ADDENDUM NO. 1

DATE: July 3, 2019

PROJECT: Denton County RFP 19-2534
Denton County Kitchen/Laundry

HDR Project No. 10105890

NOTICE:

THIS ADDENDUM IS ISSUED BY ARCHITECT TO ALL KNOWN INDIVIDUALS, FIRMS OR CORPORATIONS WHO HOLD BIDDING AND CONTRACT DOCUMENTS FOR ABOVE LISTED PROJECT.

THIS ADDENDUM IS HEREBY MADE A PORTION OF BIDDING AND CONTRACT DOCUMENTS, AS APPROPRIATE. ACKNOWLEDGE RECEIPT OF THIS ADDENDUM IN APPROPRIATE SPACE ON BID FORM.

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ADDENDUM 1 (AD-1)

INDEX PAGE

Attachments:

- Specifications
- Drawings

ADDENDUM 1 (AD-1)
REVISIONS TO PROJECT MANUAL

1.1 GENERAL NOTE

A. If paragraph has changed by this addendum, entire page (or entire section) has been reprinted. "AD" helps indicate line changed. Contractor is responsible for review of entire page to determine all changes made within paragraph.

B. The following Documents or Sections have changed:

1. Section 25 50 00, Section Revised
2. Section 27 05 32, Section Revised
3. Section 28 05 00, Section Revised
4. Section 28 05 10, Section Revised
5. Section 28 05 15, Section Revised
6. Section 28 13 13, Section Revised
7. Section 28 23 13, Section Revised

REVISIONS TO ARCHITECTURAL DRAWINGS

AD-1, Item AD-1

Cover Sheet

1. Modified to show drawings revised in Addendum number 1

AD-1, Item AD-2

Sheet G-001 – SCOPE OF WORK PLAN

1. Added clouds to indicate where new work occurs in the Express Corridor

AD-1, Item AD-3

Sheet G-102 – LIFE SAFETY PLAN – EXISTING CORRIDOR

1. Removed notes regarding coiling doors (Fire Curtain Assemblies)

AD-1, Item AD-4

Sheet AD-101 - FIRST FLOOR DEMOLITION PLAN, ELEVATIONS, AND DETAILS

1. Modified detail A4.
2. Modified keynote reference at detail C1

AD-1, Item AD-5

Sheet AD-102 - FIRST FLOOR DEMOLITION PLAN, ELEVATIONS, AND DETAILS

1. Changed previous detail D2 to new detail D3
2. Added details D2, D4, and D5
3. Modified details D1 and D3
4. Modified plan B1 to add work at two existing doors
5. Modified elevation A1 to remove redundant references at modified door locations

AD-1, Item AD-6

Sheet A-110

1. Add details A1, A2 and A3 to show replacement doors
2. Modified detail C1 to show replacement doors

3. Reversed Swing on Door G-004, this should be applied to every Architectural Plan background in the Bidding Documents.

AD-1. Item AD-7

Sheet A-552

1. Added Details C1, D3, and D4 of Dual Egress Coiling Fire Doors

AD-1. Item AD-8

Sheet A-601

2. Modified door schedule to add two doors
3. Modified door types legend to add new door type **FG**

REVISIONS TO MECHANICAL DRAWINGS

AD-1, Item MD-1

Sheet M-501

1. Details 03 and 08 removed and replaced with details 03 and 04 from sheet M-502

AD-1, Item MD-2

Sheet M-502

1. Details 03 and 04 relocated to sheet M-501
2. Sheet removed from set

AD-1, Item MD-3

Sheet M-503

1. Sheet removed from set

AD-1, Item MD-4

Sheet M-601

1. Added airflow measuring station to outside air ductwork for RTU-1 and RTU-2
2. Revised control sequence and points list for RTU-1 and RTU-2
3. Revised damper control to analog output in lieu of analog input

AD-1, Item MD-5

Sheet M-602

1. Revised control sequence for MAU-1 and MAU-2
2. Added alarm requirements for domestic water heaters
3. Added manual start/stop through BMCS for exhaust fans
4. Removed fire alarm communication from HV-1

REVISIONS TO ELECTRICAL DRAWINGS

AD-1, Item ED-1

ES-101 - ELECTRICAL SITE PLAN

1. Route new 400a feeder to ATS-KEQ kitchen and laundry electrical room k-112. Coordinate exact location and routing in field. Refer to e-601 for quantity and size of conduit and wire.
2. Route the existing feeder to ATS-EH1 in jail tower electrical room 1002. Coordinate exact location and routing in field. Refer to e-601 for quantity and size of conduit and wire.
3. Intercept existing generator feeder and reroute to new panel board GDP. Provide underground J-box to intercept the existing feeder.

AD-1, Item ED-2

EL-101A - ELECTRICAL LIGHTING PLAN - AREA A

1. All the emergency lighting fixtures are assigned to existing panel board EH1 in existing facility area electrical room 1002. Assign emergency light in area A to one circuit, and emergency light in area B and area C to another circuit.

AD-1, Item ED-3

EL-101B - ELECTRICAL LIGHTING PLAN - AREA B

1. All the emergency lighting fixtures are assigned to existing panel board EH1 in existing facility area electrical room 1002. Assign emergency light in area A to one circuit, and emergency light in area B and area C to another circuit.

AD-1, Item ED-4

EL-101C - ELECTRICAL LIGHTING PLAN - AREA C

1. All the emergency lighting fixtures are assigned to existing panel board EH1 in existing facility area electrical room 1002. Assign emergency light in area A to one circuit, and emergency light in area B and area C to another circuit.

AD-1, Item ED-5

EP-101A - ELECTRICAL POWER PLAN - AREA

1. Change circuit name due to the upstream panel board renaming.

AD-1, Item ED-6

EP-101B - ELECTRICAL POWER PLAN - AREB

1. Change circuit names due to the upstream panel board renaming.
2. Re-layout electrical room

AD-1. Item ED-7

EP-101C - ELECTRICAL POWER PLAN - AREC

1. Change circuit name due to the upstream panel board renaming.

AD-1. Item ED-8

E-601 - ELECTRICAL ONELINE DIAGRAM

1. ADD outdoor panel board GDP and ATS-KEQ.
2. Revise transformer wire table.
3. Rename KEQH1 and KEQL1.
4. For existing switchboard SBNH1, provide new circuit breaker in available space. Device to match existing manufacturer and AIC rating. Adjust existing circuit breaker spacing and add a new 400A circuit breaker in existing bus. Replace new dead-front covers along with new breakers and connector kits.

AD-1. Item ED-9

E-701 - EQUIPMENT SCHEDULES

1. Update RTU wiring based ME changes.

AD-1. Item ED-10

E-702 - EQUIPMENT SCHEDULES

1. Rename KEQH1 and KEQL1.
   Reassign emergency light circuit to existing emergency panel.

REVISIONS TO LOW VOLTAGE DRAWINGS

AD-1, Item EC-1

Sheet E-002 - LOW VOLTAGE SYSTEMS LEGEND:

1. Added new symbol to legend

AD-1, Item EC-2

Sheet ES-102 - LOW VOLTAGE SITE PLAN:

1. Added new symbol to site plan

AD-1, Item EC-3

Sheet EY-100 - ELECTRONIC SECURITY PLAN - AREAS A, B & C:

1. Adjusted notes
2. Added interlock to door
3. Added interlock to door
4. Moved Camera
5. Changed wall mounted speakers to horn strobe
6. Added door monitor
7. Added 2 pano cameras

AD-1, Item EC-4

Sheet EY-400 - ELECTRONIC SECURITY ENLARGED PLAN AND RISER DIAGRAM:

1. Adjusted cabinet keyed notes
2. Adjusted cabinet detail
3. Adjusted keyed notes
4. Adjusted riser

AD-1, Item EC-5

Sheet EY-500 - ELECTRONIC SECURITY DETAILS:

1. Adjusted notes on all details

AD-1, Item EC-6

Sheet EC-100 - COMMUNICATIONS PLAN - AREAS A, B & C:

1. Adjusted notes
2. Added 3 new CAM data symbols

AD-1, Item EC-7

Sheet EC-400 - COMMUNICATIONS ENLARGED PLAN AND RISER DIAGRAM:

1. Adjusted keyed notes
2. Adjusted rack detail
3. Adjusted riser

TABLE OF CONTENTS

SECTION 25 50 00

BUILDING MANAGEMENT AND CONTROL SYSTEM **(REVISED AD #1)**

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish labor, materials, tools, equipment, and services for Building Management and Control System, as indicated, in accordance with provisions of Contract Documents.

B. Completely coordinate with work of other trades.

1.2 DESCRIPTION

AD#1: Section 25 50 00; Part 1/1.2.A Deletion

A. BMCS system shall be fully integrated with the existing ~~Alerton~~ energy management control system in compliance with the performance requirements set forth in this specification. Equipment provided herein shall be required to communicate through a facility wide BMCS workstation by means of full binary interface to maintain operations for Denton County personnel. Include additional software or hardware required to maintain the integrity of the existing facility wide system. DDC hardware and software introduced as part of this project shall not alter integrity of existing facility wide system.

B. Building Management and Control System (BMCS) incorporating Direct Digital Control (DDC), energy management and equipment monitoring consisting of the following elements:
   1. Microprocessor based remote control panels interfacing directly with sensors, actuators, and environmental delivery systems to provide complete standalone DDC/EMS functionality. (i.e., HVAC equipment, etc.).
   2. Communication network to allow data exchange between remote panels and central building management computer.
   3. Personal computer (PC) based central and associated operator station(s), and software functioning as the primary operator interface for BMCS. System shall utilize a graphics front end.
   4. Electric and electronic control for all items indicated including dampers, valves, panels and pneumatic and electrical installation.

C. Air terminal unit damper operators and controls: Provide DDC controllers and actuators under this section.

D. Smoke and fire/smoke dampers and operators are provided under Specification Section 23 31 13. Power connection to smoke and fire/smoke dampers shall be provided under Electrical Specification Divisions. Damper end switches shall be provided and wired under this section.

E. Control dampers: Control dampers less actuators are provided under Section 23 31 13. Provide actuators for control dampers under this section.

F. Duct mounted smoke detectors are to be furnished and wired under Electrical Specification Divisions. The detectors shall be mounted in compliance with Section 23 31 13.

G. Provide submittals, installation, data entry, programming, startup, test and validation of BMCS, instruction of Owner's representative on maintenance and operation of BMCS, as-built documentation, and system warranty.

H. Completely coordinate with work of other trades.

1.3 QUALITY ASSURANCE

A. System installed by mechanics with responsibility for operation of BMCS, including debugging and calibration of each component in system.

B. Codes and Approvals:
   1. Complete BMCS installation to be in strict accordance with national and local electrical codes, and Electrical Specification Divisions of these specifications. All devices designed for or used in line voltage applications to be UL listed.
   2. Microprocessor based remote devices: UL916 and UL864 listed.
   3. BMCS central equipment: UL916 listed.
   4. Electrical environmental control and monitoring devices: UL429 and/or UL873 listed.
   5. Electronic equipment: Label and comply with requirements of FCC regulation Part 15, Section 15 governing radio frequency electromagnetic interference for Class A computing devices.
   6. UL standards:
      a. UL429 Electrically Operated Valves
      b. UL555 Fire Dampers
      c. UL873 Temperature Indicating and Regulating Equipment
      d. UL916 Energy Management Equipment.
   7. NFPA Standards and Guides:
      a. NFPA-70 National Electric Code
      b. NFPA-90A Air Conditioning Systems
      c. NFPA-90B Warm Air Heating, Air Conditioning.

C. System Components:
   1. Fault tolerant.
   2. Provide satisfactory operation without damage at 110 PCT and 85 PCT of rated voltage, and at +/- 3 hertz variation in line frequency.
   3. Provide static, transient, short circuit, and surge protection on all inputs and outputs. Communication lines to be protected against incorrect wiring, static transients, and induced magnetic interference. Bus connected devices to be a.c. coupled, or equivalent so that any single device failure will not disrupt or halt bus communication.
   4. All real time clocks and data file RAM to be battery or capacitor backed.

D. System Overall Reliability Requirement:
   1. Configure system and install to yield a Mean Time Between Failure (MTBF) at least 1000 HRS.

E. System Accuracy and Display:
   1. Maintain system end-to-end accuracy for 1 year from sensor to Operator's console display for applications specified and shall display value as specified.

F. Rate field equipment for continuous operation under ambient environmental conditions of 35 to 120 DEGF dry bulb and 10 to 95 PCT relative humidity, non-condensing.
   1. Rate instrumentation and control elements for continuous operation under ambient environmental temperature, pressure, humidity and vibration conditions specified or normally encountered for installed location.

1.4 SUBMITTALS

A. Shop Drawings:
   1. Complete system design information including:
      a. Data entry forms for initial parameters. All text and graphics to be approved prior to data entry.
      b. Valve, and damper schedules showing:
         1) Size.
         2) Configuration.
         3) Capacity.
         4) Location.
      c. Wiring and piping interconnection diagrams, including panel and device power and sources.
      d. Equipment lists (bill of materials) of all proposed devices and equipment.
      e. Software design data including:

1) Flow chart of each DDC program showing interrelationship between inputs, PID functions, all other functions, outputs, etc.
2) Sequence of operation relating to all flow chart functions.

f. Control sequence.
g. DDC installation, block diagrams, and wiring diagrams for each piece of equipment.
h. DDC panel physical layout and schematics.
i. Building level overview of control system architecture.

B. Product Data:
1. Complete list of product data including:
a. Data sheets of all products.
b. Valve, damper, and well and tap schedules showing size, configuration, capacity, and location of all equipment.

C. Project Information:
1. Certification of installer qualifications.

D. Contract Closeout Information:
1. Operation and Maintenance Data:
a. See Section 01 78 23.
2. As Built Instrumentation and Control Diagrams at 1/8 IN scale showing:
a. Communication cable circuiting drawing with DDC panels and communication devices labeled.
b. Power wiring circuiting drawing showing 120 volt circuit source and low voltage transformer locations, identifications, and circuit roués to each controlled device per transformer for the DDC system.
c. See Section 01 78 39.
3. Owner instruction report.
a. Certification that Owner Training has been provided by BMCS installer.
b. See Section 01 79 00.

1.5 WARRANTY

A. All components, system software, parts, and assemblies supplied by BMCS manufacturer to be guaranteed against defects in materials and workmanship for one year from acceptance date.

B. Labor to troubleshoot, repair, reprogram, or replace system components shall be furnished by BMCS installer at no charge to Owner during warranty period.

C. All corrective software modifications made during warranty service periods to be updated on all user documentation and on user and manufacturer archived software disks.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

AD#1: Section 25 50 00; Part 2/2.1.C Deletion

A. Temperature Control System:
1. Base:
a. Alerton by Climatec

B. Air Flow Monitoring Stations:
1. Base:
a. Air Monitor.
2. Optional:
a. Ebtron.
b. Tek Air.
c. Paragon.

~~C. Chilled Water Flow Meters:~~

~~1. Base:~~

~~a. Emco.~~

~~2. Optional:~~

~~a. Rosemont.~~
~~b. Onicon.~~

D. Other manufacturers desiring approval comply with Section 00 26 00.

2.2 MATERIALS

A. Temperature Control System:
   1. Include:
      a. Temperature sensors.
      b. Humidity sensors.
      c. Controllers.
      d. Switches.
      e. Relays.
      f. Valves.
      g. Dampers.
      h. Damper operators.
      i. Thermostats.
      j. Humidistats.
      k. Hygrometers.
      l. Other associated controls required to maintain conditions described on drawings, together with thermometers, gauges and other accessory equipment.
   2. Provide complete system of wiring and air piping as necessary to fill intent of these specifications.
   3. Control sequences indicated illustrate basic control functions only.
   4. Provide additional controls required to meet intent of these specifications and make a complete system.
   5. Space temperature and humidity control.
   6. Control of air handling units.
   7. Control of exhaust systems.
   8. Control of cooling systems.
   9. Control of heating systems.
   10. Control panels.

B. Where electronic sensing is used, furnish amplifier relays and transformer complete with overload protection.

C. Electrical drawings indicate type of motor control required by equipment.

2.3 CENTRAL OPERATORS WORK STATION

AD#1: Section 25 50 00; Part 2/2.3.B Deletion/Addition

A. Existing central operators work station shall be reused. All new direct digital controls shall interface with existing work station.

B. Central BMCS Workstations:
   1. Interface with the existing operators work station located in the **existing** Denton County ~~Facilities Department~~ **Jail**. The existing ~~Alerton~~ front end software will be expanded to the new building.

2.4 WEB BASED SYSTEM

AD#1: Section 25 50 00; Part 2/2.4.B-C Deletion

A. BMCS Architecture
   1. Overall Conceptual Description
      a. The BMCS shall be designed entirely for use on intranets and internets. All networking technology used at the Tier 1 level shall be off the shelf, industry standard technology fully compatible with other owner provided networks in the facility.
      b. All aspects of the user interface, whether to servers or to Tier 1 solid state devices, shall be via browsers. Any PCs used as operator interface points shall not require the purchase of any special software from the manufacturer in order to provide the complete user interface as described herein.
      c. The user interface will be complete as described herein, providing complete tool sets, operational features, multi- panel displays, and other display features. Systems which merely provide HTML based web pages as the operator interface will not be acceptable.
      d. The primary components of the system will be the Primary Application Nodes and Servers located at the highest level of the network architecture. Both will use the same user interface and provide the same level of accessibility via the network. The only distinction between the user interface used on servers as compared to Primary Application Nodes will be select menu items used for accessing long term storage features on the servers or on their respective archive devices (CD/RW, etc.)
   2. General
      a. The BMCS shall consist of a number of Nodes and associated equipment connected by industry standard network practices. All communication between Nodes shall be by digital means only.
      b. The BMCS network shall at minimum comprise of the following:
         1) Operator PCs – fixed or portable.
         2) Network processing, data storage and communication equipment including file servers.
         3) Routers, bridges, switches, hubs, modems and like communications equipment.
         4) Active processing Nodes including field panels.
         5) Intelligent and addressable elements and end devices.
         6) Third-party equipment interfaces.
         7) Other components required for a complete and working BMCS.
      c. All BMCS features shall be accessible via Enterprise Intranet and Internet browser with equivalent BMCS access control for user access.
      d. The BMCS shall support auto-dial/auto-answer communications to allow BMCS Nodes to communicate with other remote BMCS Nodes via standard telephone lines. Refer to drawings for type of line to be used, DSL or voice grade. Where no preference is indicated, DSL is the preferred grade.
      e. The PC Workstations, File servers and principal network equipment shall be standard products of recognized major manufacturers available through normal PC vendor channels. "Clones" are not acceptable.
      f. Provide licenses for all software residing in the BMCS system and transfer these licenses to the Owner prior to completion.
   3. Network
      a. The BMCS shall incorporate a primary Tier 1 network. At the installer's option, the BMCS may also incorporate integrated secondary Tier 2 and tertiary Tier 3 networks.
      b. The BMCS Network shall utilize an open architecture capable of all of the following:
         1) Utilizing standard Ethernet communications and operate at a minimum speed of 10/100 Mb/sec
         2) Connecting via BACnet at the Tier 1 level in accordance with as per ANSI/ASHRAE Standard 135-2001.
         3) Connecting via the N2 Protocol at the Tier 2 level.
         4) Connecting via LonMark as per ANSI/EIA 709 (LonWorks) to LonMark FTT-10 transceivers at the Tier 2 level.
      c. The BMCS network shall support both copper and optical fiber communication media.
   4. Third-Party Interfaces

a. BMCS installer shall integrate real-time data from systems supplied by other trades as required in Part 3.
b. The BMCS system shall include necessary BMCS hardware equipment and software to allow data communications between the BMCS system and systems supplied by other trades.
c. The trade installer supplying other systems will provide their necessary hardware and software and will cooperate fully with the BMCS installer in a timely manner at their cost to ensure complete data integration.

5. Uninterruptible Power Supply (UPS)
   a. Where indicated for supporting operator PCs, servers, and other equipment as indicated, provide a UPS.
   b. UPS shall be sized for 50 PCT spare capacity. The UPS shall be complete with batteries, external bypass and line conditioning.
6. Power Fail / Auto Restart
   a. Provide for the automatic orderly and predefined shutdown of parts or all of the BMCS following total loss of power to parts or all of the BMCS.
   b. Provide for the automatic orderly and predefined startup of parts or all of the BMCS following total loss of power to those parts or all of the BMCS. Archive and annunciate time and details of restoration.
   c. Provide for the orderly and predefined scheduling of controlled return to normal, automatically time scheduled, operation of controlled equipment as a result of the auto restart processes.
   d. Maintain the BMCS real-time clock operation during periods of power outage for a minimum of 72 HRS.
7. Downloading and Uploading
   a. Provide the capability to generate BMCS software-based sequences, database items and associated operational definition information and user-required revisions to same at any Operator PC, and the means to download same to the associated Application Node.
   b. Application software tool used for the generation of custom logic sequences shall be resident in both the application node and the server(s) where indicated on the drawings.
   c. Provide the capability to upload BMCS operating software information, database items, sequences and alarms to the designated server(s).
   d. The functions of this Part shall be governed by the codes, approvals and regulations applying to each individual BMCS application.

~~B. Operator Workstations~~

~~1. The operator workstation PCs shall provide the primary means of communication with the BMCS and shall be used for operations, engineering, management, audit, reporting and other related functions.~~
~~2. All PCs shall operate independently and concurrently without interference and under individual user password protection.~~
~~3. PCs functionality shall be individually definable by software means such that PC may be designated for specific limited users and may also be readily re-designated to provide operator workstation back-up to other operator workstations in the BMCS.~~
~~4. Portable operator terminals shall operate identically to the fixed operator workstation PC.~~
~~5. Fixed or portable operator PCs shall not require any special software to be purchased from the BMCS manufacturer. All actions required for the complete operator interface as described herein shall be accomplished through a common browser.~~

~~C. Servers~~

~~1. Where communication rooms are shown on the drawings, provide servers that will provide archive locations for all historical data such as trends, alarm and event histories, and transaction logs.~~
~~2. Equip servers with the same tool set that is located in the primary application nodes for the system configuration and custom logic definition.~~

3. ~~Equip servers with the same tool set that is located in the primary application nodes for graphic configuration.~~
4. ~~Access to all information on the server will be through the same user interface used to access individual nodes. When logged onto a server the operator will be able to also interact with any of the primary nodes in the facility.~~
5. ~~The hardware platform for servers will, at minimum, consist of:~~
    a. ~~PC processor with minimum 64-bit word structure.~~
    b. ~~Minimum 2 GHz processor speed.~~
    c. ~~Minimum 1 gigabyte on board ram~~
    d. ~~Hard drive or equal high-speed data storage, minimum 50 gigabytes.~~
    e. ~~OS shall be Windows 2000 Professional or Windows XP Professional~~
    f. ~~Removable high-speed data storage and export device(s) such as Read/Write CD-ROM or approved equal.~~
    g. ~~Full ASCII keyboard and digital Mouse or equal pointing device.~~
    h. ~~Full color, flat screen VDU display unit, minimum 17 IN diagonal screen, minimum 1280 x 1024 resolution, 0.26 or better dot pitch and minimum 72 Hz refresh rate.~~

D. Operator Interface
    1. General
        a. The BMCS Operator Interface shall be user friendly, readily understood and shall make maximum use of colors, graphics, icons, embedded images, animation, text based information and data visualization techniques to enhance and simplify the use and understanding of the BMCS by authorized users at the OWS.
        b. It shall be possible to designate any PC on the Tier 1 network as an Operator Interface point. No special software will need to be purchased from the BMCS manufacturer for any such PC.
        c. User access to the BMCS shall be protected by a flexible and Owner redefinable software-based password access protection. Password protection shall be multi-level and partitionable to accommodate the varied access requirements of the different user groups. Provide the means to define unique access privileges for each individual authorized user. Also provide the means to establish general password groups to which an individual will then be assigned. Once assigned to the group each individual will assume all the capabilities and restrictions of that group. Provide the means to on-line manage password access control under the control of a Master Password.
        d. The user interface shall be able to combine data from any and all of the system components in a single browser window. This shall include historical data stored on a server.
        e. The Operator Interface shall incorporate comprehensive support for functions including, but not necessarily limited to, the following:
            1) User access for selective information retrieval and control command execution
            2) Monitoring and reporting
            3) Alarm, non-normal, and return to normal condition annunciation
            4) Selective operator override and other control actions
            5) Information archiving, manipulation, formatting, display and reporting
            6) BMCS internal performance supervision and diagnostics
            7) On-line access to user HELP menus
            8) On-line access to current BMCS as-built records and documentation
            9) Means for the controlled re-programming, re-configuration of BMCS operation and for the manipulation of BMCS database information in compliance with the prevailing codes, approvals and regulations for individual BMCS applications.
        f. Provide BMCS reports and displays making maximized use of simple English language descriptions and readily understood acronyms, abbreviations and the like to assist user understanding and interpretation. All text naming conventions shall be consistent in their use and application throughout the BMCS.
        g. All PC-based configurations shall operate on Microsoft® Windows 2000 or Windows XP.

h. Each fixed and portable PC shall be on-line configurable for specific applications, functions and groups of BMCS points.

2. Navigation Trees
   a. The system will have the capability to display multiple navigation trees that will aid the operator in navigating throughout all systems and points connected. At minimum provide a tree that identifies all systems on the networks.
   b. Provide the ability for the operator add custom trees. The operator will be able to define any logical grouping of systems or points and arrange them on the tree in any order. It shall be possible to nest groups within other groups. Provide at minimum 5 levels of nesting.
   c. The navigation trees shall be "dockable" to other displays in the user interface such as graphics. This means that the trees will appear as part of the display, but can be detached and then minimized to the Windows task bar or closed altogether. A simple keystroke will reattach the navigation to the primary display of the user interface.
3. Dividable display panels
   a. It shall be possible for the operator to divide the display area within a single browser window into multiple display panels. The content of each display panel can be any of the standard summaries and graphics provided by the system.
   b. Provide each display panel with minimize, maximize, and close icons.
4. Alarms
   a. Alarms shall be routed directly from primary application nodes to PCs and servers. It shall be possible for specific alarms from specific points to be routed to specific PCs and servers. The alarm management portion of the OWS software shall, at the minimum, provide the following functions
      1) Log date and time of alarm occurrence.
      2) Generate a "Pop-Up" window, with audible alarm, informing a user that an alarm has been received.
      3) Allow a user, with the appropriate security level, to acknowledge, temporarily silence, or discard an alarm.
      4) Provide an audit trail on hard drive for alarms by recording user acknowledgment, deletion, or disabling of an alarm. The audit trail shall include the name of the user, the alarm, the action taken on the alarm, and a time/date stamp.
      5) Provide the ability to direct alarms to an e-mail address or alpha-numeric pager. This must be provided in addition to the pop up window described above. Systems which use e-mail and pagers as the exclusive means of annunciating alarms are not acceptable.
      6) Any attribute of any object in the system may be designated to report an alarm.
   b. The BMCS shall annunciate diagnostic alarms indicating system failures and non-normal operating conditions
   c. The BMCS shall annunciate application alarms at minimum, as required by Part 3.
5. Reports
   a. Reports shall be generated and directed to one or more of the following: User interface displays, printers, or archive at the user's option. As a minimum , the system shall provide the following reports:
      1) All points in the BMCS.
      2) All points in each BMCS application.
      3) All points in a specific AN.
      4) All points in a user-defined group of points.
      5) All points currently in alarm in an BMCS application.
      6) All points locked out in an BMCS application.
      7) All BMCS schedules.
      8) All user defined and adjustable variables, schedules, interlocks and the like.
      9) BMCS diagnostic and system status reports.
   b. Provide all applicable standard reports of the BMCS manufacturer.
   c. Provide for the generation by the user of custom reports as specified in Part 3.
6. Dynamic Color Graphics

a. An unlimited number of graphic displays shall be able to be generated and executed.
b. Graphics shall be based on Scalar Vector Graphic (SVG) technology.
c. Values of real time attributes displayed on the graphics shall be dynamic and updated on the displays.
d. The graphic displays shall be able to display and provide animation based on real-time BMCS data that is acquired, derived, or entered.
e. The user shall be able to change values (setpoints) and states in system controlled equipment directly from the graphic display.
f. Provide a graphic editing tool that allows for the creation and editing of graphic files. It shall be possible to edit the graphics directly while they are on line, or at an off line location for later downloading to the AN.
g. BMCS system shall be provided with a complete user expandable symbol library containing all of the basic symbols used to represent components of a typical BMCS system. Implementing these symbols in a graphic shall involve dragging and dropping them from the library to the graphic.

7. Schedules
   a. The system shall provide multiple schedule input forms for automatic BMCS time-of-day scheduling and override scheduling of BMCS operations. At a minimum, the following spreadsheet types shall be accommodated:
      1) Weekly schedules.
      2) Temporary override schedules.
      3) Special "Only Active If Today Is A Holiday" schedules.
      4) Monthly schedules.
   b. Schedules shall be provided for each system or sub-system in the BMCS. Each schedule shall include all commandable points residing within the system. Each point may have a unique schedule of operation relative to the system use schedule, allowing for sequential starting and control of equipment within the system. Scheduling and rescheduling of points shall be accomplished easily via the system schedule spreadsheets.
   c. Monthly calendars for a 12-month period shall be provided that allow for simplified scheduling of holidays and special days in advance. Holidays and special days shall be user-selected with the pointing device or keyboard, and shall automatically reschedule equipment operation as previously defined on the weekly schedules.
8. Historical trending and data collection
   a. Trend and store point history data for all BMCS points and values as selected by the user.
   b. The trend data shall be stored in a manner that allows custom queries and reports using industry-standard software tools.
   c. At a minimum, provide the capability to perform statistical functions on the historical database:
      1) Average.
      2) Arithmetic mean.
      3) Maximum/minimum values.
      4) Range – difference between minimum and maximum values.
      5) Standard deviation.
      6) Sum of all values.
      7) Variance.

E. Application Nodes (AN)
   1. Primary Application Nodes
      a. The primary application node shall perform the function of monitoring all system variables, both from real hardware points, software variables, and controller parameters such as setpoints.
      b. Application nodes shall be entirely solid state devices. No rigid disk drives will be permitted in the equipment rooms.

c. The primary application nodes shall manage and direct all information traffic on the Tier 1 network, between the Tier 1 and Tier2 networks, and to servers.
d. Any node on the Tier 1 network shall be equipped with all software necessary to drive the complete user interface including graphics on a browser connected to the node via the network or directly via a local port on the node.
e. The operating system of the application node shall support multi-user access. At minimum four users shall be able to access the same application node simultaneously.
f. Communication between nodes shall be per-to-peer via 10/100 Ethernet using the BACnet protocol.
g. The AN shall be capable of direct connection to multiple field busses using different protocols simultaneously as indicated below. Should the controller not support multiple field busses, install two primary nodes side by side.
    1) An RS-485 serial field bus such as MSTP or the manufacturer's proprietary field bus.
    2) a LON field bus for supervision and control of LON based controllers that conform to the Lon Talk standard.
h. The primary nodes will integrate data from both field busses into a common object structure. Data from both field busses will appear in common displays throughout the user interface in exactly the same format. It shall not be possible to determine which field buss the data originated on without reviewing the system configuration data.
i. AN shall be programmable and governed by the requirements of their applicable codes, approvals and regulations.
j. The AN shall be designed, packaged, installed, programmed and commissioned in consideration of their specific service and prevailing operating conditions. They shall be proven standard product of their original manufacturer and not a custom product for this Project.
k. A failure at an AN shall not cause failures or non-normal operation at any other system AN other than the possible loss of active real-time information from the failed AN.
l. Ancillary AN equipment, including interfaces and power supplies, shall not be operated at more than 80 PCT of their rated service capacity.
m. AN shall comply with FCC Part 15 subpart J class A emission requirements.
n. Each primary node shall be equipped with the necessary un-interruptible power such that it will not cease operation during minor power outages, including those that occur upon transfer to emergency generator or other local power source not provided by the utility.

2. HVAC Node
    a. HVAC Node shall provide both standalone and networked direct digital control of HVAC systems.
    b. A dedicated HVAC Node shall be configured and provided for each primary HVAC system (air handler, chiller, boiler) and each terminal HVAC system (VAV Box, Unit Heater, Fan Coil Unit, Cabinet Heater, Heat Pump, Fan Powered Box, CV Box)
    c. Each HVAC Node shall retain program, control algorithms, and setpoint information in non-volatile memory in the event of a power failure, and shall return to normal operation upon restoration of power.
    d. Each HVAC Node shall report its communication status to the BMCS. The BMCS shall provide a system advisory upon communication failure and restoration.
    e. For each primary HVAC system, provide means of indication of system performance and setpoints at, or adjacent to the HVAC Node.
    f. For each primary HVAC system, provide a means to adjust setpoints and start/stop equipment at, or adjacent to the HVAC Node.
    g. Provide a means to prevent unauthorized personnel form accessing setpoint adjustments and equipment control functions.
    h. The HVAC Node shall provide the ability to download and upload configuration data, both locally at the Node and via the BMCS communications network.
    i. The HVAC Node shall be provided with a permanently-mounted local graphic terminal where required in the sequences of this specification. The local graphic terminal shall

provide dynamic graphical representation of the associated system status, with the ability for the operator to enter commands with proper password protection.

