ADDENDUM NO. 01

March 10, 2025

Edwardsburg Public Schools - Intermediate and Primary School Renovation

Intermediate School
27157 US 12
Edwardsburg, MI 49112

Primary School
69100 Section Street
Edwardsburg, MI 49112

TO: ALL BIDDERS OF RECORD

This Addendum forms a part of and modifies the Bidding Requirements, Contract Forms, Contract Conditions, the Specifications and the Drawings dated February 10, 2025, by TowerPinkster. Acknowledge receipt of the Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of Pages ADD 1-1 through ADD 1-1 and attached TowerPinkster Addendum No. 01 Intermediate School consisting of 130 pages, and TowerPinkster Addendum No. 01 Primary School consisting of 128 pages.

TowerPinkster
Architecture · Engineering · Interiors

ADDENDUM NO. 1

DATE OF ISSUANCE:	**March 7, 2025**
PROJECT:	**Edwardsburg Intermediate School - Renovation** **69410 Section St** **Edwardsburg, MI 49112**
OWNER:	**Edwardsburg Public Schools**

ARCHITECT'S PROJECT NO.: 21-201.030

ORIGINAL BID ISSUE DATE: January 27, 2025

SCOPE OF WORK

This Addendum includes changes to, or clarifications of, the original Bidding Documents and any previously issued addenda, and shall be included in the Bid. All of these Addendum items form a part of the Contract Documents. The Bidder shall acknowledge receipt of this Addendum in the appropriate space provided on the Bid Form. Failure to do so may result in disqualification of the Bid.

DOCUMENTS INCLUDED IN THIS ADDENDUM

This Addendum includes **2** pages of text and the following documents:

- Bidding Documents: **None**
- Contract Conditions: **None**
- Specification Sections: **087000, 27 0500, 27 0528, 27 0553, 27 1513, 27 1700, 28 1300, 28 1400, 28 1500, 28 1523, 28 2000**
  Drawings: **AD 102, A 102**

CHANGES TO PREVIOUSLY ISSUED ADDENDA

None.

CHANGES TO SPECIFICATIONS

ADD-1 Item No. S-1 - Door Hardware

Refer to Specification Section: 08 7000

ADD-1 Item No. S-2 - Technology Specifications

Refer to Specification Section: 27 0500, 27 0528, 27 0553, 27 1513, 27 1700, 28 1300, 28 1400, 28 1500, 28 1523, 28 2000

Adding technology specifications.

CHANGES TO DRAWINGS

ADD-1 Item No. D-1 - Roof updates

Refer to Sheet(s): AD 102

Added keynote 4 to apply to two of the canopies

ADD-1 Item No. D-2 - Roof updates

Refer to Sheet(s): A 102

Modified roof canopy detail 1/A102. Added tapered insulation to two of the canopies. Modified roof detail 2/A102.

END OF ADDENDUM.

SECTION 08 7100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware.
2. Electronic access control system components.
3. Field verification, preparation and modification of existing doors and frames to receive new door hardware.

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 “General Requirements” sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
2. Division 06 Section “Rough Carpentry”
3. Division 06 Section "Finish Carpentry”
4. Division 07 Section “Joint Sealants” for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
   a. “Metal Doors and Frames”
   b. “Flush Wood Doors”
   c. “Stile and Rail Wood Doors”
   d. “Interior Aluminum Doors and Frames”
   e. "Aluminum-Framed Entrances and Storefronts"
6. Division 09 sections for touchup, finishing or refinishing of existing openings modified by this section.
7. Division 26 “Electrical” sections for connections to electrical power system and for low-voltage wiring.
8. Division 28 “Electronic Safety and Security” sections for coordination with other components of electronic access control system and fire alarm system.

1.2 REFERENCES

A. UL, LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies

3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.3 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
   a. Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.
   b. Review drawings and Sections from related trades to verify compatibility with specified hardware.
   c. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
   a. Wiring Diagrams: For power, signal, and control wiring and including:
      1) Details of interface of electrified door hardware and building safety and security systems.

2) Schematic diagram of systems that interface with electrified door hardware.
3) Point-to-point wiring.
4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
   a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:
   a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
   b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
   c. Indicate complete designations of each item required for each opening, include:
      1) Door Index: door number, heading number, and Architect's hardware set number.
      2) Quantity, type, style, function, size, and finish of each hardware item.
      3) Name and manufacturer of each item.
      4) Fastenings and other pertinent information.
      5) Location of each hardware set cross-referenced to indications on Drawings.
      6) Explanation of all abbreviations, symbols, and codes contained in schedule.
      7) Mounting locations for hardware.
      8) Door and frame sizes and materials.
      9) Degree of door swing and handing.
      10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:
   a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
   b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
   c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
   d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
   e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
   f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.

2. Provide Product Data:
   a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
   b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
   a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
   b. Catalog pages for each product.
   c. Final approved hardware schedule edited to reflect conditions as installed.
   d. Final keying schedule
   e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
   f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
   a. fire door assemblies, in compliance with NFPA 80.
   b. required egress door assemblies, in compliance with NFPA 101.

1.4 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
   a. For door hardware: DHI certified AHC or DHC.
   b. Can provide installation and technical data to Architect and other related subcontractors.
   c. Can inspect and verify components are in working order upon completion of installation.
   d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.

4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
   a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
   b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:
   a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
   b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware
   a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:
   a. Comply with governing accessibility regulations cited in “REFERENCES” article 08 7100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
   a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      2) Preliminary key system schematic diagram.
      3) Requirements for key control system.
      4) Requirements for access control.
      5) Address for delivery of keys.

2. Pre-installation Conference
   a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   b. Inspect and discuss preparatory work performed by other trades.
   c. Inspect and discuss electrical roughing-in for electrified door hardware.
   d. Review sequence of operation for each type of electrified door hardware.
   e. Review required testing, inspecting, and certifying procedures.
   f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:

a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

D. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.

E. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.

F. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

G. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

H. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

I. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.5 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation.

1.6 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.

1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.

a. Mechanical Warranty
    1) Locks
        a) Schlage L Series: 10 years
    2) Exit Devices
        a) Von Duprin: 10 years
    3) Closers
        a) LCN 4000 Series: 30 years
    4) Automatic Operators
        a) LCN: 2 years
b. Electrical Warranty
    1) Exit Devices
        a) Von Duprin: 3 years

1.7 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: “No Substitute.”

1. Where “No Substitute” is noted, submittals and substitution requests for other products will not be considered.

B. Approval of alternate manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category are only to be considered by official substitution request in accordance in section 01 2500.

C. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.

D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.

1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
2. Use materials which match materials of adjacent modified areas.
3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.

C. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

D. Cable and Connectors:

1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.3 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

   a. Ives 5BB series

2. Acceptable Manufacturers and Products:
   a. McKinney TB series
   b. Best FBB series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.

2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch thick doors, up to and including 36 inches wide:
   a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches high
   b. Interior: Standard weight, steel, 4-1/2 inches high

4. 1-3/4 inch thick doors over 36 inches wide:
   a. Exterior: Heavy weight, bronze/stainless steel, 5 inches high
   b. Interior: Heavy weight, steel, 5 inches high

5. 2 inches or thicker doors:
   a. Exterior: Heavy weight, bronze or stainless steel, 5 inches high
   b. Interior: Heavy weight, steel, 5 inches high

6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches or less in height, and one additional hinge for each 30 inches of additional door height.
8. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
9. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   a. Steel Hinges: Steel pins
   b. Non-Ferrous Hinges: Stainless steel pins
   c. Out-Swinging Exterior Doors: Non-removable pins
   d. Out-Swinging Interior Lockable Doors: Non-removable pins
   e. Interior Non-lockable Doors: Non-rising pins

2.4 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:

   a. Ives

2. Acceptable Manufacturers:
   a. Select
   b. Pemko

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.

