term is presented with an initial capital letter, this definition applies.
- E. PC: Personal computer. Applies to the central station, workstations, and file servers.
- F. WMP: Windows media player.
- G. Wiegand: Patented magnetic principle that uses specially treated wires embedded in the credential card.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Reference each product to a location on Drawings. Test and evaluation data presented in Product Data shall comply with SIA BIO-01.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Diagrams for cable management system.
 - 2. System labeling schedules, including electronic copy of labeling schedules.
 - 3. Wiring Diagrams. For power, signal, and control wiring. Show typical wiring schematics including the following:
 - a. Workstation outlets, jacks, and jack assemblies.
 - b. Patch cords.
 - c. Patch panels.
 - 4. Cable Administration Drawings: As specified in "Identification" Article.
 - 5. Battery and charger calculations for central station, workstations, and controllers.
- C. Product Schedules.
- D. Samples: For workstation outlets, jacks, jack assemblies, and faceplates. For each exposed product and for each color and texture specified.
 - 1. Card readers: One for every ten of each type.
 - 2. Keypads: One for every ten of each type.
 - 3. Duress button: One for every ten of each type.
 - 4. Power supplies: One of every ten of each type.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For security system to include in emergency, operation, and maintenance manuals. Include the following:
 - 1. Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on USB media of the hard-copy submittal.
 - 2. System installation and setup guides with data forms to plan and record options and setup decisions.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Credential card blanks, ready for printing.
 - a. 300 in quantity.
 - 2. Fuses of all kinds, power and electronic, equal to 10 percent of amount installed for each size used, but no fewer than three units.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
 - 1. Cable installer must have on staff an RCDD certified by Building Industry Consulting Service International.
- B. Source Limitations: Obtain central station, workstations, controllers, Identifier readers, and all software through one source from single manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store in temperature- and humidity-controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 50 and 85 deg F (10 and 30 deg C), and not more than 80 percent relative humidity, noncondensing.
- B. Open each container; verify contents against packing list; and file copy of packing list, complete with container identification, for inclusion in operation and maintenance data.
- C. Mark packing list with the same designations assigned to materials and equipment for recording in the system labeling schedules.
- D. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

1.10 PROJECT CONDITIONS

- A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 - 1. Control Station: Rated for continuous operation in ambient conditions of 60 to 85 deg F (16 to 30 deg C) and a relative humidity of 20 to 80 percent, noncondensing.
 - 2. Indoor, Controlled Environment: NEMA 250, Type 1 enclosure. System components, except the central-station control unit, installed in air-conditioned temperature-controlled indoor environments shall be rated for continuous operation in ambient conditions of 36

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

to 122 deg F (2 to 50 deg C) dry bulb and 20 to 90 percent relative humidity, noncondensing.

3. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.

PART 2 - PRODUCTS

2.1 OPERATION

- A. General: All systems shall comply with HSPD-12, FIPS Pub 201 policies, Government Smart Card Interoperability Specification (GSC-IS V2.1) and GSA Schedule 70 for products and services.
 1. The Airport has an existing Johnson Controls P2000 security system. Regardless of items specified herein, all products, controllers, reader and components shall be a part of or otherwise integrate the Johnson Controls P2000 security system.
- B. Work under this section includes all labor and materials required for design, installation, programming, testing, commissioning, documentation, and warranty of a complete, fully functional access control system as shown on the drawings and specified in this section.
- C. All work specified herein and shown on drawings shall be coordinated with all other trades, including, but not limited to, door hardware, electrical, and general contractor; and Owner as needed to complete a fully functioning system.