F. Application Software
   1. HVAC Application Software
      a. Event Messaging: Provide for the automatic execution of user-defined messages on the occurrence of each predefined BMCS real-time event including equipment/point status change, approaching limit or alarm, time of day and the like. Direct messages to any number of operator PCs, e-mail destinations, and pagers.
      b. Indoor Air Quality: Provide monitoring of outside air, return air and supply air CO2 concentration, calculate and maintain fresh air requirements. Adjust outdoor air intake to ensure return air CO2 high level limit is not exceeded.
      c. Optimum Start/Stop: Provide software to start equipment on a sliding schedule based upon indoor and outdoor conditions, to determine the minimum time of HVAC system operation needed to satisfy the space environmental requirements. The program shall also determine the earliest possible time to stop the mechanical systems. The optimum start/stop program shall operate in conjunction with, and be coordinated with, the scheduled start/stop and night setback programs.
      d. Auto Alarm Lockout: Provide for scheduled and automatic lockout of alarm annunciation from equipment during non-normal operating conditions including shutdown, emergency power operation, fire alarm and the like.
      e. Energy monitoring: Provide software to monitor and totalize consumption as measured by pulse meters.
      f. Event Initiated Programs and custom logic: Provide software to define custom logic sequences that will reside in the nodes. The definition software will also reside in the node and be accessible via the standard user interface via a browser.
      g. System Restart: Upon restoration of the AC power to an HVAC Node, automatically restart all equipment and restore all loads to the state as required by the BMCS. Provide appropriate time delays to prevent demand surges or overload trips.
      h. Heavy Equipment Delays: The system shall provide protection against excessive demand situations during start-up periods by automatically introducing time delays between successive start commands to heavy electrical loads.
      i. Runtime Totalization: Automatically sample, calculate and store runtime hours for binary input and output points as listed in the point schedule of this specification.
      j. Analog/Pulse Totalization: Sample, calculate and store consumption totals on a daily, weekly, or monthly basis for user-selected analog and binary pulse input-type points.

2.5 ELECTRICAL SYSTEM AND DEVICES

AD#1: Section 25 50 00; Part 2/2.5.B Deletion

A. All electric switch devices to be selected for applied and UL listed for application. All water thermostats provided with separable copper, monel, or stainless steel well.

B. Miscellaneous, electric and mechanical devices to include:
   1. Control dampers less actuators shall be provided under Section 23 31 13. Actuators shall be provided by controls installer.
   2. Smoke dampers and actuators indicated on plans provided by Section 23 31 13. Actuator to be factory installed, coordinate type required.
   ~~3. Automatic control valves:~~
      ~~a. Chilled water system control valves for new air handling units shall be provided as follows:~~
         ~~1) Pressure independent valves with 100:1 turndown designed to maintain constant flow rate proportional to valve position regardless of inlet pressure.~~
         ~~2) 5 PCT accuracy through selected operating pressure range calibrated per ANSI/NCSL Z540-1-1994.~~

3) ~~Control valve bodies shall be cast iron, steel, or bronze rated at 150 PSIG. All internal parts shall be stainless steel, steel, Teflon, brass, or bronze. Plastic internal parts are not acceptable.~~
4) ~~Use of valves shall eliminate need for manually balancing flow rate at each location. Valves shall have pressure ports to verify proper operation.~~
5) ~~End type:~~
a) ~~2-1/2 IN and smaller: screwed type.~~
b) ~~3 IN and larger: flanged.~~
6) ~~Manufacturer: Delta P.~~
7) ~~Valves for fan coil units may be conventional type as specified for other systems.~~

b. ~~Other systems:~~
1) ~~Materials:~~
a) ~~Stems: Stainless steel.~~
b) ~~Packing: Spring loaded Teflon with replaceable discs.~~
c) ~~Body: Bronze.~~
2) ~~End type:~~
a) ~~2-1/2 IN and smaller: screwed type.~~
b) ~~3 IN and larger: flanged.~~
3) ~~Water control valves, 4 IN size and larger: butterfly type.~~
4) ~~Valves ANSI rated to withstand pressures and temperatures encountered.~~
5) ~~Modulating straight through water valves provided with equal percentage contoured throttling plugs. All three-way valves provided with linear throttling plugs so total flow through valve remains constant regardless of valve's position. Valves sized for pressure drop equal to coil they serve, but not to exceed 5 PSI. Size two-way valve operators to close valves against pump shut off head.~~

c. ~~Terminal equipment valves to be straight through or three-way type as indicated. Stems polished stainless steel and packing ethylene-propylene suitable for both chilled water and 250 degree hot water service. Pressure ratings as required for intended service.~~

4. Firestats: 130 DEGF manual reset type.
5. Safety low limits: Snap acting, single pole, single or double throw, manual reset switch which trips if temperature sensed across any 12 IN of bulb length is equal to or below setpoint, requiring minimum 20 FT length of bulb. Provide one thermostat for every 20 square feet of coil surface. Mount freeze protection thermostats using flanges and element holders. Low limit thermostats shall have multiple contacts or shall be installed with relay loop to allow low limit thermostats to be directly connected to the motor starter/VFD and to the BMCS.
6. Electric thermostats: Line voltage or low voltage type suitable for application. Low voltage type heating thermostats to have adjustable heat anticipation.
7. Instrument Pressure Gages: Black letters on white background, 1-1/2 IN diameter, stem mounted with suitable dial range. Install pressure gages on main and branch lines at each receiver controller, at input to each actuator, at inputs and outputs from each relay and switch, and signal lines at each transmitter.
8. Electric Damper Actuators.
   a. Rating: NEMA 1 Enclosure
   b. Mounting: Direct mount
   c. Stroke: 90 seconds end to end full stroke, 15 seconds return to normal for spring return
   d. Protection: Electronic stall protection
   e. Control Input: 0-10 VDC or 0-20 mADC
   f. Power: Nominal 24 VAC
   g. Torque: Size for minimum 150 PCT of required duty
   h. Duty cycle: rated for 65,000 cycles
   i. Special:
      1) Modulating actuators: Output position feedback.

2) Two position actuators: Two auxiliary contacts for actuator position.
3) Manual override
4) Field selectable rotational / spring return direction
5) Field adjustable zero and span.

~~9. Electric Valve Actuators.~~

~~a. Rating: NEMA 1 Enclosure~~
~~b. Mounting: Direct mount~~
~~c. Control Input: Continuous 0-10 VDC or 0-20 mADC~~
~~d. Power: Nominal 24 VAC~~
~~e. Protection: Stall protection~~
~~f. Torque: Size for minimum 150 PCT of required duty~~
~~g. Special:~~

~~1) Modulating actuators: Output position feedback.~~
~~2) Two position actuators: Two auxiliary contacts for actuator position.~~
~~3) Manual override.~~
~~4) Field selectable direction.~~
~~5) Field adjustable zero and span.~~
~~6) For spring return, provide field selectable spring return direction.~~

2.6 ELECTRONIC DATA INPUTS AND OUTPUTS

AD#1: Section 25 50 00; Part 2/2.6.E-F Deletion

A. Input/output sensors and devices matched to requirements of remote panel for accurate, responsive, noise free signal output/input. Control input to be highly sensitive and matched to loop gain requirements for precise and responsive control.
   1. In no case shall computer inputs be derived from pneumatic sensors.

B. Temperature sensors:
   1. Except as indicated below, all Alerton Microset 4 combination space temp/humidity sensors shall be provided with touch screen setpoint adjustment, temperature and humidity display, and unoccupied mode override button. The following are exceptions to this:
      a. The following locations shall have sensor without setpoint adjustment:
         1) All electrical and communication rooms.
         2) All mechanical rooms.
         3) All unit heaters.
         4) All public elevator lobbies and entrance vestibules.
         5) Elevator equipment rooms.
   2. Duct temperature sensors to be averaging type. Averaging sensors shall be of sufficient length (a maximum of 1.8 sqft of cross sectional area per 1 lineal foot of sensing element) to insure that the resistance represents an average over the cross section in which it is installed. The sensor shall have a bendable copper sheath. Water sensors provided with separable copper, monel or stainless steel well. Outside air wall mounted sensors provided with sun shield.
   3. Outside air, return air, discharge air, return air, space, and well sensors to be linear with +/- .7 DEGF between 32 DEGF and 212 DEGF.

C. Relative humidity sensors to be capacitance type with 10 PCT to 90 PCT range with an accuracy of plus or minus 2 PCT of full scale. Duct mounted humidity sensors provided with sampling chamber.

D. Differential and static pressure sensors and switches:
   1. The pressure transducer shall withstand up to 150 % of rated pressure with and accuracy of plus or minus 1 PCT of full scale. The sensing element shall be either capsule, diaphragm, bellows, bourbon tube, or solid state. Pressure sensors (all types) installed on liquid lines shall have drains. Pressure sensors installed on steam lines shall have drains and siphons. All pressure sensors shall have valves for isolation, venting and taps for calibration.

Pressure sensors shall be verified by calibration. Differential pressure sensors shall have nulling valves.

2. Pressure switches shall have a repetitive accuracy of plus or minus 2 PCT of their operating range and shall withstand up to 150 PCT of rated pressure. Switch shall have a snap acting form C contact rated for the application. Provide Dwyer 3000 series photohelic gauges with isolation valves and calibration taps, required power supply, and manual reset push button. Pressure switches (all types installed on liquid lines shall have drains. Pressure sensors installed on steam lines shall have drains and siphons. All pressure switches shall have valves for isolation, venting and taps for calibration. Pressure switches shall be adjusted to the proper set point and shall be verified by calibration. Pressure switches shall be mounted higher than the process connection. Differential pressure switches shall have nulling valves. Switch contact ratings and duty shall be selected in accordance with NEMA ICS 1.
3. Fan proof-of-flow sensor to be current switch.
4. Pump proof-of-flow sensor to be current switch.
5. Provide differential pressure gauges for air handling unit filters in pressure ranges to match full loaded filter pressure drop plus 50 PCT with manual reset and set point indication. Provide with isolation valves and calibration taps.

E. Flow measurement devices:
   1. Airflow measuring stations:
      a. Fan inlet airflow measuring stations: Use airflow traverse probes mounted in the specified centrifugal fan inlets to continuously measure the airflow rate of the fan. DWDI fans shall have probes in each inlet. Probes shall accurately and instantaneously measure fan capacity to within 3 PCT of actual air volume. The probes shall also have the following features:
         1) Multiple total and static pressure sensing points for averaging.
         2) Unaffected by normal building particulate contamination.
         3) Aluminum construction with hard anodized finish.
         4) Dual end support swivel mounting brackets for each probe.
         5) Probes shall not produce a measurable pressure drop or increase sound levels by its presence in the fan inlet.
         6) Model: Air Monitor VOLU-probe/FI.
      b. Transmitter for airflow stations: Provide solid-state ultralow span transmitter to produce signals of 0-10 VDC or 4-20 MA for use in control of HVAC system. These signal outputs to be linear and proportional to airflow. The transmitter shall also have the following features:
         1) Automatic zeroing circuit within 0.1 PCT of operating span.
         2) Accuracy: within 0.25 PCT of natural span.
         3) 12 adjustable calibrated spans.
         4) Digital display indicating CFM and FPM.
         5) Maximum Over-pressurization: 20 PSIG.
         6) Velocity turndown: 10 to 1.
         7) NEMA 1 enclosure with view window.
         8) 24 volt power requirement.
         9) Model: Air Monitor VELTRON II, Model 7000.
      c. Outside Air Flow Monitor: The monitor/transmitter shall measure outside air quantity and produce signal of 0-10 VDC or 4-20 MA for use in control of HVAC systems. The output signal shall be linear and proportional airflow. The monitor/transmitter shall have following features:
         1) Outside and inlet reference sensors that are not affected by changing wind, ambient temperature, or atmospheric pressure.
         2) Accuracy: Within 5 PCT of reading over a range of 150-600 FPM.
         3) Digital display indicating CFM, FPM, and temperature.
         4) Construct of chemical and weather resistant materials. All surfaces shall be painted or exposed stainless steel.
         5) NEMA 1 enclosure.

6) Model: Air Monitor VOLU-flo/OAM.

d. The flow station manufacturer's representative shall review all mechanical drawings during the bidding period and verify the acceptability of the proposed location of the air flow measuring stations and inform the Engineer of any problems before bids are due.

e. The manufacturer's representative shall visit the site as required during installation and for system start-up.

f. The temperature control installer shall be required to calibrate the airflow sensors with input from the air balancing provider. Air flow readings shall be taken for at least five air flows through the range of operation and fit to a linear equation and programmed into the software.

g. At installer's option, electronic airflow measuring stations which meet or exceed accuracy and performance of base manufacturer may be used.

2. Electronic Airflow Stations

a. Air Flow and Temperature Measurement:

1) Thermal dispersion technology anemometer using instrument grade self-heated thermistor sensors with thermistor temperature sensors.

2) Factory tested prior to shipment and shall not require calibration or adjustment over the life of the equipment when installed in accordance to manufacturer's guidelines.

3) Manufacturer shall provide test data for accuracy performance prior to bid date. Vortex shedding arrays are not acceptable. Pitot tube and differential pressure sensing arrays are not acceptable. Auto zeroing sensors are not acceptable.

b. Flow Station Construction

1) Duct or fan inlet mounted as indicated.

2) Sensors: Two glass-encapsulated thermistors at each measuring point - self heated thermistor and temperature sensor.

a) Glass-filled polypropylene housing.

b) Factory-calibrated at 16 airflow rates and 3 temperatures to NIST-traceable standards for both airflow and temperature.

3) Duct mounted probe construction:

a) Gold anodized aluminum alloy tube

b) 304 stainless steel mounting brackets.

c) Constructed as insertion, internal, or standoff mounting, depending on installation requirements.

d) Probe sensor density:

Area (sq.ft.)	Sensors
<= 1	2
>1 to< 4	4
4 to < 8	6
8 to < 12	8
12 to < 16	12
>= 16	16

e) Probe operating ranges:

(1) Airflow: 0 to 5000 FPM.

(2) Temperature: -20 to 160 °F, ±0.15 ºF.

(3) Relative Humidity: 0 to 99 PCT non-condensing.

f) Installed accuracy of ±3 PCT of reading or better.

4) Fan inlet mounted probe construction:

a) Gold anodized aluminum alloy tube

b) 304 stainless steel mounting brackets.

c) Probe operating ranges:

(1) Airflow: 0 to 10,000 FPM.

(2) Temperature: -20 to 160 °F, ±0.15 ºF

(3) Relative Humidity: 0 to 99 PCT non-condensing.

d) Installed accuracy of ±10 PCT of reading or better.

c. Transmitter:
1) Type: Microprocessor Based, totally solid state.
2) Power Requirement: 24 VAC, isolated from other devices and not grounded. AFMS manufacturer shall furnish a 1:1 isolation transformer for each duct location.
3) Capable of processing up to 16 independent sensing points per location.
4) Output signal offset/gain adjustment.
5) Adjustable digital filter to stabilize airflow output.
6) Field configurable for either I.P. or S.I. units.
7) Local digital display on face of cabinet for indicating individual sensor airflow and temperature readings.
8) Wall-mounted NEMA 1 enclosure.

d. The temperature control installer shall be required to calibrate the airflow sensors with input from the air balancing provider. Air flow readings shall be taken for at least five air flows through the range of operation and fit to a linear equation and programmed into the software.

e. Performance:
1) Electronics temperature range: 30 to 120 DEGF.
2) Flow station pressure drop: less than 0.005 IN WC at 2000 FT./min.

f. Analog output signals: 0-10 VDC or 4-20 ma:
1) Type: linear.

g. Ebtron Gold Series or approved equal.

~~3. Water flow meters~~

~~a. Turbine flow meters:~~

~~1) Water flow meters:~~

~~a) Type: Insertion turbine type with retractable probe assembly and 2 IN full port gate valve.~~

~~b) Pipe size: 3 to 24 IN.~~
~~c) Retractor: ASME threaded, non-rising stem type with hand wheel.~~
~~d) Mounting connection: 2 IN 150 PSI flange.~~
~~e) Rotor assembly: Design for expected water flow and pipe size.~~
~~f) Seal: Teflon (PTFE).~~
~~g) Controller:~~

~~(1) Integral to unit.~~
~~(2) Locally display flow rate and total.~~
~~(3) Output flow signal to BMCS: Digital pulse type.~~

~~h) Performance:~~

~~(1) Accuracy: 1.0 PCT of reading~~
~~(2) Repeatability: 0.25 PCT of reading~~
~~(3) Turndown: 30:1~~

~~i) Power: 24 volt DC~~
~~j) Manufacturer: Emco TMP 910~~

~~b. Vortex shedding flow meters:~~

~~1) Water flow meters:~~

~~a) Type: Insertion vortex type with retractable probe assembly and 2 IN full port gate valve.~~
~~b) Pipe size: 3 to 24 IN.~~
~~c) Retractor: ASME threaded, non-rising stem type with hand wheel.~~
~~d) Mounting connection: 2 IN 150 PSI flange.~~
~~e) Sensor assembly: Design for expected water flow and pipe size.~~
~~f) Seal: Teflon (PTFE).~~

~~g) Controller:~~

~~(1) Integral to unit.~~
~~(2) Locally display flow rate and total.~~

~~(3) Output flow signal to BMCS: Digital pulse type.~~

~~h) Performance:~~

~~(1) Accuracy: 1.0 PCT of reading~~
~~(2) Repeatability: 0.15 PCT of reading~~
~~(3) Turndown: 20:1~~
~~(4) Response time: Adjustable from 1 to 100 seconds.~~

~~i) Power: 24 volt DC~~
~~j) Manufacturer: Emco V-Bar 910~~

~~c. Install flow meters according to manufacturer's recommendations. Where recommended by manufacturer because of mounting conditions, provide flow rectifier.~~
~~d. The temperature control installer shall be required to calibrate the flow meter with input from the balancing provider (Section 20 08 00). Flow readings shall be taken for at least five flows through the range of operation and fit to a linear equation and programmed into the software.~~

~~F. Carbon Dioxide Sensors:~~

~~1. Non-dispersive infrared technology.~~
~~2. Measuring range: 0-5000 ppm.~~
~~3. Accuracy: ±5 PCT or reading or ±100 ppm, whichever is greater.~~
~~4. Repeatability: ±20 ppm.~~
~~5. Maximum Drift per year: ±100 ppm.~~
~~6. Response Time (@ 500ml/min.): <=1 min.~~
~~7. Dry contact CO_2 alarm threshold adjustable over range of 0 to 5000 ppm.~~
~~8. Analog output 0-5 VDC or 4-20 mA over full sensed range.~~
~~9. Zero and span adjustment.~~
~~10. Provide aspirating box to permit measurement of return air duct carbon dioxide level. Box to be mounted to outside of duct, allowing access to sensor for maintenance.~~
~~11. Telaire Systems, Inc.~~

G. Outputs: Control relays and analog output transducers to be compatible with remote panel. Relays suitable for loads encountered. Analog output transducers designed for precision closed loop control with pneumatic repeatability error no greater than 1-1/2 PCT.

PART 3 - EXECUTION

3.1 GENERAL

A. The Building Management and Control System (BMCS) shall be designed, installed, and commissioned in a turnkey fully implemented and operational manner; including all labor not noted in the Work by Others paragraph of Part I of this section of these specifications, and not noted in other sections of these specifications.

AD#1: Section 25 50 00; Part 3/3.2.A-H Deletion/Addition

~~3.2 VARIABLE VOLUME, PACKAGED ROOFTOP UNIT~~ SEQUENCE OF CONTROL

A. ~~General: Variable air volume, heating and cooling packaged unit~~ **Reference drawings in contract documents**.

~~B. Startup: RTU system is manually started and stopped by system on/off autoswitch located on unit control panel.~~

~~1. Start variable frequency drives at zero speed and set VFD rampup at 60 sec minimum.~~

C. Dampers:

1. When supply fan is "ON":

a. Outside air damper is modulated to provide sufficient fresh air (see schedule) as measured by the outside airflow measuring station..
b. Relief air damper is modulated to provide scheduled cfm.

2. Supply fan is "OFF":

a. Outside air dampers, "CLOSED".
b. Return air damper, "CLOSED".

3. Unoccupied cycle:

a. Fans "OFF".
b. Outside air damper "CLOSED".
c. Return air damper "CLOSED".
d. Exhaust fans "OFF".
e. If space temperature falls below 50 degF (adj.):

1) Fans "ON".
2) Outside air damper "CLOSED".
3) Return air damper "OPEN".
4) Exhaust fans "OFF".
5) Heating cycle enabled

f. If space temperature is above 85 degF (adj.)

1) Fan "ON".
2) Outside air damper "CLOSED".
3) Return air damper "OPEN".
4) Exhaust fans "OFF".
5) Cooling cycle enabled.

4. Warm up/cool down cycle:

a. Fans "ON".
b. Outside air damper "CLOSED".
c. Return air damper "OPEN".
d. Exhaust fans "OFF".

D. Static pressure control for variable air volume units:

1. Provide differential pressure switch in supply fan discharge plenum which measures pressure differential between supply plenum interior and exterior (return air space).

a. On overpressure of 6 IN WG (adj.) the fans shall be shut down.

2. Furnish and install static pressure sensor installed in the supply ductwork 2/3 of the way to the end of the longest duct run.
3. The unit controller (UC) shall sense the static pressure and control the VFD's through a 4-20 ma or a 0-10 volt signal to maintain the duct static pressure setpoint of 1 IN WG (adj).

E. Filters:

1. Provide dirty filter alarm at BMCS set at 1 IN WG (adj.).

F. Temperature control:

1. Provide unit mounted supply discharge air sensor. Manufacturers controls cycle compressors to maintain 55 degF (adj.) leaving air temperature.
2. Reset the supply air temperature based on the average space temperature sensors associated with the VAV terminal units to minimize reheat.

a. The return damper shall be fully open, the max. OA damper fully closed, and the min. OA damper and return air damper modulated to maintain the minimum indoor air quality.

3. ~~BMCS shall provide night setback (unoccupied cycle) capability for any or all air handlers at Owner's discretion on both a time clock or manually.~~
4. ~~Modulate gas valve and/or bypass damper to maintain leaving air temperature setpoint (adj.).~~

~~G. Supply Fan Control:~~

a. ~~If safety controls are normal, the VFD(s) for the supply fan(s) shall be enabled by the BMCS and shall run continuously.~~
b. ~~The VFD(s) shall vary the speed of the fan motor(s) as required to maintain the supply duct static pressure sensor setting (adj.). Setting shall be coordinated with balancing provider. For dual supply fans, the fans shall operate in unison.~~

1) ~~Locate supply duct static pressure sensor in the high pressure ductwork downstream of the unit 2/3 of the distance from the unit.~~

c. ~~The airflow of the supply fan(s) shall be measured by the inlet airflow stations. The airflow station transmitter provides a linear control signal to the BMCS proportional to airflow.~~
d. ~~Provide supply fan(s) with current switch for fan status.~~

~~H. Emergency operation:~~

1. ~~Upon signal from the fire alarm shutdown of RTU as follows:~~

a. ~~Supply fan, off; exhaust fan, off.~~
b. ~~Outside air damper, closed; return air damper, closed.~~
c. ~~Manual reset required.~~

AD#1: Section 25 50 00; Part 3/3.3. Deletion

~~3.3 CONSTANT VOLUME, PACKAGED ROOFTOP UNIT~~

~~A. General: Constant air volume, heating and cooling packaged unit.~~

~~B. Startup: RTU system is manually started and stopped by system on/off autoswitch located on unit control panel.~~

1. ~~Start supply fan.~~

~~C. Dampers:~~

1. ~~When supply fan is "ON":~~

a. ~~Minimum Outside air damper is modulated to provide sufficient fresh air (see schedule).~~
b. ~~Relief air damper is modulated to provide scheduled cfm.~~

2. ~~Supply fan is "OFF":~~

a. ~~Outside air dampers, "CLOSED".~~
b. ~~Return air damper, "CLOSED".~~

3. ~~Unoccupied cycle:~~

a. ~~Fans "OFF".~~
b. ~~Outside air damper "CLOSED".~~
c. ~~Return air damper "CLOSED".~~
d. ~~Exhaust fans "OFF".~~
e. ~~If space temperature falls below 50 degF (adj.):~~

1) ~~Fans "ON".~~
2) ~~Outside air damper "CLOSED".~~
3) ~~Return air damper "OPEN".~~
4) ~~Exhaust fans "OFF".~~
5) ~~Heating cycle enabled~~

f. ~~If space temperature is above 85 degF (adj.)~~

1) ~~Fan "ON".~~

~~2) Outside air damper "CLOSED".~~
~~3) Return air damper "OPEN".~~
~~4) Exhaust fans "OFF".~~

~~5) Cooling cycle enabled.~~

~~4. Warm up/cool down cycle:~~

~~a. Fans "ON".~~
~~b. Outside air damper "CLOSED".~~
~~c. Return air damper "OPEN".~~
~~d. Exhaust fans "OFF".~~

~~D. Filters:~~

~~1. Provide dirty filter alarm at BMCS set at 1 IN WG (adj.).~~

~~E. Temperature control:~~

~~1. Provide unit mounted supply discharge air sensor. Manufacturers controls cycle compressors to maintain 55 degF (adj.) leaving air temperature.~~

~~1) When the supply air sensor is satisfied, the maximum OA damper shall modulate closed and the minimum damper shall modulate open to the minimum OA setpoint.~~

~~b. When the economized cycle is not allowed, the return damper shall be fully open, the max. OA damper fully closed, and the min. OA damper and return air damper modulated to maintain the minimum indoor air quality.~~

~~2. BMCS shall provide night setback (unoccupied cycle) capability for any or all air handlers at Owner's discretion on both a time clock or manually.~~
~~3. Modulate gas valve and/or bypass damper to maintain leaving air temperature setpoint (adj.).~~

~~F. Supply Fan Control:~~

~~a. If safety controls are normal, the VFD(s) for the supply fan(s) shall be enabled by the BMCS and shall run continuously.~~
~~b. The VFD(s) shall vary the speed of the fan motor(s) as required to maintain the supply duct static pressure sensor setting (adj.). Setting shall be coordinated with balancing provider. For dual supply fans, the fans shall operate in unison.~~

~~1) Locate supply duct static pressure sensor in the high pressure ductwork downstream of the unit 2/3 of the distance from the unit.~~

~~c. The airflow of the supply fan(s) shall be measured by the inlet airflow stations. The airflow station transmitter provides a linear control signal to the BMCS proportional to airflow.~~
~~d. Provide supply fan(s) with current switch for fan status.~~

~~G. Emergency operation:~~

~~1. Upon signal from the fire alarm shutdown of RTU as follows:~~

~~a. Supply fan, off; exhaust fan, off.~~
~~b. Outside air damper, closed; return air damper, closed.~~
~~c. Manual reset required.~~

AD#1: Section 25 50 00; Part 3/3.4. Deletion

~~3.4 HEATING AND VENTILATING, PACKAGED ROOFTOP UNIT~~

~~A. General: Constant air volume, heating and ventilating packaged unit.~~

~~B. Startup: RTU system is manually started and stopped by system on/off autoswitch located on unit control panel.~~

1. ~~Start supply fan.~~

~~C. Dampers:~~

1. ~~When supply fan is "ON":~~
   a. ~~Outside air damper is modulated to provide sufficient fresh air (see schedule).~~
2. ~~Supply fan is "OFF":~~
   a. ~~Outside air dampers, "CLOSED".~~

~~D. Filters:~~

1. ~~Provide dirty filter alarm at BMCS set at 1 IN WG (adj.).~~

~~E. Temperature control:~~

1. ~~Provide wa;ll mounted thermostat..~~
2. ~~Modulate gas valve to maintain leaving air temperature setpoint of 55 degF(adj.).~~

~~F. Supply Fan Control:~~

a. ~~If safety controls are normal, the VFD(s) for the supply fan(s) shall be enabled by the BMCS and shall run continuously.~~
b. ~~The VFD(s) shall vary the speed of the fan motor(s) as required to maintain the space static pressure sensor setting (adj.). Setting shall be coordinated with balancing provider.~~
c. ~~Provide supply fan(s) with current switch for fan status.~~

2. ~~Provide fan status and fan status alarm.~~

~~G. Emergency operation:~~

1. ~~Upon signal from the fire alarm shutdown of RTU as follows:~~
   a. ~~Supply fan, off; exhaust fan, off.~~
   b. ~~Outside air damper, closed.~~
   c. ~~Manual reset required.~~

AD#1: Section 25 50 00; Part 3/3.5. Deletion

~~3.5 KITCHEN MAKEUP AIR UNITS~~

~~A. General: Constant air volume, heating and cooling packaged unit.~~

~~B. Startup: RTU system is manually started and stopped by system on/off autoswitch located on unit control panel.~~

1. ~~Start supply fan.~~

~~C. Dampers:~~

1. ~~When supply fan is "ON":~~
   a. ~~Minimum Outside air damper is modulated to provide sufficient fresh air (see schedule).~~
   b. ~~Relief air damper is modulated to provide scheduled cfm.~~
2. ~~Supply fan is "OFF":~~
   a. ~~Outside air dampers, "CLOSED".~~
   b. ~~Return air damper, "CLOSED".~~

~~D. Filters:~~

1. ~~Provide dirty filter alarm at BMCS set at 1 IN WG (adj.).~~

~~E. Temperature control:~~

1. ~~Provide unit mounted supply discharge air sensor. Manufacturers controls cycle compressors and/or modulate hot gas bypass to maintain 55 degF (adj.) leaving air temperature.~~
2. ~~Modulate gas valve and/or bypass damper to maintain leaving air temperature setpoint (adj.).~~

a. ~~Reset discharge setpoint to minimize electric reheat.~~

F. ~~Supply Fan Control:~~

a. ~~If safety controls are normal, the VFD(s) for the supply fan(s) shall be enabled by the BMCS and shall run continuously.~~
b. ~~Provide supply fan(s) with current switch for fan status.~~

G. ~~Emergency operation:~~

1. ~~Upon signal from the fire alarm shutdown of RTU as follows:~~

a. ~~Supply fan, off; exhaust fan, off.~~
b. ~~Outside air damper, closed; return air damper, closed.~~
c. ~~Manual reset required.~~

AD#1: Section 25 50 00; Part 3/3.6. Deletion

~~3.6 AIR TERMINAL UNITS~~

A. ~~General~~

1. ~~Minimum Airflow Rates for Variable Volume Air Terminal Units~~

a. ~~As indicate don Air Terminal Unit Schedule~~

2. ~~Space Temperature Set Points~~

a. ~~Cooling Mode:75 Deg F +/- 2 Deg F (Adjustable)~~
b. ~~Heating Mode:70 Deg F +/- 2 Deg F (Adjustable)~~

3. ~~BMCS VAV Air Terminal Unit Control~~

a. ~~The BMCS shall command the VAV Air Terminal Unit into the Heating or Cooling Mode as required based upon the Heating/Cooling Mode Transition Sequence of Operation.~~
b. ~~The BMCS shall limit and control the respective maximum Heating and Cooling supply air temperatures as sensed by the units supply air temperature sensor.~~
c. ~~The BMCS shall control the unit's VAV damper and heating control valve in response to the space temperature set point according to the Heating or Cooling Sequence of Operation.~~
d. ~~Refer to the VAV Terminal Unit Schedule for all Maximum and Minimum Air Flow and Temperature Limits for both Heating and Cooling modes.~~

B. ~~Single duct, variable volume unit cooling only (VV #), direct digital controls~~

a. ~~Cooling Mode:~~

~~During the Cooling Mode the VV damper shall modulate proportionately to maintain the space temperature set point via BMCS control. As the space temperature rises above its set point, the VV damper shall modulate open proportionately towards its Maximum Cooling Mode Supply Air Flow Rate to maintain set point. As the space temperature decreases below its set point, the VV damper shall modulate closed proportionately towards its Minimum Cooling Mode Supply Air Flow Rate.~~

C. ~~Single duct, variable volume unit with electric reheat(VVR #), direct digital controls~~

a. ~~Heating Mode, VVR Transition from Cooling Mode:~~

While in the Cooling Mode and maintaining the Maximum Cooling Mode Reheat Supply Air Temperature limit at minimum supply air flow rate and the space temperature falls 5 Deg F below set point for five (5) minutes, the BMS shall command the VVR Air Terminal Unit to enter into the Heating Mode.

b. Heating Mode – VVR:

The VVR Air Terminal Unit shall enter into the Heating Mode by command from the BMCS. Upon command to enter into the Heating Mode, the VVR damper shall open to provide the scheduled Heating Mode Supply Air Flow Rate and the SCR controller shall modulate the heat to provide the scheduled Maximum Heating Mode Supply Air Temperature. When the space temperature set point has been achieved, the SCR controller shall modulate the heat as required to maintain the space temperature set point limited by the Maximum Heating Supply Air Temperature as sensed by the unit's supply air temperature sensor.

c. Cooling Mode, VVR – Transition from Heating Mode:

While in the Heating Mode and the SCR controller has modulated the heat to maintain a Minimum Heating Mode Supply Air Temperature equal to the space temperature set point and the space temperature continues to rise above set point:

1. The BMCS shall command the VVR damper to reduce the air flow rate proportionately in response to the space temperature while the SCR controller modulates the heat down proportionately to main the minimum Heating Mode Supply Air Temperature.
2. When the VVR damper has modulated down to the Minimum Cooling Mode Supply Air Flow Rate and the SCR controller is maintaining the Minimum Heating Mode Supply Air Temperature and the space temperature rises 5 Deg F above the Heating Mode Temperature Set Point, the BMCS shall command the VVR Air Terminal Unit into the Cooling Mode.

d. Cooling Mode – VVR:

The VVR Air Terminal Unit shall enter into the Cooling Mode by command from the BMCS. During the Cooling Mode the VVR damper shall modulate proportionately to maintain the space temperature set point via BMS control. As the space temperature rises above its set point, the VVR damper shall modulate open proportionately towards its Maximum Cooling Mode Supply Air Flow Rate to maintain set point. As the space temperature decreases below its set point, the VVR damper shall modulate closed proportionately towards its Minimum Cooling Mode Supply Air Flow Rate. When the unit is supplying its minimum air flow rate and there is a further decrease in space temperature, the SCR controller shall modulate the heat to maintain the Maximum Cooling Mode Reheat Supply Air Temperature as sensed by the unit's supply air temperature sensor via BMS control. Upon satisfying the space temperature set point, the SCR controller shall modulate the heat to maintain space temperature set point while being limited by the Cooling Mode Supply Air Temperature until the SCR controller is off. When the SCR controller is off and the space temperature rises, the BMCS shall command the VVR damper to modulate open proportionately to maintain the space temperature set point.