6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.5 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Von Duprin EPT-10

2. Acceptable Manufacturers and Products:
   a. Securitron CEPT-10
   b. Precision EPT-12C

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.6 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch steel or brass rods at doors up to 90 inches in height. For doors over 90 inches in height increase top rods by 6 inches for each additional 6 inches of door height. Provide dust-proof strikes at each bottom flush bolt.

2.7 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.8 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage L9000 series

2. Acceptable Manufacturers and Products:
   a. Sargent 8200 series
   b. Best 45H series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-3/5-inch x 3/5 inch with 180-degree visibility. Provide messages color-coded using ANSI Z535 Safety Red with full text and/or symbols, as scheduled, for easy visibility. When applicable allows for lock status indication on both sides of the door.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to “KEYING” article, herein.
5. Provide locks with standard 2-3/4 inches backset with full 3/4 inch throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
   a. Lever Design: As indicated in sets.

2.9 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
a. Von Duprin 98/35A series

2. Acceptable Manufacturers and Products:
a. Precision APEX 2000 series
b. Sargent 19-43-GL-80 series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer’s approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches x 3 inches steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.10 ELECTRIC STRIKES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
a. Von Duprin 6000 series

2. Acceptable Manufacturers and Products:
a. HES 1006 series

B. Requirements:

1. Provide electric strikes designed for use with type of locks shown at each opening.
2. Provide electric strikes UL Listed as burglary resistant that are tested to a minimum endurance test of 1,000,000 cycles.
3. Where required, provide electric strikes UL Listed for fire doors and frames.
4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.11 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Ilco Kaba Peaks Plus

2. Acceptable Manufacturers and Products:

   a. No Substitute

B. Requirements:

1. Provide interchangeable cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

2.12 KEYING

A. Scheduled System:

1. Existing factory registered system:
   a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:
   a. Replaceable Construction Cores.
      1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
         a) 3 construction control keys
         b) 12 construction change (day) keys.
      2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2. Permanent Keying:
   a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
      1) Master Keying system as directed by the Owner.

b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
c. Provide keys with the following features:
    1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
    2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
d. Identification:
    1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
    2) Identification stamping provisions must be approved by the Architect and Owner.
    3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
    4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
    5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
e. Quantity: Furnish in the following quantities.
    1) Change (Day) Keys: 3 per cylinder/core that is keyed differently.
    2) Permanent Control Keys: 3.
    3) Master Keys: 6.
    4) Key Blanks: quantity as determined in the keying meeting.

2.13 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
    a. LCN 4010/4110 series

2. Acceptable Manufacturers and Products:
    a. Sargent 281 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch diameter with 11/16-inch diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.

7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
11. **Through-bolt all wood door closers.**

1.01 ELECTRO-HYDRAULIC AUTOMATIC OPERATORS

C. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

a. LCN 4600 series

2. Acceptable Manufacturers and Products:

b. Norton 6000 series

c. Besam Power Swing

D. Requirements:

1. Provide low energy automatic operator units with hydraulic closer complying with ANSI/BHMA A156.19.
2. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
3. Provide units with conventional door closer opening and closing forces unless power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
5. Provide drop plates, brackets, and adapters for arms as required for details.
6. Provide hard-wired actuator switches and receivers for operation as specified.
7. Provide weather-resistant actuators at exterior applications.
8. Provide key switches with LED's, recommended and approved by manufacturer of automatic operator as required for function described in operation description of hardware group below. Cylinders: Refer to "KEYING" article, herein.
9. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.

10. Provide units with vestibule inputs that allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

1.02 DOOR TRIM

E. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood

F. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.14 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.15 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
   a. Glynn-Johnson

2. Acceptable Manufacturers:
   a. Rixson

b. ABH

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.16 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide overhead stops.

2.17 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Zero International

2. Acceptable Manufacturers:
   a. National Guard
   b. Reese

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch high by 5 inches wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.18 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.19 FINISHES

A. Finish: Generally, Satin Chromium, BHMA 626/652 (US26D). Provide finish for each item as indicated in sets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.

C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

D. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Where on-site modification of doors and frames is required:

1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.

2. Field modify and prepare existing doors and frames for new hardware being installed.
3. When modifications are exposed to view, use concealed fasteners, when possible.
4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
   a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
   b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
   c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.3 INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.
3. Furnish permanent cores to Owner for installation.

J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect's opening number.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

L. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.

M. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

N. Overhead Stops/Holders: Mount overhead stopes/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

P. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

Q. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

R. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
2. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

Primary School

Hardware Group No. 01

For use on Door #(s):
A146A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050L 06A 09-544	626	SCH
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER	626	KAB
1	EA	OH STOP	100S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

NOTES:
1) MATCH EXISTING LEVER STYLE OF SCHOOL. LEVER STYLE 06A SPECIFIED AS BASIS OF DESIGN.

Hardware Group No. 02

For use on Door #(s):
A147

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070L 06A	626	SCH
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER	626	KAB
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

NOTES:
1) MATCH EXISTING LEVER STYLE OF SCHOOL. LEVER STYLE 06A SPECIFIED AS BASIS OF DESIGN.

Hardware Group No. 03

For use on Door #(s):
A144A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD		315AN	IVE
1	EA	STOREROOM LOCK	L9080L 06A		626	SCH
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6211AL FSE CON	✓	630	VON
1	EA	OH STOP	100S		BLK	GLY
1	EA	SURF. AUTO OPERATOR	4642	✓	693	LCN
2	EA	ACTUATOR, JAMB MOUNT	8310-818T	✓	630	LCN
2	EA	SURFACE MOUNT BOX	8310-819S			LCN
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY	✓		SCH
1	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
1	EA	INTERCOM SYSTEM	PROVIDED BY SECURITY CONTRACTOR	✓		
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER RATED SEALS BY DOOR/FRAME MANUFACTURER	✓		VON

NOTES:
1) MATCH EXISTING LEVER STYLE OF SCHOOL. LEVER STYLE 06A SPECIFIED AS BASIS OF DESIGN.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO THE READER OR PRESSING INTERCOM DOOR RELEASE BUTTON WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE (ALLOWING ACCESS) AND ACTIVATE EXTERIOR AUTO OPERATOR ACTUATOR. PUSHING EXTERIOR AUTO OPERATOR ACTUATOR AT THIS TIME WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE DOOR. PUSH INTERIOR ACTUATOR AT ANY TIME WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE AND SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE DOOR.

DOOR TO REMAIN LOCKED WITH LOSS OF POWER OR ACTIVATION OF THE FIRE ALARM. FREE EGRESS AT ALL TIMES.

Hardware Group No. 04

For use on Door #(s):
A144B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	INSTITUTION LOCK	L9082L 06A		626	SCH
2	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6211 FSE CON	✓	630	VON
1	EA	SURFACE CLOSER	4011		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488S		BK	ZER
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY	✓		SCH
2	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
1	EA	PUSH-TO-ENTER BUTTON	PROVIDED BY SECURITY CONTRACTOR	✓	630	SCE
1	EA	DOOR RELEASE BUTTON	PROVIDED BY SECURITY CONTRACTOR	✓	628	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	✓		VON

NOTES:
1) MATCH EXISTING LEVER STYLE OF SCHOOL. LEVER STYLE 06A SPECIFIED AS BASIS OF DESIGN.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

UNLOCKED HOURS: DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM AND PUSH-TO-ENTER BUTTON ON SCHOOL CORRIDOR SIDE SHALL BE ENABLED BY ACCESS CONTROL SYSTEM. PRESSING PUSH-TO-ENTER BUTTON ON SCHOOL CORRIDOR SIDE WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS FROM SCHOOL CORRIDOR INTO OFFICE. OFFICE SIDE ALWAYS LOCKED PREVENTING FREE PASSAGE FROM OFFICE INTO THE SCHOOL. PRESENTING A VALID CREDENTIAL TO THE READER ON SCHOOL OFFICE SIDE, OR PRESSING DOOR RELEASE BUTTON LOCATED AT RECEPTION DESK, WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS FROM OFFICE INTO SCHOOL.

