SECTION 28 13 16

IP ACCESS CONTROL SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Section includes materials, labor and service for the installation of an IP Integrated Security and Communication System for door entry, including but not limited to:
1. Master Stations: Maximum CPS system shall be seven master stations.
2. Door Stations: Maximum CPS system shall be seven doors.
3. Accessories.

1.02 DEFINITIONS

A. Refer to Section 27 05 03 - Communications General Requirements for definitions.

1.03 REFERENCE STANDARDS

A. City of Chicago Building Code - Municipal Code of Chicago for the Building Industry; 2017.

B. City of Chicago Electrical Code - National Electrical Code with Chicago Amendments; 2017.

C. ISO 9001 - Quality management systems -- Requirements; 2015.

D. TIA-569-D - Telecommunications Pathways and Spaces; Rev D, 2015.

E. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting at least one week prior to the start of the work of this section.
1. Ensure required submittals have been provided with sufficient time for review prior to scheduling the preinstallation meeting.
2. Review the detailed requirements for the work of this section and to review the drawings and specifications for this work. Require attendance by all affected installers including but not limited to:
   a. Contractor's Superintendent.
   b. Installer.
   c. Manufacturer/Fabricator Representative.
   d. Other affected Subcontractors.

e.   Architect/Engineer of Record.

f.   Board's Representative.

3.   Record minutes and distribute copies within five (5) days after meeting to participants as well as Architect/Engineer of Record, Board and those affected by decisions made.

B.   Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A.   See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B.   Product Data: Provide manufacturer's standard catalog pages and data sheets for each system component. Include ratings, configurations, standard wiring diagrams, dimensions, finishes, service condition requirements, and installed features.

C.   Shop Drawings: Indicate locations of system components and proposed size, type, and routing of conduits and/or cables. Include elevations and details of proposed equipment arrangements. Include system interconnection schematic diagrams. Include requirements for interface with other systems.

D.   Certificate: Certify that proposed system design and components meet or exceed specified requirements.

E.   Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

F.   Operation Data: Include detailed information on system operation, equipment programming and setup, and replacement/spare parts.

G.   Maintenance Data: Include detailed information on recommended maintenance procedures and intervals.

H.   Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in School's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A.   Manufacturer Qualifications: ISO 9001:2000 certified company, specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B.   Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A.   Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

B.   Store products in manufacturer's unopened packaging with labels clearly identifying product name and manufacturer, keep dry and protect from damage until ready for installation.

1.08 WARRANTY

A.   Provide two year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

A.   System Description

1.   IP Network Compatible Video Intercom System: A network-based communication and security system featuring video entry security, internal communication, emergency stations, and paging. All units and app in the systems shall be able to unlock doors remotely on a network, assist on-site visitors from an offsite location, broadcast emergency announcements, and communicate using a PoE network.

a.   Network Interface: 10 BASE-T / 100 BASE-TX Ethernet (RJ-45).

       b.   Network Protocols: IPv4, IPv6, TCP, UDP, SIP, HTTP, HTTPS, MJPEG, RTSP, RTP, RTCP, IGMP, MLD, SMTP, DHCP, NTP, DNS.

       c.   Bandwidth Usage
- 1) G.711: 64Kbps x 2 per video call.
- 2) 64Kbps per monitor.
- 3) H.264: 24Kbps ~ 2,048Kbps.

       d.   Communication: Hands-free (VOX), push-to-talk (simplex), or handset (full-duplex).

       e.   Video Display: 3-1/2 inches (89 mm) color LCD.

       f.   Camera: Type
- 1) 1/4 inch (6 mm) color CMOS.
- 2) View Area: 2 feet 2 inches (660 mm) vertical x 3 feet 1 inch (940 mm) horizontal at 20 inches (508 m).

       g.   Video Stream: ONVIF Profile S.

       h.   Door Release: Programmable Form C dry contact, 24V AC/ DC, 500mA - (use RY-24L for larger contact rating, which requires 24V DC power supply) or use RY-IP44 with 4 multipurpose relays.

       i.   Wire Type: CAT-6e.

       j.   Distance:
- 1) Door Station to Network Node: 330 feet.
- 2) Master Station to Network Node: 330 feet.