D. Single duct, constant volume unit with electric reheat(CVR #), direct digital controls

a. Heating Mode, CVR – Transition from Cooling Mode:

While in the Cooling Mode and maintaining the Maximum Cooling Mode Reheat Supply Air Temperature limit and the space temperature falls 5 Deg F below set point for five (5) minutes, the BMCS shall command the CVR Air Terminal Unit to enter into the Heating Mode.

b. Heating Mode- CVR:

The CVR Air Terminal Unit shall enter into the Heating Mode by command from the BMCS. Upon command to enter into the Heating Mode, the SCR controller shall modulate the heat to provide the scheduled Maximum Heating Mode Supply Air Temperature. When the space temperature set point has been achieved, the SCR controller shall modulate the heat as required to maintain the space temperature set point limited by the Maximum Heating Supply Air Temperature as sensed by the unit's supply air temperature sensor.

c. Cooling Mode, CVR - Transition from Heating Mode:

While in the Heating Mode and the SCR controller has modulated the heat to maintain a Minimum Heating Mode Supply Air Temperature equal to the space temperature set point and the space temperature rises 5 Deg F above the Heating Mode Temperature Set Point, the BMCS shall command the CVR Air Terminal Unit into the Cooling Mode.

d. Cooling Mode - CVR:

The CVR Air Terminal Unit shall enter into the Cooling Mode by command from the BMCS. As the space temperature decreases below set point, the SCR controller shall modulate the heat to maintain the Maximum Cooling Mode Reheat Supply Air Temperature as sensed by the unit's supply air temperature sensor via BMCS control. Upon satisfying the space temperature set point, the SCR controller shall modulate the heat to maintain space temperature set point while being limited by the Cooling Mode Maximum Supply Air Temperature.

AD#1: Section 25 50 00; Part 3/3.7. Deletion

3.7 MISCELLANEOUS FANS

A. All exhaust fans with constant speed starters shall be controlled as follows (unless indicated otherwise).

1. Fans shall be manually enabled/disabled remotely through the BMCS.
2. Provide each fan with current switch for fan status.

B. Dishwasher exhaust fan :

1. Provide wall switch is dishwashing area to control fan. The wall switch shall be wired directly to the fan motor starter independent of the BMCS.
2. Provide fan with current switch for fan status.

C. Kitchen exhaust fans (KEF-all):

1. Provide temperature switch in each kitchen/server exhaust hood. Coordinate location with the kitchen/server exhaust hood supplier.
2. When the exhaust temperature within the exhaust hood rises above the exhaust temperature set point of 85 degrees F then the temperature switch closes and sends a signal to the BMCS. The BMCS energizes the exhaust fan and associated kitchen makeup air unit (where applicable).
3. When any one kitchen/servery hood exhaust fan is energized then the BMCS energizes all of the kitchen/servery exhaust fans.
4. Provide each fan with current switch for fan status.

D. Where an exhaust fan is shown or specified with a control damper, the fan shall not be allowed to operate unless associated normally closed, two position control damper with electric actuator is proven open by end switch. If fan is off, the associated control damper shall be closed.

AD#1: Section 25 50 00; Part 3/3.8. Deletion

~~**3.8 DUCTLESS SPLIT SYSTEMS**~~

~~A. Ductless split systems (all):~~

~~1. Ductless split system is stand alone.~~
~~2. Provide room high temperature alarm.~~

AD#1: Section 25 50 00; Part 3/3.9. Deletion

~~**3.9 UNIT HEATERS AND DUCT HEATERS**~~

~~A. Electric cabinet unit heaters (EUH #):~~

~~1. Unit mounted thermostat cycles fan and stages of electric heat as required to maintain space sensor set point of 65 DEG F(adj.).~~
~~2. BMCS monitors status.~~

~~B. Electric duct heater (EDH #):~~

~~1. Wall mounted thermostat senses space temperature and sends a signal to the unit mounted controls to energize electric duct heater when the space temperature falls below the space temperature set point of 70 DEG F (adj.)..~~
~~2. Upon a fall in space temperature below the space temperature set point, then the wall mounted thermostat sends a signal to the BMCS. Once flow is proven then the BMCS stages the duct heater to maintain the space temperature set point.~~
~~3. BMCS monitors status.~~

AD#1: Section 25 50 00; Part 3/3.10. Deletion

~~**3.10 MISCELLANEOUS CONTROLS**~~

~~A. For each domestic hot water system, provide temperature sensor at the outlet of the water heaters.~~

3.11 DATA CONTROL (D/C) AND GRAPHICS

A. Provide all programming required to accomplish sequence of operations, including all data and control points not listed on input/output points summary shown on plans.

B. In addition to graphics of building systems with dynamic data points as noted in following data and control and graphic summary, and graphics required under digital system management sections, following additional graphics shall be provided:
   1. Building layouts (floor plans).
   2. Any other graphics necessary for logical penetration.
   3. Sequence of operation (window split screen view).
   4. Flow charts for critical DDC loops and existing building.
   5. Supervisor graphics.
   6. System configuration.
   7. Display VVR and CVR boxes, and reheat coil locations on building floor plans. This applies only to boxes specified with DDC control.
   8. Display duct mounted humidifier locations on building floor plans.
   9. Display air handling unit locations and configuration (flow diagram, DDC Logic Diagram and control sequence).
   10. Flow diagram of steam system for new building showing PRVs, and display all points indicated on I/O summary.
   11. Flow diagram of chilled water system for new building showing variable speed pumps and locations of differential pressure switches, and display all points indicated on I/O summary.
   12. Display all pneumatic and DDC sensors, thermostats, and humidistats on floor plan corresponding to air terminal or other controlled device locations.

13. Display all DDC panels, indexed to correspond with system configuration.

C. Include Pseudo points for display in logical groups and graphics. Command pseudo points to be command directly from displays.

D. Each analog point to have unique remote panel resident dual high, and dual low limit alarm threshold engineering units. Where specified, provide floating (band above and below setpoint) alarm limits.

E. Each digital output to have software-associated monitored input. Anytime monitored input does not track its associated command output within programmable time interval, "command failed" alarm shall be reported.

F. Where calculated points (such as CFM) are shown, they shall appear in their respective logical groups. Respective unconditioned raw data (such as logarithmic differential pressure) points to also be grouped in special group for display and observation independent of logical groups.

G. Where data or control points are required to accomplish digital control or energy management sequences specified, but not listed in I/O summary, installer shall provide the points necessary to accomplish the specified sequence.

H. Primary analog input and analog output of each DDC loop to be resident in single remote panel containing DDC algorithm, and shall function independent of any peer or mux communication links. Secondary (reset type) analog inputs may be received from the peer network, but approved default values and/or procedures shall be substituted in DDC algorithm for this secondary input in network communications fail or if secondary input becomes erroneous or invalid.

3.12 INSTALLATION

A. All wiring and tubing to be properly supported, and run in neat and workmanlike manner. All wiring and tubing shall run parallel to or at right angles to building structure. All piping and wiring within enclosures to be neatly bundled, and anchored to prevent obstruction to devices and terminals.

B. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and pilot lights, push buttons and switches flush on cabinet panel face. ANSI/NEMA 250, general purpose utility enclosures with enameled finished face panel. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved nameplate on cabinet face.

C. Electrical wiring:
   1. BMCS installer: responsible for all electrical installation required for fully functional system, and not shown on electrical plans or required by electrical specifications.
   2. Code compliance: all local and national codes.
   3. Wiring size: #18 AWG minimum THHN, shielded where required by manufacturer or installation.
   4. Line voltage and low voltage control wiring installation: in conduit.
   5. Power supply:
      a. Coordinate with electrical engineer and electrical installer.
      b. BMCS installer: responsible for costs associated with installation of power supply from electrical panel to control device(s).

D. Identification:
   1. Provide laminated plastic nameplates for control panels. Other equipment devices furnished, including sensors, switches, valves, gages, actuators and all other item furnished under this section shall be identified with plastic embossed labels adhered to the device. Each nameplate shall identify the function, such as "mixed air low limit" or "cold deck temperature sensor" Laminated plastic shall be one-eighth inch thick whiter with black

center core. Nameplates shall be a minimum of 1 IN by 3 IN with minimum one quarter inch high engraved block lettering. Nameplates for devices smaller than 1 IN by 3 IN shall be attached by a nonferrous metal chain. Submit proposed wording of each nameplate with hardware submittal.

2. Instrumentation and Control Diagrams: Provide framed drawings including the sequence of controls and verbal description in laminated plastic showing complete diagrams for all equipment furnished and interfaces to all existing equipment, at each respective equipment location. Condensed operating instructions explaining preventive maintenance procedures methods of checking the system for normal safe operation and procedures for safely starting and stopping the system manually shall be prepared in typed form, framed as specified for the diagrams and posted beside the diagrams. Proposed diagrams, instructions and other sheets shall be submitted prior to posting.

E. BMCS installer to enter all computer programs and data files into related computers, including all control programs, initial approved parameters and settings, English descriptors, and colorgraphics complete with dynamic dispersed data. In addition, following to be user implemented, shall have samples installed for training and validation:
   1. Trend log.
   2. Alarm message (action taking message).
   3. Run time maintenance message.
   4. Trouble action message.
   5. Dynamic trend plot (6 points).

F. BMCS installer to maintain diskette copies of all data file, and application software for reload use in event of system crash or memory failure. One copy to be delivered to Owner during training session, and one copy archived at local software vault provided by BMCS manufacturer within 10 miles of OS.

G. Mount local control panels at convenient location adjacent to equipment served.
   1. Mount relays, PE switches, pressure switches, etc., on rear of temperature control panels. Tag each instrument by using "Dymo" tape corresponding to symbols used on control diagrams.

H. Locate panels so visual observation and adjustment can be accomplished from floor level.

I. Room sensors:
   1. Unless indicated otherwise, locate thermostats, humidistats and sensor for room control, and monitoring immediately inside of door adjacent to light switch.
      a. Where light switch is in an entry way to room, locate on wall within room so it is capable of sensing true space conditions.
      b. Prior to installation, coordinate locations with Architect/Engineer.
      c. Mount at 48 IN above finished floor.
   2. All room temperature and humidity sensors indicated in the control sequences shall be provided whether or not a location is indicated on the plans. If a location is not shown, allow for a maximum of 100 FT of wiring between the sensor and terminal unit or equipment. Submit Request for Information (RFI) to confirm sensor location with Architect.

3.13 VALIDATION

A. Submit test plan and test procedures for the performance verification tests for approval. Explain in detail actions and expected results to demonstrate compliance with the requirements of this specification and the method for simulating the necessary conditions of operation to demonstrate performance of the system. Deliver Test Plans documentation for the performance verification tests to the owners representative 30 days prior to the performance verification tests. Provide draft copy of operation and maintenance manual with performance verification test.

B. BMCS installer shall completely checkout, calibrate, and test all connected hardware and software to insure that system performs in accordance with approved specifications and sequences of operation submitted. Calibration to be demonstrated by the BMCS installer in the

presence of the Architect or Owner's representative, as dictated by the Owner. representative. Should random sampling indicate improper commissioning, the owner reserves the right to subsequently witness complete calibration of the system at no addition cost to the owner.

C. Demonstrate to authorities that all required safeties and life safety functions are fully functional and complete.

D. Make accessible, personnel to provide necessary adjustments and corrections to systems as directed by balancing agency.

E. After completion of validation procedures, installer shall perform validation demonstration in the presence of the Architect or Owner's representative, as dictated by the Owner. Record the outcome of each test noting actual outcomes and discrepancies. Submit detailed report of outcomes. Witnessed validation demonstration and associated report shall consist of:
   1. Running each specified report and recording outcomes.
   2. Display and demonstrate each data entry to show site specific customizing capability. Demonstrate parameter changes.
   3. Step through penetration tree, display all graphics, demonstrate dynamic update, and direct access to graphics.
   4. Execute digital and analog commands in graphic mode.
   5. Demonstrate DDC loop precision and stability via trend logs of inputs and outputs (6 loops minimum).
   6. Demonstrate EMS performance via trend logs and command trace.
   7. Demonstrate scan, update, and alarm responsiveness.
   8. Demonstrate spreadsheet/curve plot software, and its integration with database.
   9. Demonstrate on-line user guide, and help function and mail facility.
   10. Demonstrate digital system configuration graphics with interactive upline and downline load, and demonstrate specified diagnostics.
   11. Demonstrate multi-tasking by showing dynamic curve plot, and graphic construction operating simultaneously via split screen.
   12. Demonstrate class programming with point options of beep duration, beep rate, alarm archiving, and color banding.

3.14 MANUALS (FOLLOWING MANUALS TO BE PROVIDED)

A. Functional design manual: The functional design manual shall identify the operational requirements for the system and explain the theory of operation, design philosophy, and specific functions. A description of hardware and software functions, interfaces, and requirements shall be provided for all system operating modes.

B. Hardware manual: Furnish a hardware manual describing all equipment provided including a general description and specification, installation and checkout procedures, equipment electrical schematics and layout drawings, system schematics and I/O wiring lists, and alignment and calibration procedures.

C. Software manual: The software manual shall describe all furnished software, starting with a system overview and proceeding to a detailed description of each software module. The manual shall be oriented to enable proper integration, loading, testing and program execution. Provide flow charts or diagrams or equivalent documentation, as approved in advance by owners representative, in hard copy enabling the logical step by step analysis of the program listings. Substitutions of different format are not acceptable.

D. Maintenance Manual: The maintenance manual shall provide descriptions of maintenance for all equipment including inspection, periodic preventative maintenance, fault diagnosis and repair or replacement of defective components.

3.15 TRAINING

A. All training to be by BMCS manufacturer and utilize specified manuals, as built documentation, and on-line help utility.
   1. Provide classroom instruction course at Climatec's local Training Center in Irving, TX.

a. Minimum 2 day for 3 individuals
b. Travel, room and board at Owner's expense.

B. Operator training to include one initial on-site eight hour sessions encompassing:
1. Sequence of operation review.
2. Sign on-sign off.
3. Selection of all displays and reports.
4. Commanding of points, keyboard, and mouse mode.
5. Modifying English text.
6. Use of all dialog boxes and menus.
7. Modifying warning limits, alarm limits, and start-stop times.
8. System initialization.
9. Download and initialization of remote panels.
10. Purge and/or dump of historical data.
11. Use of portable operator's terminal.
12. Troubleshooting of sensors (determining bad sensors).
13. Password modification.

C. After initial training, BMCS manufacturer shall include 8 additional hours of training for miscellaneous instruction requested by the Owner.

D. Supervisor training shall include additional eight hour session encompassing:
1. Password assignment/modification.
2. Operator assignment/modification.
3. Operator authority assignment/modification.
4. Point disable/enable.
5. Terminal and data segregation/modification.
6. Use of portable operator terminal.
7. Use of spreadsheet package with system data.

E. Programmer training shall include two additional eight hour sessions encompassing:
1. Software review of sequence of operation and flow charts.
2. Modification of control programs.
3. Add/delete/modify data points.
4. Use of diagnostics.
5. System maintenance procedures.
6. Review of initialization.
7. Upload/download and off-line archiving of all system software. Programmer training shall be for two Owner personnel, and shall be scheduled by Owner with two week notice anytime during warranty period.
8. Graphic creation.

END OF SECTION

SECTION 27 05 32
WIRED TELECOMMUNICATION SYSTEMS **(REVISED AD #1)**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Requirements of Drawings, General and Supplementary Conditions and Division 01 apply to this section.

1.2 SUMMARY

A. This section defines the requirements of a complete structured cabling system network, which provides for voice and data transmission infrastructure throughout the facility.

B. Related Sections:
   1. Division 26
   2. Division 28

1.3 REFERENCES AND COMPLIANCES TO THE LATEST EDITIONS, AS RELATED

A. Design, manufacture, test, and install telecommunications cabling networks per manufacture's requirements and in accordance with NFPA-70 (National Electrical Code), state codes, local codes, requirements of authorities having jurisdiction and particularly the following standards:
   1. ANSI/TIA-568-C.0 - Generic Telecommunications Cabling for Customer Premises
   2. ANSI/TIA-568-C.1 - Commercial Building Telecommunications Cabling Standard
   3. ANSI/TIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards
   4. ANSI/TIA-568-C.3 - Optical Fiber Cabling Components Standard
   5. ANSI-J-STD-607-A - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
   6. ANSI/TIA/EIA-606(A) The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
   7. ANSI/TIA/EIA-526-14A -- Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant
   8. BICSI® Telecommunications Distributions Methods Manual, latest edition.
   9. ISO/IEC 11801 Generic Cabling for Customer Premises.
   10. National Electrical Code (NEC).
   11. IEEE C2-2002 National Electrical Safety Code (NESC®) current edition.
   12. FCC Part 68 Code of Federal Regulations, Title 47, Telecommunications.
   13. UL 1459 Underwriters Laboratories Standard for Safety—Telephone Equipment.
   14. UL 1863 Underwriters Laboratories Standard for Safety—Communication Circuit Accessories.
   15. National Fire Protection Agency (NFPA).
   16. American National Standards Institute (ANSI).
   17. Telecommunications Industry Association (TIA).
   18. Electronic Industries Alliance (EIA).
   19. National Electrical Safety Code (NESC).

1.4 SYSTEM DESCRIPTION

A. Provide a fully functional communications infrastructure, which includes:
   1. Build-out of all telecommunications areas, entrance facility, building distribution, floor distribution and data/telecommunication outlets meeting the requirements of ANSI/TIA+/EIA.

2. Adherence to the design guidelines for installation of cabling in pathways and spaces as defined by ANSI/TIA/EIA 569
3. All material, labor, tool, apparatus and equipment to furnish completely working telecommunication cabling system.
4. Horizontal cables, backbone cables, cross connects, patch cords and data/telecommunication outlets.
5. Complete grounding of all systems components and cabinets to the telecommunications main grounding busbar in compliance with ANSI/TIA/EIA 607.
6. Cable identification tags and system labeling shall match owners existing system.
7. Coordination of the entire installation with all other divisions.

1.5 SUBMITTALS

A. Submit data consisting of shop drawings, wiring diagram, riser diagram, and original color catalog cuts complete with technical data necessary to evaluate the material and equipment.
   1. Submit dimensions, wiring and block diagrams, performance data, ratings, operational characteristics, and other descriptive data to describe the items proposed.
   2. Bill of materials, noting long lead time items.
   3. Optical loss budget calculations for each optical fiber run.
   4. Project schedule including all major work components that materially affect any other work on the project.

B. Pre-Construction Meeting
   1. The contractor must schedule a pre-construction meeting with the Architects representative and the Denton County Department of Technology Services to review and coordinate the communications room build out, cabling installation, and labeling scheme.

C. Electrical Contractor shall provide a submittal that shows the proposed means and methods for the installation of the conduit and back box for device locations for approval by owner prior to the start of any rough-in.

1.6 QUALITY ASSURANCE

AD#1: Section 27 05 32; Part 1/1.6.A Addition/Deletion

A. Contractor Qualifications: Company specializing in installation of structured data/telecom cabling systems networks for a minimum of five years. Experience shall include the following:
   1. List at least 10 facilities of equal size and technical requirements utilizing the equipment submitted.
   2. For each facility, list:
      a. Name and location of facility
      b. Date of occupancy by Owner
      c. Owner's representative to contact and telephone number
      d. Construction Manager or General Contractor
      e. Architect
   3. Material and equipment shall be new, and conform to grade, quality, and standards specified. Equipment and materials of the same type shall be a product of the same manufacturer throughout
   4. The successful cabling contractor must meet the following two requirements:
      a. Must be an authorized ~~TE Connectivity~~ **CommScope Netconnect** Design Installer prior to bidding and maintain current status with the warranting manufacturer ~~TE Connectivity~~ **CommScope Netconnect**, including all training requirements, for the duration of the Cable Infrastructure Project. The contractor shall staff each installation crew with the appropriate number of trained personnel, in accordance with their manufacturer/warranty contract agreement, to support the ~~TE Connectivity~~ **CommScope Netconnect** 25-Year System Performance Warranty requirements. Prior to installing any cable on the site, the contractor must submit copies of the training certificates or certification cards for the installation crew to the Denton County Project

Manager. After installation, the Contractor shall submit all documentation to support the warranty in accordance with the manufacturer's warranty requirements, and to apply for said warranty on behalf of Denton County. The system warranty shall cover the components and labor associated with the repair/replacement of any failed link as a result of a defective product when a valid warranty claim is submitted within the warranty period.

b. Must have a BICSI® certified RCDD review the drawings and meet with Denton County representatives to discuss the project and to ensure that a structured cabling system is installed that provides a comprehensive telecommunications infrastructure..

5. Equipment and materials of the type for which there are independent standard testing requirements, listings, and labels, shall be listed and labeled by the independent testing laboratory.
6. A complete technical specification for the submitted equipment, noting differences and adherence to this Section. Subcontractors shall assume all rights and obligations toward the contractor that the contractor assumes toward the owner and engineer/designer.

1.7 WARRANTY

AD#1: Section 27 05 32; Part 1/1.7.A Addition/Deletion

A. Contractor shall provide a certified ~~TE Connectivity~~ **CommScope Netconnect** Cabling System with a minimum of 25-year warranty from the date of acceptance by the owner. The owner shall deem acceptance as beneficial use.

B. Installation personnel shall meet manufacturer's training and education requirements for implementation of extended warranty program.

C. Contractor shall agree to repair or replace defective components/materials and correct defective work when given notice by Owner during the warranty period.

D. Damage caused to completed work done by others shall be replaced or repaired by the contractor.

E. Effect replacement or substitutions of equipment within 12 hours upon receipt of warranty request from Owner during normal working hours.

1.8 EXTRA MATERIALS

A. Provide the following Patch cables:
1. 5 foot Black Category 6 patch cable – 9% of total number of Category 6 cables installed.
2. 6 foot Black Category 6 patch cable – 49% of total number of Category 6 cables installed.
3. 10 foot Black Category 6 patch cable – 25% of total number of Category 6 cables installed.
4. 15 foot Black Category 6 patch cable – 5% of total number of Category 6 cables installed.
5. 20 foot Black Category 6 patch cable – 5% of total number of Category 6 cables installed.
6. 25 foot Black Category 6 patch cable – 5% of total number of Category 6 cables installed.
7. 30 foot Black Category 6 patch cable – 2% of total number of Category 6 cables installed.

PART 2 - PRODUCTS

2.1 TRANSMISSION MEDIA

AD#1: Section 27 05 32; Part 2/2.1. B-C

A. Copper Cable
1. Horizontal Cabling-Unshielded Twisted Pair (UTP):
   a. Every cable run shall be a continuous single cable, homogenous in nature. Splices are not permitted anywhere.
   b. The electrical performance of the overall cable shall comply with ANSI/TIA/EIA 568 requirements for category 6.

c. All horizontal and backbone cables shall be #24 AWG thermoplastic insulated solid conductors that are formed into four individually twisted-pairs and encased by a thermoplastic jacket.
d. All patch cables shall be #24 AWG stranded and factory pre-terminated.
e. CAT6 cables must be terminated with the SL termination tool.
f. All cables shall have appropriate rating: plenum and riser for their environment.
g. All horizontal and backbone cables shall be installed with expansion capabilities to accommodate 25 percent future growth.

B. Fiber Optic Cable
1. Data Backbone Cabling Fiber Optics:
a. Fiber optic color-coding shall conform to the ANSI/TIA/EIA 598-A standard.

2. Provide 12 strand single mode and 12 strand XG multimode armored fiber cable data backbone between ~~Comm/Security~~ **Low Voltage** Room ~~#151~~ L-**112** and existing Security Electronics Room 2006, located within the ~~new~~ **existing** Jail Expansion. Cabling between **Low Voltage Room and existing** Security Electronics Room shall be terminated within the rooms and be utilized specifically for Security System Network, separate from the Administrative Network. The fiber cabling should be terminated with LC connectors. LC connectors shall be epoxy polish.
~~3. A 12 strand single mode / 12 strand XG multimode armored fiber cable shall be installed between existing Facility Communications MDF Room #D122 and Comm/Security Room #151. The fiber cabling will be terminated using LC connectors. LC connectors shall be epoxy polish.~~
4. A 6 port MRJ-21 panel shall be installed in existing **Security Electronics Room 2006**~~Facility Communications MDF Room #D122~~ and **Low Voltage Room #L-112** ~~Comm/Security Room #151~~. These panels will be connected together with a 6 port cable, providing a 6 port backbone path between the two ~~Communications~~ **equipment** rooms.

C. Copper Backbone Cable

1. A 25 pair copper cable terminated on 110 blocks on the wall (within **Low Voltage Room #L-112** ~~Comm/Security Room #151~~) shall be installed between existing **Security Electronics Room 2006** ~~Facility Communications MDF Room #D122~~ and **Low Voltage Room #L-112** ~~Comm/Security Room #151~~.
2. There shall be one 48 port ~~TE Connectivity~~ **CommScope Netconnect** voice panels in **Low Voltage Room #L-112** ~~Comm/Security Room #151~~ connected to a 110 block on the wall for voice service. The 25 pair cable will connect to the ~~TE Connectivity~~ **CommScope Netconnect** voice panel using a CHAMP connector. This will be used to get voice service from the wall into the racks.

2.2 HARDWARE

AD#1: Section 27 05 32; Part 2/12.2.B, E-G

A. Termination Blocks
1. All termination blocks shall be suitable for installation within a telecommunication facility for the termination of category 6 UTP cables.
2. The termination blocks shall meet or exceed category 6 specifications for termination blocks as defined by ANSI/TIA/EIA 568 B.2
3. All copper termination blocks and connectors shall be IDC (Insulation Displacement Connection) type.
4. Provide and install IDC-blocks sufficient to terminate all cables and 25 percent spare. Provide stand-off brackets
5. The termination blocks shall be capable of supporting, organizing, labeling and patching/cross connecting the station cables.
6. Termination blocks shall be rack mountable to a 19 IN equipment rack.

B. Patch Panels

1. The patch panels in the rack shall be 48 port and use black angled ~~TE Connectivity~~ **CommScope Netconnect** Category 6 SL Series for all terminations. Denton County Department of Technology Services must review and approve layout prior to termination of cables. Reference Appendix "A".
2. Patch panels shall have IDC-type termination for station cables and have RJ-45 ports. Each port shall be a category 6, 8-pin, 8-conductor modular jack employing T568B wiring protocol. All patch panel ports shall be populated with an insert that contains a bend-limiting strain relief.
3. Patch panels shall be capable of supporting, organizing, labeling and patching between station termination field and the equipment.
4. Patch panels shall be 19 IN rack mounted horizontally.

Cable support bars shall be installed behind each patch panel to provide additional cable support and cable routing control.

C. Fiber Optics Patch Panels
1. Patch panels shall have 6 multi-mode duplex LC adapters, expandable to at least 24 duplex LC adapters. (Reference Appendix A)
2. Provide Single mode Patch panels, which shall have 6 single-mode duplex LC adapters, expandable to at least 24 duplex LC adapters.
3. Patch panels shall be rack mountable , capable of accepting 8 adapter panels, and provide a splice tray for protection of mechanical or fusion splices while maintaining minimum bend radius requirements.

D. Category 6 Cabling
1. Horizontal Category 6 cabling shall be 23 AWG, 4-pair UTP, UL/NEC CMP rated, with a white plenum-rated jacket for County Network cabling. Individual conductors shall be 100% virgin FEP insulated. Cable jacketing shall be lead-free. All cable shall meet or exceed all Category 6 / Class E requirements. Cable shall be supplied on wooden reels or in reel-in-box. Individual conductors shall be 100% virgin FEP insulated. Cable jacketing shall be lead-free. All cable shall meet or exceed all Category 6 / Class E requirements. Cable shall be supplied on wooden reels or in reel-in-box.

E. Fiber Optic Cable and Termination Hardware
1. Fiber optic backbone cabling shall consist of singlemode and 850 nm laser optimized 50/125 multimode XG OM3 optical fiber. ~~TE Connectivity~~ **CommScope Netconnect** cable and components shall be used for all fiber backbone cabling. Industry standard LC Duplex connectors shall be housed in enclosures sized for the number of strands being terminated. Multimode fiber shall have an aqua outer jacket. Singlemode backbone fiber shall have a yellow outer jacket. Backbone fiber shall be contained in a flex-armor jacket and Plenum or riser rated as defined by the building specifications. The network backbone cabling shall be installed between ~~the~~ **existing Security Electronics Room 2006** ~~main telecom room (MDF)~~ and **Low Voltage Room #L-112** ~~each TR (IDF)~~unless otherwise specified.

F. Copper Backbone Cabling
1. Install 1– 25 pair cable in ~~communications rooms~~ **low voltage equipment room** between the rack and the wall. Terminate on 110 block with wire management on the wall and a Champ connector on one 48 port ~~TE Connectivity~~ **CommScope Netconnect** voice patch panels in the rack.

G. Modular Jacks - All modular jacks shall contain a dust cover and be un-keyed, unshielded, 4-pair, RJ-45, and shall fit in a .790 inch x .582 inch opening. Modular jacks shall terminate using 110- style pc board connectors, color-coded for both the T568A and T568B wiring scheme. Each modular jack shall be wired using the T568B wiring scheme. The 110-style insulation displacement connectors shall be capable of terminating 22-24 AWG solid or 24 AWG stranded conductors. The insulation displacement contacts shall be paired with additional space between pairs to improve crosstalk performance. Modular jacks shall utilize a secondary PC board separate from the signal path for crosstalk compensation.

1. Each modular jack shall meet the Category 6 performance standards and requirements.
2. Modular jacks shall be compatible with the ~~TE Connectivity~~ **CommScope Netconnect** SL Series Modular Jack Termination Tool. Each modular jack shall be provided with a bend-limiting strain relief. The strain relief shall provide cylindrical support to limit the bend radius at the point of termination.
3. Faceplates shall be Semtron Stainless steel, 1FM-xxx-~~TE CONNECTIVITY~~**COMMSCOPE NETCONNECT** series.

H. Coax Cabling - Coax cabling shall be RG-6/U quad shield, UL/NEC CMP rated, with a blue plenum rated jacket. Coax cables shall be terminated on both ends with RG-6 compression F connectors.

I. All hardware used for electronic enclosures, device outlets or solid cable trough lid shall be tamper resistant.

2.3 FIRESTOP

A. A firestop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Firestop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.

B. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, etc. shall be properly firestopped.

C. The Contractor shall provide cable penetrations of fire rated walls.

D. Penetrations shall be sleeved with a built-in fire stop system that automatically adjusts to the number of cables installed and in compliance with NEC and the local fire codes.
   1. Hilti Fire Stop CP 653 4 IN Speed Sleeve for pass through between floors.
   2. EZ Path Fire Rated Pathway for pass through between walls.

E. Provide and install additional fire stop assemblies where necessary for cable routing if available pathways or conduit sleeves do not exist such as transition for cable tray systems.

F. Provide and install the proper amount of firestop assemblies with a 40% fill ratio, a 35% growth factor and an overall 25% spare capacity.

G. Any wall penetration shall not decrease the original fire rating of the wall.

H. Firestop systems shall be UL Classified to ASTM E814 (UL 1479) and shall be approved by a qualified Professional Engineer (PE), licensed (actual or reciprocal) in the state where the work is to be performed. A drawing showing the proposed firestop system, stamped/embossed by the PE shall be provided to the Owner's Technical Representative prior to installing the firestop system(s).

2.4 DATA/TELECOM OUTLETS

AD#1: Section 27 05 32; Part 2/2.4. Addition/Deletion

A. Work areas or offices must have at least two communications outlets. Each communications outlet shall be sized to accommodate two or three Category 6 cables and connectors as designated on the project drawings. Each work area outlet shall consist of a double gang electrical box with a minimum depth of 2-1/2 inches and 1 inch knockouts. Each double gang box shall have a 1 inch conduit routed to the closest cable tray for routing of cables to the communications room, consolidating of individual 1 inch conduits into a larger homerun is acceptable. Maximum 40% fill must be maintained when consolidating homeruns. Work area outlets boxes shall not be daisy chained together. Communications outlets shall be within 3 feet of an electrical outlet and installed at the same height, unless otherwise specified.

Communications outlets shall be placed so that the work area or workstation cable does not exceed 16 feet in length. This length is figured into the total horizontal cabling length and must not be exceeded. Floor boxes and poke-thru devices shall be submitted and approved by Denton County. Floor boxes, poke-thru devices, and covers shall be heavy duty in construction and easily accessible by users. They shall accommodate a complete line of connectivity outlets and modular inserts for UTP, STP, fiber optic, coaxial, and other cabling types with matching faceplates and bezels to facilitate mounting.