2.2 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70, "National Electrical Code."
- C. Comply with SIA DC-03.
- D. TWIC and FIPS 201 Compliance:
 1. The entire system shall be capable of supporting the latest FIPS 201/PIV-I smart cards. The system as specified must work with existing cards, utilizing either DESFire compliant or HID iClass smart cards. These cards shall be utilized initially upon completion of this project, but support the ability of the current and any future FIPS 201/PIV-I compliant cards to be read, used, and managed by the access control system. The system shall also be capable of operating with the Customs and Border Protection issued badges. FIPS 201/PIV-I Compliance shall be defined as:
 - a. All provided card readers shall be able to read the current FIPS 201/PIV card configurations as defined in the latest FIPS 201 documentation.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

- b. All installed card readers shall be able to read any future changes to the FIPS 201 cards. Readers with either flash upgradeable firmware or manufacturer's free swap replacement programs are considered approved.
- c. All reader-to-reader panel, reader panel to IFP, and IFP to host communication protocols shall be able to identify and transfer the necessary FIPS 201 card information for the purpose of physical access control applications. All IFP and associated hardware shall be able to identify and process the necessary FIPS 201 card information for the purpose of physical access control applications.
- d. Badge input station application shall allow verification of a foreign FIPS-201 card. This includes but is not limited to: verification of card format authenticity and verification of certificate authenticity.
- e. Due to evolving changes to the FIPS 201 standard, if all other reader interface and capabilities are met, then a manufacturer's plan to provide FIPS 201 compliance shall be acceptable.

2.3 CARD READERS, CREDENTIAL CARDS, AND KEYPADS

- A. Manufacturers: Provide devices and components that are a part of or capable of integrating with the existing Johnson Controls P2000 security system.
- B. Card-Reader Power: Powered from its associated controller, including its standby power source, and shall not dissipate more than 5 W.
- C. Response Time: Card reader shall respond to passage requests by generating a signal that is sent to the controller. Response time shall be 800 ms or less, from the time the card reader finishes reading the credential card until a response signal is generated.
- D. Enclosure: Suitable for surface, semi-flush, pedestal, or weatherproof mounting. Mounting types shall additionally be suitable for installation in the following locations:
 - 1. Indoors, controlled environment.
 - 2. Outdoors, subject to cold, damp conditions.
- E. Indicator shall provide visible and audible status indications. Indicate power on or off, whether user passage requests have been accepted or rejected, and whether the door is locked or unlocked.
- F. Smart Card Readers:
 - 1. Active-detection proximity card readers shall provide power to compatible credential cards through magnetic induction, and shall receive and decode a unique identification code number transmitted from the credential card.
 - 2. The card reader shall read proximity cards in a range from direct contact to one-inch from the reader.
- G. Smart Card Readers with Keypad:

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

1. Active-detection proximity card readers shall provide power to compatible credential cards through magnetic induction, and shall receive and decode a unique identification code number transmitted from the credential card.
2. The card reader shall read proximity cards in a range from direct contact to one-inch from the reader.
3. Entry-control keypads shall use a unique combination of alphanumeric and other symbols as an Identifier.
4. Keypads shall contain an integral alphanumeric/special symbols keyboard with symbols arranged in ascending ASCII-code ordinal sequence.
5. Communication protocol shall be compatible with the local processor.
6. Designed to require an entry on the keypad before presenting the credential card.

H. Keypad Display:

1. Keypads shall include a digital visual indicator and shall provide visible and audible status indications and user prompts.
2. Display shall indicate power on or off and whether user passage requests have been accepted or rejected.
3. Design of the keypad display or keypad enclosure shall limit viewing angles of the keypad as follows:
 - a. Maximum Horizontal Viewing Angle: Plus or minus 5 degrees or less off a vertical plane perpendicular to the plane of the face of the keypad display.
 - b. Maximum Vertical Viewing Angle: Plus or minus 15 degrees or less off a horizontal plane perpendicular to the plane of the face of the keypad display.

I. Keypad Response Time:

1. The keypad shall respond to passage requests by generating a signal to the local processor. The response time shall be 800 ms or less from the time the last alphanumeric symbol is entered until a response signal is generated.