LOCKED HOURS: DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM AND PUSH-TO-ENTER BUTTON ON SCHOOL CORRIDOR SIDE SHALL BE DISABLED BY ACCESS CONTROL SYSTEM, THUS LOCKED IN BOTH DIRECTIONS. PRESENTING A VALID CREDENTIAL TO THE READER ON EITHER SIDE OR PRESSING DOOR RELEASE BUTTON LOCATED AT RECEPTION DESK, WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS.

DOOR TO REMAIN LOCKED WITH LOSS OF POWER, ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS), OR ACTIVATION OF THE FIRE ALARM.

Hardware Group No. 05

For use on Door #(s):
A145

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	INSTITUTION LOCK	L9082L 06A		626	SCH
2	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6211 FSE CON	↯	630	VON
1	EA	SURFACE CLOSER	4011		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488S		BK	ZER
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY	↯		SCH
2	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	↯	BLK	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	↯		VON

NOTES:
1) MATCH EXISTING LEVER STYLE OF SCHOOL. LEVER STYLE 06A SPECIFIED AS BASIS OF DESIGN.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO EITHER READER WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS. DOOR TO REMAIN LOCKED UPON LOSS OF POWER OR ACTIVATION OF THE FIRE ALARM.

Hardware Group No. 06

For use on Door #(s):
A146B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	INSTITUTION LOCK	L9082L 06A		626	SCH
2	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6211 FSE CON	↯	630	VON
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4011 ST-1544		689	LCN
1	EA	MOUNTING PLATE	4020-18		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488S		BK	ZER
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY	↯		SCH
2	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	↯	BLK	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	↯		VON

NOTES:
1) MATCH EXISTING LEVER STYLE OF SCHOOL. LEVER STYLE 06A SPECIFIED AS BASIS OF DESIGN.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO EITHER READER WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS. DOOR TO REMAIN LOCKED UPON LOSS OF POWER OR ACTIVATION OF THE FIRE ALARM.

Hardware Group No. 07

For use on Door #(s):
A143A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112HD EPT		315AN	IVE
2	EA	POWER TRANSFER	EPT10 CON	✓	622	VON
1	EA	REMOVABLE MULLION	KR4954 STAB		693	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-98-EO-CON	✓	626	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-98-NL-OP-110MD-CON - RHRA	✓	626	VON
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	IC RIM CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
2	EA	90 DEG OFFSET PULL	8190EZHD 12" O		630-316	IVE
2	EA	OH STOP	100S		BLK	GLY
1	EA	SURFACE CLOSER	4111 EDA		693	LCN
1	EA	SURF. AUTO OPERATOR	4642 - RHRA	✓	693	LCN
1	EA	BLADE STOP SPACER	4110-61		693	LCN
1	EA	WEATHER RING	8310-801			LCN
1	EA	ACTUATOR, JAMB MOUNT	8310-818T	✓	630	LCN
1	EA	SURFACE MOUNT BOX	8310-819S			LCN
1	EA	ACTUATOR, WALL MOUNT	8310-853T	✓	630	LCN
1	EA	SURFACE MOUNT BOX	8310-867S			LCN
1	EA	MULLION SEAL	8780N		BK	ZER
2	EA	DOOR SWEEP	8192BK		BK	ZER
1	EA	THRESHOLD	655A		A	ZER
2	EA	WIRE HARNESS	CON-XX/XXP (AS REQ'D) - ELECTRIFIED HARDWARE TO POWER TRANSFER (EVALUATE CONDITIONS AND MODIFY WIRE LENGTH AS REQ'D)	✓		SCH
2	EA	WIRE HARNESS	CON-192P	✓		SCH
1	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
2	EA	DOOR CONTACT	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	✓		VON
			WEATHERSTRIP BY DOOR/FRAME MANUFACTURER			

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

UNLOCKED HOURS: DOORS ELECTRONICALLY DOGGED DOWN VIA ACCESS CONTROL SYSTEM, THUS IN PUSH/PULL MODE. PUSHING EITHER AUTO OPERATOR ACTUATOR WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE ONE LEAF.

DOORS NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO THE READER WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH (ALLOWING ACCESS) AND ACTIVATE EXTERIOR AUTO OPERATOR ACTUATOR. PUSHING EXTERIOR AUTO OPERATOR ACTUATOR AT THIS TIME WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN ONE LEAF. PUSH INTERIOR ACTUATOR AT ANY TIME WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH AND SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN ONE LEAF.

THE REQUEST TO EXIT FEATURE (RX) OF THE DEVICES TO SHUNT THE ALARM OUTPUT OF THE DOOR CONTACTS DURING VALID EGRESS. DOOR CONTACTS MONITOR WHETHER THE DOORS ARE OPENED, CLOSED OR HELD OPEN TOO LONG. DOORS TO REMAIN LOCKED WITH LOSS OF POWER OR ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS). FREE EGRESS AT ALL TIMES.

Intermediate School

Hardware Group No. 01

For use on Door #(s):
B123B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	L9010 03A	626	SCH
2	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 02

For use on Door #(s):
B128

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CORRIDOR LOCK W/OUTSIDE INDICATOR	L9456L 03A 09-544 OS-OCC	626	SCH
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER	626	KAB
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488S	BK	ZER

Hardware Group No. 03

For use on Door #(s):
B127

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070L 03A	626	SCH
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER	626	KAB
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 04

For use on Door #(s):
B121A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	INSTITUTION LOCK	L9082L 03A	626	SCH
2	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER	626	KAB
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

NOTES:
1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING FRAME PREPARATIONS.

Hardware Group No. 05

For use on Door #(s):
B123A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD		315AN	IVE
1	EA	STOREROOM LOCK	L9080L 03A		626	SCH
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6211AL FSE CON	↯	630	VON
1	EA	OH STOP	100S		BLK	GLY
1	EA	SURF. AUTO OPERATOR	4642	↯	693	LCN
2	EA	ACTUATOR, JAMB MOUNT	8310-818T	↯	630	LCN
2	EA	SURFACE MOUNT BOX	8310-819S			LCN
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY	↯		SCH
1	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	↯	BLK	SCE
1	EA	INTERCOM SYSTEM	PROVIDED BY SECURITY CONTRACTOR	↯		
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	↯		VON
			WEATHERSTRIP BY DOOR/FRAME MANUFACTURER			

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO THE READER OR PRESSING INTERCOM DOOR RELEASE BUTTON WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE (ALLOWING ACCESS) AND ACTIVATE EXTERIOR AUTO OPERATOR ACTUATOR. PUSHING EXTERIOR AUTO OPERATOR ACTUATOR AT THIS TIME WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE DOOR. PUSH INTERIOR ACTUATOR AT ANY TIME WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE AND SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE DOOR.

DOOR TO REMAIN LOCKED WITH LOSS OF POWER. FREE EGRESS AT ALL TIMES.