Modular inserts shall snap directly into each flange through the use of a mounting bezel. Where electrical and data share the same floor box or poke-thru device, the floor box or poke-thru device shall be designed to simultaneously accommodate both electrical and data cabling without compromising the performance of the data cabling. Floor boxes and poke-thru devices shall not obstruct the floor area. In addition to the conduit for electrical, each floor box and poke-thru shall have a 1 inch conduit stubbed out above the ceiling. In addition to this 1 inch conduit, each floor box and poke-thru shall have an additional 1 inch conduit to a double gang box in the wall. The double gang box shall also have a 1 inch conduit stubbed out above the ceiling.

B. Standard Office Outlets - Standard office communications outlets shall consist of one double gang Semtron stainless steel faceplate with security screws. Faceplates shall contain white Category 6 cables terminated on Category 6, 8-position, 8- conductor inserts. Inserts shall be white to match Cat-6 cable color. Faceplates shall be laser engraved/screened with outlet numbers located to the right of each port.

C. Wall Phone Outlet - Standard wall phone outlets shall consist of one double gang single port Semtron stainless steel wall phone faceplate with security screws. Faceplates shall contain one white Category 6 cable terminated on a Category 6, 8-position, 8- conductor insert. Wall phone outlets shall be installed at the standard ADA wall phone height. Faceplates shall be laser engraved/screened with outlet numbers located to the right of each port.

D. Wireless Access Point Outlets - Wireless access points (WAP) outlets shall be located above the ceiling and be spaced at intervals to form a grid over the area to be served by the wireless signal. Each WAP outlet shall consist of one white Category 6 cables terminated on a Category 6, 8-position, 8- conductor inserts (white inserts) mounted in an biscuit box mounted above the ceiling tile for suspended ceilings or placed in approved locations. The location of these outlets must be fully accessible and provide adequate space to install the WAP. WAP outlet locations must be indicated on the drawings.

~~E. Inmate Phone – Inmate phones shall be cabled to dedicated head-end equipment located in existing Facility Communications MDF Room #D122. Outlet faceplate shall be blank stainless steel with security fasteners.~~

~~F. Cable Television Outlets – Cable Television Outlets shall contain one blue RG-6/U quad shield coax cable. The faceplate shall be double-gang with one F-connector coupler. Outlets are to be mounted at the same height as the electrical outlets within a maximum distance of 3 feet. In addition provide a white Cat-6 cable at each television outlet. The category-6 shall be terminated with a modular plug as outlined above. Provide 4-6 IN of cable coiled in the box behind the faceplate. Route RG-6/U cables to existing Facility Communications MDF Room #D122. Route Cat-6 cables to Security/Comm. Room #151. Provide necessary quantity of taps to tie into the existing system. The contractor shall be responsible to verify and adjust the CATV signal as necessary for the new outlets connected to the existing Distribution Amplifiers for signal distribution from County's existing CATV system.~~

G. At the Security Electronics Equipment room, coax shall be terminated on the wall in the multimedia SL series patch panel using coax inserts.

H. All faceplates in the Inmate/Secure areas shall be Semtron Stainless steel plates installed with security fasteners as specified in Division 11.

I. Different types of outlets and corresponding locations are as indicated on drawings.

J. Each 8-pin, 8-conductor modular insert shall have a Cat 6 4-pair UTP cable terminated according to T568B wiring protocol.

K. Security Cameras Outlets - strategically locate an electrical enclosure to serve as a network data cabling hub between the devices being installed and the network data cabling horizontal backbone cabling infrastructure. The electrical enclosure shall be 8 IN X 8 IN X 4 IN for one to two devices or 16 In x 16 IN x 6 IN for two to four devices, and shall have a securable door with cabinet lock, or a cover plate held in place with security screws. A one-inch EMT conduit run shall be installed from ~~the network data cabling cable tray~~ **the area equipment room** to the enclosure. From the enclosure to the device, a 1/2 –inch flex seal tight conduit or a 3/4 -inch EMT conduit run shall be installed, depending on the type of conduit pathway needed for the particular device. Each device shall receive one Cat6 cable. The device endpoint of this network data cabling horizontal backbone cabling infrastructure cable shall be at the enclosure. The Cat6 cable shall have a Cat6 insert (RJ-45) terminated on the end and be placed into a two cable biscuit box. The specified length of cabling service loop shall be created and neatly dressed within the enclosure with the biscuit box. Pull string shall be installed and left in place in the one-inch EMT conduit runs that exist between the enclosures and the ~~cable tray~~ **area equipment room**. From the device being installed, either a 1/2 –inch flex seal tight conduit run or a 3/4 -inch EMT conduit run shall be installed between the device and the electrical enclosure. A Cat6 patch cable shall be installed in the conduit run that exists between the device and the enclosure and connected at the device and at the data cabling biscuit box located in the enclosure, with extra patch cabling slack properly dressed in the enclosure. Electrical quad boxes and "LB" 90-degree bend devices shall be installed as needed within the conduit pathways to establish pull points and assist with the cabling installation.

L. Patch Panels and Wire Management:

1. All horizontal cables shall be terminated on Category 6 angled patch panels in the telecommunications room. Patch panels shall provide 48 modular jack ports wired using the T568B wiring scheme and accept RJ-45, 8-Position modular plugs. Patch panels shall be configured as 6-port modules with individually replaceable jacks. The front of each module shall be capable of accepting ~~TE Connectivity~~ **CommScope Netconnect** labels for patch panels. Each port shall be capable of accepting an icon to indicate its function. Patch panels shall terminate the building cabling on 110-style insulation displacement connectors. Patch panels shall be supplied unloaded with jacks bagged separately, for terminating using the ~~TE Connectivity~~ **CommScope Netconnect** SL Series Termination Tool. Each modular jack shall be provided with a bend-limiting strain relief. The strain relief shall provide cylindrical support to limit the bend radius at the point of termination. All patch panels shall meet or exceed all Category 6 performance requirements.
2. Each rack shall contain ~~eight (8)~~ CPI horizontal, double sided, 2U wire management (p/n: 30530-719). 8 Foot, CPI vertical, double sided 6 IN wide, wire management (p/n: 30095-715) shall be installed ~~between each rack and 8 Foot, CPI vertical, double sided 6 IN wide, wire management (p/n: 30095-715) shall be installed~~ on each end of the rack in **Low Voltage Room #L-112** ~~the Communications Rooms~~.

M. All racks, cabinets, ladder, and brackets shall be black in color.

N. All racks, cabinets, and ladders are to be properly grounded to the grounding bar. Remove all paint on racks and/or ladders where grounding wires are attached.

O. Provide end caps for all racks and ladder.

P. All racks in ~~Communications~~ **equipment room** shall be 8FT tall.

Q. All ladder racks shall be 12 IN wide.

R. Ladder rack shall be installed within the ~~communications~~ **equipment room** ~~portion of the room~~ as shown on the drawings and also mounted vertically on the walls above the ladder racks for access to incoming cabling.

S. Runway radius and e-bends shall be installed to accommodate the proper installation and bend radius of the cabling.

T. Access doors, panels and frames: See Section 08 31 16:
   1. Where not indicated on drawing, provide access panels and/or doors at walls, and inaccessible ceilings to permit access to equipment, devices and cabling electrical enclosures.

2.5 MANUFACTURERS

AD#1: Section 27 05 32; Part 2/2.5.A.B Addition/Deletion

A. ~~TE Connectivity~~ **Refer to Section Appendix "A" for acceptable manufacturers**.

~~B. Chatsworth~~

PART 3 - EXECUTION

3.1 GENERAL

AD#1: Section 27 05 32; Part 2/2.5.B-C Addition/Deletion

A. All work must conform to the latest editions of:
   1. Manufacturer's specifications
   2. National Electrical Code
   3. National Electrical Safety Code
   4. ANSI/TIA/EIA
   5. All local codes and ordinances

B. Contractors shall be a current and authorized ~~TE Connectivity~~ **CommScope Netconnect** Design & Installation contractor at the time bids are due and conform to the specifications.

C. Contractor shall supply the full names of the installers to be on site during cable installation and shall also supply copies of the installers' ~~TE Connectivity~~ **CommScope Netconnect** Certification cards. ~~TE Connectivity~~ **CommScope Netconnect** Certification cards must be carried by the installers at all times.

D. Use methods and lubricating compounds on cables and wires to prevent damage to cables and wires during pulling-in. Provide compounds that are not injurious to the cable and wire jackets and do not harden or become adhesive.

E. Conduit and wall penetration fill ratio shall not exceed 40% for conduits and penetrations with 3 or more cables.

F. All CAT 6 network drops located above ceilings shall be grouped together and terminated adjacent to each other on the patch panels in the racks.

G. A cable bundle organizing tool "honeycomb" shall be used to neatly organize and dress the cabling. The tool shall be placed on the cable at the location it enters the room and shall be pulled toward the racks and patch panels. The tool shall not be pulled backwards toward the wall to organize and dress the cabling.

H. Inspect all conduit bends to verify proper radius. Comply with code for minimum permissible radius and maximum permissible length before insertion of pull stations. Any conduit run that has more than two 90 degree bends in the run shall have an accessible pull-point location established between the beginning and end points of the conduit cable run. The pull point shall consist of an electrical quad box with a removable cover.

I. At no time shall a station run exceed 90 meters (295 feet).

J. When terminating a station cable the integrity of the twist for each individual pair shall be maintained up to the point of termination, not to exceed ½ inch.

K. Adhere to manufacturer's published specifications for pulling tension, minimum bend radii, and sidewall pressure when installing cable.

L. Penetrations through floor and fire-rated walls shall utilize a fire stopping assembly approved for that application in accordance with ANSI/TIA/EIA 569-A. Fire stop shall be 3M fire barrier pass-through device.

M. Provide cable service loops at all junction/pull boxes. Service loops shall be neatly contained in the boxes.

N. Three to five foot service loops shall be coiled neatly above the ceiling on all cables.

O. Where drawings specifically allow the installation of cable in void, plenum or suspended ceiling areas, the contractor shall conform to ANSI/TIA/EIA 569-A with respect to the separation from power and EMI sources.

P. Tie-wrap cables and cut to length at termination point.

Q. Comply with ANSI/TIA/EIA-607 for all grounding and bonding of the entire system.

R. Leave 6 IN slack protruding from wall at outlet mounting point and protect from damage by workmen prior to installing outlet.

S. Cable terminations at all locations shall be neat orderly and display quality workmanship.

T. Minimize removal of cable insulation jacket at all terminations.

U. Contractor shall install white category 6, 4-pair UTP for County Network drops and blue category 6, 4-pair UTP for Security Network drops.

V. All cabling shall be dressed utilizing velcro cable management ties.

W. Fiber cables shall have their sheathing removed so that no more than 18 IN of un-stripped cable enters the panel. Cables shall be stripped back a sufficient amount so that the fiber strands wrap at least one full circle inside of the panel with their connectorized ends attached to the distribution panel's bulkhead.

X. Category 6 cable shall be installed within the cable tray system and shall not share pathways with any other wiring or cabling.

Y. Fiber strands shall be installed in an order compliant with the ANSI/TIA/EIA 598-A Color Code.

Z. Provide, install, connect and interconnect in all telecommunication and Security Electronics rooms: telecommunication main grounding busbar, telecommunication grounding busbar and all required interconnections, per ANSI/TIA/EIA-607.

AA. Connect the telecommunications main grounding busbar to the main electrical distribution panel's ground and building steel.

BB. Cabling in tray shall be dressed and bundled using velcro (hook and loop) straps.

CC. All surface raceway shall conform to ANSI/TIA/EIA 569-A Surface Raceway, where applicable.

DD. All conduits shall have grommets and bushings. Comply with Division 26 general requirements.

EE. Contractor shall not place or attach conduit directly to T-bar grid, concealed spline grid, flexible or rigid ductwork, HVAC registers, sprinkler piping or fixtures, or light fixtures.

AD#1: Section 27 05 32; Part 3/3.2.A.B Addition/Deletion

3.2 LOW VOLTAGE ROOM

A. ~~Each new telecommunications~~ **Low Voltage equipment room** shall have two NEMA L14-30 receptacles, each on a dedicated circuit, located at the bottom of each network rack. The room shall also have four dedicated quad NEMA 5-20 receptacles and two dedicated duplex NEMA 5-20 receptacles. The location of these receptacles shall be coordinated with Denton County. All electrical circuits and HVAC in the ~~telecommunications~~ **low voltage** room shall be on a generator circuit.

B. Fire retardant 4 feet x 8 feet x 3/4 inch AC grade plywood backboards free of defects (knots and voids shall be considered a defect) shall be installed on each identified wall. The plywood shall be installed 12 inches AFF and extend at least 9 feet AFF. Plywood shall be mounted with the A side exposed to the interior of the room and the C side against the wall. Backboards shall be painted off-white in color leaving the UL fire-rating symbol unpainted and visible. Each telecommunications closet shall have overhead ladder rack and ladder rack secured to the wall for riser cables. ~~Each telecommunications closet~~ **Low Voltage equipment room** shall be provided with a telecommunications ground bus bar (TGB).

3.3 CABLE TESTING

A. All data cables shall be tested with a 568B compliant test unit. Tests must be performed using the appropriate test and tool for the type of cabling being installed (i.e. a Category 6 compliant test should be used to test Category 6 cable).

B. Cable test results for each cable installation must be submitted and approved by the Architect and Denton County Department of Technology Services.

C. If copper backbone cable contains more than one (1) percent bad pairs, remove and replace entire cable.

D. All cables shall be tested for DC continuity of each conductor, shorts between conductors and shields and operation of shorting bars in connectors.

E. Test shall be performed after data connectors have been installed and cable terminated on outlet ports at both ends.

F. The Contractor shall provide written verification of cable testing results indicating date of test performed and results, signed by job foreman.

G. Bi-directional testing of optical fibers is required.

3.4 CABLING DOCUMENTATION

A. All station labeling shall be laser engraved/screened and terminal room labeling will be machine generated.

B. All cables must be clearly labeled on each end with machine-generated labels. The cables must also be labeled on each end with a wrap around cable label. This label should be wrapped around the sheathing of the cable prior to terminating each end.

C. Cabling shall be protected against damage during installation.

D. Cabling on the first floor shall begin with 1001 and continue up to the number of cables. Cabling on the second floor shall begin with 2001 and continue up to the number of cables. Each cable shall have a unique label. The numbering scheme must be approved by the Denton County Department of Technology Services prior to installation.

E. Computer icons are to be used on patch panels.

F. Provide to Owner, prior to final acceptance, complete schedules identifying each conductor from outlet jack to main terminal room blocks.

G. Prior to Substantial Completion, submit project record drawings and data identifying system architecture and component distribution.

H. Documentation shall be provided on cable installation as well as all tests performed on the cable, including test upon cable arrival.

I. As-built documentation must be submitted in electronic AutoCAD format (.DWG)

J. Printed as-builts must be laminated and mounted on a foam core. The finished as-builts must have a border tape on all 4 edges and one 3/16 IN ID metal grommet at each corner for mounting. The drawing shall be approved by the Architect as well as Denton County Department of Technology Services prior to being printed and mounted.

3.5 OPERATION TRAINING AND MAINTENANCE DATA

A. Demonstrate to the Owner's designated representatives, Contractor, Architect, and representatives of the authorities having jurisdiction, the features and functions of the system and subsystems. Instruct the Owner and designated representatives in the proper operation and maintenance of the system.

B. Provide operation parts and maintenance manuals defining operation and troubleshooting methods.

C. Furnish the necessary trained personnel to perform the demonstration and instructions and arrange to have the manufacturer's representatives present to assist with the demonstrations.

D. Allow a minimum of 16 hours time for performing the prescribed demonstrations/training.

E. Arrange with the Owner's designated representative the date and times for performing the demonstrations.

F. The Owner will select date and time for demonstration.

G. Comply with requirements of the General Provisions of the Contract Systems Demonstrations.

END OF SECTION

The following table lists the most commonly used components of the Denton County copper and fiber optic cabling system. Consult the manufacturer's web site for coordination of the most current item descriptions and part numbers. For building compatibility, commonly used structured cabling system components such as racks, ladder rack, cable management and other associated hardware shall be manufactured by Chatsworth Products, Inc. Any substitution must be approved by Denton County. Not all items listed below will be used for this project. Reference drawings for specific call-outs.

APPENDIX 'A'

Manufacturer	Description	Part Number
CommScope Netconnect	XG Category 6A F/UTP (ScTP) Cable, 4-Pair, Plenum (CMP) rated, 23AWG, Wooden Reel (X= Color) Colors required specified in specification documentation	4-1499416-X
	XG Category 6A AMP-TWIST Shielded Modular Jacks	1711160-2
	Colored Dust Covers for XG Cat 6A AMP-TWIST Modular Jacks (x=color) Color shall match Cable Color terminated on jack	1711511-X
	XG Category 6A AMP-TWIST Shielded Patch Panels 24 port (Angled)	1933321-2
	XG Category 6A AMP-TWIST Shielded Patch Panels 48 port (Angled)	1933322-2
	XG Category 6A AMP-TWIST Shielded Patch Panels 24 port (Standard)	1933319-2
	XG Category 6A AMP-TWIST Shielded Patch Panels 48 port (Standard)	1933320-2
	XG Category 6A F/UTP Slim Line Patch Cables Length, Color and Part Number vary. Check specification documentation	X-193388X-X
	Category 6 UTP Cable, 4-Pair, Plenum (CMP) rated, 23AWG, reel-in-box (X=Color) Colors required specified in specification documentation	219567-X
	Category 6 SL Series Modular Jack with Dust Cover, Unshielded (x=color) Colors required specified in specification documentation	1375187-X
	SL Series Modular Jack Bend Limiting Strain Relief	1375200-1
	SL Series Blank Insert (x=color) Color shall match electrical outlets, switches and faceplates	1116412-X
	SL Series Patch Panel, Category 6, 24-port, 1U, Universal Wiring (T568A/T568B) (Standard)	1375014-2
	SL Series Patch Panel, Category 6, 48-port, 2U, Universal Wiring (T568A/T568B) (Standard)	1375015-2
	SL Series Patch Panel, Category 6, 24-port, 1U), Universal Wiring (T568A/T568B) (Angled)	1499600-2
	SL Series Patch Panel, Category 6, 48-port, 2, Universal Wiring	1499601-2

	(T568A/T568B) (Angled)	
	4-port Angled Faceplate (x=color) Color shall match electrical outlets, switches and faceplates	406185-X
	2-port Angled Faceplate (x=color) Color shall match electrical outlets, switches and faceplates	1375155-X
	1-port Wall Phone Flush Faceplate (x=color) Color shall match electrical outlets, switches and faceplates	1479152-X
	Category 6 Slim Line Patch Cables Length, Color and Part Number vary. Check specification documentation	X-19331XX-X

Manufacturer	**Description**	**Part Number**
	Category 5e UTP cable, 4 pair, reel-in-box (X=Color) Colors required specified in specifications documentation	57826-X (CMR)
	Category 5e UTP cable, 4 pair, reel-in-box (X=Color) Colors required specified in specifications documentation	57825-X (CMP)
	Category 5e UTP cable, 25 pair, Wooden Reel (X=Color) (for cable sizes greater than 25 pair, substitute another manufacturer) Colors required specified in specifications documentation	1499418-X (CMR)
	Category 5e UTP cable, 25 pair, Wooden Reel (X=Color) (for cable sizes greater than 25 pair, substitute another manufacturer) Colors required specified in specifications documentation	1499419-X (CMP)
	Category 5e UTP cable, Etherseal, Wooden Reel (CMP) (Exterior Use)	1499448-3
	SL Series Category 5e Modular Jacks, Unshielded (X=Color)	1375190-X
	SL Series Modular Jack Strain Relief	1375200-2
	SL Series Patch Panel, Category 5e, 48-port, 2U, Universal Wiring (T568A/T568B)	1479155-2
	SL Series Modular Jack Termination Tool	1725150-1
	MRJ21 Cassette 6 port	1479459-1
	MRJ21 Cassette Blank	1777046-1
	MRJ21 Cassette Panel	1479451-1
	MRJ21 Cassette 48 Port Angled Patch Panel Non-AMPTRAC	1777052-1
	MRJ21 Cassette 48 Port Standard Patch Panel Non-AMPTRAC	1435971-1
	MRJ21 Cassette Label Holder Panel, Angled	1777054-1
	MRJ21 Cassette Label Holder Panel, Standard	1777040-1
	MRJ21 Cassette Label Holder Label Sheets (X=Color)	1375354-X
	MRJ21 Cable Assemblies (CMP) A to A Blue Jacket (X= Length)	X-1499518-X
	MRJ21 Cable Support Bar 12 in.	1933352-3
	Category 3 Patch Panel, 24 Port, 1U, RJ14C (2 Pair)	557403-1
	Category 3 25-Pair Patch Panel, 48 Port, 3U, RJ45 (1 Pair)	555482-1
	Champ Plug, Male, Champ-Lok (RJ21)	553913-1
	2-Port Modular Jack Box (x=color) Color shall match electrical outlets, switches and faceplates	1116698-X
	Icon Wheels (Data) (X=Color) (Blank) (X=Color)	558198-X 558821-X
	110Connect Category 5e Patch Panel, 24 Port	406330-1
	110Connect XC Category 5e Kit, Wiring Block with legs, 50-Pair	569433-1
	110Connect XC Category 5e Kit, Wiring Block with legs, 100-Pair	569439-1

	110Connect XC Category 5e Kit, Wiring Block with legs, 300-Pair	569445-1
	110Connect XC Cable Management Trough with legs	569389-1
	Clear Label Holder for 110Connect XC Wiring Blocks	558417-1
	Multimedia SL Series Patch Panel 24 Port Unshielded Angled	1499622-1
	Multimedia SL Series Patch Panel 48 Port Unshielded Angled	1499623-1
	Multimedia SL Series Patch Panel 24 Port Unshielded	1375291-1
	Multimedia SL Series Patch Panel 48 Port Unshielded	1375292-1
	Cover for Angled Patch Panels	1499614-1
	Angled 1U Blank Panels	1479992-1
	Standard 1U Blank Panels	556965-1
	Front Cable Management Assembly	1777240-1
Manufacturer	**Description**	**Part Number**
	SL Series Multimedia Adapter Plate	1479506-1
	Hybrid SM/XG 50/125um, 48 strand (2 SM 12, 2 MM 12), Plenum Interlocking Armored Fiber Cable (Use within buildings)	varies
	Single-mode 12 Strand, Armored Fiber Cable, Plenum Rated (Use within buildings)	varies
	XG OM3 Multimode 12 Strand, Armored Fiber Cable, Plenum Rated (Use within buildings)	varies
	Outside Plant Armored (OSPA), 6-144 Fiber Cable, (Use between buildings, Fiber count varies per project)	varies
	Outside Plant Armored (OSPA), 6 Fiber Cable, Single-mode	varies
	Outside Plant Armored (OSPA), 72 Fiber Cable, Single-mode	varies
	3U Rack Mount Fiber Patch Enclosure for Armored Cables	1435557-1
	XG OM3 Multimode Snap-in Adapter Plate LC Duplex 24 Fiber	1435516-5
	XG OM3 Multimode Snap-in Adapter Plate LC Duplex 12 Fiber	1374463-5
	Single-mode Snap-In Adapter Plate LC Duplex 24 fiber	1435516-1
	Single-mode Snap-In Adapter Plate LC Duplex 12 fiber	1374463-1
	Blank Snap-In Plate	559523-1
	1U Rack Mount Fiber Patch Enclosure for Armored Cable	1435555-1
	Easy Access Zone Enclosure	1777215-1
	Easy Access Zone Strain Relief Bracket	1777224-1
	LC Simplex LightCrimp PLUS Connector for XG OM3 fiber cable	6754483-4
	LC Simplex LightCrimp PLUS Connector for Single-mode fiber cable	6754482-1
	Duplex LC Clip, Package of 6 (Blue)	1754371-4
	Duplex LC Clip, Package of 6 (Black)	1754371-2
	Buffer Tube Splitter Kits (XX=Multiple or Single)	14350XX-1
	MPO Optical Fiber Cassette LC Duplex XG 50um OM3 24 Fiber	1918784-1
	MPO Optical Fiber Cassette LC Duplex Single-mode 24 Fiber	1918786-1
	MPO Optical Fiber Cable Assembly XG OM3 50um 12 fiber OFNP (X=Length)	X-1907404-X
	MPO Optical Fiber Cable Assembly Single-mode 12 fiber OFNP (X=Length)	X-6435070-X
	1U Rack Mount Fiber Optic Patch Panel	1777125-1
	PARA-OPTIX Backbone Enclosure Kit, 36 XG OM3 Duplex LC Ports (72 Fiber)	1919547-1
	PARA-OPTIX MPO-Style Trunk Cable Assembly, XG OM3 (72 Fiber) (OFNP) (X=Length)	X-1919505-X

	F-Connector Coupler Insert for SL Modular Jack Patch Panel (X=Color)	1499855-X
Varies		
	Wall Mount Rack Bracket to Vertically Mount 24 or 48 Port SL Multimedia Patch Panel (something similar to http://rs.innovationfirst.com/wall-mount-rack-brackets.shtml or http://www.rackmountsolutions.net/Wallmount_Rack_V_Series.asp)	Varies
	Coyote Splice Enclosure	Varies
Chatsworth		
Products, Inc.	18 inch Universal cable runway – Black	10250-718
	Cable Runway Radius Bend – Black, Outside Bend	10723-718
Manufacturer	**Description**	**Part Number**
	Cable Runway Radius Bend – Black, Inside Bend	10724-718
	Cable Runway E-Bend – Black	10822-718
	Runway Radius Drop, Cross Member – Black	12100-718
	Cable runway end closing kit - Black	11700-718
	Cable runway protective end caps	10642-001
	Cable runway wall angle support – Black	11421-718
	Cable runway triangular support bracket - Black	11312-718
	Cable runway elevation kit - Black	10506-718
	Cable runway junction and splice hardware - Black	
	19 inch Standard Rack – 8 foot Black	55053-715
	Double sided universal horizontal cable manager, black – 2RMU	30530-719
	Double sided vertical cable manager, black – 6 inches wide, 8 foot tall	30095-715
	Raised Floor Enclosure for Fiber, 4U	A0822-RF-F
	OnTrac Wire Mesh Cable Tray, 4 x 12, Zinc Finish	34821-512
	OnTrac Wire Mesh Standard Splice Kit, Zinc Finish	34738-501
	OnTrac Wire Mesh Splice Bar, Zinc Finish	34739-501
	OnTrac Wire Mesh Splice Washer and Bolt Kit, Zinc Finish	34728-501
	OnTrac Wire Mesh Clamp Washer, Zinc Finish	34746-501
	OnTrac Wire Mesh Carriage Bolt Hardware Kit, Zinc Finish	34728-502
	OnTrac Wire Mesh 90 degree Splice Bar Kit, Zinc Finish	34740-501
	OnTrac Wire Mesh Pedestal Clamp Support Kit, Zinc Finish	34737-502
	OnTrac Wire Mesh Pedestal Clamp Bracket, Zinc Finish	34737-501
	OnTrac Wire Mesh L Support Bracket, Zinc Finish	34734-512
	OnTrac Wire Mesh Split Bolt Grounding Clamp	34838-001
	OnTrac Wire Mesh Label Holder	34749-001
	OnTrac Wire Mesh Cable Tray Installation Cutting Tool	34839-001
	OnTrac Wire Mesh Cable Tray Installation Shear Cutting Tool	13367-001
	Grounding Busbar Assembly with Lug Kit (TGB Pattern)	40156-012
	Grounding Busbar Assembly with Lug Kit (TMGB Pattern)	40158-012
	Velocity 2U Horizontal Cable Manager	13930-702
	KoldLok Mini Grommet (see also Upsite Technologies)	13871-001
	Vertical Cable Manager for F-Series TeraFrame 51U Cabinets	35095-C11
	Front to Back Horizontal Cable Manager for F-Series TeraFrame Cabinets	35108-C01
	F-Series TeraFrame Cabinet with accessories, 1 Side Panel Chatsworth Custom Cabinet Part Number. Contact CPI	TS1009768

	F-Series TeraFrame Cabinet with accessories, 2 Side Panels Chatsworth Custom Cabinet Part Number. Contact CPI	TS1009773
Upsite		
Technologies	KoldLok Mini Split Floor Grommet (Brush Type)	10077
	HotLok 1 U Blanking Panel	10015
	HotLok 1 U Blanking Panel with Temperature Strip	10025
3M		
	3M Fire Barrier Pass-Through Device – Square	98-0400-55XX-X
	3M Fire Barrier Pass-Through Device Mounting Bracket – Single, Triplex, Sixplex	98-0400-55XX-X
Manufacturer	**Description**	**Part Number**
Belden or		
equivalent	RG-6/U Quad Shield Coax, Plenum, Color as specified	varies
	RG-6 Compression F-Connectors	varies
ACP International		
	72 inch Fiberglass Line Marker, Orange with orange decals on both sides, black text	ACP-072
	Curled vinyl wrap around markers, Orange, black text	DN-33, DN-34
	3 inch round Crystal Cap Curb Markers	CC-3
Legrand/Wiremold		
	Legrand/Wiremold Resource RFB Series Floor Box with Evolution Series Cover	RFB6E with Evolution Series Cover
	Legrand/Wiremold Evolution Series Poke-Thru Device	6AT Series
	Legrand/Wiremold Evolution Series Work Surface Portal	WS6SBK
APC		
	UPS 3000VA, 2U, L5-30 Input	SUM3000RMXL2U
	UPS 1500VA, 2U, L5-15 Input	SUM1500RMXL2U
	UPS Extended Run Battery Pack	SUM48RMXLBP2U
Semtron, Inc.		
www.semtron.com	2 Gng 1 Port 110,SL** Stainless Faceplate – laser engraved labeling	2FM-0E-AMP
	2 Gng 2 Port 110,SL** Stainless Faceplate – laser engraved labeling	2FM-(2)0E-AMP
	2 Gng 3 Port 110,SL** Stainless Faceplate – laser engraved labeling	2FM-(3)0E-AMP
	2 Gng 4 Port 110,SL** Stainless Faceplate – laser engraved labeling	2FM-(4)0E-AMP
	2 Gng 1 Port Flush AMP110,SL Stainless Faceplate – laser engraved labeling	2FM-0E-PHONE-AMPCIS
	2 Gng stainless F-Connector faceplate – laser engraved labeling	2FM-(2)0E-AMP

END OF APPENDIX

SECTION 28 05 00

BASIC MATERIALS & METHODS FOR ELECTRONIC SYSTEMS **(REVISED AD #1)**

PART 1 - GENERAL

1.1 SUMMARY

AD#1: Section 28 05 00; Part 1/1.1.B Deletion

A. Drawings and specifications sections "General Conditions," "Special Requirements" and "General Requirements" form a part of this section and other Division 28 sections by this reference thereto and shall have the same force and effect as if printed herewith in full. All contractors for this work shall have read all General and Special Conditions, Division 01 Specifications sections and other referenced sections in the execution of all work and will be bound by all conditions and requirements therein.

B. Related sections:

1. Division 00 - Bidding Requirements and Contract Forms
2. Division 01 - General Requirements
3. Division 08 - Door Hardware
4. Division 11 - Detention Equipment
5. Division 26 - Electrical Requirements
6. Division 27 - Cabling Requirements
7. Division 31 - Earthwork
8. ~~Section 28 05 05 - Uninterruptible Power Supply Systems~~
9. ~~Section 28 05 10 - Detention Area Intercom/Paging System~~
10. ~~Section 28 05 15 - Detention Door Control System~~
11. ~~Section 28 13 13 - Card Access Control System~~
12. ~~Section 28 23 13 - Video Surveillance System~~

C. Drawings use and interpretation:
   1. Drawings are diagrammatic and indicate general arrangement of systems and equipment, except when specifically dimensioned or detailed.
   2. For exact locations of building elements, refer to dimensioned architectural/structural drawings.
   3. Field measurements take precedence over dimensioned drawings.
   4. Intention is to show size, capacity, approximate location, direction and general relationship of one work phase to another, but not exact detail or arrangement.

D. Installation of all electronic systems and equipment is subject to clarification as indicated in reviewed shop drawings and field coordination drawings.

E. Dimensions indicated are limiting dimensions.

F. Do not use equipment exceeding dimensions indicated or equipment or arrangements that reduce required clearances or exceed specified maximum dimensions.

G. Description of systems:
   1. Provide materials to provide functioning systems in compliance with performance requirements specified.
   2. Provide modifications required by reviewed shop drawings and field coordinated drawings.

H. The work of this division shall consist of, but shall not be limited to, the providing of the following systems:
   1. Section 28 05 05 - Uninterruptible Power Supply System
   2. Section 28 05 10 - Detention Intercom and Paging System
   3. Section 28 05 15 - Detention Door Control System

4. Section 28 13 13 - Access Control System
5. Section 28 23 13 - Video Surveillance System

I. This section includes basic design requirement specifications for the security monitoring and control system. This section contains requirements that pertain to all Division 28 security sections, and includes the design basis, as well as requirements for submittals, quality assurance, product handling, record documents, project conditions, installation, demonstrations and training.

1.2 INITIAL CONTRACTOR SURVEY

A. Prior to commencing any work on site, the contractor shall perform a complete functional system test of the existing systems to be upgraded and/or replaced.

B. Upon completion of the test, the contractor shall submit a complete list of the existing systems operational status by system and device including device functions and note ANY deficiencies found.

C. The test report and deficiency list shall be submitted to the General Contractor (GC) and Architectural/Engineer (A/E) for review.
   1. The A/E will retain this document as a Project Record Document that will become part of this contract.
   2. The A/E will review the list with the GC and OWNER for a period of 2 weeks.
   3. After the 2 week review period the GC will issue a formal Notice to Proceed (NTP) noting known deficiencies.
   4. A request for price will be issued for the deficiencies found that are desired to be corrected.