J. Keypad Power:

1. The keypad shall be powered from the source as shown and shall not dissipate more than 150 W.

K. Keypad Mounting Method:

1. Keypads shall be suitable for surface, semi-flush, pedestal, or weatherproof mounting as required.

L. Keypad Duress Codes:

1. Keypads shall provide a means for users to indicate a duress situation by entering a special code.

M. Communication Protocol: Compatible with local processor.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

- N. Touch-Plate and Contactless Card Reader: The reader shall have "flash" download capability to accommodate card format changes. The card reader shall have capability of transmitting data to security control panel and shall comply with ISO/IEC 7816.
- O. Credential Card Modification: Entry-control cards shall be able to be modified by lamination direct print process during the enrollment process without reduction of readability. The design of the credential cards shall allow for the addition of at least one slot or hole to accommodate the attachment of a clip for affixing the credential card to the badge holder used at the site.
- P. Card Size and Dimensional Stability: Credential cards shall be 2-1/8 by 3-3/8 inches (54 by 86 mm). The credential card material shall be dimensionally stable so that an undamaged card with deformations resulting from normal use shall be readable by the card reader.
- Q. Card Material: Abrasion resistant, nonflammable, nontoxic, and impervious to solar radiation and effects of ultraviolet light.
- R. Card Construction:
 - 1. Core and laminate or monolithic construction.
 - 2. Lettering, logos, and other markings shall be hot stamped into the credential material or direct printed.
 - 3. Furnish equipment for on-site assembly and lamination of credential cards.

2.4 CABLES

- A. General Cable Requirements: Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and as recommended by system manufacturer for integration requirement.
- B. Plenum-Rated TIA 232-F Cables:
 - 1. Nine, No. 22 AWG, stranded (7x30) tinned copper conductors.
 - 2. PE insulation.
 - 3. Aluminum foil-polyester tape shield with 100 percent shield coverage.
 - 4. Fluorinated ethylene propylene jacket.
 - 5. Conductors are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 - 6. Flame Resistance: Comply with NFPA 262.
- C. Plenum-Rated TIA 485-A Cables:
 - 1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
 - 2. Fluorinated ethylene propylene insulation.
 - 3. Unshielded.
 - 4. Fluorinated ethylene propylene jacket.
 - 5. NFPA 70 Type: Type CMP
 - 6. Flame Resistance: NFPA 262, Flame Test.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

D. Paired, Plenum-Type, Reader and Wiegand Keypad Cables:

1. Three pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, individual aluminum-foil/polypropylene-tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and fluorinated-ethylene-propylene jacket.
2. NFPA 70, Type CMP.
3. Flame Resistance: NFPA 262 flame test.

E. Multiconductor, Plenum-Type, Reader and Wiegand Keypad Cables:

1. Six conductors, No. 20 AWG, stranded (7x28) tinned copper conductors, fluorinated-ethylene-propylene insulation, overall aluminum-foil/polyester-tape shield with 100 percent shield coverage plus tinned copper braid shield with 85 percent shield coverage, and fluorinated-ethylene-propylene jacket.
2. NFPA 70, Type CMP.
3. Flame Resistance: NFPA 262 flame test.

F. LAN Cabling:

1. Comply with requirements in Section 271513 "Communications Copper Horizontal Cabling."

2.5 TRANSFORMERS

- A. NFPA 70, Class II control transformers, NRTL listed. Transformers for security access-control system shall not be shared with any other system.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.
- B. Examine roughing-in for LAN and control cable conduit systems to PCs, controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with recommendations in SIA CP-01.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

- B. Comply with TIA 606-C, "Administration Standard for Commercial Telecommunications Infrastructure."
- C. Product Schedules: Obtain detailed product schedules from manufacturer of access-control system or develop product schedules to suit Project. Fill in all data available from Project plans and specifications and publish as Product Schedules for review and approval.
- D. In meetings with Architect and Owner, present Product Schedules and review, adjust, and prepare final setup documents. Use approved, final Product Schedules.

3.3 CABLING

- A. Comply with NECA 1, "Good Workmanship in Electrical Construction."
- B. Install cables and wiring according to requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Wiring Method: Install wiring in raceway within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use NRTL-listed plenum cable in environmental airspaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
- D. Install LAN cables using techniques, practices, and methods that are consistent with Category 5e rating of components and optical fiber rating of components, and that ensure Category 6 and optical fiber performance of completed and linked signal paths, end to end.
- E. Boxes and enclosures containing security-system components or cabling, and which are easily accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered accessible. Junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.
- F. Install end-of-line resistors at the field device location and not at the controller or panel location.