Hardware Group No. 06

For use on Door #(s):
B123C

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	POWER TRANSFER	EPT10 CON	✓	689	VON
1	EA	CONST LATCHING BOLT	FB51P		630	IVE
1	EA	DUST PROOF STRIKE	DP2		626	IVE
1	EA	INSTITUTION LOCK	L9082L 03A		626	SCH
2	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6223 FSE CON	✓	630	VON
1	EA	COORDINATOR	COR X FL		628	IVE
2	EA	MOUNTING BRACKET	MB (AS REQ'D)		689	IVE
2	EA	SURFACE CLOSER	4111 SCUSH		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	SILENCER	SR64		GRY	IVE
1	EA	WIRE HARNESS	CON-XX/XXP (AS REQ'D) - ELECTRIFIED HARDWARE TO POWER TRANSFER (EVALUATE CONDITIONS AND MODIFY WIRE LENGTH AS REQ'D)	✓		SCH
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM POWER TRANSFER TO POWER SUPPLY	✓		SCH
2	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
1	EA	PUSH-TO-ENTER BUTTON	PROVIDED BY SECURITY CONTRACTOR	✓	630	SCE
1	EA	DOOR RELEASE BUTTON	PROVIDED BY SECURITY CONTRACTOR	✓	628	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	✓		VON

NOTES:
1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING FRAME PREPARATIONS.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

UNLOCKED HOURS: DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM AND PUSH-TO-ENTER BUTTON ON SCHOOL CORRIDOR SIDE SHALL BE ENABLED BY ACCESS CONTROL SYSTEM. PRESSING PUSH-TO-ENTER BUTTON ON SCHOOL CORRIDOR SIDE WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS FROM SCHOOL CORRIDOR INTO OFFICE. OFFICE SIDE ALWAYS LOCKED PREVENTING FREE PASSAGE FROM OFFICE INTO THE SCHOOL. PRESENTING A VALID CREDENTIAL TO THE READER ON SCHOOL OFFICE SIDE, OR PRESSING DOOR RELEASE BUTTON LOCATED AT RECEPTION DESK, WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS FROM OFFICE INTO SCHOOL.

LOCKED HOURS: DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM AND PUSH-TO-ENTER BUTTON ON SCHOOL CORRIDOR SIDE SHALL BE DISABLED BY ACCESS CONTROL SYSTEM, THUS LOCKED IN BOTH DIRECTIONS. PRESENTING A VALID CREDENTIAL TO THE READER ON EITHER SIDE OR PRESSING DOOR RELEASE BUTTON LOCATED AT RECEPTION DESK, WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS.

DOOR TO REMAIN LOCKED WITH LOSS OF POWER OR ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS).

Hardware Group No. 07

For use on Door #(s):
B124A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	INSTITUTION LOCK	L9082L 03A		626	SCH
2	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6211 FSE CON	↯	630	VON
1	EA	SURFACE CLOSER	4111 SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
3	EA	SILENCER	SR64		GRY	IVE
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY	↯		SCH
2	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	↯	BLK	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	↯		VON

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO EITHER READER WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS. DOOR TO REMAIN LOCKED UPON LOSS OF POWER.

Hardware Group No. 08

For use on Door #(s):
B129A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112HD EPT		315AN	IVE
2	EA	POWER TRANSFER	EPT10 CON	✓	622	VON
1	EA	REMOVABLE MULLION	KR4954 STAB		693	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-98-EO-CON	✓	626	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-98-NL-OP-110MD-CON - RHRA	✓	626	VON
1	EA	IC RIM CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
2	EA	90 DEG OFFSET PULL	8190EZHD 12" O		630-316	IVE
2	EA	OH STOP	100S		BLK	GLY
1	EA	SURFACE CLOSER	4111 EDA		693	LCN
1	EA	SURF. AUTO OPERATOR	4642 - RHRA	✓	693	LCN
1	EA	BLADE STOP SPACER	4110-61		693	LCN
1	EA	WEATHER RING	8310-801			LCN
1	EA	ACTUATOR, JAMB MOUNT	8310-818T	✓	630	LCN
1	EA	SURFACE MOUNT BOX	8310-819S			LCN
1	EA	ACTUATOR, WALL MOUNT	8310-853T	✓	630	LCN
1	EA	SURFACE MOUNT BOX	8310-867S			LCN
1	EA	MULLION SEAL	8780N		BK	ZER
2	EA	DOOR SWEEP	8192BK		BK	ZER
1	EA	THRESHOLD	655A		A	ZER
2	EA	WIRE HARNESS	CON-XX/XXP (AS REQ'D) - ELECTRIFIED HARDWARE TO POWER TRANSFER (EVALUATE CONDITIONS AND MODIFY WIRE LENGTH AS REQ'D)	✓		SCH
2	EA	WIRE HARNESS	CON-192P	✓		SCH
1	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
2	EA	DOOR CONTACT	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	✓		VON
			WEATHERSTRIP BY DOOR/FRAME MANUFACTURER			

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

DOORS NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO THE READER WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH (ALLOWING ACCESS) AND ACTIVATE EXTERIOR AUTO OPERATOR ACTUATOR. PUSHING EXTERIOR AUTO OPERATOR ACTUATOR AT THIS TIME WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN ONE LEAF. PUSH INTERIOR ACTUATOR AT ANY TIME WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH AND SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN ONE LEAF.

THE REQUEST TO EXIT FEATURE (RX) OF THE DEVICES TO SHUNT THE ALARM OUTPUT OF THE DOOR CONTACTS DURING VALID EGRESS. DOOR CONTACTS MONITOR WHETHER THE DOORS ARE OPENED, CLOSED OR HELD OPEN TOO LONG. DOORS TO REMAIN LOCKED WITH LOSS OF POWER OR ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS). FREE EGRESS AT ALL TIMES.

END OF SECTION 08 7100

SECTION 27 0500 – COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 Documents

A. This section of the of the specification is part of the contract documents and is to be read, interpreted and coordinated with all other parts.

1.2 Summary

A. Section Includes:

1. Overview
2. Abbreviations
3. Contractor Qualifications
4. Standards and Guidelines
5. Quality Assurance
6. Permits and Inspections
7. Low Voltage Cable Bundling

1.3 Overview

A. This document must be read, interpreted and coordinated with all other related specifications to deliver a complete Telecommunications infrastructure system.

B. This specification prescribes mandatory requirements for the Telecommunications infrastructure system.

C. A structured approach is specified which will ensure a flexible distribution system that will minimize the future costs of moves, additions and changes.

D. The Contractor will supply, furnish, and install all material, labor, tools, equipment and services required for construction and put into regular operation the complete Telecommunications system as shown on the Telecommunications drawings, described in the specifications, and any attached appendices.

E. Any and all proposed changes to this specification shall be subject to approval in writing to the Architect prior to implementation.

1.4 Abbreviations

A. 8P8C: 8-position, 8-contact

B. ANSI: American National Standards Institute

C. ASTM: American Society for Testing and Materials

D. 10Gig: 10-Gig Active Ethernet

E. 10GPON: 10-Gigabit Symmetrical Passive Optical Network

F. A/V: Audio Visual

G. AC: Alternating Current

H. AHJ: Authority Having Jurisdiction

I. APC: Angled Physical Contact

J. BICSI: Building Industry Consulting Service International.

K. Coated RMC: PVC Coated Rigid Metallic Conduit

L. DC: Direct Current

M. EF: Entrance Facility

N. EIA: Electronic Industries Alliance

O. EMI: Electromagnetic Interference

P. EMT: Electrical Metallic Tubing

Q. ENT: Electrical Non-metallic Tubing

R. ER: Equipment Room

S. GRC: Galvanized rigid steel conduit

T. IDF: Intermediate Distribution Frame

U. IP: Internet Protocol

V. IMC: Intermediate metal conduit

W. LAN: Local Area Network

X. MDF: Main Distribution Frame

Y. MPTL: Modular Plug Terminated Link

Z. NTP: Network Time Protocol

AA. OSP: Outside Plant Wiring

BB. PDU: Power Distribution Unit

CC. PoE: Power over Ethernet

DD. RCDD: Registered Communications Distribution Designer (BICSI)

EE. RGS: Rigid Galvanized Steel

FF. RU: Rack Unit

GG. SFP: Small Form Pluggable

HH. SMF: Single Mode Fiber

II. STP: Shielded Twisted Pair

JJ. TDMM: Telecommunications Distribution Methods Manual (BICSI)

KK. TECH: Technician (BICSI Certified)

LL. TI: Technology Integrator

MM. TIA: Telecommunications Industry Association

NN. TR: Telecommunications Room

OO. UL: Listed by Underwriters Laboratories (United States)

PP. UPC: Ultra Physical Contact

QQ. UPS: Uninterruptable Power Supply

RR. UTP: Unshielded Twisted Pairs

SS. WAO: Work Area Outlet

TT. WAP: Wireless Access Point

1.5 Contractor Qualifications

A. The Contractor will have experience in the installation and testing of similar systems as specified herein and will have completed at least two projects of similar size and scope within the last 24 months. The contractor will provide references upon request (including the project name, address, date of implementation, client name, title, telephone number and project description).