D. It will be noted that the only deficiencies for the project have been submitted by the contractor and any further deficiencies not identified at that time are the responsibility of the contractor.

1.3 SUBMITTALS (SEE DIVISION 01)

A. Shop drawings:
   1. As indicated in each Division 28 section and as indicated herein.
   2. All contractor provided equipment shall be identified in the shop drawing package by its associated room designation (i.e. PLC-A122, do not label equipment PLC-1, PLC-2, TS-1, TS-2, etc…).
   3. Submit for review by the A/E, complete engineering data for each system for evaluation of the proposed system with respect to specification requirements.
   4. "Point-to-Point" sheet and detail references shall be provided throughout the shop drawing set to specifically identify:
      a. Field device location on floorplan to cable termination location.
      b. Cable termination location to equipment cabinet elevation.
      c. Equipment cabinet elevation to equipment component detail.
      d. Equipment component detail to equipment wiring diagram.
      e. Equipment wiring diagram to termination schedule
      f. Termination schedule including:
         1) PLC input/output information.
         2) Power supply information.
         3) Field device wiring diagram.
         4) Field device rough-in detail.
         5) Programming information.
         6) Functional information.
         7) Interface to other system information (camera call-up to intercom/alarm, etc…)
         8) Any pertinent or device specific special operational information.
      g. The cross-references shall be backwards and forwards referencing throughout the shop drawings to the level that each field device can be referenced from its floorplan location to its specific termination location and associated wiring information.

5. Submittals for each system shall consist of engineering data sheets, schedules, and manufacturer's descriptive catalog sheets for each system component and manufacturer prepared shop drawings to indicate conformance with the contract documents.
    a. Provide complete floor plans. Each plan shall show proposed device locations.
        1) Show actual device nomenclature as illustrated on riser and single line diagrams.
        2) Show pullboxes, equipment enclosures and terminal cabinets.
        3) Show conduits and fill (optional if lateral conduits are shown with size and fill on the riser).
    b. Riser diagram:
        1) Illustrate conduit relationships between devices shown on the floor plans.
        2) (Lateral conduits are optional if shown on the plans).
        3) Show actual device nomenclature as illustrated on the plans and breaker number where the power will be sourced.
    c. Single-line diagrams:
        1) Show signal relationships of devices within the system.
        2) Show actual device nomenclature as illustrated on the riser and plans.
        3) Show wire numbers.
    d. Equipment enclosure wiring diagrams:
        1) Show a pictorial illustration of each equipment enclosure and/or terminal cabinet.
        2) Show the device nomenclatures exactly as shown on the single line diagrams.
        3) Show the terminations including the wire numbers as shown on the single line diagrams.
        4) Show wire colors for each terminal.
        5) For each wire exiting the enclosure, show the destination of the wire by floor, room number and the drawing number of the panel where the wire terminates.
    e. Field device wiring diagrams:
        1) For each field device, existing or new, provide a detailed wiring diagram.
        2) Show the termination connectors on the device.
        3) Show the wire numbers attached to the connectors, pigtails or terminal blocks.
        4) Show the wire colors connected to the pins, pigtails or terminal blocks on each device connector.
    f. Freestanding device wiring diagrams:
        1) For each freestanding device, such as a computer, printer or the like, show the rear elevation of the device as a pictorial.
        2) Show the termination connectors on the device.
        3) Show the wire numbers attached to the connectors.
        4) Schedule the wire colors connected to the pins on each device connector.
    g. Custom assembly diagrams:
        1) For each custom assembly such as a receptacle assembly, control panel or the like, provide an assembly drawing illustrating the appearance of the assembled device including dimensions, assembly components and functional attributes (momentary or alternate action switch, lens color, panel finish and the like).
    h. Specification comparison:
        1) Copy of specification annotated on line by line basis where proposed product or system differs from specified product or system. Any differences to be explained.
6. When application engineering and submittals have been prepared, a meeting shall be set up with the A/E, GC and OWNER for preliminary shop drawing review. The project superintendent for the work of this division shall explain the entire system operation, equipment and other items as called for in the specification. Any drawings required shall be submitted one week in advance of proposed meeting date and preliminarily reviewed at this meeting. This meeting will be held at the project site.
7. Each individual submittal item for materials and equipment shall be marked to show specification section and paragraph number which pertains to the item. Manufacturer’s description sheets shall have an arrow stamp pointing to each item on the sheet that is intended for review. Each operational feature of the systems included shall be addressed in narrative form and relate to specific system requirements described in the plans and

specifications. All drawing submittals shall be submitted on same size sheets, identified by system, and sequentially numbered throughout the entire set.

8. Submittals shall be made for each of the systems being supplied for the project.
9. All shop drawings required shall be submitted at the same time in one complete packaged submittal. Any supplemental sheets added during construction will need to be submitted separately for approval.
10. Provide (2) ARCH-F 30" x 42" hard copies, (2) ARCH-C 18" x 24" hard copies, and (2) PDF on CD-RW digital copies of each submission.

B. Product data:
   1. Table of Contents in the form of the Bill of Materials provided as defined by each Division 28 section.
   2. Data sheets for each device as indicated in each Division 28 section and as indicated herein.
   3. Where multiple options are shown on a single data sheet, highlight product options that will be provided and strikethrough options that are not applicable or otherwise specifically identify all options/features to be included in the project.
   4. Each data sheet shall have a footer each page with the following information:
      a. Submitting Contractor's Logo
      b. Specification Section
      c. Specification Reference
      d. Manufacturer Name
      e. Manufacturer Part Number
      f. Brief Description
   5. Description of system operation indicating overall system operation and purpose and capabilities of each component within system.
   6. Cross reference data sheets to components shown on system/riser diagrams.
   7. Provide (4) ANSI-A 8.5" x 11" colored, tabbed, hard copies in 3-ring binders, and (2) PDF on CD-RW colored, digitally tabbed, digital copies of each submission.

C. Security Electronics Control System (SECS) Graphic Maps:
   1. Graphic maps shall be submitted for each control station for approval by A/E and OWNER.
   2. Provide (4) ANSI-A 8.5" x 11" colored, tabbed, hard copies in 3-ring binders, and (2) PDF on CD-RW colored, digitally tabbed, digital copies of each submission.

D. Samples:
   1. As indicated in each Division 28 section.

E. Project information:
   1. As indicated in each Division 28 section.

F. Factory Acceptance Test:
   1. Provide travel, lodging and a rental vehicle for (2) OWNER representatives, (1) GC representative and (1) A/E representative for an attendance period of (2) Days at the contractor's electronic control system fabrication shop.
   2. The entire Security Electronics Control System (SECS) shall be a fully programmed and operational mock-up to simulate system functionality, as it will operate when installed on-site.

1.4 OPERATION AND MAINTENANCE MANUALS

A. Contract closeout information:
   1. As indicated in each Division 28 section.

B. Record drawings:
   1. Keep a complete set of all electronic systems drawings in job site office for showing actual installation of electronic systems and equipment. Drawings shall show exact location of devices, equipment and routing of conduit and cable.

2. Use this set of drawings for no other purpose.
3. Where any material, equipment, or system components are installed differently from that shown, indicate differences clearly and neatly using ink or indelible pencil during construction.
4. At project completion, update shop drawings with a notated revision to reflect all AsBuilt changes and submit final record set of drawings to A/E for approval.
5. Upon A/E approval, provide (2) ARCH-F 30" x 42" hard copies, (2) ARCH-C 18" x 24" hard copies, and (2) PDF on CD-RW digital copies to A/E for distribution to the OWNER.

C. Operation and Maintenance Manuals:
1. Table of Contents in the form of the Bill of Materials provided as defined by each Division 28 section.
2. Data sheets for each device as indicated in each Division 28 section and as indicated herein.
3. Where multiple options are shown on a single data sheet, highlight product options that will be provided and strikethrough options that are not applicable or otherwise specifically identify all options/features to be included in the project.
4. Stamp each data sheet with its associated specification section reference.
5. Following each data sheet provide its corresponding Operation and Maintenance technical manual.
6. Description of system operation indicating overall system operation and purpose and capabilities of each component within system.
7. Cross reference data sheets to components shown on system/riser diagrams.
8. Provide (4) ANSI-A 8.5 IN x 11 IN colored, tabbed, hard copies in 3-ring binders, and (2) PDF on CD-RW colored, digitally tabbed, digital copies of each submission.

D. Equipment Enclosure Guide:
1. Equipment cabinets or racks for the electronic systems shall include a laminated layout drawing permanently affixed inside the door or cover of each enclosure sized to fit with each item of equipment within the enclosure identified and cross-referenced with equipment data sheet.

E. Operation and Maintenance Data:
1. Shall include a complete terminal block schedule for each panel with the following data for each point within the electronic control system
2. Type of point, i.e., input, output, etc…
3. Schedule relating points, terminal block numbers, and signal source or destination.
4. Input and output schedule.
5. Location and type of input source device.
6. Location and type of output device controlled.
7. Project-specific, illustrated user's manual.
8. Provide detailed electrical schematics for all electrical/electronic components.

F. On-site Digital Storage:
1. The AsBuilt Drawings and Operation and Maintenance Documents as defined in Section 28 shall be digitally stored within 6ft of each SECS Server Location on the project. A Space Age Electronics Storage Device (eFAD) shall be installed in an IGB series single gang electrical back box with a red Décor plate cover. The unit shall be permanently marked "SECS Documents" and will not be able to be removed from the surface. The unit will install like an electrical device and be securely fastened. The eFAD unit shall have a minimum capacity of 4GB's of digital storage. The access will be an USB type B connector on the front faceplate.

G. Maintenance and operating instructions on all systems.

H. Control wiring diagrams for all locking systems with each system identified.

I. Certification from system manufacturers that systems are installed in accordance with manufacturer's recommendations and are functioning correctly at the time of final inspection.

1.5 QUALITY ASSURANCE

AD#1: Section 28 23 13; Part 1/1.5. E Addition/Deletion

A. Perform all work in accord with following codes:
   1. Federal, state and local codes, regulations and ordinances
   2. Underwriter's (UL) code requirements
   3. NFPA 70 National Electrical Code (NEC) (Latest Edition)
   4. Occupational Safety and Health Act (OSHA)
   5. All authorities having jurisdiction
   6. Factory Mutual System (FM) requirements
   7. NFPA 101: Life safety code (Latest Edition)
   8. ANSI-A117.1: Handicap code, Chapter 553 - Part V
   9. Uniform Building Code
   10. American's with Disabilities Act (ADA)

B. The intent of these specifications is to insure the systems described in this division are provided and installed by a technically experienced installer and, further, that the work is fully coordinated between the various systems by a single installer who is technically qualified as described herein.

C. Where the installer is a branch office or other division of a larger organization, the qualifications of the branch office or other division shall meet the requirements of the Contract Documents. The installer incorporated under the same name, shall have successfully completed a minimum of three similar construction projects, both in scope and system types.

D. The work of this division shall be managed and supervised by a full-time site project superintendent who shall have the following qualifications:
   1. Experience in the applications engineering, installation, and supervision of similar construction projects both in scope and system type for a minimum of 5 years
   2. Full time employee of the installer
   3. Have a working knowledge of all systems installed under this division.
   4. Project superintendent shall be on site full time through duration of construction.

E. Acceptable installers/integrators: Subject to their adherence to these specifications, the following are pre-qualified to perform the electronic systems installation/integration work of this section:
   1. ~~MCS (Argyle Security Group~~ **CML Security Group**, ~~San Antonio~~ **Erie**, ~~TX~~ **CO**.
   2. **Cornerstone Detention** ~~(Cornerstone Electronics),~~ Montgomery, AL~~.~~
   3. ~~Com-Tec, Appleton, WI.~~
   4. ~~Engineered Control Systems, Spokane, WA~~
   5. SouthernFolger, San Antonio, TX

F. Firms other than those previously listed desiring approval to bid the project shall submit a Substitution Request in accordance with Section 00 26 00. Attach the following information:
   1. The submitting systems integrator shall provide copies of the company license number issued by the state, which signifies they are approved to do security work in the state (if applicable).
   2. A list of 10 projects that were completed by the submitting integrator. These projects must have been designed to use industrial programmable controllers and touchscreens as described in this specification and applied in a detention security application. The 10 projects should be similar in size, scope, and price to this project. If SUBCONTRACTORS were used by the submitting Systems Integrator, then that project SHALL NOT be used or included in the list, as this project is requiring a "Single Source Responsibility" format requiring complete installation by full time employed employees of the submitting Systems Integrator. The architect will review each project submitted and disallow any project not

meeting the above requirements. If the total approved projects do not meet the minimum 10 required, the Architect/Owner will not approve the submitting systems integrator.

a. For each project listed provide:
    1) The brand of PLC, Audio, Video and backbone equipment used.
    2) Values of the subsystems and total contract price.
    3) Technically describe the security components integration with each system.
    4) Provide Contact Person Name and Phone Number at each submitted project site that can confirm that the systems integrator preformed the installation in an acceptable manner.
    5) List the names and roles of employees on the submitted projects.

3. The names and up to date phone numbers of the Architect, System Engineer and Owner of ALL Jail/Detention/Corrections projects installed by the submitting systems integrator, within the last 5 years.
4. A notarized statement from the Owner or President, listing those products that will be used for each section of Security Electronics. No exceptions to this bill of material shall be accepted after the awarding of the contract. Multiple selections are NOT ACCEPTABLE. State in writing, your intent to "comply fully with the requirements of this specification and to hold harmless the Architect, Engineer and Owner from omissions of a casual nature that would be considered to be an implied requirement for a fully operational security electronics integrated system." Provide a list of "compliance to" or "non-compliance" for each paragraph of this specification. Compliance/Non-compliance must be in a format listing each section/subsection/paragraph of this specification and an explanation of compliance/non-compliance for each entry.
5. A list of all outstanding, past judgments or lawsuits against the company or owners under their current name or any previous name or business entity.
6. Company's history providing detention control systems.
7. Organizational chart with the resumes of individuals.
8. Provide a narrative description of all software to be utilized, network types, and interfaces with other systems. Any custom software that is to be developed by the contractor needs to be described in detail.
9. Provide written confirmation, "Software Assurance Letter", that at the completion of the Factory Acceptance Test, the submitting systems integrator will provide to the owner, at no charge, the complete ladder-logic program used on this project to date, fully commented, the complete list of scripts and routines used in the GUI touchscreen package fully commented and the documented source code of any custom or proprietary DLL, EXE, NET or software module written by the submitting systems integrator for use on this project. At the completion of the project, before acceptance from the owner and the final retainage payment, the systems integrator will provide the final, fully commented documentation, listed above, for the project. If this "Software Assurance Letter" is not included, the submitting systems integrator WILL NOT BE APPROVED to bid this project.
10. A letter from the Surety Company reflecting the Surety Company's history and experience with the Integrator providing the Security Electronics and the current bonding limit.

G. Systems Integrators who do not meet these specifications, fail to turn a valid prequalification, or do not have an acceptable reputation of good service will not be allowed to bid. Additional firms approved to bid shall be listed by addendum only.

1.6 PROJECT CONDITIONS

A. Examine Contract Documents to determine how other work will affect execution of electronic systems work.

B. Make arrangements for and pay for necessary permits, licenses, and inspections.

C. Determine and verify locations of all existing utilities on or near site.

D. Provide covering and shielding for all equipment to protect from damage.

E. Repair, restore or replace damaged, corroded and rejected items.

1.7 OWNER'S TRAINING (SEE DIVISION 01).

A. Include all costs required to:
   1. Train operation and maintenance personnel in use and maintenance of systems provided under this section.
   2. Train maintenance staff in troubleshooting and maintenance of each system.
   3. Provide copies of technical manuals, including function and operational circuit and operational circuit characteristics and schematic diagrams, for each system and system components.

B. Training sessions shall be conducted by instructors certified in writing by manufacturer of specific system.
   1. Conduct sessions for not less than four hour periods during normal working hours, i.e., Monday through Friday, 8:00 AM to 5:00 PM.
   2. Training session schedules shall conform to requirements of Owner.
   3. Submit schedules to Owner for approval not less than two weeks prior to training session.
   4. Do not schedule training sessions for different systems concurrently.
   5. Training hours shall be cumulative of hours specified in each section.

C. Instruct operating staff in proper operation, including hands-on training.

D. Video record all training sessions including but not limited to classroom training, operational training and hands on training:
   1. Provide (2) interactive DVD/R copies and (2) USB copies of recorded training material to OWNER.

1.8 EXTRA MATERIALS (SEE DIVISION 01)

A. Furnish spare parts required in each Division 28 section.

B. Spare parts required in each Division 28 section shall be stored within 6ft of each SECS Server Location on the project. A Space Age Electronics Records, Parts and Battery Box (RPB) Spare Parts and Battery Box shall be installed. The enclosure shall be UL Listed, constructed of 16 gauge cold rolled steel. It shall have a red powder coat epoxy finish. The access door shall be locked with a 3/4" barrel lock and a lift away hinge with a grounding Strap. The enclosure will supply 4 mounting holes and a grounding lug. Inside the enclosure will accommodate standard 8 1/2 x 11 manuals and loose document records that will be protected within the enclosure. The enclosure shall also provide 2 key ring holders with a location to mount standard business type cards for key contact personnel.

C. All spare parts shall be new and in original packaging from manufacturer.

D. Insure parts are package to protect from damage and to allow for easy storage.

E. Provide inventory of all spare parts.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Acceptable manufacturers:
   1. Individual items:
      a. Base:
         1) As noted in each Division 28 section.
      b. Optional: As noted in each Division 28 section.
   2. Other manufacturers desiring approval comply with Section 00 26 00.

B. Use only prime quality, new materials, apparatus and equipment.

C. Any peripheral accessories required shall be provided to insure intended function.

D. Use UL labeled electrical materials where listing has been established for materials or devices in question.

E. Structural steel for supports: ASTM-A36/A36M.
   1. Galvanize members installed in areas of high humidity or condensation.
   2. Furnish other members with shop coat of rust inhibiting primer.
   3. Shop fabricate for field assembly using bolts.
   4. Minimize field welding.
   5. Retouch primer and galvanizing after field welding.

F. Access doors, panels and frames (as specified in Section 08 31 16)
   1. Style and type required for material in which installed.
   2. Provide in walls, floors, and ceilings to permit access to all equipment requiring service, adjustment or inspection. Include any location where splicing occurs.

G. Provide security equipment that is institutionally rated.

2.2 WEATHER PROOF EQUIPMENT

A. Use weatherproof (WP) enclosures for all exterior devices and equipment.

B. For applications that are on exterior doors, in unconditioned spaces, exterior areas or in an environment where moisture could be an issue, silicone filled connectors shall be used for all wiring connections and terminations.

2.3 LIGHTNING PROTECTION (SURGE PROTECTION DEVICES-SPD)

A. Acceptable manufacturers:
   1. Surge Protection Devices:
      a. Base:
         1) Ditek
      b. Optional:
         1) Northern Technologies
         2) Transtector systems
         3) Leviton
      c. Indicate on shop drawings locations of all transient voltage surge protection devices.
   2. All SPD devices shall be provided by one manufacturer.
   3. SPD manufacturer shall have a company-wide quality program and be ISO 9001 certified by an accredited organization.

B. Protect all communication, video, and data equipment against surges induced on all control, communication, video, sensor and data cables. All cables and conductors which serve as control, sensor, audio, or data conductors which leave the building (including devices mounted on building exterior) shall have surge protection circuits installed that meet the IEEE 472 surge withstand capability test and the electrical transient tests as established in UL 365-1985. Fuses shall not be used for surge protection.

C. Lightning protection devices for protection of control, sensor, audio, and data cabling shall be located as recommended by the manufacturer.

D. All control, communications, video, sensor, and data cables connected to lightning protection devices shall be isolated from all other building internal and external wiring, and shall not occupy the same conduit raceway, junction boxes, or wireways.

E. All systems and components as specified herein shall be equipped with lightning protection devices, installed as described herein.

F. All power connections, including 24VDC and 24VAC power supplies and direct wired or plug-in 120VAC power connections, for all systems and components as specified herein, shall be equipped with lightning suppression devices. All communication, data and power lightning

protection devices shall be bonded to building grounding system in accordance with Article 250 of the National Electrical Code.

G. Communication, data and signal:
   1. Shall incorporate Silicon Avalanche Diode devices as the primary protection means
   2. Shall have a surge life of at least 10 operations for 10,000 amp, 8 x 20 microsecond wave
   3. Shall have an initial clamping voltage suitable to the application and shall not exceed 200 percent of the peak signal voltage rating of the circuit.
   4. Shall have a peak clamping voltage suitable to the application and shall not exceed 300 percent of the peak signal voltage rating of the circuit.
   5. Shall be selected as required for the particular data frequencies and signal level characteristics of the application

H. Branch power circuits:
   1. Shall incorporate Silicon Avalanche Diode devices as the primary protection means
   2. Shall have a surge life of at least 200 operations for 3,000 amps, 8 x 20 microsecond wave for 120V single phase application
   3. Shall have a maximum single surge capacity of at least 19,000 amps for 8 x 20 microsecond wave
   4. Shall have an initial clamping voltage of no greater than 250V (location category B, 500A) for 120V single phase application.
   5. Shall have a peak clamping voltage of not greater than 500V (location category B, 500A) for 120V single phase application.

2.4 EQUIPMENT HOUSING

A. Equipment housed in security equipment rooms shall be housed in equipment cabinets. Refer to Section 28 05 15 for cabinet specifications.

2.5 ACCESS DOORS, PANELS AND FRAMES

A. Access doors, panels and frames: See Section 08 31 16.
   1. Where not indicated on Drawings, provide access panels and/or doors at walls, and inaccessible ceilings as required to permit access to equipment, devices and enclosures requiring service, adjustment, or inspection.
   2. Size:
      a. As required to allow access, inspection, service, and removal of items served.
      b. Minimum 24 x 24 IN

PART 3 - EXECUTION

3.1 INSTALLATION

A. All cabling for the Electronic Security Systems Network Connectivity and Video Surveillance System shall be provided by the structured cabling systems contractor. See Section 27 05 32 for detailed specifications. All other system cabling shall conform to paragraph 3.6 “Wiring”.

B. Use only thorough, highly skilled, and experienced workers.

C. When changes in location of any work are required, obtain approval of Architect before making change.
   1. Make changes at no extra cost.

D. Do not change indicated sizes without written approval of Architect.

E. Provide to Division 26 installer non-standard electrical boxes.

F. Work provided by Division 26.
   1. Complete raceway system from the main head end equipment to the end devices, including any necessary standard size backboxes, wireways, pullboxes and manholes.

2. 120 volt AC wiring and connections to UPS equipment
3. Under Division 28 submit conduit requirements and special backboxes for work of Division 26 in a timely manner so as not to impede the progress of the work.
4. Under Division 28 provide additional conduits required or increase in size of conduit to effect the installation of the electronic systems contained herein.
5. Division 28 responsible for 120 volt AC wiring and connections from the output of UPS systems to Division 28 equipment including required connections

G. Fill percentage: Conduit fill shall not exceed 40 percent.

H. Conduit verification:
1. Verify that all conduit is clear of foreign matter and substances prior to pulling of wire or cable.
2. Apply a chemically inert conduit lubricant to all wire and cable prior to pulling. Do not subject wire and cable to tension greater than recommended by the manufacturer. Under no circumstances shall wire or cable be "jerked", "yanked" or attached to any mechanical pulling device which exerts excessive force; shear or tensile.
3. Secure all wire and cable runs vertically in conduit for continuous distances greater than thirty (30) feet at the vertical run terminations. Non-coaxial cables shall be secured by screw-flange nylon cable ties or similar devices. Symmetrical clamping devices with split, circular or other wire conforming, non-metallic bushings shall be provided for all other cables.

I. Division 28 systems (i.e., door control, CCTV, access control) shall not occupy the same conduit raceway. All Class 1 and Class 2 circuits shall be routed within separate raceways and shall be portioned within all wireways.

J. Door position monitor switches may be wired electronically "in series" with applications involving double doors in areas of non-inmate circulation.

K. Provide installation, including electrical connections, cable pulling, testing and interfacing of systems.

L. Deliver materials and equipment to project and store in original containers or cartons, properly protected from elements.

M. Denton County requires that all threaded screws be hand turned using non-electrified tools. However, electric screwdrivers tools may be used with caution. Installers shall assume all responsibility for any device or surface damaged during the installation. The use of electric power “impact” tools shall not be permitted on any door hardware or other device installations for any aspect of the security system. No Security equipment shall be installed in a manner where it is firmly secured against the surface it is being mounted to and is mounted where it is level. The installers shall use a leveling device to check for installation accuracy with leveling.

N. The Security Contractor shall pre-drill all holes for work performed on wood doors, plywood, cabinets, built-in furniture, and wood-like material applications.

O. Sheetrock anchors shall be metal. No plastic anchors are allowed for drywall installations.

P. Metal toggle bolts shall be used for mounting devices in ceiling tiles.

Q. Greenlee Manufacturing concrete anchors shall be used for installation of card readers and any other access control devices on concrete, stone, cinder block, or brick.

R. Metal mud rings shall be used for any installation application where a single gang drywall cut out is required.

S. The use of a stud finder is highly recommended to avoid installing parts and equipment over metal studs.

T. Cabling penetrations through interior walls above the ceiling shall use a fire rated sleeve.

U. Service loops shall be installed at both ends of all cable runs.

V. Remove and vacuum drywall particles, wire fragments, unused spade lugs and other debris from all J-boxes, enclosures and boxes.

W. Store items subject to moisture or temperature damage in dry, temperature controlled spaces.

X. Execute all work described in this specification and shown on drawings and all work dependent upon, and necessary to, complete finish of the work so described or shown, in a workmanlike manner using materials best adapted to purposes where such work or material is not specifically mentioned.

Y. All parts that are packaged with installed devices and not used during the installation and installation instruction sheets and templates shall be saved and turned over to Denton County at the completion of the project.

Z. Grounding:
1. Ground cable shields, drain conductors, and equipment to a ground source as specified in Division 26 Section "Grounding", and in accordance with NEC
2. Bond shields and drain conductors to ground at only one point in each circuit.
3. Ground Bus: Mount on inside of each security equipment panel. Connect ground cable furnished by Division 26 to ground bus.
4. Coordinate with Division 26 the locations and the grounding requirements for the security equipment.

3.2 CUTTING AND PATCHING (SEE SECTION 01 73 29)

A. Provide cutting, fitting, repairing, patching and finishing of installed work.
1. Include installed work of other sections where it is necessary to disturb such work to permit installation of electronic systems work.
2. Repair or replace existing or new work disturbed.

B. Avoid cutting, where possible, by setting sleeves or frames, and by requesting openings in advance.

C. Before cutting, obtain approval of Architect.
1. Use only approved methods.
2. Cut all holes neatly and as small as possible to admit work.
3. Do not weaken walls or floors; locate holes in concrete to miss structural sections.

D. Locate openings and sleeves to permit neat installation of conduits and equipment.

E. Do not remove or damage fireproofing materials.
1. Install hangers, inserts, supports, and anchors prior to installation of fireproofing.
2. Repair or replace fireproofing removed or damaged, at no extra cost.

3.3 COORDINATION

A. General:
1. Coordinate the work with the other trades to assure that where this work interfaces to other trades, those interfaces are provided, complete and functional.
2. Verify all field conditions.
3. The Contractor shall work with the general contractor and the electrical contractor to oversee, design, manage, and complete the installation of all necessary conduit work for access control and security.
4. Coordinate the conduit routing to the door openings and to rough in boxes for the door position switch and electrical hardware with Divisions 8, 11 and 26.
5. Positioning Members: Provide additional support or positioning members as required for the proper installation and operation of equipment, materials and devices provided as part of this work as approved by the Architect or Owner without additional expense.
6. Interface Devices: Provide all items necessary to complete this work in conformance with the Contract Documents or the satisfaction of the Owner without any additional expense.

7. The Contractor shall work with the general contractor and the electrical contractor to oversee, design, manage, and complete the installation of all necessary conduit work for security equipment.

3.4 INSTALLATION OF EQUIPMENT

A. Install all equipment in accord with manufacturer's recommendations.

B. Provide all necessary anchoring devices and supports.
   1. Use structural supports suitable for equipment.
   2. Check loadings and dimensions of equipment with shop drawings.
   3. Do not cut, or weld to, building structural members.

C. Work performed on wood products shall require pre-drilled holes prior to fastening cable or equipment.

D. Verify that equipment will fit support layouts indicated.
   1. Where substitute equipment is used, revise indicated supports to fit at no additional cost.

E. Arrange for necessary openings to allow entry of equipment.
   1. Where equipment cannot be installed as structure is being erected, provide and arrange for building-in of boxes, sleeves or other devices to allow later installation.

F. Installation of security electronics head end equipment shall not proceed until the progress of construction has reached the following status in the area of installation:
   1. Temperature and humidity are controlled
   2. Finished ceiling, if any, is installed
   3. Walls are prime coated
   4. Floors are either finished or sealed

G. Installation of security electronics equipment shall not proceed until the progress of construction has reached the following status in the area of installation:
   1. Temperature and humidity are controlled
   2. Finished ceiling, if any, is installed
   3. Walls are prime coated
   4. Floors are either finished or sealed
   5. Millwork is complete

H. Equipment installed in areas where the previously described conditions have not been met and maintained after equipment installation shall be removed and either cleaned or replaced at the Architect/Engineer's discretion.

I. Install equipment to permit easy access for normal maintenance.
   1. Maintain easy access to switches, pull boxes, panels, receptacles, etc…
   2. Relocate items which interfere with access

J. Provide tamper resistant security fasteners on all device plates, etc., and for all exposed fasteners, in inmate areas within secure detention perimeter. These areas include but are not limited to the following: all spaces within the vehicular sallyport, inmate sallyport, holding cells, visitation booths, movement corridors, movement elevators and court holding cell areas within secure perimeter and all other areas as directed.

3.5 PAINTING (SEE DIVISION 09)

3.6 WIRING

A. All wiring:
   1. Point to point with appropriate terminal connections for every wire and component termination.
   2. All connections mechanically secure.

3. Clearly identify, label and tag all wiring and terminals at each junction box and each terminal end to facilitate installation and maintenance.
4. All cables shall be labeled at both ends with both hand written notations on the cabling and machine-generated labels using easily understandable descriptions, or if numbered, documentation provided to show the termination point of both cable ends.
5. Terminate all stranded wire with solderless, crimp on, insulated terminals properly sized for gauge and type wire and screw terminal.
6. Identify all wire and cable clearly with permanent labels (wire tags) wrapped around the full circumference at least twice within 1 IN of each connection. Indicate the number designated on the associated shop or field drawings or run sheet, as applies. Assign wire or cable designations consistently throughout a given system. Each wire or cable shall carry the same labeled designation over its entire run, regardless of intermediate terminations.
7. All wiring shall be color coded. Power circuits shall be color coded in accord with NEC. Lock wiring shall be color coded to match locking device color code where possible.
8. Coaxial Cables shall be RG-6 quad shield unless specified otherwise.
9. Wiring of different systems shall not be placed in the same conduit raceway systems.

B. All cable and wire:
1. Standard type available from more than one cable manufacturer
2. Manufacturer and installer are responsible for system performance

C. All cabling, wiring, conduits and equipment housings: In strict accordance with recommendations of equipment manufacturer; finish and color of all face plates as directed by Architect.

D. Furnish and install all wiring and cable for Security Electronics systems, and perform all connections and equipment terminations.
1. Check each cabling system run thoroughly for opens, shorts, faults, and other discontinuities.
2. Test each system receptacle for continuity, ground condition, and voltage level prior to allowing plug-in of system equipment.
3. All conductors from outgoing terminal blocks in control consoles, panels and/or systems equipment cabinets to devices controlled to be continuous.
   a. No splicing of conductors allowed.
4. Field device terminations to be per manufacturer's requirements:
   a. Conductor to conductor connections to be fully insulated crimp on male/female tab type or pin and sleeve type
   b. No conical spring connectors to be used.

E. Install electronic systems wiring in conduit 1 inch minimum, unless otherwise indicated.

F. Conductors:
1. All conductors to be stranded
2. 120 VAC and power supply connections: Minimum 12 GA, 600V insulation.
3. 120 VAC and 24 VAC door power circuits: Minimum 14 GA, 600V insulation.
4. Class 1, remote control and signaling circuits: Minimum 18 GA, 600 volt insulation.
5. Class 2, remote control and signaling circuits: Minimum 20 GA, 300 volt insulation.
6. Use larger wire size when recommended by equipment manufacturer or required for voltage drop.
7. All communications wire to be rated for minimum 300 volt.
8. Provide ground wire to all electric motor driven or solenoid locks with a rated voltage greater than 30 volts.
9. All audio cable shielded.

G. Wire lacing and dressing:
1. Lace, tie or harness wire and cable vertically, horizontally and at right angles to the enclosure surfaces as required herein and in accordance with accepted professional practice. Provide service loops where harnesses of different classes cross or where hinged panels are to be interconnected.

2. Dress, lace or harness all wire and cable to prevent mechanical stress on electrical connections. No wire or cable shall be supported by a connection point.

H. Boxes: Provide a 6 IN loop for all wire and cable routed through pull boxes or distribution panels. Cable loops and bends shall not be at a radius smaller than that recommended by the manufacturer. Enlarge pull boxes as necessary to accommodate this requirement.