3.4 CABLE APPLICATION

- A. Comply with TIA 569-D, "Commercial Building Standard for Telecommunications Pathways and Spaces."
- B. Cable application requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.
- C. TIA 232-F Cabling: Install at a maximum distance of 50 ft. (15 m) between terminations.
- D. TIA 485-A Cabling: Install at a maximum distance of 4000 ft. (1220 m) between terminations.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

E. Card Readers and Keypads:

1. Install number of conductor pairs recommended by manufacturer for the functions specified.
2. Unless manufacturer recommends larger conductors, install No. 22 AWG wire if maximum distance from controller to the reader is 250 ft. (75 m), and install No. 20 AWG wire if maximum distance is 500 ft. (150 m).
3. For greater distances, install "extender" or "repeater" modules recommended by manufacturer of the controller.
4. Install minimum No. 18 AWG shielded cable to readers and keypads that draw 50 mA or more.

F. Install minimum No. 16 AWG cable from controller to electrically powered locks. Do not exceed 250 ft. (75 m) between terminations.

G. Install minimum No. 18 AWG ac power wire from transformer to controller, with a maximum distance of 25 ft. (8 m) between terminations.

3.5 GROUNDING

A. Comply with Section 270526 "Grounding and Bonding for Communications Systems."

B. Comply with IEEE 1100, "Recommended Practice for Power and Grounding Electronic Equipment."

C. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

D. Bond shields and drain conductors to ground at only one point in each circuit.

E. Signal Ground:

1. Terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.
2. Bus: Mount on wall of main equipment room with standoff insulators.
3. Backbone Cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.

3.6 INSTALLATION

A. Install card readers, keypads and push buttons.

3.7 IDENTIFICATION

A. In addition to requirements in this article, comply with applicable requirements in Section 270553 "Identification for Communications Systems" and with TIA 606-C.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville

Fayetteville, North Carolina

Gordon Johnson Architecture

AP#1808

July 15, 2019

- B. Develop cable administration drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with the same designation. Use logical and systematic designations for facility's architectural arrangement.
- C. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - 1. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
 - 2. Each wire connected to building-mounted devices is not required to be numbered at the device if the color of the wire is consistent with the associated wire connected and numbered within the panel or cabinet.

3.8 SYSTEM HARDWARE

- A. Develop, install, and test hardware, and perform tests for the complete and proper operation of systems involved.
- B. Video Management System (VMS)
 - 1. The access control system shall interface with the video management system such that, upon access control alarm, the video management system shall automatically present the live view of the closest camera.
 - 2. All access control events logged into system shall also log video recordings of the event area.

3.9 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. LAN Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use tester approved for type and kind of installed cable. Test for faulty connectors, splices, and terminations. Test according to TIA 568-D.1, "Commercial Building Telecommunications Cabling Standards - Part 1: General Requirements." Link performance for balanced twisted-pair cables must comply with minimum criteria in TIA 568-D.1.
 - 2. Test each circuit and component of each system. Tests shall include, but are not limited to, measurements of power-supply output under maximum load, signal loop resistance, and leakage to ground where applicable. System components with battery backup shall be operated on battery power for a period of not less than 10 percent of the calculated

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

battery operating time. Provide special equipment and software if testing requires special or dedicated equipment.

3. Operational Test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.

C. Devices and circuits will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.10 STARTUP SERVICE

A. Engage a factory-authorized service representative to supervise and assist with startup service after tying into the existing system.

1. Complete installation and startup checks according to approved procedures that were developed in "Preparation" Article and with manufacturer's written instructions.

3.11 DEMONSTRATION

A. Develop separate training modules for the following:

1. Computer system administration personnel to manage and repair the LAN and databases and to update and maintain software.
2. Operators who prepare and input credentials to man the control station and workstations and to enroll personnel.
3. Security personnel.
4. Hardware maintenance personnel.
5. Corporate management.