B. All members of the installation team must be certified by the Manufacturer as having completed the necessary training to complete their part of the installation. All personnel will be adequately trained in the use of such tools and equipment as required.

C. The Contractor must be certified to install a certified fire-stop system.

D. The Contractor will own and maintain tools, installation equipment, and test equipment necessary for successful installation and testing of optical and Category 6 and 6a premise distribution systems.

E. The Contractor must maintain a state Contractor's license as required by the state.

F. The Contractor installing the structured cabling shall have a Registered Communication Distribution Designer (RCDD) as a Project Superintendent.

G. The Contractor's lead installer shall have a current BICSI TECH certification and shall be onsite for the duration of the project.

1.6 Standards and Guidelines

A. The following organizations publish telecommunications construction standards with provisions that, through reference in this text, constitute provisions of this Document. At the time of publication of this Document, the editions of the standards published by the organizations indicated were valid. Installers of telecommunications and networking services for this project must adhere to the telecommunication standards published by these organizations, all standards are subject to revision; parties to agreements based on this Document shall apply the most recent editions of the standards published by the organizations indicated.

1. Federal Communications Commission (FCC)
2. Institute of Electrical and Electronics Engineers, Inc (IEEE)
3. National Fire Protection Association (NFPA)
4. National Electrical Safety Code (NESC)
5. American National Standards Institute (ANSI)
6. Telecommunications Industry Association (TIA)
7. Electronic Industries Alliance (EIA)
8. Building Industry Consulting Service International (BICSI)

B. Applicable Standards and Guidelines

1. The following list of methods and standards included are considered part of this specification. This is a list of primary references and does not limit the applicability of other standards that are incorporated into the work described in these specifications. They incorporate generally accepted communications infrastructure practices described in Standards documents (and addenda) published by recognized standards bodies and organizations. These include standards published by the Telecommunications Industry Association/Electronics Industries Alliance (TIA/EIA) and Building Industry Consultant Services International (BICSI).
   a. ANSI/TIA/ EIA 568B, Commercial Building Telecommunications Cabling Standard This prescribes the requirements for Intrabuilding copper and optical fiber cable performance, installation and testing
   b. ANSI/TIA/EIA 569B, Telecommunication Standard for Pathways and Spaces. This standard includes specifications for the design and construction of pathways and spaces within buildings required to support information technology equipment and cable media.
   c. ANSI/TIA/EIA 607, Commercial Building Grounding and Bonding Requirement. This document includes the components of an effective grounding system for communication systems within public and commercial buildings.
   d. ANSI/TIA/EIA 758, BICSI Customer Owned Outside Plant Telecommunications Cabling
   e. Standard. This standard provides specifications for Interbuilding communication facilities that
   f. include cable media, pathways and spaces.
   g. ANSI/TIA/EIA 862, Building Automation Systems Cabling Standard for Commercial Buildings. This standard describes the generic cable system for building automation systems (BAS) that are intended to support a multi-product, multi-vendor automation environment within public and commercial buildings.

h. Building Industry Consulting Services International (BICSI) Telecommunications Distribution Methods Manual, 14th Edition. This is a manual of proven design guidelines and methods accepted by the telecommunications industry.

i. ANSI/NFPA 70, National Electrical Code, (NEC) Current Edition. In addition to standards related to electrical safety, the NEC has several sections that specifically address low voltage cable installation.

1.7 Quality Assurance

A. The latest National Electrical Code shall be observed and shall govern the character of work, style, quantity and the size of all material used.

B. All materials shall conform with the standards of the Underwriter's Laboratories in every case where such standards have been established for the particular type of material in question.

C. All material and equipment shall be UL listed and bear the UL label where such listing and labeling exists.

D. The complete electrical installation shall comply with all the requirements of the MI.O.S.H.A.

E. Codes shall be used as minimum requirements, and where the Specifications or Plans call for an installation that exceeds and does not violate the Code requirements, the Specifications and Plans shall be followed.

1.8 Permits and Inspections

A. The Contractor shall obtain and pay for all permits required by the State of Michigan Labor Department, Electrical Division.

B. The Contractor shall submit, to precede request for final payment, a copy of the Certificate of Inspection as required by the State of Michigan.

1.9 Low Voltage Cable Bundling

A. Cable Ties

1. Cable ties shall not be allowed for the final bundling of data, security and audio/video cables.
   a. Cable ties can be used on a temporary basis during cable installation.
   b. All cable ties shall be removed after temporary use.
   c. All temporary zip ties shall be plenum rated, where required.

B. Hook and Loop

1. Hook & Loop (also known as Velcro) shall be used in final data, security and audio/video cable installations.
   a. All low voltage cables shall be bundled neatly using hook & loop.
   b. Hook & Loop shall be black except in exposed areas or otherwise noted in drawings and/or specifications.
   c. The Hook & Loop color in exposed areas shall be approved by Architect prior to installation.
   d. All Hook & Loop shall be a minimum of ¾" in width.
   e. All Hook & Loop shall be plenum rated, where required.

END OF SECTION 27 0500

SECTION 27 0528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Work covered by this Section shall consist of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the installation of pathways as described on the Drawings and/or required by these specifications.

B. Section Includes:

1. Non-Continuous Cable Supports.
2. Hook & Loop (Velcro)

C. Related Requirements:

1. Division 26 Section "Raceways and Boxes for Electrical Systems" for conduits, wireways, surface raceways, boxes, enclosures, cabinets, handholes, and faceplate adapters serving electrical systems.
2. Division 28 Section "Pathways for Electronic Safety and Security" for conduits, surface pathways, innerduct, boxes, and faceplate adapters serving electronic safety and security.

1.2 ACTION SUBMITTALS

A. Non-Continuous Cable Supports

B. Hook & Loop (Velcro)

1. Refer to specification 27 500 COMMON WORK RESULTS FOR COMMUNICATIONS.

1.3 INFORMATIONAL SUBMITTALS

A. Installer Credentials:

1. BICSI TECH certification is required for the lead installer that will be onsite at all times.
2. Valid certificates shall be provided to TowerPinkster prior to project kick-off.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1. As-built Drawings.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer shall have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings, cabling administration Drawings, and field-testing program development by a BICSI TECH.
2. Installation Supervision: Installation shall be under the direct supervision of a BICSI TECH, who shall be present at all times when Work of this Section is performed at Project site.

PART 2 - PRODUCTS

2.1 NON-CONTINUOUS CABLE SUPPORTS

A. General Requirements for non-continuous cable supports:

1. Shall be UL Listed
2. Shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables per ANSI/TIA 568.0-D
3. Shall have flared edges to prevent damage while installing cables Comply with TIA-569-D.
4. Shall have a cable retainer wire form to provide containment of cables within the hanger. The cable retainer shall be removable and reusable.
5. Shall have a hot-dipped galvanized or G60 finish and shall be rated for indoor use in non-corrosive environments.
6. Acceptable products: PENTAIR CADDY CAT32HP, CAT48HP, CAT64HP.
7. Non-continuous cable supports shall be a minimum of 2-inches.