B.   Capacities (System):
1. Door Stations: Maximum of Five Hundred Twenty (520) stations with one (1) Master Station Model IX-MV.
2. Master Stations:
   - a. Maximum four (4) stations **[Elementary School]**.
   - b. Maximum eight (8) stations **[High School]**.
3. Power Source:
   - a. Door and Master Stations require PoE (802.3af).
4. All Call.
5. Video Monitor.
6. Scan Monitor.

C.   Priority:
1. Three levels of priority:
   - a. Normal.
   - b. Priority.
   - c. Urgent.
2. Call Queuing:
   - a. System can queue up to 20 calls.
   - b. Higher priority calls going to the front of the queue.
   - c. Visual indicators when priority or urgent calls in the queue.
3. Three types of Call Transfers:
   - a. Delay transfer.
   - b. Scheduled.
   - c. Press "transfer" button on the master.

2.02 MANUFACTURERS

A.   Aiphone Corporation, 6670 185th Avenue NE, Redmond, Washington 98052. Toll Free (800) 692-0200. Phone (425) 455-0510. Fax (425) 455-0071. Website: www.aiphone.com. E-mail cs@aiphone.com.

B.   IP Video Intercom System: IX Series Intercom System as manufactured by Aiphone Corporation.

C. Aiphone Corporation has special pricing for Chicago Public Schools. To obtain CPS pricing contact Aiphone Corporation for a quote use Promotion Code #2019-0024 along with the name of the school.

D. All products shall be UL Listed.

2.03 SECURITY AND COMMUNICATION SYSTEM

A. Integrated Security and Communication System: Aiphone "IX Series".
   1. Door Station Calling:
      a. Tremolo call tone programmable from 10 to 600 seconds or infinite.
      b. LCD monitor remains on for duration of call-in and communication up to a maximum of 10 minutes.
   2. Master Station Calling: Select station to call, pre-tone sounds, then speak hands-free or push-to-talk.
   3. Communication:
      a. Auto: VOX.
      b. Manual: Press-to-talk, release-to-listen.
   4. Camera: CCD 250,000 pixels.
   5. Video Monitor:
      a. 3.5-inch direct view TFT color LCD.
      b. Scanning Lines: 525.
   6. Door Release: N/O or N/C, programmable per station.
   7. Door Release Contact: 24 V AC/DC, 0.5 A.
   8. Wiring: CAT6e UTP-4 homerun from each station to nearest data switch. Cables to be terminated on yellow RJ45 CAT6e jack.
   9. Distance:
      a. Door Station to Data Switch: 330 feet maximum.
      b. Master Station to Data Switch: 330 feet maximum.

B. Master Stations:
   1. Master Stations: Audio/Color Video Model IX-MV.
      a. An IP addressable video master station.
      b. Video Identification and monitoring with a 3.5 inch (89 mm) color LCD monitor.
      c. Wall or desk mounted.
      d. Handset (duplex) and hands-free (VOX/PTT) communication.
      e. Call up to 500 other IX units.
      f. Six (6) programmable speed dials buttons for calling stations or accessing paging zones.
      g. It connects directly to a network using CAT6e cable.
      h. This station requires a 802.3af compliant Power-over-Ethernet network.

C. Door Stations:
   1. Fixed Color Video Door Station: Model IX-DF-HID or IX-DVF-P (Surface Mounted).
      a. Proximity Card Reader: Embedded "HID ProxPoint Plus".
      b. Stainless Steel Panel.
      c. Surface mount.
      d. Camera - ONVIF profile S.
      e. Camera Protection: Clear Lexan lens cover.
      f. RJ-45 jack.
      g. Speaker.
      h. Microphone.
      i. Visual Indicators.
      j. White Illumination LEDs: Automatically turn on in low-light conditions.
      k. CAT6e homerun wired to nearest data switch (Concentrator Enclosure/ MDF/IDF).
      l. Operating Temperature: 40 degrees F to 140 degrees F.
      m. Weather resistant.