END OF SECTION 281500

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

SECTION 282000 - VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The scope of this work is to expanding on the existing Johnson Controls P2000 video management system. Regardless of specifications listed herein, all components of the video management system added to the existing system shall be a part of or able to integrate with the Johnson Controls P2000 system.
- B. Section includes a video surveillance system consisting of cameras, digital video recorder, data transmission wiring, and a control station with its associated equipment.
 - 1. Standard cameras
 - 2. Power supplies
 - 3. Camera-supporting equipment
 - 4. Monitors
 - 5. Digital video recorders

1.3 DEFINITIONS

- A. AGC: Automatic gain control.
- B. CCD: Charge-coupled device.
- C. FTP: File transfer protocol.
- D. IP: Internet protocol.
- E. LAN: Local area network.
- F. MPEG: Moving picture experts group.
- G. NTSC: National Television System Committee.
- H. PC: Personal computer.
- I. PTZ: Pan-tilt-zoom.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

- J. RAID: Redundant array of independent disks.
- K. TCP: Transmission control protocol - connects hosts on the Internet.
- L. WAN: Wide area network.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include dimensions and data on features, performance, electrical characteristics, ratings, and finishes.
 - 1. Cameras and accessories.
 - 2. Rough-in and power requirements.
 - 3. Manufacturer cabling.
- B. Shop Drawings: For video surveillance. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Design calculations: Calculate requirements and perform structural analysis for installed products.
 - 2. Show anticipated field of views on the plans for Owner/Engineer approval.
 - 3. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.
 - 4. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
 - 5. Wiring Diagrams: For power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
- C. Design Data: Include an equipment list consisting of every piece of equipment by model number, manufacturer, serial number, location, and date of original installation. Add pretesting record of each piece of equipment, listing name of person testing, date of test, set points of adjustments, name and description of the view of preset positions, description of alarms, and description of unit output responses to an alarm.

1.5 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Data: Certificates, for cameras, camera-supporting equipment, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Field quality-control reports.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

- C. Product Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For cameras, power supplies, infrared illuminators, monitors, digital video recorders, video switches, and all others specified herein to include in emergency, operation, and maintenance manuals. Include the following:
 - 1. Lists of spare parts and replacement components recommended to be stored at the site for ready access.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 - 1. Control Station: Rated for continuous operation in ambient temperatures of 60 to 85 deg F (16 to 29 deg C) and a relative humidity of 20 to 80 percent, noncondensing.
 - 2. Interior, Controlled Environment: System components, except central-station control unit, installed in air-conditioned temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F (2 to 50 deg C) dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
 - 3. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

- A. Video-signal format shall comply with NTSC standard, composite interlaced video. Composite video-signal termination shall be 75 ohms.
- B. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."
 2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.
- C. Tamper Protection: Tamper switches on enclosures, control units, hinged boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display shall identify tamper alarms and indicate locations.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Video surveillance system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NECA 1.
- D. Comply with NFPA 70.
- E. Electronic data exchange between video surveillance system with an access-control system shall comply with SIA TVAC.

2.3 STANDARD CAMERAS

- A. Manufacturers: Provide devices and components that are a part of or capable of integrating with the existing Johnson Controls P2000 security system.
- B. Color Camera:
1. Comply with UL 639.
 2. Pickup Device: CCD interline transfer, 380,000 771(H) by 492(V) pixels.
 3. Horizontal Resolution: 1080p.
 4. Signal-to-Noise Ratio: Not less than 50 dB, with camera AGC off.
 5. With AGC, manually selectable on or off.
 6. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. Illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with camera AGC off.
 7. Manually selectable modes for backlight compensation or normal lighting.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