2.2 HOOK & LOOP (VELCRO)

A. Refer to specification 27 500 COMMON WORK RESULTS FOR COMMUNICATIONS.

PART 3 - EXECUTION

3.1 INSTALLATION

1. Installation and configuration shall conform to the requirements of the current revision levels of ANSI/ EIA/TIA Standards 568 & 569, NFPA 70 (National Electrical Code), applicable local codes, and to the manufacturer's installation instructions.
2. Install cables using techniques, practices, and methods that are consistent with Category 5e or higher requirements and that supports Category 5e or higher performance of completed and linked signal paths, end to end.
3. Install cables without damaging conductors, shield, or jacket.
4. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by manufacturer or by TIA 568.
5. Pull cables without exceeding cable manufacturer's recommended pulling tensions or outlined in TIA 569. Use pulling means that will not damage media.
6. Do not exceed load ratings specified by manufacturer.
7. Non-continuous supports shall be installed a minimum 3 inches above ceilings.

8. Non-continuous supports shall be installed so there is no more than 5ft between supports, measured horizontally.

B. Comply with NECA 1, NECA 101, and TIA-569-B for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum pathways. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

C. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab.

E. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.

F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Pathways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot intervals.
2. Arrange pathways to cross building expansion joints at right angles with expansion fittings.
3. Arrange pathways to keep a minimum of 1 inch of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.

H. Stub-ups to Above Recessed Ceilings:

1. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

I. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.

J. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

K. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

L. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound.

M. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service pathway enters a building or structure.
3. Where otherwise required by NFPA 70.

N. Mount boxes at heights indicated on Drawings in accordance with ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

3.2 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.3 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or deterioration.

END OF SECTION 27 0528

SECTION 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Color and legend requirements for labels and signs.
2. Labels.
3. Fasteners for labels and signs.

1.2 ACTION SUBMITTALS

A. Labels

1.3 INFORMATIONAL SUBMITTALS

A. Installer Credentials:

1. BICSI TECH certification is required for the lead installer that will be onsite at all times.
2. Valid certificates shall be provided to TowerPinkster prior to project kick-off.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer shall have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings, cabling administration Drawings, and field-testing program development by a BICSI TECH.
2. Installation Supervision: Installation shall be under the direct supervision of a BICSI TECH, who shall be present at all times when Work of this Section is performed at Project site.
3. Testing Supervisor: Currently certified by BICSI as a TECH to supervise on-site testing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70 and TIA 606-B.

B. Comply with ANSI Z535.4 for safety signs and labels.

C. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Equipment Identification Labels:

1. White letters on a Black field.

2.3 LABELS

A. Self-Adhesive Wraparound Labels: computer printed, 3-mil-thick, vinyl flexible labels with acrylic pressure-sensitive adhesive.

1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating protective shields over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
2. Marker for Labels: Permanent, waterproof black ink marker recommended by tag manufacturer.
3. Marker for Labels: Machine-printed, permanent, waterproof black ink recommended by printer manufacturer.
4. Handwritten labels are not approved.

B. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Minimum Nominal Size:
   a. 1-1/2 by 6 inches for raceway and conductors
   b. 3-1/2 by 5 inches for equipment.
   c. As required by authorities having jurisdiction.

2.4 FASTENERS FOR LABELS AND SIGNS

A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Verify identity of each item before installing identification products.

C. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

D. Apply identification devices to surfaces that require finish after completing finish work.

E. Install signs with approved legend to facilitate proper identification, operation, and maintenance of communications systems and connected items.

F. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

G. Self-Adhesive Wraparound Labels:

1. Secure tight to surface at a location with high visibility and accessibility.
2. Provide label within 12 inches from each cable end.

H. Self-Adhesive Labels:

1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.

3.2 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations with high visibility. Identify by system and circuit designation.

C. Accessible Fittings for Raceways and Cables within Buildings: Identify covers of each junction and pull box with self-adhesive labels containing wiring system legend.

1. System legends shall be as follows:
   a. Telecommunications.

D. Faceplates: Label individual faceplates with self-adhesive labels. Place label at top of faceplate. Each faceplate shall be labeled with its individual, sequential designation, numbered clockwise when entering room from primary egress, composed of the following, in the order listed:

1. Refer to detail drawings

E. Equipment Room Labeling:

1. Racks, Frames, and Enclosures: Identify front and rear of each with self-adhesive labels containing equipment designation.
2. Patch Panels: Label individual rows and outlets, starting at to left and working down, with self-adhesive labels.

F. Backbone Cables: Label each cable with a self-adhesive wraparound label indicating the location of the far or other end of the backbone cable. Patch panel or punch down block where cable is terminated should be labeled identically.

1. Fiber optic cables shall be labeled on each end within 12 inches of where fiber cable enters enclosure.

G. Horizontal Cables: Label each cable with a self-adhesive wraparound label indicating the following, in the order listed:

1. Refer to detail drawings.

H. Instructional Signs: Self-adhesive labels.

I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures: Self-adhesive labels.

1. Apply to exterior of door, cover, or other access.

J. Equipment Identification Labels:

1. Indoor Equipment: Self-adhesive label.
2. Outdoor Equipment: Laminated-acrylic or melamine-plastic sign.
3. Equipment to Be Labeled:
   a. Communications cabinets.
   b. Uninterruptible power supplies.
   c. Computer room air conditioners.
   d. Fire-alarm and suppression equipment.
   e. Egress points.
   f. Power distribution components.

END OF SECTION 27 0553

SECTION 27 1513 – COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Work covered by this Section shall consist of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the installation, termination, and labeling of copper horizontal cabling infrastructure as described on the Drawings and/or required by these specifications.

B. Section Includes:

1. CAT6 Cable.
2. CAT6 Termination Hardware.
3. CAT6 Patch Cables.
4. Labeling.
5. Certification Testing.
6. As-Built Drawings.
7. Grounding provisions for twisted pair cable.
8. Cable Manufacturer Warranty

1.2 COPPER HORIZONTAL CABLING DESCRIPTION

A. Horizontal cabling system shall provide interconnections between Distributor A, Distributor B, or Distributor C, and the equipment outlet, otherwise known as "Cabling Subsystem 1," in the telecommunications cabling system structure. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.

1. TIA-568.2-D requires that a minimum of two equipment outlets be installed for each work area.
2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications equipment outlet.
3. Bridged taps and splices shall not be installed in the horizontal cabling.

B. A work area is approximately 100 sq. ft. and includes the components that extend from the equipment outlets to the station equipment.

C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

1.3 ACTION SUBMITTALS

A. Cabling Manufacturer Certified Installer Certificate

B. CAT6 Cable

C. CAT6 Termination Hardware

D. CAT6 Patch Cables

E. Shop Drawings: Reviewed by a current BICSI RCDD.

1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
3. Cabling administration Drawings and printouts.
4. Wiring diagrams and installation details of telecommunications equipment, to show location and layout of telecommunications equipment.

F. Twisted pair cable testing plan.

1.4 INFORMATIONAL SUBMITTALS

A. Installer Credentials:

1. Each installer is required to be certified by the manufacturer of the products that are installed (i.e. Panduit, Belden, Hubbell, Commscope)
2. BICSI TECH certification is required for the lead installer that will be onsite at all times.
3. Valid certificates shall be provided to TowerPinkster prior to project kick-off.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1. As-built Drawings.
2. Certification results for all installed cables (PDF & Certification tester format)
3. Cabling Manufacturer Warranty Certificate

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer shall have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings, cabling administration Drawings, and field-testing program development by a BICSI TECH.
2. Installation Supervision: Installation shall be under the direct supervision of a BICSI TECH, who shall be present at all times when Work of this Section is performed at Project site.
3. Testing Supervisor: Currently certified by BICSI as a TECH to supervise on-site testing.

B. Testing Agency Qualifications: Testing agency is required to have personnel certified by BICSI on staff.

1. Testing Agency's Field Supervisor: Currently certified by BICSI as a TECH.

1.7 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568.1-D, when tested according to test procedures of this standard.