    2.   If conditions require side conduit entry to mounting enclosure, provide SBX-ISDVF surface mounted backbox and provide door station Model IX-DF-HID. Contact the CPS Information Technology Services (ITS) Help Desk at (773) 553-3925 for special mounting approval.

    3.   If conditions require surface mount, provide flush mounted door station IX-DF-HID with surface mounted backbox SBX-ISDVF and security lock box for IS-DVF.

  D.   Accessories

    1.   Provide components as indicated or as required for connection of access control system to devices and other systems indicated.

    2.   Provide cables as indicated or as required for connections between system components.

    3.   Provide accessory racks/cabinets as indicated or as required for equipment mounting.

    4.   Security and communication system (Aiphone IX Series) accessories:

       a.   Security Lockbox: Model LB-SDVF.

         1)   Required for each door station.

         2)   Lock not included.

       b.   RY-IP44 – IP Input/Output Relay adapter.

         1)   For one (1) door.

         2)   Relay required only when door release to be wired to strike.

         3)   Four contact inputs for remote call function.

         4)   Four programmable relay outputs for door release. External signaling, etc., (N/O 30V DC, 500mA).

         5)   PS-1225UL - power supply.

PART 3 EXECUTION

3.01 EXAMINATION

  A.   Verification of Conditions: Verify that mounting surfaces are ready to receive system components. Verify that conditions are satisfactory for installation prior to starting work.

  B.   Notify Architect/Engineer of Record of conditions that would adversely affect installation or subsequent use.

  C.   Proceed only after unsatisfactory conditions have been corrected. Commencement of work in this section will be an indication of the acceptance of substrate conditions and the Contractor will be held responsible for the satisfactory execution and results of the finished work.

3.02 WIRING METHODS AND INSTALLATION OF PATHWAYS

  A.   Wiring Method: Install cables in dedicated raceways for Security and Communication Door Entry System cabling. Conceal raceway except in unfinished spaces.

    1.   Comply with requirements for raceways and boxes and their installation specified in Sections 26 05 33.13 - Conduit for Electrical Systems, 26 05 33.16 - Boxes for Electrical Systems, and 26 05 33.23 - Surface Raceways for Electrical Systems.

    2.   Comply with TIA-569-D for pull-box sizing and length of conduit and number of bends between pull points.

    3.   Utilize wide radius bends and elbows.

    4.   Provide all wiring in conduit, minimum ¾ inch.

  B.   Conduit shall not be exterior mounted on outside of building to door station. Exception: Approval from CPS Information Technology Services (ITS) Help Desk at (773) 553-3925.

  C.   Wiring within Enclosures: Bundle, lace, and train cables to terminal points without exceeding manufacturer's limitations on bending radii. Provide service loop per requirements of this Section. Provide and use lacing bars and distribution spools.

  D.   Wiring within MDF **[and IDFs]**: Bundle, lace, and train cables to terminal points without exceeding   manufacturer's limitations on bending radii. Provide service loop per requirements of this Section. Utilize overhead ladder rack runway for cable routing within room(s).

1. Coordinate with Division 27 contractor on installation of floor-mounted rack for security system equipment. Coordinate location adjacent to structured cabling floor-mounted racks.
2. Data switch shall be located in the MDF **[IDF]** room, top of security rack, 2U.
   a. Comply with requirements for ladder rack runway, cabinets, and racks specified in Section 27 11 16 - Communications Cabinets, Racks, and Enclosures. Drawings indicate general arrangement of pathways and fittings.