I. Wiring practices:
   1. Non-coaxial connections: Make all non-coaxial connections (except microphone or line level) to screw-type barrier blocks with insulated crimp-type spade lugs or Kulka 3700 type barrier blocks. Use of rail mount compression terminals is allowable. Size all lugs properly to assure high electrical integrity, i.e., low resistance connections. Connect only one (1) wire per spade lug and not more than two (2) lugs per screw terminal. No "free" (i.e., stak-on) splices are acceptable. Wire nuts and/or electrical tape connections are absolutely forbidden.
   2. Security cabling and conduit penetrations into metal, including metal studs and top plates, shall use insulated bushings or grommets.
   3. Security cabling applications for walls that are typical commercial drywall construction shall be concealed within the wall partitions or door frames and may not be installed into surface mounted conduit or installed as exposed wiring unless specifically approved by Denton County.

3.7 FIELD QUALITY CONTROL

A. Perform indicated tests to demonstrate workmanship, operation, and performance:
   1. Conduct tests in presence of Architect, Owner and, if required inspectors of agencies having jurisdiction
   2. Arrange date of tests in advance with Architect, manufacturer and installer.
   3. Give minimum of 24 hours notice to all inspectors.
   4. Furnish or arrange for use of electrical energy, steam, water, diesel fuel, or gas required for tests.

B. Repair or replace equipment and systems found inoperative or defective and retest.
   1. If equipment or system fails retest, replace it with products conforming to Contract Documents.
   2. Continue remedial measures and retests until satisfactory results are obtained.

C. Test equipment and systems as indicated for each item, unless otherwise recommended by manufacturer.

3.8 SYSTEMS OPERATIONAL TESTS

A. Prior to the time of substantial completion, an acceptance test, witnessed by a representative of the A/E and Owner, shall be held of each system comprising the total electronic system to determine full compliance with the contract drawings. Provide all personnel, equipment, instrumentation and communication equipment and include all costs of testing in the contract.

B. It shall be the responsibility of the Integrator to submit for the A/E's approval, a proposed “SECS Check-List” for use in final acceptance testing. This checklist shall consist of a list of individual tasks on a device-by-device basis, organized into logical groups per system being supplied; the check-list shall list each device and its associated function with a “comment” box for further description or clarification. The checklist shall be submitted not later than 90 days prior to the scheduled start of acceptance testing. Acceptance testing may not begin until the A/E has approved the form and content of the acceptance checklist.

C. Not less than 2 weeks prior to the scheduled acceptance test, the installer/integrator shall certify in writing that the systems are installed in compliance with the manufacturer's recommendations, comply with the requirements of the contract documents and are operating correctly. The contractor shall completely fill out the A/E approved SECS Check-List that all devices and equipment have been tested and are operating correctly. These written certifications shall be

submitted to the A/E and shall signify that the total electronic system is operationally tested and ready for final acceptance testing by the A/E.

D. Final acceptance tests of the total electronic systems shall be conducted as directed by the A/E but generally described as follows:
   1. Locking system shall be tested by operation of each individual locking device with status visual display observed.
   2. Remote control and emergency release of locking systems shall also be tested.
   3. Emergency lock-down shall be performed.
   4. Intercom system shall be tested by operation of all individual features and stations.
   5. Each individual alarm system and each group of alarm systems operating both individually and collectively shall be tested for alarm signal initiation, tamper signal initiation and loss of power signal initiation as directed by the A/E.

E. The Contractor shall schedule and perform a system wide acceptance test of all access control system and security camera system components with Denton County before the project will be approved as complete.

3.9 ADJUST AND CLEAN

A. Inspect all equipment and put in good working order.

B. Clean all exposed and concealed items.

C. All equipment shall be clean and dust free.

3.10 PUTTING SYSTEMS IN OPERATION - START UP

A. Put all systems into satisfactory operation prior to final acceptance, at time agreed to by Owner and Architect.

B. Operate all systems in good working order for period of 5 working days.

3.11 DEVICE MOUNTING SCHEDULE

A. Dimensions are to center of device unless otherwise indicated. Coordinate outlet locations with all architectural millwork, hollow metal and/or casework elevations. Coordinate device mounting height with wainscoting where provided. Where top of wainscot or counters and device mounting height overlaps, shift device down to provide 2 IN gap between top of device and top of wainscot.

3.12 LABELING

A. Labeling:
   1. Engraved phenolic nameplates for security equipment cabinets, and enclosures.
   2. Label all junction boxes using black permanent ink with type of system wiring installed in junction box, i.e., door controls, intercom, CCTV, etc…

3.13 EXTRA PARTS

A. All parts that are packaged with installed devices and not used during the installation and manufacturer installation and operation instruction sheets and templates shall be saved and turned over to Denton County at the completion of the project.

END OF SECTION

SECTION 28 05 10
DETENTION AREA INTERCOM SYSTEM **(REVISED AD #1)**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Requirements of Drawings, General and Supplementary Conditions and Division 01 apply to this section.

1.2 SUMMARY

A. The intercom system provides a means of voice communications between remote intercom and the master intercom stations, communications between master stations, as well as communication between the new housing unit and the existing intercom stations in the existing buildings. The intercom system shall integrate to the Programmable Logic Controller for annunciation and control at the security monitoring touchscreens.

B. Related sections:
   1. Basic Materials and Methods for Electronic Systems: Section 28 05 00.
   2. Uninterruptible Power Supply System: Section 28 05 05.
   3. Detention Door Control System: Section 28 05 15.

1.3 SUBMITTALS (SEE SECTION 28 05 00)

1.4 WARRANTY (SEE DIVISION 01)

1.5 OPERATING AND MAINTENANCE DATA (SEE SECTION 28 05 00)

1.6 QUALITY ASSURANCE (SEE SECTION 28 05 00)

1.7 OWNER'S TRAINING (SEE SECTION 28 05 00)

PART 2 - PRODUCTS

2.1 GENERAL

A. Acceptable manufacturers: All systems by same manufacturer, having authorized installer and service organization:
   1. Detention audio communication system:
      a. Base: Tech Works
      b. Optional: Quam, Dukane
   2. Detention intercom master station:
      a. Base: Tech Works
      b. Optional: Quam, Rauland
   3. Detention Speakers, backboxes and grilles:
      a. Base: Atlas Sound
      b. Optional: Quam, Bogen
   4. Detention intercom station:
      a. Base: Quam.
      b. Optional: Atlas Sound, Rauland
   5. Standalone Intercom System:
      a. Base: Aiphone AX-Series
      b. Optional: Commend CP 800-Series, Stentofon ACE 9400-Series

6. Wire and Cable:
    a. Base: West Penn.
    b. Optional: Belden or approved equal.
7. Other manufacturers desiring approval comply with Division 01.

B. Systems: Manufacturer factory designed and catalogued systems, designed to operate as complete, coordinated systems, including interfaces to other Division 28 systems.
1. Speaker and transformer assemblies with grilles and backboxes
2. Power amplifiers
3. Mixers - preamplifiers.
4. Program input facilities.
5. Other accessories required for specified operation of system.
6. Include all wire, cable, conduit and fittings.

2.2 OPERATION

A. General:
1. Provide call origination capabilities where and as specified.
2. Provide auxiliary relays as required for paging.
3. Provide interface to Detention Door Control System and touch screen for operational features indicated.
4. Provide interface to video surveillance system for camera call up on intercom selection.

B. Operation:
1. Provide incoming call annunciation as follows:
    a. At touch screen provide tone and flashing symbol.
2. Provide call answer as follows:
    a. At touch screen activate intercom station selection icon causing selection icon to change state and opening talk path to the intercom station allowing listening to sound at the remote intercom station. Use of "TALK" button allows speaking to remote intercom station. At the end of conversation, resetting station selection icon causes icon to resume normal state and resets intercom.
3. If intercom station is viewable by a camera or cameras (both sides of control doors), video shall be called up to the appropriate monitor(s) at the control station.
4. Provide paging to and monitoring of selected areas as indicated. Page area as follows:
    a. At touch screen activate paging selection icon causing selection icon to change state and opening talk path to the paging. Use of "TALK" button allows speaking to remote paging speakers. At the end of conversation or change of screen view to a different area, resetting station selection icon causes icon to resume normal state and resets system
    b. Provide all page and individual zone page where indicated and at touch screen control stations. Individual zone paging shall also have group paging for the following Page Groups:
        1) Inmate – Zones TBD
        2) Staff (Non-Inmate Areas) – Zones TBD
        3) Public – Zone TBD
    c. Provide zone monitoring at the touchscreen for two-way speakers shown in the contract documents.

2.3 INTERCOM-PAGING SYSTEM

AD#1: Section 28 05 10; Part 2/2.3.E-F Deletion

A. Detention audio amplifier:
1. EIA/TIA 19” rack mounted.
2. The unit shall include all switching and logic control for push to talk (PTT) operation.
3. An integral privacy tone shall be available and jumper selectable to alert the remote party that they are being monitored.

4. All logic and control connections shall be fully PLC compatible ground sensing.
5. Microphone inputs shall be 1000 ohms balanced, –80dBm, with phantom power.
6. The Remote Speaker Power Amplifier shall deliver 20 watts continuous power into 25 Volt loads at less than 1% total harmonic distortion.
7. Model: Tech Works ICA-202D or approved equal.

B. Detention audio relay board:
1. EIA/TIA 19 IN rack mounted.
2. All logic and control connections shall be fully PLC compatible ground sensing.
3. The unit shall have a minimum of (16) 2A DPDT relays rated to transmit 25V audio.
4. Board shall be rated to handle 50W audio at 25V.
5. Field device connections shall be spring clamp terminal or screw terminal type. Specialty connectors requiring a specialty tool are not acceptable.
6. Model: Tech Works ICR-116 or approved equal.

C. Detention intercom master station:
1. Provide a detention grade intercom master station at each SECS control station location.
2. Vandal resistant metal enclosure including a gooseneck microphone, an integral speaker and a "push to talk" control push buttons.
3. The console shall have a powder coated metal base with a stainless steel faceplate. The face shall be Laser Engraved to prevent wear and destruction of labeling.
4. The microphone shall be a wide-range condenser type with unidirectional polar pattern and 12 inch gooseneck. The microphone shall operate on any 9V to 52V DC phantom power source.
5. The speaker shall be a 3 inch water resistant 45 ohm general purpose device with ceramic magnet and a frequency response of 150 Hz- 10K Hz.
6. Model: Tech Works DODC-1 or approved equal.

D. Security intercom stations:
1. Speaker/microphone: 3 IN dynamic impregnated cone speaker. Waterproof and puncture resistant construction. 2.5 OZ ceramic magnet. 8 ohm voice coil impedance with 25 volt matching transformer tapped at 1/2, 1 and 2 watts.
2. Provide 11 gauge stainless steel faceplate with three offset metal plates in front of speaker.
3. Pushbutton switch: A single pole, single throw, momentary dry contact, moisture and damage proof with mechanical stop to protect electric switch.
4. Provide watertight gasket and stainless steel fasteners for mounting intercom stations in outside areas as indicated on drawings.
5. Model: Quam CIS4/25 or approved equal.

~~E. VP-77 Replacement Security intercom stations:~~

~~1. Speaker/microphone: 3 IN dynamic impregnated cone speaker. Waterproof and puncture resistant construction. 2.5 OZ ceramic magnet. 8 ohm voice coil impedance with 25 volt matching transformer tapped at 1/2, 1 and 2 watts.~~
~~2. Provide approximately 5-1/2"W x 6-1/4"H 11 gauge stainless steel faceplate with standard 2-gang cut-out and tapped screw holes for mounting of new 2-gang intercom station. Coordinate the exact plate size and mounting hole locations with the existing conditions, it is solely the contractors responsibility to ensure the replacement intercom assembly fully covers the existing hole and is mounted to vandal proof standards.~~
~~3. Pushbutton switch: A single pole, single throw, momentary dry contact, moisture and damage proof with mechanical stop to protect electric switch.~~
~~4. Provide watertight gasket and stainless steel fasteners for mounting intercom stations in outside areas as indicated on drawings.~~
~~5. Model: Custom stainless steel replacement panel with Quam CIS4/25 or approved equal.~~

~~F. Stand-alone Detention intercom stations:~~

~~1. Speaker/microphone: 3 IN dynamic impregnated cone speaker. Waterproof and puncture resistant construction. 2.5 OZ ceramic magnet. 8 ohm voice coil impedance with 25 volt matching transformer tapped at 1/2, 1 and 2 watts.~~
~~2. Provide 11 gauge stainless steel faceplate with three offset metal plates in front of speaker.~~
~~3. Pushbutton switch: A single pole, single throw, momentary dry contact, moisture and damage proof with mechanical stop to protect electric switch.~~
~~4. Provide watertight gasket and stainless steel fasteners for mounting intercom stations in outside areas as indicated on drawings.~~
~~5. Model: Aiphone SS series or approved equal.~~

2.4 PAGING SYSTEM

A. Power amplifiers: With silicon transistors exclusively with output at less than 5 percent distortion:
   1. Frequency response 40 to 15,000 Hz plus/minus 1.5dB.
   2. Noise level 84dB below rated output.
   3. Input 400 microvolt - microphone, 0.3 volt auxiliary.
   4. Balanced or single-ended 25 volt and 70 volt outputs at a screw terminal strip.
   5. Output regulation within 2dB from no load to full load.
   6. Auxiliary voltage of 28 volts DC, lamp minimum.
   7. Unit rated 105-130 volt, 50-60 Hz.
   8. Provide 600 ohm input from paging control.
   9. Provide paging control relay to operate control zones.
   10. Size amplifiers for load requirements.

B. Speakers:
   1. 8 IN, seamless cone type.
   2. Frequency range: 30-17,000 Hz.
   3. Power rating: 10 watt normal.
   4. Voice coil: .75 IN diameter.
   5. Impedance: 8 OHM.
   6. Transformer: Preassembled with speaker, taps of 1/2, 1, 2; insertion loss 1.0 dB.
   7. Model: Atlas Sound SD72 Series.

C. Horns:
   1. Provide horn of weatherproof all metal construction.
   2. Provide integral switch selectable line transformer.
   3. Provide heavy gauge wire cage around outdoor speakers in recreation/exercise yards.
   4. Frequency response 375-14,000 Hz.
   5. Power rating: 15 watts.
   6. Model: Atlas Sound AP-15 Series.

D. Speaker enclosures:
   1. Recessed enclosures:
      a. Use in suspended ceilings and where indicated.
      b. Non-secure areas: Atlas Sound 198-8-5.
      c. Secure areas: Atlas Sound 193-8-5.
   2. Surface mount enclosures:
      a. Exterior finish: Baked white enamel.
      b. 16 GA cold rolled steel, 10-5/6 IN square.
      c. Atlas Sound SE161-R.
   3. Grilles:
      a. Non-Secure areas: Atlas Sound 161-8.
      b. Secure areas: Atlas Sound VP161-white.
   4. Provide mounting hardware to secure speaker to grill and grill to back box.
   5. Attach with security fasteners. See Section 28 05 00.

2.5 WIRE AND CABLE

A. Provide wire and cable for operation described. Provide separate cable for each intercom station.

B. Intercom with Call-In: Minimum 22 GA.; one shielded pair/one unshielded pair.

C. Call-In: Minimum 22 GA.; one shielded pair.

D. Paging: 22 GA.; one shielded pair.

PART 3 - EXECUTION

3.1 INSTALLATION (SEE SECTION 28 05 00)

A. Connect to UPS system.

B. Install in accordance with manufacturer's instructions.

C. Install all wiring in metallic conduit, minimum 3/4 IN, dedicated for intercom and paging, speaker wiring only. Wiring shall be installed without splices.

D. Install intercom and call-in stations at +48 IN above finished floor.

E. Adjust all amplifier controls for optional performance as determined by the Owner's representative.

F. Provide all necessary interfacing to the Touchscreen and PLC Control Systems.

3.2 TESTING (SEE SECTION 28 05 00)

END OF SECTION

SECTION 28 05 15
DETENTION DOOR CONTROL SYSTEM **(REVISED AD #1)**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Requirements of Drawings, General and Supplementary Conditions and Division 01 apply to this section.

1.2 SUMMARY

A. Related sections:
   1. Door Hardware: Division 08.
   2. Detention Hardware and Equipment: Section 11 19 00.
   3. Basic Material and Methods for Electronic Systems: Section 28 05 00.
   4. Uninterruptible Power Supply System: Section 28 05 05
   5. Detention Area Intercom System: Section 28 05 10.
   6. Video Surveillance System: Section 28 23 13.
   7. Lighting Control: Division 26
   8. Plumbing Water Control: Division 22.

B. The touchscreen control system integrator shall provide training of operational, administrative and maintenance functions for the touchscreen control system through the Electronic Systems Integrator.

C. Operational training shall be provided to Owner/User staff on the Demonstration Station and include multiple preprogrammed scenarios to train and test each function of the operational system.

D. Administrative training shall be provided to Owner/User staff in all functions and responsibilities assigned to the Administrative Station of the touchscreen control system. Full written documentation shall be provided for back up support.

E. Maintenance training shall be provided to Owner/User staff in all maintenance of hardware and software. The maintenance staff shall participate in both operational and administrative staff training prior to maintenance training.

1.3 SUBMITTALS (SEE SECTION 28 05 00)

A. Shop drawings:
   1. Complete wiring diagrams of components.
   2. Prior to preparation of shop drawings for control wiring and locking control review electrical requirements of all electric operated security devices, i.e., electric locks, position switches, and door operators to be installed on this project.
   3. Submit, with shop drawings, written certification that control wiring and locking system control have been coordinated with security hardware (Section 11 19 00) and Door Hardware (Section 08 71 00) and the existing security hardware. Certification letter shall read as follows: "(Integrator/Contractor's name) has reviewed all electrical characteristics and control wiring requirements of all electric operated security devices, i.e., electric locks, electric sliders, position switches, door operators, lighting controls, intercom controls, etc., to be installed and/or integrated in this project and has incorporated all modifications and revisions required to provide a completely coordinated control system."
   4. No submittal review will be conducted until receipt of certification.
   5. Security Electronics Control System (SECS):

a. A meeting shall be arranged at the Owner's site to discuss operational and functional issues relating to the design of the Graphics prior to creating the maps for the submittal process outlined below.
b. Shop drawings: (Submittal Review Meeting):
    1) Full size layout of each graphic map
    2) List of system integrator suggested modifications to graphic maps.
    3) List of system integrator suggested system enhancement.
c. Demonstration:
    1) Upon preliminary approval of the graphic maps, the Electronic Systems Integrator shall fabricate and program a fully functional control station demonstration unit with all maps, icons, and functions as required by these contract documents.
    2) A/E demonstration: The Electronic Systems Integrator shall provide a fully functional control station demonstration unit to the A/E which fully demonstrates the operational capabilities of the system. The A/E shall have a review period of at least two weeks to review the functionality. At the end of the review period, the A/E will provide the Electronic Systems Integrator with a listing of modifications and/or adjustments deemed appropriate for the proper operation of the unit.
    3) Upon completion of the A/E review, the Electronics Systems Integrator shall make all modifications and/or adjustments listed by the A/E at no additional cost to Owner and update the control station unit for re-test by A/E.
    4) Owner review: Upon completion of the modifications and/or adjustments listed by the A/E and re-test, the Electronic Systems Integrator shall set up the demonstration unit at the offices of the Owner and demonstrate the operational capabilities. The unit shall remain at the offices of the Owner for a review period of 20 days. At the end of the review period, the A/E will provide the Electronic Systems Integrator with a listing of modifications and/or adjustments deemed appropriate for the proper operation of the unit.
    5) Upon completion of the Owner review, the Electronic Systems Integrator shall make all modifications and/or adjustments listed by the A/E and update the demonstration station with software and hardware as required at no additional cost to the Owner. The demonstration station shall remain at the offices of the Owner until the time of substantial completion to be used in staff training.
    6) Upon substantial completion, the demonstration unit shall be installed in the facility for the purpose of training. The station shall be connected as an additional station on the system. Control from the training station shall be inhibited, that is no devices can be operated from this station. All other functions shall be fully emulated.

B. Any deviation from this specification must be submitted as a substitution request.

C. Project information:
1. Where word logic or multiple instructions are used, an example shall be shown for the individual function.
2. Communications diagrams and programming shall be provided for review.
3. The proposed interface to the touchscreen computers shall be described in detail. Programming interfaces to the touchscreen and all ancillary devices shall be identified and approved.
4. Communication protocols, commands and interfaces between computers and the PLC network shall be fully explained and documented.

1.4 QUALITY ASSURANCE (SEE SECTION 28 05 00)

1.5 WARRANTY (SEE DIVISION 01)

1.6 OPERATING AND MAINTENANCE DATA (SEE SECTION 28 05 00)

1.7 OWNER'S TRAINING (SEE SECTION 28 05 00)

A. Provide training of Owner personnel in proper operation, maintenance, and installation of touchscreens, devices and PLC programming.

1.8 EXTRA MATERIALS (SEE SECTION 28 05 00)

AD#1: Section 28 05 15; Part 1/1.8.B

A. Deliver spare parts in protective wrapping and packaging for proper storage.

B. Provide the following spare parts:
   1. PLC input modules: (2) of each type used.
   2. PLC output modules: (2) of each type used.
   3. All software: (1) full backup.
   4. Relays: (25) of each type used.
   5. Fuses: (25) of each type used.
   6. Power supply: (2) of each type used.
   7. Specialty boards or components: (2) of each type used.
   8. PLC controller CPU with back-up disc: (1) of each type used.
   9. ~~Complete Control Station: (1) complete control station including all software, hardware, monitors, cables, and any other peripheral devices necessary.~~

PART 2 - PRODUCTS

AD#1: Section 28 05 15; Part 2/2.1.A Addition/Deletion

2.1 MATERIALS

A. Acceptable ~~integrators~~ **materials and components:** ~~for the security electronics control system (SECS) with integrated programmable logic control system:~~
   1. ~~SECS integrators:~~
      a. ~~MCS (Argyle Security Group), San Antonio, TX.~~
      b. ~~Trentech (Cornerstone Electronics), Montgomery, AL.~~
      c. ~~Com-Tec, Appleton, WI.~~
      d. ~~Engineered Control Systems, Spokane, WA~~
   2. Programmable logic controller (PLC):
      a. Base: Omron.
      b. Optional: Allen-Bradley, Schneider/Modicon
   3. Server:
      a. Base: Dell
      b. Optional: HP, no exceptions.
   4. Control Station:
      a. Base: Dell
      b. Optional: HP, no exceptions.
   5. Control station Security Electronics Control System (SECS) Software:
      a. Base: Wonderware
      b. Optional: Indusoft, no exceptions.
   6. Systems Equipment Cabinets (SEC):
      a. Base: Middle Atlantic
      b. Optional: Home Inc., Lowell

7. Relays:
    a. Base: Finder
    b. Optional: Omron, IDEC

B. Other manufacturers desiring approval comply with substitution procedures.

2.2 TOUCHSCREEN CONTROL SYSTEM

AD#1: Section 28 05 15; Part 2/2.2.A Deletion

A. General description and system overview:
1. Provide a complete integrated control and monitoring system for human machine interface at locations indicated on the drawings utilizing control stations integrated with programmable logic control system. System configuration shall be such that failure of a single component shall not render the system inoperative. Provide all labor, equipment, materials and supervision to install, calibrate, adjust, document and test the total system as required herein and as indicated on the drawings.
2. The control station shall be connected to the network of the programmable logic controllers for high speed throughput for security systems operation.
3. The control station system shall be a Windows based Wonderware system. The software shall be programmed and tailored to the specified functions and features described herein and shown on the drawings including existing functions. The SECS integrated control and monitoring system shall be compatible with the electronic control system and function in conjunction with all electronic security systems to display, control and monitor all devices and functions. The control station is for operator interface only; all other standard functions of the operating system platform shall be inhibited. All control functions are to be controlled by the PLC.
4. Control station graphic displays shall be created to match the existing Jail Tower icons/color schemes and display all areas of the facility/site. The contractor should not assume electronic files of building floor plans are available. Displays shall include but not be limited to the following:
    a. Communications systems: Intercom call-up, audio select/reset, audio monitor.
    b. Security control systems: Open/stop/close, lock/ unlock, group assign/unassign, group release, emergency release, door alarms, local control alarm/enable/disable, duress alarms.
    c. Video surveillance systems: Video select, automatic or manual video taping, selection of full or quad scenes where quad displays are used, setup of sequences.
    d. Utility Functions: Power and lighting control
    e. System alarms: UPS alarm, PLC trouble, PLC alarm (See UPS Specification for detailed Alarm capabilities.
    f. Each building floor level and site plan to a designated scale. All floorplan graphics shall be displayed at the same scale.
    g. The function bar, intercom queue and alarm queue shall be located at the bottom of each map (not on the side).
    h. Special function maps shall be developed for life safety and emergency egress operations. Identification of smoke zones and paths of egress shall be identified on a series of maps. Control and monitoring of doors in the paths of egress shall be available from this screen.
    i. Page zones shall be color-coded shaded floorplan areas of the rooms or areas that will be included in the given page zone.
    j. Utility control icons shall be available on map at all times.
    k. CCTV monitor output selection shall be available at all times in the function bar, the user will be able to choose which available monitor camera selection will be routed to.
5. Maps for functional areas shall be designed in order to minimize the quantity of maps and display as much of the functional area as possible on a single map.
6. Background of display, Graphic floorplan display, text and icons shall match existing Jail Tower color schemes, or as otherwise confirmed by A/E.

7. All control icons (switch functions) used shall be of size that will facilitate a positive selection point. The minimum size shall be 0.5 IN square. All status indicators shall be a minimum of 0.1875 IN in diameter, or equivalent square or rectangle.
8. Coordinate map orientation with user position at touchscreen station.
9. Control of functions shall be by the touching of icons on the graphic display. Each icon shall be distinct for its assigned function and consist of distinct symbols and colors. Each change of status shall include that for both selection (confirmation of touch input) and verification (confirmation from controlled device). Touching of an icon shall initiate an audible tone for confirmation.
10. Any change in status or state of an icon shall be indicated by a different color, for example, control station icons status on a common network shall show gray when logged off, green when logged on, yellow when taken over, and red when in duress. This is typical for all icons.
11. Selection of any icon shall initiate an audible tone for selection confirmation.
12. Graphic map hierarchy and access shall be both operator and event driven. The system shall allow the operator to move between functional area maps via the floor, building or site maps, and move between maps within a functional group by touching the area of the functional map that is desired. The system shall also allow events to drive the map movement when the event is acknowledged by the operator.
13. Icons for activation or access to global functions shall be selectable on each map. Upon selection, these functions shall be displayed in a window over a portion of the displayed map, or a separate display with automatic return to the previous map upon selection of the global function. Global functions shall include, but not be limited to:
    a. Interlock override
    b. Emergency release
    ~~c. Emergency lockdown~~
    ~~d. Group cell release~~
    e. Alarm silence/reset
    ~~f. Control Area duress~~
    g. Paging
    h. Camera selection
14. The system shall allow the operator to move between functional area maps via the floor, building or site maps, and move between maps within a functional group by selecting the area of the map that is desired. Left/Right, and Up/Down arrows shall be placed on each map to allow movement through the facility. The system shall also allow events to drive the map movement when the event is acknowledged by the operator.
15. The interaction time between system input at the control station and the activation of a field device shall not exceed one-half (0.5) second. Similarly, the interaction time between field input device and display on the control station shall not exceed one-half (0.5) second.
16. No increase in reaction time for the system shall be acceptable due to multiple screens on line or due to combination of functional areas.
17. The software shall provide on-line utilities, accessed through the system utilities function icon. These utilities shall provide the operator with the ability to edit and update required data bases, system operating variables, report configuration and generation, alarm tags and point descriptions, etc. These utilities shall be protected by security levels and password requirements.
18. Integrator's Company name/Logo can only appear once on start-up screen. All other screens shall not have any logo or company name displayed.
19. Home screen and screen saver shall include facility name and an Owner provided logo.

B. All applicable components shall meet FCC Class B Computing Device standards and be UL and C.S.A.listed.

C. All touchscreen equipment and software shall be non-proprietary in nature and readily available for purchase directly from multiple sources.

D. System configuration:
   1. The interactive touch screen control system consists of touch screen operator interface console which shall be connected to each other via a fiber optic local area network. The programmable logic control system shall communicate with the touch screen operator interface consoles via direct connection to its local touch screen operator interface console. The programmable logic control system shall have its own communication circuit linking all of the PLC's together.
      a. Touch screen operator interface consoles (TIC): The TIC shall serve as the graphic based operator interface between the corrections officer and the facility's locking controls system and the security subsystems as specified herein.
      b. Programmable logic control system (PLC): The PLC shall provide all necessary logic transactions required to implement the functions and features of the locking control system and the security subsystem as specified herein. The PLC shall be distributive in nature and a standard product of one manufacture.
      c. A dedicated file server shall be utilized to control the TIC local area network.
   2. Server minimum hardware requirements:
      a. Processor: Intel Pentium 1403 v2 2.60GHz, 6M Cache, 2C, 80W, Max Mem 1333MHz
      b. Memory: 4GB RDIMM, 1600 MT/s, Low Volt, Single Rank, x8 Data Width
      c. Hard Drive: 500GB 7.2K RPM SATA 3Gbps 3.5in Cabled Hard Drive
      d. Size: 1RU
      e. NIC: LAN speed 1000 Base T.
      f. Misc: All necessary boards for integration to local area network, PLC's, mouse, control station, Ethernet, etc., shall be provided.
      g. Server: Dell PowerEdge R320 or A/E approved equal
      h. KVM: Aten CL1000M or A/E approved equal
   3. The touchscreen operator interface console (TIC) shall consist of the following minimum requirements. Provide a TIC that meets these requirements, as well as the minimum requirements as specified by the manufacturer of the software utilized on the TIC:
      a. Processor: Intel Core i5-3470 Processor (Quad Core, 6MB Cache, 3.20GHz w/HD2500 Graphics)
      b. Operating System: Windows 7 Professional English 64bit
      c. Memory: 4GB1 DDR3 SDRAM at 1600MHz
      d. Hard Drive: 500GB 3.5 6.0Gb/s SATA with 16MB DataBurst Cache
      e. NIC: LAN speed 1000 Base T.
      f. Misc: All necessary boards for integration to local area network, PLC's, mouse, control station, Ethernet, etc., shall be provided.
      g. Computer: Dell OptiPlex 7010 Desktop or A/E approved equal
      h. Monitor: ELO 24” 2401LM Monitor or A/E approved equal
      i. Soundbar: Dell Stereo Soundbar AX510 or A/E approved equal
   4. Surface wave touchscreen overlay (SAW):
      a. The SAW shall utilize a single glass panel design with no front layers or coating. The
      b. The SAW shall have a minimum activation force of 2-3 OZ.
   5. LAN type:
      1) See Division 27 specifications for communications wiring details.

E. Software License requirements:
   1. All software licenses shall be transferred to the Owner at completion of the project. This shall include but not be limited to all original installation disks, software manuals, software development packages, runtime licenses, equipment manuals, etc.; all project specific application software shall be provided as part of the O&M manuals.
   2. Any modifications made to the software during the warranty period shall be updated and provided to the owner at the end of warranty period. All passwords to include “master” or “Super User” Passwords shall be provided to the owner at the completion of the project.

F. Minimum software base requirements:

1. The software shall be an off-the-shelf package available through a distributor network. The off-the-shelf software shall be programmed and tailored to the specified functions and features described herein and shown on the drawings. Custom or proprietary software code will not be approved.
2. The software shall provide on-line utilities, accessed through the system utilities function icon. These utilities shall provide the operator with the ability to edit and update required data bases, system operating variables, report configuration and generation, alarm tags and point descriptions, etc. These utilities shall be protected by security levels and password requirements.
3. The software shall automatically align and adjust the SAW during the boot-up sequence of the TIC without interaction of the correctional officer.
4. All software licenses shall be transferred to the Owner at completion of the project. This shall include but not be limited to all original installation disks, software manuals, software development packages, runtime licenses, equipment manuals, etc.; all project specific application software shall be transferred at the end of warranty period.

G. Additional programming: The Electronic Systems Integrator shall include all associated costs for forty (40) hours of site specific program changes to the system. Integrator shall also provide unit price for additional eight (8) hour block of on-site programming time. Integrator personnel shall be on site for 25 percent of this programming time.

2.3 TOUCHSCREEN SYSTEM FUNCTIONS

A. General:
1. All touches of the screen and calls for events shall be annunciated by both visual and audible means.
2. Each icon shall be distinct for its assigned function and consist of symbols and colors. Each change of status shall include that for both selection (confirmation of touch input) and verification (confirmation from controlled device).
3. Window for global and auxiliary functions shall be displayed in a location on the screen that shall not impede the viewing of the underlying map.
4. A date and time function shall be displayed continuously on the screen. Reset of date and time shall be accomplished globally from the Administrative Station.
5. All system actions shall be logged to the operations log with the following minimum information:
   a. Time and date of action
   b. Action point name
   c. Operator performing action
6. Alarms and events shall be stacked in a queue by order of receipt and priority level.

B. Communication systems:
1. Communication with remote intercom stations shall be simplex with use of a push-to-talk button, or icon, to control direction of speech.
2. A call from a remote intercom station shall cause an event to be displayed on the touchscreen display. Acknowledgment of that event shall cause the map for the area of the call to be displayed and the associated icon to be identified. Touching the icon shall open the audio channel to a listen mode and cause the camera(s) viewing the area to be displayed on adjacent video monitors. Reset of the communications path shall be accomplished by touching the icon a second time, response to another event, or movement to another map.
3. Intercom calls shall be stacked in a queue by order of receipt. Intercom calls from station with a higher priority level assignment shall precede those of a lower priority level when received and be placed in the top of the queue stack.
4. Paging shall be accomplished by moving to the selected map, screen or window. Touching the icon shall open the audio channel. Communication to the paging speakers shall be accomplished by activating the push-to-talk button and speaking into the microphone. Reset of the communications path shall be accomplished by touching the icon a second time, response to another event, or movement to another map.