8. Scanning Synchronization: Camera shall revert to internally generated synchronization on loss of external synch signal.
 9. White Balance: Auto-tracing white balance, with manually settable fixed balance option.
 10. Motion Detector: Built-in digital.
- C. Automatic Color Dome Camera: Assembled and tested as a manufactured unit, containing dome assembly, color camera, motorized pan and tilt, zoom lens, and receiver/driver.
1. Comply with UL 639.
 2. Horizontal Resolution: 1080p.
 3. Wide Dynamic Range.
 4. Remote Focus and Zoom, iris control, IR corrected.
 5. Signal-to-Noise Ratio: Not less than 50 dB, with camera AGC off.
 6. With AGC, manually selectable on or off.
 7. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. Illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with camera AGC off.
 8. Manually selectable modes for backlight compensation or normal lighting.
 9. Pan and Tilt: Direct-drive motor, 360-degree rotation angle, and 180-degree tilt angle. Pan-and-tilt speed shall be controlled by operator. Movement from preset positions shall be not less than 300 degrees per second.
 10. Preset Positioning: Eight user-definable scenes, each allowing 16-character titles. Controls shall include the following:
 - a. In "sequence mode," camera shall continuously sequence through preset positions, with dwell time and sequencing under operator control.
 - b. Motion detection shall be available at each camera position.
 - c. Up to four preset positions may be selected to be activated by an alarm. Each of the alarm positions may be programmed to output a response signal.
 11. Scanning Synchronization: Camera shall revert to internally generated synchronization on loss of external synch signal.
 12. White Balance: Auto-tracing white balance, with manually settable fixed balance option.
 13. Motion Detector: Built-in digital.

2.4 LENSES

- A. Manufacturers: Provide devices and components that are a part of or capable of integrating with the existing Johnson Controls P2000 security system.
- B. Description: Vari-focal, high quality coated optics, designed specifically for video-surveillance applications and matched to specified camera.
 1. Auto-Iris Lens: Electrically controlled iris with circuit set to maintain a constant video level in varying lighting conditions and prevent image-bleaching effects.
 2. Fixed Lens: With calibrated focus ring.
 3. Zoom Lens: Motorized, remote-controlled unit, rated as "quiet operating." Features include the following:

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

- a. Electrical Leads: Filtered to minimize video signal interference.
- b. Motor Speed: Variable.
- c. Lens shall be available with preset positioning capability to recall the position of specific scenes.

2.5 POWER SUPPLIES

- A. Low-voltage power supplies matched for voltage and current requirements of cameras and accessories, and of type as recommended by manufacturer of camera, infrared illuminator, and lens.
 1. Enclosure: NEMA 250, Type 1.

2.6 INFRARED ILLUMINATORS

- A. Manufacturers: Provide devices and components that are a part of or capable of integrating with the existing Johnson Controls P2000 security system.
- B. Description: Lighting fixtures that emit light only in the infrared spectrum, suitable for use with cameras indicated, for nighttime surveillance, without emitting visible light.
 1. Field-Selectable Beam Patterns: Narrow, medium, and wide.
 2. Rated Lamp Life: More than 8000 hours.
 3. Power Supply: 120-V ac.
- C. Area Coverage: Illumination to 150 feet (50 m) in a narrow beam pattern.
- D. Exterior housings shall be suitable for same environmental conditions as the associated camera.

2.7 CAMERA-SUPPORTING EQUIPMENT

- A. Manufacturers: Provide devices and components that are a part of or capable of integrating with the existing Johnson Controls P2000 security system.
- B. Minimum Load Rating: Rated for load in excess of the total weight supported times a minimum safety factor of two.
 1. Outdoor units: Rated for a wind load of 100mph.
- C. Mounting Brackets for Fixed Cameras: Type matched to items supported and mounting conditions. Include manual pan-and-tilt adjustment.
- D. Protective Housings for Fixed and Movable Cameras: Steel or 6061 T6 aluminum enclosures with internal camera mounting and connecting provisions that are matched to camera/lens combination and mounting and installing arrangement of camera to be housed.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville

Fayetteville, North Carolina

Gordon Johnson Architecture

AP#1808

July 15, 2019

1. Tamper switch on access cover sounds an alarm signal when unit is opened or partially disassembled. Central-control unit shall identify tamper alarms and indicate location in alarm display.
2. Camera Viewing Window: Polycarbonate window, aligned with camera lens.
3. Duplex Receptacle: Internally mounted.
4. Alignment Provisions: Camera mounting shall provide for field aiming of camera and permit removal and reinstallation of camera lens without disturbing camera alignment.
5. Built-in, thermostat-activated heater units for exterior cameras only. Units shall be automatically controlled so the environmental limits of the camera equipment are not exceeded.
6. Sun shield for exterior cameras only shall not interfere with normal airflow around the housing.
7. Mounting bracket and hardware for wall or ceiling mounting of the housing. Bracket shall be of same material as the housing; mounting hardware shall be stainless steel.
8. Finish: Housing and mounting bracket shall be factory finished using manufacturer's standard finishing process suitable for the environment.
9. Enclosure Rating: NEMA Type 1.

2.8 MONITORS

- A. Manufacturers: Provide devices and components that are a part of or capable of integrating with the existing Johnson Controls P2000 security system.
- B. Color:
 1. Screen Size (Diagonal Dimension): 24-in, minimum.
 2. Horizontal Resolution: 1080p.
 3. Minimum Front Panel Devices and Controls: Power switch; power-on indicator; and brightness, contrast, color, and tint controls.
 4. Degaussing: Automatic.
 5. Mounting: Dual, desktop stand or wall mounted.
 6. Electrical: 120-V ac, 60 Hz.

2.9 DIGITAL VIDEO RECORDERS

- A. Manufacturers: Provide devices and components that are a part of or capable of integrating with the existing Johnson Controls P2000 security system.
- B. Description: Digital, time-lapse type, full-frame and motion recorder, with removable hard drive.
 1. Recording Time: 400 hours minimum.
 2. Resolution: 1920 by 1080, minimum.
 3. Programming shall be from trackball and push buttons on face of the recorder, settings shall be displayed on any video monitor connected to the recorder. Programming shall include the following:
 - a. Motion analysis graph.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

- b. Password protection.
 - c. Alarm and timer controls.
 - d. Continuous recording option.
 - e. Time-lapse operating modes.
 - f. Search video by time, event, or motion.
4. Programming: SmartMedia card for software updating, image archiving, and image transfer to a PC.
 5. Storage: 1-TB, removable hard drive. Software shall permit hot-swapping drives.
 6. Time and Date Generator: Records time (hr:min:sec) and date legend of each frame.
 7. Audio Recording: 70 to 7000 Hz.
 8. Mounting: 19-in security cabinet complying with CEA 310-E, or freestanding desktop.

2.10 DIGITAL SWITCHERS

- A. Manufacturers: Provide devices and components that are a part of or capable of integrating with the existing Johnson Controls P2000 security system.
- B. PTZ Controls: Arranged for multiple-camera control, with switches to select camera to be controlled.
 1. Pan-and-Tilt Control: Via software controls.
 2. Zoom Control: Via software controls.
 3. Automatic-Scan Control: Via software controls. For each camera with pan capability that places camera in automatic-scanning mode.

2.11 IP VIDEO SYSTEMS

- A. Manufacturers: Provide devices and components that are a part of or capable of integrating with the existing Johnson Controls P2000 security system.
- B. Description:
 1. Each cabinet/rack housing security equipment shall house a PoE switch for all network cameras, VMS devices, servers, and storage devices. Provide connectivity to access control panels, alarm panels, and all security-related network attached devices.
 2. System shall provide high-quality delivery and processing of IP-based video, audio, and control data using standard Ethernet-based networks.
 3. System shall have seamless integration of all video surveillance and control functions.
 4. Graphical user interface software shall manage all IP-based video matrix switching and camera control functions, two-way audio communication, alarm monitoring and control, and recording and archive/retrieval management. IP system shall also be capable of integrating into larger system environments.
 5. System design shall include all necessary compression software for high-performance, dual-stream, MPEG-2/MPEG-4 video. Unit shall provide connections for all video cameras, camera PTZ control data, bidirectional audio, discreet sensor inputs, and control system outputs.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

6. All camera signals shall be compressed, encoded, and delivered onto the network for processing and control by the IP video-management software.
7. Camera system units shall be ruggedly built and designed for extreme adverse environments, complying with NEMA Type environmental standards.
8. Encoder/decoder combinations shall place video, audio, and data network stream that can be managed from multiple workstations on the user's LAN or WAN.
9. All system interconnect cables, workstation PCs, PTZ joysticks, and network intermediate devices shall be provided for full performance of specified system.