E. Comply with requirements for ladder rack runway, cabinets, and racks specified in Section 27 11 16 - Communications Cabinets, Racks, and Enclosures. Drawings indicate general arrangement of pathways and fittings.

F. Power Supply shall be within 33 feet of the master station.

G. Master station power supply wiring shall be in metal raceway.

3.03 INSTALLATION

A. Install all equipment and components in accordance with manufacturer's written instructions, in compliance with City of Chicago Building Code, City of Chicago Electrical Code, and with recognized industry practices, to ensure that all items comply with specifications and service intended purposes.

B. Record serial numbers of all items furnished that are serialized. Serial numbers to be included in warranty manual.

C. All items must be complete as specified prior to final acceptance. It will be the responsibility of the Contractor to ensure all cabling meets all specifications and standards defined herein.

D. Pulling Cable: Do not exceed manufacturer's recommended pulling tensions. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between indicated termination, tap, or junction points. Remove and discard cable where damaged during installation and replace it with new cable.

E. Terminations: Terminate UTP cables in MDF room at patch panels.

F. Labeling
   1. Identify system components, wiring, cabling, and terminals according to Section 26 05 53 - Identification for Electrical Systems.
   2. System: Use a unique 3-syllable alphanumeric designation for each cable, and label the cable and the jacks, connectors, and terminals to which it connects with the same designations. Use logical and systematic designations related to the architectural arrangements of the facility.
      a. First syllable is to identify and locate the wiring closet or equipment room where the cable originates.
      b. Second syllable is to identify and locate the cross-connect or patch panel field in which the cable terminates.
      c. Third syllable is to designate the type of media (copper or fiber) and the position occupied by the cable pairs or fibers in the field. Unit location.
   3. Outlets: Label cables within entry outlet boxes.
   4. Distribution Racks and Frames: Label each unit and field within that unit.
   5. Within Connectors Fields, in MDF Room: Label each connector and each discrete unit of cable-terminating and connecting hardware.
   6. Cables, Generally: Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

G. Cable Schedule: Post at a prominent location in each wiring closet and equipment room. List incoming and outgoing cables and their designations, origins, and destinations. Provide a diskette copy of final comprehensive schedules for the project in the software and format selected by the Board.

H. Install integrated security and communication system in accordance with manufacturer's instructions at locations indicated on the Drawings.

     I.   Mount equipment plumb, level, square, and secure.

     J.   Unless otherwise indicated, use CAT6e Cable.

         1.   CAT6e Cables:

              a.   Run cables from and homerun to one central location where data switch will be installed.

              b.   Maximum Cable Runs: Keep each cable run to a maximum of 330 feet from communication device to data switch.

              c.   Maintain twists of cable pairs to point of termination or no more than 0.5-inch untwisted.

              d.   Do not remove more than 1 inch of jacket when terminating cables.

              e.   Cable Bends:

                   1)   Make gradual bends of cable, where necessary.

                   2)   Do not make bends of cable sharper than 1-inch radius.

                   3)   Do not allow cable to be sharply bent or kinked at any time.

              f.   Cross-connect cables, where necessary, using CAT6e rated punch blocks and components.

              g.   Do not splice or bridge cables.

              h.   Cable Pulling:

                   1)   Pull cable with low to moderate force.

                   2)   Do not use oil or other lubricants not specifically designed for cable pulling.

              i.   Keep cables as far away from potential sources of EMI as possible.

              j.   Label Cable Termination Points: Use unique number for each cable segment.

              k.   Testing Cables: Test installed cable segments with cable tester.

              l.   Jacks: Install jacks to prevent dust and other contaminants from settling on contacts. Jacks are to be yellow in color.

              m.   Cable Slack:

                   1)   Leave extra slack on cables, neatly coiled-up in ceiling or nearest concealed place.