C. Control systems:
   1. Normal operation of detention swing door(s) or full function sliding door(s) with electric locking device(s) shall be such that selecting the icon shall initiate an unlock command. The locking device(s) shall be controlled to withdraw the lock bolt and hold withdrawn for a preset period of time (set at three seconds) and then released. Motor operated devices shall use the half cycle switch function of the lock to accomplish the hold back position.
   2. Group release operation of cell doors shall cause all selected cell doors within a selected group to unlock and remain unlocked until the cell door is opened, at which time the lock bolt shall be extended for re-locking upon closing of cell door. If cell group selection is deactivated or individual cell is removed from selected group, cell unlocking function shall return to individual door unlocking requirements.
   3. Emergency release operation shall be configured as a release per housing pod to release the cell doors only in that pod. Cell swing and sliding door(s) shall be such that simultaneously selecting a combination of icons (at least two) shall initiate an unlock command. The locking device(s) shall be controlled to withdraw the lock bolt and hold withdrawn until the icon is selected a second time. Motor operated devices shall use the half cycle switch function of the lock to accomplish the hold back position. Emergency release of a group of doors total operation time for the group shall not exceed ten (10) seconds. Emergency release function shall not cause locks to continuously cycle.
   4. Normal and emergency egress operation of full electric sliding devices shall be such that selecting the "open" icon associated with a door will cause the door to stop momentarily (if moving) and then open. Selecting the icon while the door is in movement shall cause the door to stop. Selecting the "close" icon when the door is not secure shall cause the door to stop momentarily (if moving) and then close to a secure condition.
   5. High-security doors shall be user defined doors (such as maximum security cell doors) that will require additional confirmation and privileged user access to open. When a door that is categorized as “High-Security” is unlocked a secondary confirmation window will be displayed with a yes or no icon. If yes is selected the door will be unlocked.
   6. Monitoring of the status of selected doors shall be displayed on the applicable map. The open contact position of the lock bolt switch or the door position switch shall indicate an unsecured status. The closed contact position of the lock switch and the door position switch shall indicate secure status. Any door left ajar after its assigned time delay shall report as an event requiring operator acknowledgment.
   7. Provide interlock function for all sallyport/vestibules with controlled and/or monitored doors. Through the control station system, provide an interlock alert and override function. When an attempt is made to open an interlocked door while another door of the interlock group is non-secure, a message shall be displayed indicating interlock is engaged. An interlock override function shall be accessible from the screen that will allow defeat of the interlock. A user must have privilege to override an interlock. When interlocks are overridden a record of time, date and operator shall be made to logging database.
   8. Doors shall have a user level controlled shunt function associated with the alarm to “shunt” or inhibit the alarm on from annunciation on the control station.
   9. Control of devices of other systems such as lighting, water, receptacles, phone, and other circuits shall be accomplished with icons assigned for such functions. Touching the icon shall alternately turn on/off the circuit.
      a. Water Control shall be provided via interface to Division 22 Water Control System.
      b. Furnish lighting control panel interface in accordance with the Division 26 lighting control panel manufacturers requirements.
   10. Door timers shall be user settable/adjustable via a user-friendly timer adjustment screen. The privileged access user shall have the ability to adjust timers individually or universally for unlock/open, door prop, and other special timer features.

D. Staff alarm systems:
   1. Upon activation of a personal alarm device (i.e., panic button, duress, personal alarm) an event shall be indicated at the control station. Upon acknowledgment at the master control station, the associated map shall display. Where video surveillance is provided for the

affected area, the video image shall be displayed on the spot incident monitor and start video taping of scene.
2. Provide alarm silence/reset functions.
3. Duress-panic alarms shall annunciate via PLC system to control stations.
4. Each Control Station shall have a red “Duress” button available from every graphic map including welcome screen and log on map.

E. Video surveillance system:
1. Icons for cameras shall be located on the graphic in their approximate location and/or in a location that will support the operation of a remote device (i.e., intercom, door). Touching the icon shall cause the video image to be displayed on the spot monitor.
2. Provide camera controls for pan, tilt, zoom, quad split display, and video taping shall be available in a window on the screen when called by the operator.
3. Provide graphic depicting camera locations for the entire facility. Touching the camera icon shall cause that particular camera to be displayed.

F. System alarms:
1. Annunciation of UPS alarms (i.e., on-line, trouble, battery low) shall be provided.
2. Annunciation of electronic control system alarms (i.e., PLC failure, processor failure, communications failure, low battery, network, etc.) shall be provided.

G. Provide "Clean Screen" icon which when activated will clear screen (except for this icon) to allow cleaning of screen. Selecting icon a second time will bring screen back on line.

H. Provide "Help" icon which when activated will bring dialog boxes up to explain use of each icon and what it represents.

2.4 PROGRAMMABLE LOGIC CONTROLLER (PLC)

A. The PLC shall control all input/output functions of the TICs and associated remote control devices. The PLC shall provide interface between the TIC's and related systems.
1. PLC shall be capable of expansion for future housing unit door controls. Expansion capability shall be unlimited.

B. The PLC shall be general purpose in nature and not custom designed for specific application. The PLC shall become location and operation specific upon installation of input/output modules and programming.

C. Except as otherwise specified herein, the equipment and materials of this section shall be product(s) of a single manufacturer engaged in the production of logic control systems for industrial applications for a minimum of ten (10) years.

D. General: Logic control system shall be programmable controllers, which shall control building input/output functions in addition to interfacing with TICs.

E. All programmable logic controllers shall be the products of a single manufacturer.
1. All controllers shall meet the requirements of this section.
2. All controllers shall utilize the same instruction codes and commands.
3. Touchscreens shall directly communicate to the controller via communications port.

F. Controller construction:
1. The programmable logic controller, power supply and I/O modules shall be of modular construction, enclosed in a protective housing, which is capable of being rack mounted or back mounted.
2. Each I/O module shall be a self contained unit housed within proper placement and polarity. All identical function modules shall be coded alike.
3. The controller shall be constructed to withstand as a minimum, the following climatic conditions, without the need for special enclosures or additional environmental control equipment such as fans or air conditioning.
a. Temperature: 0 to 60 C.
b. Storage Temperature: -40 to 70 C.

c. Humidity: 10-90 percent relative humidity (non-condensing).

4. All controllers and I/O structures of a single manufacturer shall be capable of being mounted on the same size fixing center to allow for larger capacity controllers to be installed in the future should the facility require an expansion beyond the limits specified in the original contract documents.
5. All input/output modules and racks must be of a standard type and be fully interchangeable with all size controllers.
6. All controllers shall have built-in comprehensive self-test and self-diagnostic capabilities.
7. All controllers shall be equipped with built-in "watchdog" relay contacts. These contacts shall be normally open dry contact, which will remain closed during normal controller operation and open in the event of a controller fault, sensed by the controller's built-in self diagnostics.
8. All controllers shall be equipped with built-in status indication of the following information:
   a. Power applied to the system
   b. DC power valid (+5, +15, -15 VDC)
   c. Watchdog contacts healthy
   d. Serial port(s) active
   e. Ram battery failure
   f. EEPROM program failure
9. All I/O cards shall be 24V dc and each card shall have as minimum thirty two (64) discrete circuits. No direct wiring to the front of the module should be required. A separate wiring harness should be available with a D-type connector on one end (for connection to the I/O module) and a "fan-tail" on the other for screw down connection. Each PLC output shall be fused.
10. At each location that I/O is installed provide a minimum of 25 percent spare input points and 25 percent spare output points.
11. Controllers must be capable of driving local I/O, where local is defined as up to fifty (50) FT from the control unit, without the need for further intelligent interface modules.
12. When required, the system must be capable of controlling remote I/O up to a distance of ten thousand (10,000) FT from the controller, using high speed links with a minimum data rate of one hundred and eighty (180) Kbaud. Communications over this link shall be accomplished using twisted pair wires with an overall shield.

G. The controller CPU's shall communicate to and from the I/O interface boards.
   1. Provide spare PLC controller CPU which shall be rack mounted.

H. Functional requirements:
   1. The system software shall be stored in EEPROM and the operating software and all data bases shall be stored in battery backed RAM.
   2. Memory shall be expandable in segments up to 512K words. Each memory segment shall be field expandable up to the maximum amount of RAM allowed in the programmable controller. Memory battery back-up shall be for a minimum period of twelve (12) months in the event of a power failure.
   3. The controllers shall provide all necessary logic functions, timing functions, input points, output points, memory, communication capabilities and software for the operating features shown in the contract documents.
   4. Functions shall include, but not be limited to, the following, which can be implemented in bit logic, word logic or a mixture of both bit and word logic sufficient levels, variations and quantities to provide the operating features shown in the contract documents.
      a. Logical AND, OR, XOR, INVERT
      b. On/Off delay
      c. Counters
      d. Timers
      e. Sequencers
      f. Four function math (add, subtract, multiply, divide)
      g. BCD inputs and outputs
      h. Contacts

i. Coils
j. Block instructions (conditional jumps)
k. Group logic functions
l. Array math functions
m. ASCII and control structures

5. All data can be displayed in either binary, hexadecimal, decimal, or ASCII forms.
6. Communication capability shall be provided in logic controllers to allow serial communications between distributed control systems. Serial communications shall be RS232, RS422, or 20ma and shall operate at selectable speeds from 110 to 9600 baud. Communication ports shall be configurable as a data link between controllers, encoders, a VDU port or printer port. As a minimum, two communications ports shall be available as in-built to each controller selected.
7. Provide real time clock.

I. Provide all necessary power supplies to power all components of PLC system. PLC power supplies shall be dedicated to the PLC and supplied by UPS. Include battery back-up power to maintain random access memory (RAM) in the processor.

2.5 POWER SUPPLIES

A. Provide power supplies as required for power locks, control indication functions and all equipment associated with Division 11 detention hardware. Power supplies shall conform to requirements of NEC Article 725. Provide overcurrent protection of primary and distribute secondary overcurrent protection for secondary wiring circuits.
   1. Class 1 power supplies shall be provided with overcurrent protection as required by NEC Article 725. Provide overcurrent protection for all conductors in accordance with ampere rating. Minimum conductor size served by a Class 1 power supply shall be 14 GA.
   2. Class 2 power supplies shall be power limited and/or overcurrent protected in accordance with NEC Article 725. Nameplate rating of power supply shall not exceed limits indicated In NEC Article 725. Minimum conductor size served by a Class 2 power supply shall be 20 GA.

B. Power source (120 VAC) for equipment shall be provided by uninterruptible power supply (UPS). Provide terminals for all incoming circuits provided. Distribute load equally among all circuits provided.

C. All door locks and sliders shall be powered from the UPS system.

2.6 SYSTEMS EQUIPMENT CABINETS (SEC)

A. Install all components of electronic systems in systems equipment cabinets with hinged door(s), handle and key lock. All enclosures keyed alike.

B. Install engraved nameplate on each enclosure with system designation.

C. Equipment Racks:
   1. EIA compliant 19” gangable equipment rack fully welded construction shall provide a static load capacity of 10,000 lbs. and a UL Listed 2,500 lb. weight capacity.
   2. Top and bottom construction: 14 GA steel.
   3. Side panels and horizontal braces: 16 GA steel.
   4. Rackrails: 11 GA steel with tapped 10-32 mounting holes in universal EIA spacing.
   5. Doors: 16 GA, flush mount; plain or louvered, flush pulls.
   6. Panels: 16 GA, flush mount; plain or louvered, quick removal.
   7. Colors: Black or White only.
   8. Use space and locations as intended and allocated on drawings.
   9. Equipment racks in equipment and control rooms:
      a. 84-0 IN tall; 25 IN wide; 28 IN deep; quantity as required to accommodate contractors equipment in A/E designated equipment area.
      b. Provide keyed front hinged flush door for access.
      c. Provide louvered back plates for cabinets mounted against wall.

d. Provide rear hinged flush door for access when back of cabinet is exposed.
e. Provide casters as designated on the plans.
f. Provide ventilation fan and fluorescent light in top panel.
g. Provide Middle Atlantic WRK series or A/E approved equal

10. Provide doors, blank plates, side plates, back plates, and trims needed to fill in and complete the cabinets.

D. Provide louvers and thermostatically controlled fans at all control consoles and equipment racks/enclosures

E. Provide electrical plug strip(s) to power 120 volt equipment as required by equipment in each cabinet.

F. Provide florescent work lights in each cabinet.

G. Provide cabinets completely assembled with all equipment and tested prior to shipment to job site.

2.7 NETWORK GIGABIT SWITCH

A. All PLC, Touchscreen and video surveillance network switches will be provided by Denton County.

2.8 RELAY INTERFACE

A. Provide relay interface between control system and all controlled devices where controlled device current exceeds capability of PLC output devices.

B. Relays:
1. Contact rating to be equal to or greater than inrush rating of motor or solenoid.

C. Label all relays and terminations with designations to match installation and maintenance drawings.

D. Provide individual fuse for each relay to protect relay and other circuitry from a short circuit failure at the lock or controlled device.

E. Provide intermediate relay interface for control of all devices indicated above located in dayrooms.

2.9 REMOTE ACCESS AND SERVICE

A. Remote access network switch:
1. Base: Electro Standards Laboratories
2. Optional: approved equal

B. Located at each SECS server location to allow access from the WAN to local security LAN via switching all 8 pins of the RJ45 interface eliminating the need to plug and unplug cables and transparent to data speed and format certified for Cat6A compliance.

C. Switching shall be accomplished locally via a front-panel pushbutton. A remotely controlled port shall be provided to accept RS232 Serial Data ASCII commands for switch management.

D. Provide front-panel LED’s to display switch position and power status.

E. Upon power loss the switch shall retain the last switch position and continue to pass data.

PART 3 - EXECUTION

3.1 INSTALLATION (SEE SECTION 28 05 00)

A. Connect all field wiring to terminal blocks provided. Verify all labeling and coordinate with record documents.

B. Provide complete programming of PLC and touchscreen system to meet requirements of contract documents. EEPROM burn to occur after final acceptance.

C. Provide ventilation for equipment. Where equipment is mounted in millwork cabinets provide ventilating fan in millwork to circulate room air into cabinet space.

END OF SECTION

SECTION 28 13 13
CARD ACCESS CONTROL SYSTEM **(REVISED AD #1)**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Requirements of Drawings, General and Supplementary Conditions and Division 1 apply to this Section.

1.2 SUMMARY

A. Related sections:
   1. Basic Materials and Methods for Electronic Systems: Section 28 05 00
   2. Detention Door Control System: 28 05 15
   3. Video Surveillance System: Section 28 23 13

1.3 SUBMITTALS (SEE SECTION 28 05 00)

A. Product data:
   1. Technical data on each product, including finishes
   2. Description of system operation
   3. Riser diagrams and system data
   4. Equipment design considerations for future expansion, when indicated
   5. Materials list and backbox schedule (including unique backboxes)
   6. Spreadsheet for MAC addresses, numbering, and ID of devices

B. Access control contractor shall schedule a pre-construction meeting with at least the Denton County Department of Technology Services, the General Contractor, Electrical Contractor, Door hardware contractor the architect and all other trades having coordination responsibility to review and coordinate the installation of the access control system and to review and understand the Specifications, Prints and Scope of Work.

C. System design and layout of components, including but not limited to, access control modules, power supplies, connections, and cabling shall be approved by Denton County Department of Technology Services before installation begins.

1.4 QUALITY ASSURANCE (SEE SECTION 28 05 00)

1.5 WARRANTY (SEE DIVISION 1)

A. General: Provide a warranty with the following minimum provisions:
   1. Conditions: The warranty shall cover any defects in materials and workmanship including installation and programming which shall be found during the term. This shall include any deficiencies in installation standards vis-a-vis the Specifications.
   2. Response: The contractor shall respond to calls for warranty service within 8 working hours. Emergency service shall be obtainable within 4 hours of notification by the Owner. Emergency service shall be obtainable on a 24 hours basis, 7 days per week.
   3. Qualifications: The contractor shall utilize factory trained technicians located within 100 miles of the jobsite.

1.6 OPERATION AND MAINTENANCE DATA (SEE DIVISION 1)

A. As-built drawings shall show the cable paths, layout of the enclosures, access control modules, power supplies, and connections as well as a floor plan showing the location of all access controlled doors, card readers, access control hardware, door release buttons, and all other access control system components.

1.7 OWNER'S TRAINING (SEE SECTION 28 05 00)

PART 2 - PRODUCTS

2.1 GENERAL

A. Acceptable manufacturer:
   1. Security access system:
      a. Base:
         1) Lenel (To Match Existing County infrastructure)

B. System description: Access control and monitoring system for security of building spaces, programmable for individual access cards for status level and time interval access control. System to include but not be limited to the following:
   1. Controller
   2. Card readers
   3. Reader terminals
   4. Power supplies

C. Provide interface to the existing Lenel On-Guard access control system in use by Denton County. The contractor shall verify the current version.

D. Denton County Department of Technology Services shall be responsible for Lenel System programming for adding access control panels to the system, card readers, access levels, time zones, and monitor zones.

E. The contactor shall be responsible for programming all Lenel LNL-2220 Intelligent Dual Reader Control Modules with the IP address, subnet mask, default gateway, DNS servers, userids, and passwords prior to installation. Installer shall obtain IP address, subnet mask, default gateway, DNS servers, user ID's, and passwords from the Denton County Department of Technology Services. The installer shall properly configure the Lenel LNL-2220 Modules according to the manufacturer's installation instructions. In addition the contractor is responsible for programming and coordinating the local input/output functions, global input/output functions, elevator controls, alarm panels, auxiliary inputs, and auxiliary outputs.

2.2 BASIC SYSTEM CAPABILITIES

AD#1: Section 28 13 13; Part 2/2.2. Deletion

A. Access Control

~~B. Intrusion Detection~~

C. Door/Gate Control

~~D. Elevator Control~~

~~E. Alarm Assessment (Instructions)~~

~~F. Guard Tour~~

~~G. Response Dispatch and Management~~

~~H. Database Reports~~

~~I. Maps displaying alarm points~~

~~J. If/Then Functions~~

~~K. Scheduled Events~~

~~L. Mouse oriented operation~~

~~M. Network alarm and access control functions~~

~~N. Company segregated data~~

~~O. External data interface to import initial cardholder database and export cardholder data; as well as the transactions. Utilizes ASCII flat file.~~

2.3 HARDWARE SPECIFICATIONS

A. See Appendix A for Manufacturer and model numbers for components. Components listed are base manufacturer and model number. Substitutions must be submitted and approved by Denton County Department of Technology Services.

B. Card Reader Interface Modules:
   1. Reader interface modules shall be dual reader LNL-1320 units as a minimum.
   2. Lenel Single Interface Reader Modules shall not be utilized for any access control system application without written authorization from the Denton County Department of Technology Services.

C. Provide LNL-2220 Controllers one per building/per floor as indicated on the contract documents.

D. Card Readers:
   1. Basic Card Reader with Pin Pad:
      a. All door control card readers shall be HID iClass SE 921 NTN NEK 0002K.
      b. Door frame, Window Frame or Mullion mounts shall NOT be used unless no other option exists (the part to be used shall be approved by Denton County Department of Technology Services prior to installation).
      c. Reader cable through holes on exterior surfaces shall be sealed using a low odor.
      d. HID iCLASS card readers shall be connected such that the status LED is red when the door is in locked mode and green when the door is in unlocked mode

E. Enclosures for Lenel System components shall be Unity Manufacturing. The color shall be gray. Enclosures shall be sized appropriately for the project. All enclosures shall remain consistent in size per floor/building. See Appendix B for Enclosure details.

F. All enclosures shall be pre-approved by Denton County Department of Technology Services and use Altronix lock #002 (p/n: LNL-Cam1) or CH751.

G. The access control panels shall contain a battery backup system. Backup low voltage batteries shall be 12 volt DC, 12 Amp/Hour and shall be installed in the Altronix power supply enclosure. All Lenel access control modules shall be securely fastened with mechanical fasteners or plastic mounting rail “snap trap” as approved by Denton County; no double stick tape or equivalent may be used. Lenel access control modules shall be installed vertically and not horizontally in the enclosures and shall not be mounted on enclosure doors.

H. The Lenel access control module boards shall not be mounted more than one deep (no stacking). G. All wire management in enclosures shall be gray Panduit duct wire management. Panduit width for duct shall be 1.0 IN, 1.5 IN, and/or 3.0 IN. The depth of the Panduit duct wire management shall be 3.0 IN. The covers for the Panduit duct works shall be cut and neatly trimmed to provide a close fit to the enclosure side walls and with other Panduit duct covers.

I. AC-fail application on all power supplies shall be deployed and wired in series (normally-closed) to the Lenel LNL-2220 controller input for power fail notification.

J. Battery-fail application on all power supplies shall be deployed and wired in series (normally-closed) to the Lenel LNL-2220 controller input for battery fail notification.

K. Altronix PD8 power distribution devices shall be used to distribute power to all Lenel access control modules. Power to Lenel modules or Altronix ACM8 devices may not be electrically wired in series or daisy chained.

L. Altronix ACM8 Access Control Module devices shall be used to distribute power to all door hardware and other access control system applications requiring 24-volt DC power, including but not limited to, PIR motion detectors, local sounder alarms, emergency exit devices (glass break), and relay switch devices. No access control power applications may be electrically wired in series. Each access control system device and application shall have a separately fused power source.

M. A terminal block shall be installed in the Altronix power supply enclosure and used to distribute power from the power supply/charger to the power distribution devices (Altronix PD8 and ACM8). Terminal "Strips" shall not be deployed for this application.

N. The Altronix ACM8 access power controller device shall be used for fire alarm system, if required.

O. Power distribution outputs for both Altronix ACM8 and PD8 devices shall be labeled to identify connections. The wiring to and from these devices shall also be labeled.

P. The access control panels shall contain a battery backup system. Backup low voltage batteries shall be 12 volt DC, 12 Amp/Hour and shall be installed in the Altronix power supply enclosure.

Q. Power Distribution Devices shall be installed in the Main Lenel Control Enclosure. Power distribution wiring from the power supply to the terminal block, and from the terminal block to the Altronix power distribution devices shall be 16-AWG plenum, 2-conductor wiring

R. Enclosure Tamper Switches:
   1. Furnish magnetic tamper switches for all security system enclosures and equipment cabinets that are not equipped with a tamper switch from the enclosure manufacturer. All tamper switches shall be terminated to a Lenel input on the Lenel 2220 Controller Module, and monitored by the Lenel card access control system.
      a. Securely fasten the switch and magnet to the enclosure using screw hardware. Adhesives of any type shall not be permitted.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be provided by a Lenel Authorized contractor.

B. Install all devices in locations as shown on the drawings in accordance with the standards set forth herein and in accordance with standard industry practice.

C. Access control system head-end equipment shall not be installed into communications rooms or any other locations until the rooms have the plywood sheathing on the walls, the walls are painted (final coat), the flooring has been installed and sealed, the network data racks and ladder racks have been installed, all conduit work has been installed, all electrical work and HVAC work is complete, fire rated cable pass-through devices have been installed into wall partitions for the rooms, and a serviceable and lockable door has been installed. These requirements shall be in place to provide for cleanliness and security of all access control equipment being deployed.

D. Remove and vacuum drywall particles, wire fragments, unused spade lugs and other debris from all J-boxes, enclosures and boxes.

E. Readers shall be installed on the controlled side of the door in close proximity to the door handle.

F. Readers shall be installed in compliance with ADA requirements.

G. Door frame, Window Frame or Mullion mounts shall NOT be used.

H. Electrified access control door hardware wiring for all electronic access control door hardware devices shall be installed and terminated by a Lenel Authorized contractor. The door

hardware contractor shall initially install the electronic access control door hardware devices.

I. Conduits for access control devices shall be routed to a small enclosure (minimum of 8 IN x 8 IN) located on the secure side of the door for doors that do not have a false ceiling space such as doors in communication rooms, equipment rooms, electrical rooms with tilt-wall construction, rooms with cinder-block wall construction and or/other types of hardened wall construction.

J. Pre-drill all holes for work performed on wood doors, plywood, cabinets, built-in furniture, and wood-like material applications.

K. Sheetrock anchors shall be metal. No plastic anchors are allowed for drywall installations.

L. Metal toggle bolts shall be used for mounting devices in ceiling tiles.

M. Greenlee Manufacturing concrete anchors shall be used for installation of card readers and any other access control devices on concrete, stone, cinder block, or brick.

N. Metal mud rings shall be used for any installation application where a single gang drywall cut out is required.

O. Utilize a stud finder to avoid installing parts and equipment over metal studs.

P. Cabling penetrations through interior walls above the ceiling shall use a fire rated sleeve.

Q. Service loops shall be installed at both ends of all cable runs.

R. All non-terminated wiring shall be neatly coiled into enclosures and electrical boxes and/or recessed into the door frames.

S. Plenum rated cable shall be used. Weather resistant or direct burial cabling shall be used for all exterior cable installations.

T. The automatic door opening system contractor shall make all wiring terminations involving access control system wiring that integrates with the automatic door opening system.

U. Multiple access control devices and applications at the door may not be electrically wired in series with the exception of the door position switches and/or other normally closed applications. Normally open applications shall be electrically wired in parallel all the way back to the access control panel and terminated at the access control panel. Power applications shall not be electrically wired in series at the door. Power applications shall be electrically wired in parallel at an appropriate point in the access control panel.

V. Provide 24 Volt DC 10 Amp power suppliers as required. Power supplies shall be installed next to or under the access control panels, each power supply shall have it's own enclosure.

W. Conduits shall be routed to a small enclosure (minimum of 8 IN x 8 IN) located on the secure side of the door for doors that do not have a false ceiling space such as doors in communication rooms. Conduit paths are required for, but not limited to, card readers, door position switches, door locking hardware, and request to exit switches.

X. The color of the door position monitor switches shall match the frame they are being installed into.

Y. The exposed magnetic part of any door position monitor switch shall not come into contact with any metal part of a door, door frame, or any other metal structure.

Z. For doors that have a recessed top channel at the top of a door with a door position monitor switch being installed at the top of the door and door frame, recessed steel door contacts with top channel mounting magnets or rare earth door magnets shall be installed for the magnetic contact part of the door position monitor switch.

AA. No Impact / Power Drivers (Tools) On Any Security or Door Hardware Installation Applications.

3.2 WIRING (SEE SECTION 28 05 00)

A. 120 volt AC pig tail wiring with ground shall be 14 or 12 AWG.

B. All 120 volt AC applications shall be grounded between the electrical system and the enclosures.

C. The access control system shall only utilize parts and components that operate on 24-volt D.C. low voltage electrical power. 12-volt D.C. low voltage electrical power applications are not acceptable unless approved in writing by Denton County and will only be accepted for access control applications where 24-volt D.C. electrical power options are not available.

D. Provide and install the necessary quantity of 24 volt D.C., 10-Amp Altronix power supplies with battery backup. Power supplies shall be installed under the access control panel. Each power supply shall have its own separate Altronix enclosure with the "J" designation for a size of 14.5 IN W x 18IN H X 4.625 IN D.

E. All access control applications shall incorporate separately jacketed cabling for each access control system device/application that is being deployed. Multiple conductor cables shall not be split open for separate applications unless specifically approved in writing by Denton County. No "banana peel" cables are allowed.

F. Denton County utilizes 802.11a/b/g/n wireless access points (2.4GHZ and 5 GHZ). Any wireless devices installed shall not interfere with the County's existing wireless frequency use.

G. Power distribution wiring from the power supply to the Altronix PD8 devices shall be 16 AWG plenum, 2 conductor.

H. Access panel wiring shall not be unjacketed over two inches within the Panduit duct for any application.

I. Access Control cabling shall be grouped together and enter the communications rooms through a dedicated fire rated penetration. Maintain 40 % fill ratio within 3M fire rated penetrations.

J. All conductors that have been exposed outside of the cabling jacket shall be wrapped with electrical tape.

K. No wiring shall be located behind any power supply, power distribution boards, or any other enclosure device.

L. All cable management mounts and fasteners shall be secured using an appropriate wood or metal fastener.

M. The network cabling shall be installed as part of the facility's structured data cabling system by the County's contracted TE Connectivity cabling contractor or the contracted TE Connectivity cabling contractor associated with the project. The access control contractor is not responsible for any network data cabling related to the access control system.

N. Denton County shall be responsible for providing network switches and PoE to Lenel controllers. (PoE, IEEE 802.3af power over Ethernet)

O. Coordinate the work with the other trades to assure that where this work interfaces to other trades, those interfaces are provided, complete and functional.

3.3 DOOR RELEASE

A. Wiring for accessory devices such as door release switches shall be continuous from the device to the access control panel. Each accessory access control device or application shall have its own separate dedicated cable. Accessory access control devices may not be electronically wired "in series," they must be electronically wired "in parallel."

B. The wiring for door release switches shall enter the wall through properly sized holes in a single gang plastic cover plate. The plastic cover plate shall be secured to an electrical box or metal mud ring. Wiring shall be neatly dressed and secure from the wall to the device. Small metal straps secured with small screws shall be utilized for dressing and securing the door release

switch device wiring to cabinetry, furniture, or the mounting surface. Pre-drilled pilot holes are required for installing wood screws in any wood or other surface material accommodating screws. Fastening with sticky-back tape is not acceptable.

3.4 TRAINING (SEE SECTION 28 05 00)

A. General: Present, review and clarify all materials to the Owner and Owner's operating personnel and fully demonstrate the operation and maintenance of the systems, equipment and devices specified herein.

B. Duration: Provide training to designated representatives of the Owner at a location convenient to the Owner. At the end of training, Owners personnel shall be able to competently use and understand the system.

END OF SECTION

APPENDIX 'A'

Manufacturer	Description	Part Number
Lenel	Intelligent Dual Reader Control Module	LNL-2220

	Dual Reader Interface Module	LNL-1320
Unity Manufacturing	Enclosure - Gray Powder Coated with Perforated Back Panel 36 IN W x 48 IN H x 10 IN D with 33 IN W x 45 IN H Back Panel with locking t-handle	Type 3R CT
Altronix	10 AMP, 24 volt DC power supply / charger	AL1024ULX
	ACM8 Access Power Controller	ACM8
	PD8 Power Distribution Module	PD8
	BC600G Enclosure 18 IN H x 14.5 IN W x 4.625 IN D	BC600G
	"J" Designated Enclosure 18 IN H x 14.5 IN W x 4.625 IN D	
	Din Rail Bracket 10-Inch	D10
Panduit	1 IN x 3 IN PVC Ductwork Light Gray Color, Type G with slot wiring duct	G1X3LG6
	1.5 IN x 3 IN PVC Ductwork Light Gray Color, Type G with slot wiring duct	G1.5X3LG6
	2 IN x 3 IN PVC Ductwork Light Gray Color, Type G with slot wiring duct	G2X3LG6
	3 IN x 3 IN PVC Ductwork Light Gray Color, Type G with slot wiring duct	G3X3LG6
	1 IN PVC Duct Cover Light Gray Color, Type G	C1LG6
	1 IN PVC Duct Cover Light Gray Color, Type G	C1.5LG6
	1 IN PVC Duct Cover Light Gray Color, Type G	C2LG6
	1 IN PVC Duct Cover Light Gray Color, Type G	C3LG6
Page Electric	Paige Manufacturing Access Control All-In-One/Composite Cable	454932AYW
Belden	Shielded 18 AWG, 6 conductor with drain wire, plenum	
	Shielded 18 AWG, 4 conductor with drain wire, plenum	
	Shielded 18 AWG, 2 conductor with drain wire, plenum	
	Shielded 20 AWG, 2 conductor with drain wire, plenum	
	Shielded 22 AWG, 2 conductor with drain wire, plenum	
	Shielded 24 AWG, 2 conductor with drain wire, plenum	82841 or 89841
	Unshielded 16 AWG, 2 conductor, plenum	
	Unshielded 18 AWG, 2 conductor, plenum	
	Unshielded 18 AWG, 4 conductor, plenum	
3M	3M Fire Barrier Pass-Through Device - Square	98-0400-55XX-X
	3M Fire Barrier Pass-Through Device Mounting Bracket – Single, Triplex, Sixplex	98-0400-55XX-X
Manufacturer	Description	Part Number
Rutherford Controls	Door Release Button	RCI-909S
HID	iCLASS Card Reader with Keypad	HID iClass SE 921 NTN NEK 0002K

GE Security	Recessed Pin Plunger - Closed Loop, Clip Mount, White	3012-N SecurIT
	Double-Pole, Double-Throw 3/4-Inch Door Position Monitoring Switch.	1076-CD-N
	Recessed Steel Door Contacts with Top Channel Mounting Magnet.	R1078 Series
	Rare Earth Magnet for Steel Doors, 1-5/8-Inch Diameter x 5/8-Inch Long.	1840-N
	Recessed Steel Door Contact w/Wire Leads, 3/4-Inch Diameter, Closed Loop, Grey, 3/4-Inch Gap Size.	1078CW-G
	Recessed Steel Door Contact w/Wire Leads, 3/4-Inch Diameter, Closed Loop, Brown, 3/4-Inch Gap Size.	1078CW-M
	Recessed Steel Door Contact w/Wire Leads, 3/4-Inch Diameter, Closed Loop, White, 3/4-Inch Gap Size.	1078CW-N
TYCO TE	Snap-Track (For mounting module boards to the access control enclosure perforated back panel)	4TK2 Panel Mount---48-Inch Split-Apart
WEIDMULLER W Series	Terminal Block---End Anchors	1061200000
	Terminal Block---Main Component WDU4	1020100000
	Terminal Block---Partitions	1050180000
	Terminal Block---4-Pole Cross Connectors	1054660000
	Terminal Block---10-Pole Cross Connectors	1052060000
	DIN Rail (2-Meter Length)	051450000

END OF APPENDIX 'A'

APPENDIX "B"

EMT CONDUIT INSTALLATION DETAIL FOR CABLING PATHWAY FOR WIRELESS COMMUNICATION DEVICES

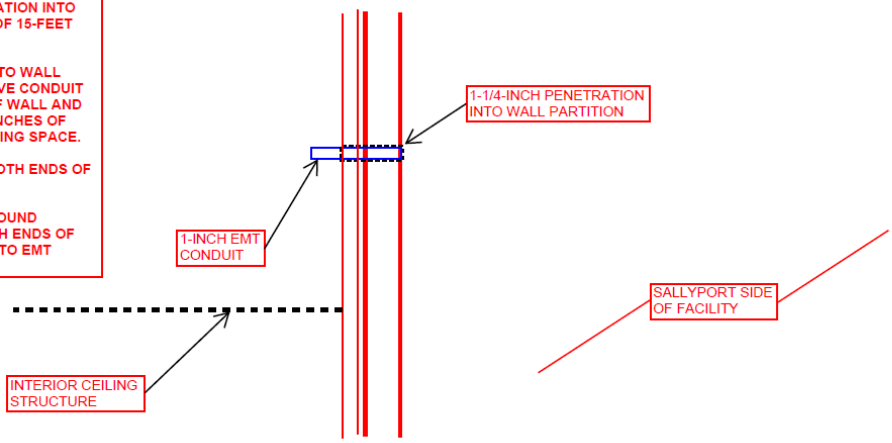
1-INCH EMT CONDUIT INSTALLATION FOR CABLING PATHWAY FOR WIRELESS COMMUNICATION DEVICES.