2.12 SIGNAL TRANSMISSION COMPONENTS

- A. Cable: Four-pair category 6A UTP cable. Comply with requirements in Section 271513 "Communications Copper Horizontal Cabling."
- B. Video Surveillance Data Cable Connectors: RJ-45. Match camera cable color. Comply with requirements Section 271513 "Communications Copper Horizontal Cabling."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerance, hazards to camera installation, and other conditions affecting installation.
- B. Examine roughing-in for LAN, WAN, and IP network before device installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 WIRING

- A. Comply with requirements in Section 270528 "Pathways for Communications Systems."
- B. Wiring Method: Install cables in raceways unless otherwise indicated.
 1. Except raceways are not required in hollow gypsum board partitions.
 2. Conceal raceways and wiring except in unfinished spaces.
- C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
- D. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

- E. For communication wiring, comply with the following:
 - 1. Section 271313 "Communications Copper Backbone Cabling."
 - 2. Section 271323 "Communications Optical Fiber Backbone Cabling."
 - 3. Section 271513 "Communications Copper Horizontal Cabling."
 - 4. Section 271523 "Communications Optical Fiber Horizontal Cabling."
- F. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.3 VIDEO SURVEILLANCE SYSTEM INSTALLATION

- A. The main video server shall be located in a cabinet within Telecom Room B130. Rack-mounted video equipment in temporary security office shall be relocated to the same cabinet within Telecom Room B130.
- B. Install cameras and infrared illuminators level and plumb.
- C. Install cameras with 84-inch- (2134-mm-) minimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.
- D. Set dome camera unit stops to suit final camera position and to obtain the field of view required for camera. Connect all controls and alarms, and adjust.
- E. Install power supplies and other auxiliary components at control stations unless otherwise indicated.
- F. Install tamper switches on components indicated to receive tamper switches, arranged to detect unauthorized entry into system-component enclosures and mounted in self-protected, inconspicuous positions.
- G. Avoid ground loops by making ground connections only at the control station.
 - 1. For 12- and 24-V dc cameras, connect the coaxial cable shields only at the monitor end.
- H. Identify system components, wiring, cabling, and terminals according to Section 270553 "Identification for Communications Systems."

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

1. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
2. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video-surveillance equipment for acceptance and operational testing as follows:
 - a. Prepare equipment list described in "Informational Submittals" Article.
 - b. Verify operation of auto-iris lenses.
 - c. Set back-focus of fixed focal length lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Adjust until image is in focus with and without the filter.
 - d. Set back-focus of zoom lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Additionally, set zoom to full wide angle and aim camera at an object 50 to 75 feet (17 to 23 m) away. Adjust until image is in focus from full wide angle to full telephoto, with the filter in place.
 - e. Set and name all preset positions; consult Owner's personnel.
 - f. Set sensitivity of motion detection.
 - g. Connect and verify responses to alarms.
 - h. Verify operation of control-station equipment.
3. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days' notice of test schedule.
4. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.

C. Video surveillance system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Tasks shall include, but are not limited to, the following:

1. Check cable connections.
2. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed.
3. Adjust all preset positions; consult Owner's personnel.
4. Recommend changes to cameras, lenses, and associated equipment to improve Owner's use of video surveillance system.
5. Provide a written report of adjustments and recommendations.

Fayetteville Regional Airport – Airline Terminal Improvements – Part 2

Owner: City of Fayetteville
Fayetteville, North Carolina
Gordon Johnson Architecture

AP#1808

July 15, 2019

3.6 CLEANING

- A. Clean installed items using methods and materials recommended in writing by manufacturer.
- B. Clean video-surveillance-system components, including camera-housing windows, lenses, and monitor screens.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain video-surveillance equipment.

END OF SECTION 282000