                   2)   Leave a minimum of 1 foot of cable slack at door station side and a minimum of 10 feet of cable slack at data switch side.

              n.   Do not install cables taught.

              o.   Grommets: Protect cables with grommets where passing through metal studs or other items that could damage cables.

              p.   Do not mix TIA/EIA 568A and 568B wiring on same installation. Use TIA/EIA 568B wiring throughout installation.

              q.   Staples:

                   1)   Do not use staples that crimp cables tightly.

                   2)   Do not use T-18 and T-25 cable staples.

              r.   Use firestop cables that penetrate firewalls.

              s.   Install pull wire in raceway to door station for future card reader.

         2.   Use suitable listed cables in wet locations, including underground raceways.

         3.   Use suitable listed cables for vertical riser applications.

         4.   Use listed plenum rated cables in spaces used for environmental air.

         5.   Use power transfer hinges complying with Section 08 71 00 for concealed connections to door hardware.

     K.   Provide grounding and bonding in accordance with Section 26 05 26 - Grounding and Bonding for Electrical Systems.

3.04 FIELD QUALITY CONTROL

     A.   Prepare and start system in accordance with manufacturer's instructions.

     B.   Program system parameters according to requirements of Board.

     C.   Inspect for physical damage and test cable for continuity and shorts. Test cable segments for faulty connectors, splices, terminations, and the integrity of the cable and its component parts.

D. Test for proper interface with other systems in accordance with manufacturer's instructions.

E. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.05 ADJUSTING

A. Make adjustments or corrections for operation of the system in accordance with manufacturer's instructions. Obtain final approval from Department of Safety & Security.

B. Follow the manufacturer's instructions to program the system in accordance with the Department of Safety & Security requirements and provide a copy of programming on CD-ROM disk in format required for downloading.

C. Re-adjust or replace system devices until all cameras are properly aimed and focused to meet Department of Safety & Security satisfaction. Personnel shall be available for adjustments for a period of thirty (30) consecutive days.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish. Repair damaged finish(es), including chips, scratches, and abrasions.

B. All equipment, hardware and finishes shall be cleaned prior to final acceptance. Unless otherwise indicated, clean shall mean free of dust, dirt, mud, debris, oil, grease, residues, and contamination.

C. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Preliminary Acceptance. Protect conduit and wireway openings against the entrance of foreign matter by means of plugs or caps. Cover fixtures, materials, equipment and devices furnished or installed under this Section or otherwise protect against damage, both before and after installation. Hardware, materials, equipment, or devices damaged prior to final acceptance of the work shall be restored to their original condition or replaced.

D. During the course of installation work, provide for on-going proper disposal of all debris, including but not limited to: equipment packaging and shipping materials, shipping pallets, empty cable reels/boxes, cable cuttings, etc. The Contractor shall, at all times, keep the site free from accumulations of waste material or rubbish caused by its employees or work. Remove all crates, cartons, and other waste materials or trash from the working areas at the end of each working day. Flammable waste material must be removed from the working areas at the time of generation. All rubbish and debris, combustible or not, shall be discarded in covered metal containers daily and removed from the premises at least weekly and legally disposed of.

3.07 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of equipment to Board's designated representatives and correct deficiencies or make adjustments as directed.

B. Demonstration: Demonstrate operation of system to Board's appointed personnel at final system inspection by qualified representative of manufacturer.

C. Training: Train Board's personnel on operation and maintenance of system.
   1. Provide instruction and training of the Board authorized appointed personnel as required for operation of system.
   2. Provide hands-on demonstration of operation of system components and complete system, including user-level program changes and functions.
   3. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   4. Provide minimum of four (4) hours of training.
   5. Instructor: Manufacturer's training personnel.
   6. Location: At project site.
   7. Aiphone Technical Support

> > a. Available from 6:00 AM to 4:30 PM, Monday thru Friday, Pacific Time at (800) 692-0200.
>
> 8. Video tape first training session and provide tape to designated representative.

3.08 PROTECTION

A. Protect installed system components from subsequent construction operations.

END OF SECTION 28 13 16