CREATE 1-1/8" TO 1-1/4" PENETRATION INTO WALL PARTITIONs AT A HEIGHT OF 15-FEET A.F.F.

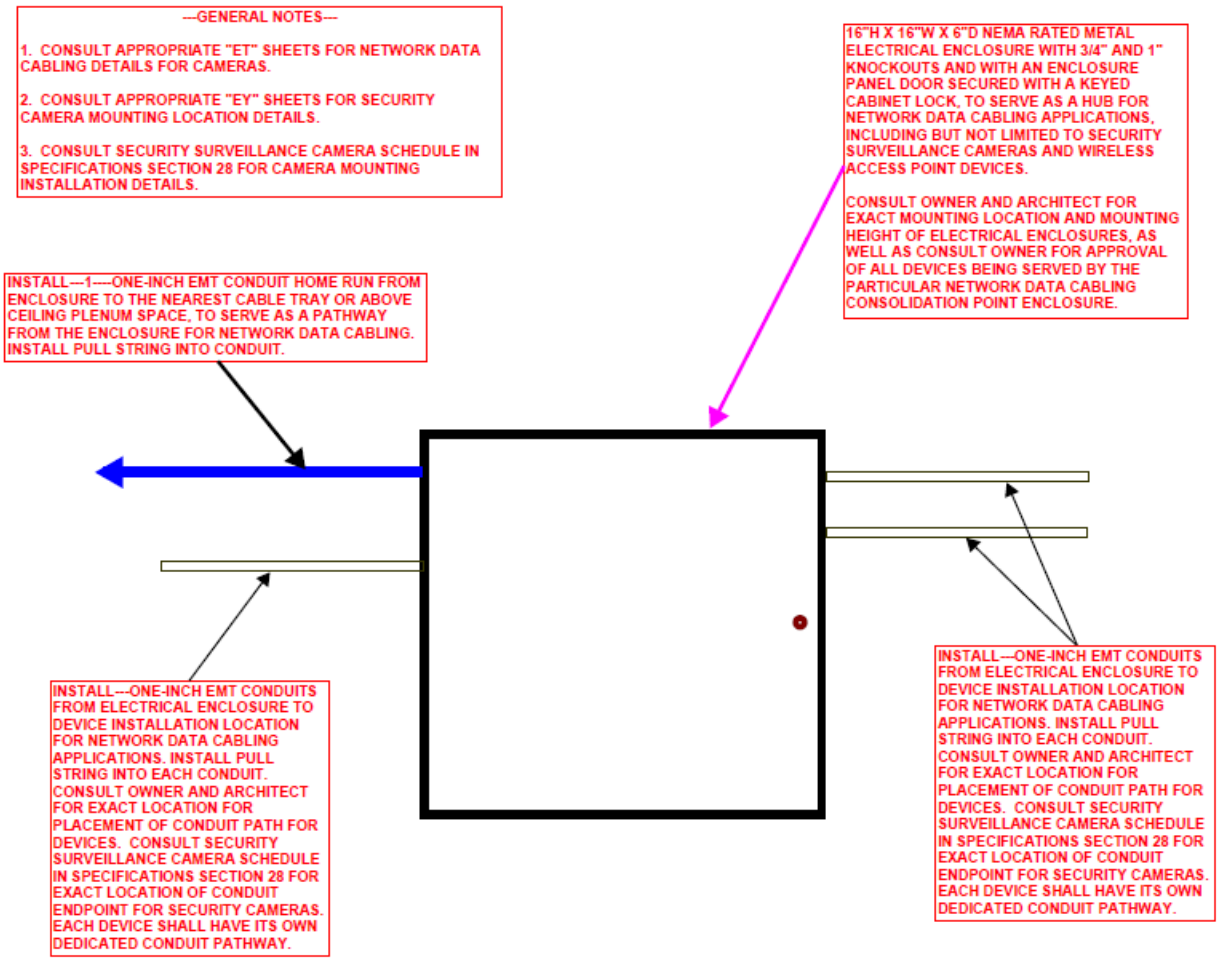
INSTALL 1-INCH EMT CONDUIT INTO WALL PARTITIONS PENETRATION. LEAVE CONDUIT FLUSH WITH SALLYPORT SIDE OF WALL AND LEAVE APPROXIMATELY 3 TO 5 INCHES OF EXCESS CONDUIT IN ABOVE CEILING SPACE.

APPLY PLASTIC BUSHINGS ON BOTH ENDS OF CONDUIT.

APPLY REQUIRED SEALANTS AROUND CONDUIT AT WALLS AND AT BOTH ENDS OF PENETRATION (NOT DIRECTLY INTO EMT CONDUIT).



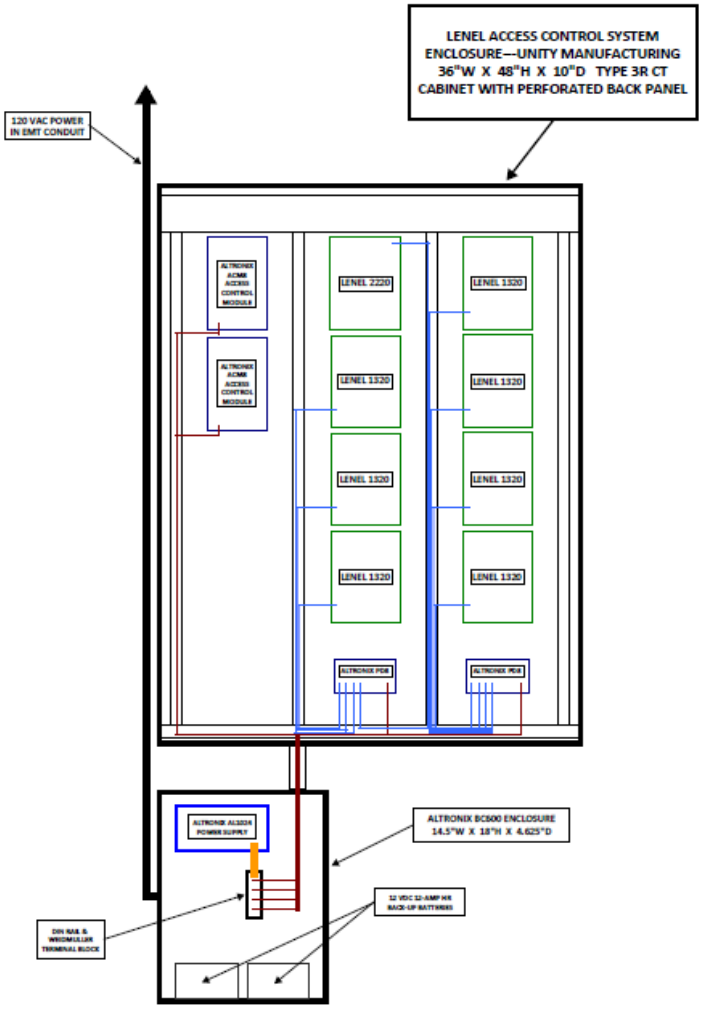
NETWORK DATA CABLING HUB ENCLOSURE SYSTEM INSTALLATION DETAIL



DENTON COUNTY PRE-TRIAL JAIL FACILITY

BOOK-IN ADDITIONS AND RENOVATIONS CONSTRUCTION PROJECT

LENEL ACCESS CONTROL SYSTEM ENCLOSURE---
TYPICAL LOW VOLTAGE POWER DISTRIBUTION DESIGN / LAYOUT

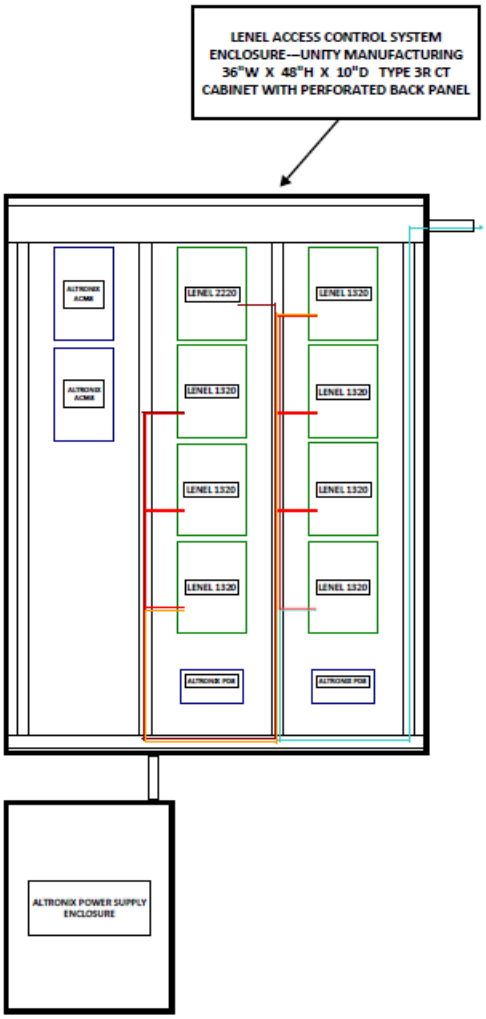


SEE ACCESS CONTROL SYSTEM SPECIFICATIONS AND DETAIL DRAWINGS FOR LENEL ACCESS CONTROL ENCLOSURE DESIGN AND BUILD-OUT REQUIREMENTS

DENTON COUNTY PRE-TRIAL JAIL FACILITY

BOOK-IN ADDITIONS AND RENOVATIONS CONSTRUCTION PROJECT

LENEL ACCESS CONTROL SYSTEM ENCLOSURE---
TYPICAL RS-485 DATA / COMMUNICATION WIRING DESIGN / LAYOUT



INSTALLATION NOTES

1. WIRING FOR RS-485 DATA / COMMUNICATIONS APPLICATIONS SHALL BE 22-GUAGE OR 24-GUAGE AWG COPPER 4-CONDUCTOR CABLE. WIRING SHALL BE TWISTED PAIR, SHIELDED WITH DRAIN, AND PLENUM RATED CABLE. TR+ TERMINATION POINT WIRING SHALL UTILIZE THE LIGHTER COLORED CONDUCTOR AND THE TR- TERMINATION POINT WIRING SHALL UTILIZE THE DARKER COLORED CONDUCTOR WITH A TWISTED PAIR. THE SIGNAL GROUND TERMINATION POINT WIRING SHALL BE THE DARKER COLORED CONDUCTOR WITH THE OTHER TWISTED PAIR. THE COLOR COMBINATION FOR CONDUCTORS DEPLOYED SHALL BE CONSISTENT THROUGHOUT THE ACCESS CONTROL SYSTEM HEAD-END.

2. THE SIGNAL GROUND TERMINATION POINT SHALL BE INCORPORATED INTO THE WIRING SCHEME FOR THE RS-485 WIRING NETWORK.

3. TERMINATION POINTS SHALL NOT HAVE MORE THAN TWO SETS OF CONDUCTORS TERMINATED AT ANY ONE TERMINATION POINT.

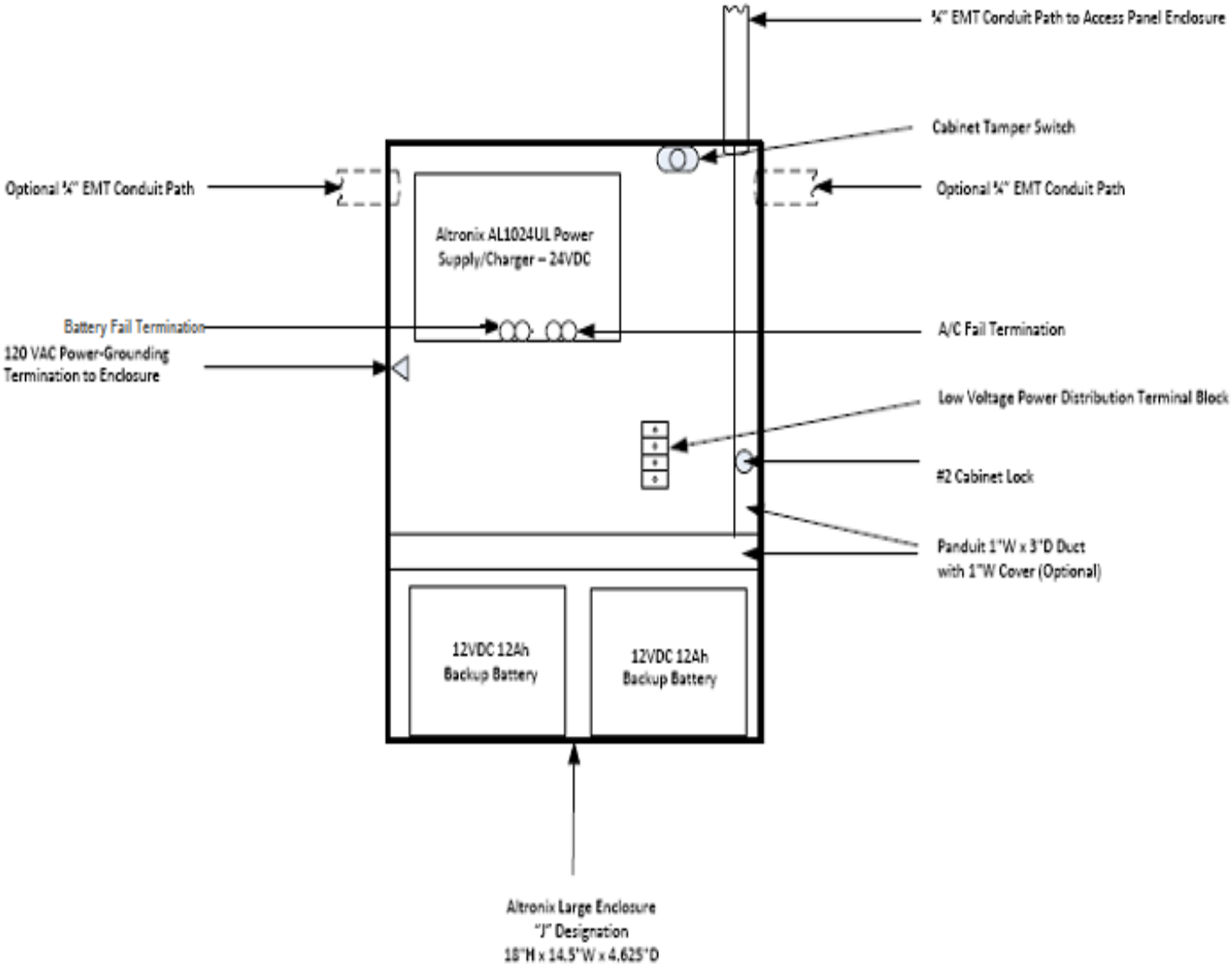
4. THE WIRING SCHEME DEPLOYED SHALL BE WIRED IN SERIES (DAISY CHAINED) AND THE FIRST LINK SHALL BE PORT TWO ON THE LENEL 2220 INTELLIGENT DUAL READER CONTROLLER MODULE.

5. THE WIRING SCHEME SHALL PROPOGATE IN SERIES AND SHALL BE IN THE EXACT SEQUENCE WITH THE LENEL READER MODULE'S ADDRESSING PATTERN, FROM LOWEST ADDRESS NUMBER TO THE HIGHEST ADDRESS NUMBER.

6. THE LAST LENEL 1320 DUAL READER CONTROL MODULE SHALL HAVE ITS JUMPER SWITCH FOR END-OF-LINE COMMUNICATION PROPERLY CONFIGURED.

SEE ACCESS CONTROL SYSTEM SPECIFICATIONS AND DETAIL DRAWINGS FOR LENEL ACCESS CONTROL ENCLOSURE DESIGN AND BUILD-OUT REQUIREMENTS

Access Control System Panel
Power Supply Configuration



END OF APPENDIX 'B'

SECTION 28 23 13
VIDEO SURVEILLANCE SYSTEM **(REVISED AD #1)**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Requirements of Drawings, General and Supplementary Conditions and Division 01 apply to this section.

1.2 SUMMARY

A. Basic Material and Methods for Electronic Systems: Section 28 05 00
B. Uninterruptible Power Supply System: Section 28 05 05
C. Detention Intercom and Paging System: Section 28 05 10
D. Detention Door Control System: Section 28 05 15
E. Card Access Control System: Section 28 13 13

1.3 SUBMITTALS (SEE SECTION 28 05 00)

A. Shop drawings:
   1. System diagram
   2. Description of system operation to include exact locations of cameras with field of view and lens sizes shown. Field of view to be indicated both horizontally and vertically. Provide on scaled floor plans with scale of 1/4 IN = 1 FT.
   3. Security surveillance cameras shall be labeled "C-###" where ### is a unique number identifying the camera. All documentation, drawings, and labels shall identify cameras using this unique identifier.
   4. Product data:
   5. Technical data on all equipment and devices used
   6. Follow the numbering identification format utilized on the architectural drawings for the project
   7. Prepare a spreadsheet that incorporates all camera equipment installed device's MAC addresses, and match that data with the camera schedule.

1.4 QUALITY ASSURANCE (SEE SECTION 28 05 00)

A. System standards:
   1. NFPA 70, National Electrical Code (Latest edition).

1.5 WARRANTY (SEE DIVISION 01)

1.6 OPERATING AND MAINTENANCE DATA (SEE SECTION 28 05 00)

1.7 OWNER'S TRAINING (SEE SECTION 28 05 00)

A. Provide technical and maintenance training for Owner personnel.

PART 2 - PRODUCTS

2.1 GENERAL

A. Acceptable manufacturers:
   1. Camera/Recording System:
      a. Base: Genetec Omnicast Enterprise

2. Video surveillance equipment:
   a. Base: Axis
3. Mounts:
   a. Base: Axis
4. Wire and cable:
   a. Base: Belden.
5. Other manufacturers desiring approval comply with Section 00 26 00.

2.2 GENERAL DESCRIPTION

A. The county's security surveillance camera system is entirely network based, consisting of a structured network data cabling system that incorporates both fiber optics and copper cabling, network switches that provide Power over Ethernet, I.P. network cameras, and an enterprise video software management system.

B. The network cabling for these cameras shall be installed as part of the facility's structured data cabling system by the county's contracted TE Connectivity cabling contractor or the contracted TE Connectivity cabling contractor associated with the construction project.

C. Video Surveillance workstation specs:
   1. Dell Precision Tower 5810 685W TPM Chassis
   2. Intel Xeon Processor E5-1650 v3 (6C, 3.5GHz, Turbo, HT, 15M, 140W)
   3. Windows 7 Professional 64-bit English
   4. Dual NVidia Quadro K2200 4GB (2DP, DL-DVI-I) (2 DP to SL-DVI adapter)
   5. 16GB Memory (4x4GB) 2133MHz DDR4 RDIMM ECC
   6. Integrated Intel AHCI chipset SATA controller (6x6.0Gb/s) - SW RAID 0/1/5/10
   7. 512GB 2.5" Serial-ATA Solid State Drive
   8. DVD+/-RW Drive
   9. US English keyboard
   10. Dell USB Laser 6-button mouse
   11. Dell 4 year hardware service with Onsite service after remote diagnosis
   12. Qty 2 - Dell Ultrasharp U3015 Monitor

D. Denton County shall be responsible for providing server and storage hardware and Genetec camera licenses.

2.3 CAMERAS AND ACCESSORIES

AD#1: Section 28 23 13; Part 2/2.3.A-D Addition/Deletion

A. Fixed interior cameras **(wall or ceiling mount)** shall be ~~AXIS P-3365-VE and~~ P-3367-VE Fixed Dome, ~~Outdoor~~ Network Camera**. For pendant mounting provide AXIS T91B53.**

B. Fixed interior Panoramic (multisensor) camera shall be AXIS P3707-PE, 360 deg. multisensory, Network Camera.

C. Fixed exterior cameras **(wall mount)** shall be ~~AXIS P-3365-VE and~~ P-3367-VE Fixed Dome, ~~Outdoor~~ Network Camera.

D. PTZ exterior cameras (corner mount) shall be AXIS P5415-E PTZ Dome, NETWORK Camera. For corner mounting provide AXIS T94P01B.

2.4 VIDEO WIRING SYSTEMS

A. Video signal cable: Category 6. Camera cabling shall be provided by the Division 27 network data cabling contractor. All cameras shall be routed to Comm/Security Room #151. See Section 27 05 32.

B. All patch cables shall be installed with the factory label end connected to the termination point that is traveling in the direction closest to the network switch

PART 3 - EXECUTION

3.1 INSTALLATION (SEE SECTION 28 05 00)

A. Install all equipment in accordance with manufacturer's recommendations.

B. Make all connections to video equipment with approved connectors for cable used.

C. All CAT6 cabling relocations, extensions, and repositions due to camera relocations or repositions shall be performed by the contracted AMP ND&I cabling installer. The security contractor shall coordinate the move of the CAT6 cabling with the contracted AMP ND&I cabling installer.

D. Assign Camera Number per Architectural Drawings and Camera Schedule to each camera part box before installation begins. Camera Boxes, Camera Housings, and Cameras must be assigned a unique camera number/identifier based on the camera schedule. The Camera Numbers shall remain on the devices throughout the installation process.

E. Substantial Coordination is required by all responsible parties involved with the installation of security cameras and related equipment. Coordinate the installation with the architect, the general contractor, the Denton County Construction Management Team, the Denton County Department of Technology Services, the Denton County Sheriff's Department, the electrical contractor, and any other organization that would require involvement or consultation on the project

F. A pre-installation meeting consisting of the contractor, the architect, the general contractor, the Denton County Construction Management Team, the Denton County Department of Technology Services, the Denton County Sheriff's Department, the electrical contractor, and any other entity that would require involvement or consultation on the project shall occur prior to the installation of any cameras.

G. Security escorts may be required for the installation of security cameras. The Denton County Sheriff's Department shall coordinate security escorts if escorts are required for an installation. Participate in any such coordination with security escorts that is required.

3.2 CAMERA INSTALLATION

A. Installation instruction sheets and templates and all parts that are packaged with installed devices and not used during the installation shall be saved and turned over to Denton County at the completion of the project.

B. Camera installation work shall be of exceptional quality, meeting and exceeding security industry standards.

C. The manufacturer's installation instructions shall be read, understood, and adhered to for all camera and camera system components installed.

D. Follow all design details for camera installations presented in the detail drawing sheets of the architectural plans. Several different types of design scenarios are presented and shall be followed.

E. Cameras shall be mounted securely to the mounting surface and shall be installed in a manner where all cameras and camera system components are water-proof.

F. Impact-driven power tools shall not be used for the installation of any screw type fasteners. Electric power drills and electric screw-driver tools shall not be utilized for the installation of any machine threaded, wood, or drywall screw-type fasteners.

G. All conduit cabling paths for exterior cameras require holes that are one-inch in diameter, unless otherwise specifically noted.

H. Installers shall use marking tape and/or camera installation templates for pre-marking for the placement of camera mounting brackets for cameras.

I. For camera installations onto brick, cinderblock, concrete, concrete tilt wall, or any other hardened surface, installer shall create a cabling pathway in the hardened material using a hammer drill and concrete drill bit. Installer shall drill a small starter hole all the way through the wall first before using the larger size concrete drill bits for the final hole.

J. For camera installations onto brick, cinderblock, concrete, concrete tilt wall, or any other hardened surface, installer shall use an appropriate concrete fastener or anchor to mount the camera to the structure. Greenlee Manufacturing concrete anchors are preferred.

K. The installation of gooseneck mounts or parapet mounts shall require the utilization of an appropriate fastener device to properly secure the camera mount.

L. For camera installations onto metal siding, self-tapping screws shall only be utilized if the screws can be firmly secured without stripping the threads created in the metal siding material. Either metal toggle bolts or a system of threaded screws with nuts and lock-nut washers shall be used to mount cameras for installations involving any metal siding material.

M. For camera installations onto wood or any man-made wood-like material, screws shall only be utilized if the screws may be firmly secured to the mounting surface without stripping the threads created in the material. Pre-drilled pilot holes shall be required for the utilization of wood screws for fastening cameras to any wood or wood-like material. Either metal toggle bolts or a system of threaded screws with nuts and lock-nut washers shall be used to mount cameras for installations involving any wood or wood-like material.

N. For camera installations into drywall or any drywall-like material, metal sheetrock anchors shall be used. Plastic anchors shall not be used for any camera installations into drywall or any drywall-like material. Metal toggle bolts shall be used if it is determined that the weight of the camera or camera system will exceed the holding force capacity of metal sheetrock anchors.

O. For camera installations into ceiling tiles or any ceiling tile-like material, metal toggle bolts shall be used. Plastic anchors or metal sheetrock anchors shall not be used for any camera installations into ceiling tiles or any ceiling tile-like material.

P. Use a metal hole-punch marking tool for indenting the surface for drill bit pilot holes.

Q. Installer shall apply a coating of silicone caulk or another latex-based caulk to any penetrations that extend into the camera's housing, with the exception of cabling penetrations.

R. For exterior camera installations onto a building's exterior wall or any vertical structure, installer shall apply a coating of silicone caulk or another latex-based caulk between the camera and the surface the camera is being mounted to. Caulk shall be applied a total radius of 270 degrees, 135 degrees on each side of the camera from the camera's center point located at the top of the camera.

S. Interior building penetrations may be required to establish patch cable pathways from the camera to the camera's network data cabling port. Installer shall create penetrations using the appropriate tools necessary for the material that will contain the penetration.

T. EMT conduit shall be installed for all interior building penetrations that are established for patch cable pathways. The EMT conduit shall be 1/2-inch or 3/4-inch in diameter minimum, sized to accommodate the quantity and size of the cables served, plus extra capacity to comply with the NEC and Division 26. The EMT conduit shall have appropriate bushings installed at both ends and be de-burred at both ends. The conduit shall be stable and secure within the penetration and have caulk applied between the conduit and the material containing the penetration.

U. All penetrations into interior and exterior wall partitions that are designated fire-rated wall partitions shall be sealed using a special fire-rated caulk.

V. Any patch cable penetrations that will pass through any type of metal material such as a metal stud top plate shall require the installation of rubber or plastic bushings or grommets. This application shall be required to protect all cabling from damage that could arise from coming in contact with any sharp or ragged metal materials.

W. For camera installations in and around areas that are highly sensitive to dust, dirt, and debris, installer shall make every effort to keep those work areas clean and free of dust, dirt, and debris that may be generated by the installation work. Installer shall immediately clean and remove any dust, dirt, and debris that is generated when performing installations in and around areas that are highly sensitive to particulate matter. This shall also include the practice of removing ceiling tiles that need to be cut and transporting such ceiling tiles to a different location for cutting where the generation of dust, dirt, and debris does not present a hazard. Boxes or other containers that can effectively catch and contain dust, dirt, and debris shall also be utilized during the installation.

X. The cabling path from all exterior camera housing backplate mounting brackets to the interior of a building shall consist of a water-proof passage utilizing seal-tight flex conduit (liquid, gray) with the properly sized fitting for attachment to the camera housing backplate mounting bracket.

Y. The seal-tight flex conduit shall extend from the camera housing with a length that is sufficient to protect the patch cable from any hazards that may exist and enable the flex conduit to be sealed at the building's interior end using silicone caulk or another latex based caulk.

Z. If only a flex connector is used for the install, installer shall apply caulk to the inside of the flex connector and surround the patch cable with caulk. Installer shall insert a solid filler material (plastic, foam, paper) into the flex conduit first to provide a dam at the other end of the flex connector to prevent caulk from running and spreading throughout the connector part and accumulating on the inside of the camera's housing unit. This will seal off the inside of the camera housing and prevent the transfer of air, moisture, dirt, insects, and other unwanted materials into the interior camera housing unit.

3.3 PATCH CABLE INSTALLATION

AD#1: Section 28 23 13; Part 3/3.3.B Addition/Deletion

A. All security cameras shall be connected to the nearest network data outlet installed specifically for that camera using the specified patch cable for the project.

B. Denton County utilizes ~~TE Connectivity~~ **CommScope Netconnect** Category 6 patch cables. No other brand of patch cable shall be installed for any network data application at Denton County without the expressed written authorization from the Denton County Department of Technology Services. Patch cables that come with the camera shall not be used.

C. All network data patch cables shall be installed with the factory label end terminated at the insertion point that is closest to the network data switch. The unlabeled end shall be terminated at/toward the device being installed.

D. Installer shall make a written or electronic note indicating which network data cable port number patch cables are installed at, and deliver that information to the Denton County Department of Technology Services.

E. The Denton County Department of Technology Services shall be responsible for installing patch cables at the County's network communications rooms for the purpose of networking the newly installed cameras with the network switch.

F. When installing patch cables, installer shall strap a piece of electrical tape onto both ends of the patch cable before performing any functions with the patch cable. This requirement is for the protection of the patch cable and the data port terminals during the installation.

G. Installer shall carefully observe data cabling bend radius specifications when installing and dressing the patch cables. Bends in patch cables shall not be more than 4 times the diameter of the cable.

H. Patch cables shall not be cut and re-terminated. The factory terminated ends to patch cables shall always be utilized.

I. Patch cables shall be properly and securely dressed from the camera to the network data connection port. The use of Velcro is the preferred procedure for dressing patch cables. Standard zip cable ties shall be used only if the cable ties are not strapped on too tight.

J. Patch cables shall be kept off of and away from all piping, HVAC works, electrical fixtures, infrastructure, and equipment, and any objects that might present a problem with electrical interference or pose a damaging hazard to the patch cable.

K. Installer shall leave some loose slack at both ends with the patch cable installation

L. Special tools for installing and fishing patch cables shall be utilized by the installer if such equipment is necessary to properly install the patch cables.

3.4 NETWORK DROP MODIFICATIONS

A. The repositioning of the network data cabling ports for cameras shall be done only if it is deemed necessary to bring the network data cabling ports closer to the camera installation location. Any such repositioning of any network data cabling must be approved by Denton County prior to the cabling being moved.

B. Installers shall follow all network data cabling installation standards and specifications if the network data cabling is repositioned anywhere at any time.

3.5 AXIS CAMERA SPECIFIC APPLICATION REQUIREMENTS

A. Unless otherwise stated, installers shall mount the AXIS Vandal Guard Cover Plate for all AXIS P 3365-VE and P3367-VE Cameras Installed.

B. Installer shall carefully apply silicone or a latex based caulk to the back of the camera mounting backplate to account for any locations where water could enter the camera's housing.

C. Installer shall make sure that all water-proof plugs are properly installed.

D. Installer shall place a strip of white electrical tape across the top seam of the camera covering approximately 240 degrees of the housing seam, thereby providing an extra layer of water-proofing to the camera housing, for any camera installed in an exterior environment.

3.6 SITE RESTORATION AND CLEAN UP

A. Installer shall properly replace all ceiling tiles that have been displaced during the installation. Installer shall leave the location in the state it was before the installation work began, including but not limited to the following actions: the repositioning of any furniture or other objects moved during the install, the closure of access hatch doors opened, or any other action taken during the installation work.

B. For camera installations at existing buildings, the installer shall thoroughly clean the work area and, if necessary, use a vacuum cleaner and/or wet towels to remove dust, dirt, and debris.

C. Schedule and perform a security surveillance camera system acceptance test with the Denton County Department of Technology Services and the Denton County Sheriff's Department.

D. All parts, tools, screws, and patch cables that are packaged with cameras and camera devices and components that are not used during the installation shall be saved and turned over to Denton County at the completion of the project. Manufacturer installation and operation instruction sheets and installation templates shall be saved and turned over to Denton County at the completion of the project.

E. All dust, debris, and fillings created or encountered during the installation process shall be removed from camera housings, holes, and wiring paths prior to the installation of camera devices and components.

3.7 TESTING (SEE SECTION 28 05 00)

A. Test all system components and connections using methods as recommended by manufacturer.

END OF SECTION