B. Telecommunications Pathways and Spaces: Comply with TIA-569-E.

C. Grounding: Comply with TIA-607-D.

2.2 GENERAL CABLE CHARACTERISTICS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and NFPA 70 for the following types:

1. Communications Plenum Rated: Type CMP complying with UL 1685.
2. Communications, Plenum Rated: Type CM, Type CMG, Type CMP, Type CMR, or Type CMX in metallic conduit installed according to NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."

B. RoHS compliant.

2.3 CAT6 CABLE

A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6 cable at frequencies up to 350MHz.

B. Standard Compliances:

1. ANSI/TIA 568.2-D
2. NEC/CEC Type CMR (UL 1666) for Non-Plenum
3. NEC/CEC Type CMP (NFPA 262) for Plenum
4. UL Listed CMP-LP (0.5A) for Plenum
5. UL 444
6. RoHS Compliant Directive 2011/65/EU
7. ANSI/TIA 862 (Building Automation)
8. ICEA S-116-732
9. ICEA S-102-700
10. ISO/IEC 11801 Ed. 2.0 (Class E)

C. Applications

1. IEEE 802.3: 1000 BASE-T, 100 BASE-TX, 10 BASE-T, PoE, PoE+
2. ANSI/TIA 854: 1000 BASE-TX
3. CDDI, Token Ring, ATM
4. Digital Video
5. Broadband and Baseband Analog Video

D. Conductors: 100-ohm, 23 AWG solid copper.

E. Shielding/Screening: Unshielded twisted pairs (UTP).

F. Refer to drawings for cable manufacturer and part numbers.

2.4 CAT6 TERMINATION HARDWARE

A. Description: This section covers patch panels, jack modules, modular plugs, faceplates and surface mount boxes.

B. Patch Panels

1. Mounts to standard EIA 19" rack
2. All metal modular patch panels.
3. Stainless steel, painted black
4. Accept shielded and non-shielded jacks.
5. Write-on areas and option adhesive labels for port identification.
6. 24 and 48 port.
7. Flat and angled design.
8. Refer to drawings for manufacturer and part numbers.

C. Jack Modules

1. CAT6/Class E, 8-position
2. Exceeds channel requirements of ANSI/TIA-568.2-D Category 6 and ISO 11801 Class E standards at swept frequencies 1 to 250 MHz
3. Meets ANSI/TIA-1096-A contacts plated with 50 microinches of gold for superior performance
4. Rated for 2500 cycles with IEEE 802.3af / 802.3at and 802.3bt type 3 and type 4. Supports Power over HDBaseT up to 100 watts
5. Operating Temp: -10°C to 65°C (14°F to 149°F)
6. Terminate 4-pair, 22-26 AWG
7. 100 Ohm
8. Several available color options
9. Refer to drawings for manufacturer and part numbers.

D. Modular Plugs

1. CAT6/Class E, 8-position/8 wire
2. Exceeds ANSI/TIA Category 6 and ISO Class E performance requirements when properly terminated to CAT 6
3. Terminate 23-24 AWG (solid or stranded)
4. 100 Ohm
5. Supports PoE, PoE+, and proposed Type 3 and 4 PoE++ applications for up to 100 W

6. Refer to drawings for manufacturer and part numbers.

E. Faceplates - Plastic

1. Available in 1, 2, 3, 4 and 6 port single-gang
2. Optional label windows
3. Accepts variety of CAT6 jacks and AV inserts
4. Refer to drawings for manufacturer and part numbers.

F. Faceplates – Stainless Steel

1. Available in 2, 4 and 6 port single-gang
2. Optional label windows
3. Accepts variety of CAT6 jacks and AV inserts
4. Refer to drawings for manufacturer and part numbers.

G. Surface Mount Boxes

1. Low profile design
2. Variety of port densities
3. Accepts variety of CAT6 jacks and AV inserts
4. Breakouts for use with surface raceway
5. Made of ABS
6. UL 1863 rated
7. Refer to drawings for manufacturer and part numbers.

2.5 CAT6 PATCH CABLES

A. Description: Patch cord cable shall be offered in multiple colored UTP cable for design flexibility with a clear strain relief boot on each modular plug.

1. CAT6/Class E
2. Compatible with both T568A and T568B wiring schemes
3. Exceeds all ANSI/TIA-568.2-D and ISO 11801 Class E standards for all frequencies from 1 to 250 MHz
4. Meets ANSI/TIA-1096-A (formerly FCC Part 68); contacts plated with 50 microinches of gold for superior performance
5. UL 1863 approved
6. A variety of lengths shall be available for design flexibility.
7. PoE compliance: Rated for 2500 cycles with IEEE 802.3af / 802.3at and 802.3bt type 3 and type 4
8. Rated to 2500 mating cycles.
9. Field terminated patch cables shall not be allowed in any situation.
10. Refer to drawings for manufacturer and part numbers.

2.6 LABELING

A. Description: Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-B requirements for the following:

1. Cables use flexible vinyl or polyester that flexes as cables are bent.

2. All labels shall be installed on each end of installed cable within 12 inches of termination.
3. Labels shall be:
    a. Self-laminating vinyl labels
    b. Permanent acrylic tape that adheres to surfaces that are smooth, rough or powder coated
    c. Machine-printed labels indicating:
        1) Telecommunication Room
        2) Patch Panel
        3) Patch panel port

4. Hand-Written labels shall **NOT** be allowed in any situation.

2.7 AS-BUILT DRAWINGS

A. Description: Drawings submitted by contractor upon completion of project reflecting all changes made and documenting all installations.

1. As-built drawings shall be submitted to TowerPinkster for any/all structured cabling projects.
2. Each as-built shall indicate locations of all installed cables.
3. As-built drawing shall only have typed text (No hand-written as-builts).
4. As-builts shall be submitted in PDF format.
    a. Any other format requires approval prior to submittal.

2.8 GROUNDING PROVISIONS FOR TWISTED PAIR CABLING

A. Comply with requirements in Section 27 0526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.

B. Comply with TIA-607-D.

2.9 CABLE MANUFACTURER WARRANTY

A. A cabling manufacturer warranty shall be provided by the installation contractor for all structured cabling projects.

1. Warranty shall be 25-year standards-based performance warranty that applies to all registered links and/or channels in an installation.
2. Warranty shall be submitted within 30 days of project completion.

PART 3 - EXECUTION

3.1 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

A. Comply with NECA 1 and NECA/BICSI 568.

B. Wiring Method: Install cables in raceways and cable trays, except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, attics, and gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables, except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements for raceways and boxes specified in Section 27 0528 "Pathways for Communications Systems."

C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

D. General Requirements for Cabling:

1. Comply with TIA-568.2-D.
2. Comply with BICSI's Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section.
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
5. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
8. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section. Use lacing bars and distribution spools.
9. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
10. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
11. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
12. Pulling Cable: Comply with BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Pulling and Installing Cable" Section. Monitor cable pull tensions.
13. Provide 5ft service loop at each location (security cameras & wireless access points shall have 15ft)
14. Bundle CAT6 cables in groups of no more than 24 cables as they route on ladder rack to patch panel in all exposed areas of Telecommunication Rooms.

E. Group connecting hardware for cables into separate logical fields.

F. Separation from EMI Sources:

1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.

3.2 FIRESTOPPING

A. Comply with requirements in Section 07 8413 "Penetration Firestopping."

B. Comply with TIA-569-D, Annex A, "Firestopping."

C. Comply with "Firestopping Systems" Article in BISCI's "Telecommunications Distribution Methods Manual."

3.3 GROUNDING

A. Install grounding according to the "Grounding, Bonding, and Electrical Protection" chapter in BICSI's "Telecommunications Distribution Methods Manual."

B. Comply with TIA-607-D and NECA/BICSI-607.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall, allowing at least a 2-inch clearance behind the grounding bus bar. Connect grounding bus bar to suitable electrical building ground, using a minimum No. 4 AWG grounding electrode conductor.

D. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568.2-D.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test twisted pair cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

C. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similarly to Table 10.1 in BICSI's "Telecommunications Distribution Methods Manual," or shall be transferred from the instrument to the computer, saved as text files, printed, and submitted.

D. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

E. End-to-end cabling will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 27 1513

SECTION 27 1700 - TESTING, ID. AND ADMIN OF BALANCED TWISTED PAIR INFRASTRUCTURE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide all labor, materials, tools, field-test instruments and equipment required for the complete testing, identification and administration of the work called for in the Contract Documents.

B. In order to conform to the overall project event schedule, the cabling contractor shall survey the work areas and coordinate cabling testing with other applicable trades.

C. In addition to the tests detailed in this document, the contractor shall notify the Owner or the Owner's representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor shall carry out and record any additional measurement results at no additional charge

1.2 SCOPE

A. This Section includes the minimum requirements for the test certification, identification and administration of horizontal balanced twisted pair cabling.

1.3 SECTION INCLUDES:

1. Copper cabling test instruments
2. Copper cabling testing
3. Identification
    a. Labels and labeling
4. Administration
    a. Test results documentation
    b. As-built drawings

B. Testing shall be carried out in accordance with this document.

C. Testing shall be performed on each cabling link including MPTL (modular plug terminated link). (100% testing)

D. All tests shall be documented.

1.4 QUALITY ASSURANCE

A. All testing procedures and field-test instruments shall comply with applicable requirements of:

1. ANSI/TIA-1152, Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
2. ANSI/TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises.

3. ANSI/TIA-568-C.1, Commercial Building Telecommunications Cabling Standard
4. ANSI/TIA-568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
5. ANSI/TIA-606-C, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by the customer, unless the customer specifies their own labeling requirements.

B. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:

1. Manufacturer of the connectors or cable.
2. Manufacturer of the test equipment used for the field certification.
3. Training organizations (e.g., BICSI, A Telecommunications Association headquarters in Tampa, Florida.

C. The Owner or the Owner's representative shall be invited to witness and/or review field-testing.

1. The Owner or the Owner's representative shall be notified of the start date of the testing phase five (5) business days before testing commences.
2. The Owner or the Owner's representative will select a random sample of 5% of the installed links. The Owner or the Owner's representative shall test these randomly selected links and the results are to be stored in accordance with Part 3 of this document. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the representative shall repeat 100% testing at no cost to the Owner.

1.5 SUBMITTALS

A. Manufacturers catalog sheets and specifications for the test equipment.

B. A schedule (list) of all balanced twisted-pair copper links to be tested.

C. Sample test reports.

D. Certification results for all installed data cables.

1.6 ACCEPTANCE OF TEST RESULTS

A. Unless otherwise specified by the Owner or the Owners representative, each cabling link shall be in tested for:

1. Wire Map
2. Length
3. Propagation Delay
4. Delay Skew
5. DC Loop Resistance – recorded for information only
6. DC Resistance Unbalance – recorded for information only
7. Insertion Loss

8. NEXT (Near-End Crosstalk)
9. PS NEXT (Power Sum Near-End Crosstalk)
10. ACR-N (Attenuation to Crosstalk Ratio Near-End) – recorded for information only
11. PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End) – recorded for information only
12. ACR-F (Attenuation to Crosstalk Ratio Far-End)
13. PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
14. Return Loss
15. TCL (Transverse Conversion Loss) – recorded for information only
16. ELTCTL (Equal Level Transverse Conversion Transfer Loss) – recorded for information only

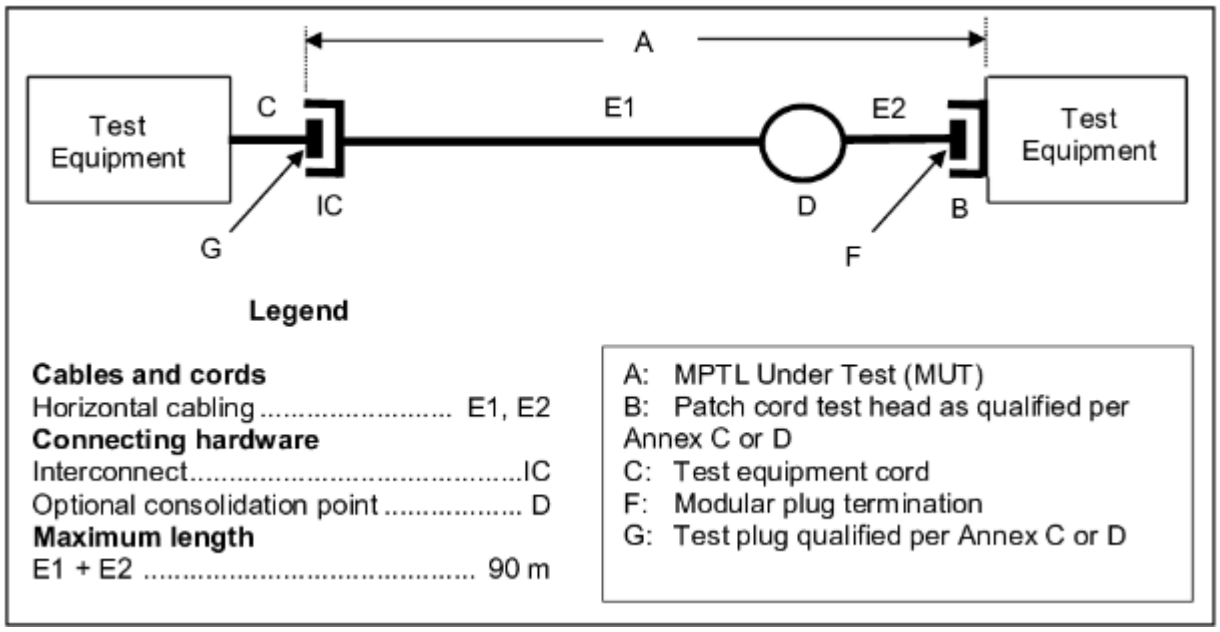
B. All installed cabling Permanent Links shall be field-tested and pass the test requirements and analysis as described in Part 3. Any Permanent Link that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected Permanent Link meets performance requirements. The final and passing result of the tests for all Permanent Links shall be provided in the test results documentation in accordance with Part 3.

C. Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the Owner.

1.7 MODULAR PLUG TERMINATED LINK (MPTL)

A. The ANSI/TIA-568.2-D standard requires that horizontal cable be terminated on a telecommunications outlet to provide flexible access to the user. In certain limited cases there may be a need to terminate horizontal cables to a plug that is directly plugged into a device. This will sometimes be done to service a security camera, a radio enabled wireless access device, or another device which is not often moved or rearranged.

B.



1. (A) Modular plug terminated link under test (MUT)
2. (B) Patch cord test head qualifier per Annex C or D in ANSI/TIA-568.2-D
3. (C) Test equipment patch cord
4. (D) Optional consolidated point

5. (E) Horizontal cable
6. (F) Test plug qualified per Annex C or D in ANSI/TIA-568.2-D

C. Modular plug terminated link transmission requirements

1. Modular plug terminated link shall comply with the permanent link transmission requirements of the ANSI/TIA-568.2-D standard.

PART 2 - PRODUCTS

2.1 BALANCED TWISTED-PAIR CABLE TESTERS

A. A The field-test instrument shall be within the calibration period recommended by the manufacturer, typically 12 months.

B. Certification tester

1. Accuracy
   a. Level IIIe accuracy in accordance with ANSI/TIA-1152
   b. Independent verification of accuracy

2. Permanent Link Adapters
   a. RJ45 plug must meet the requirements for NEXT, FEXT and Return Loss in accordance with ANSI/TIA-568-C.2 Annex C
   b. Twisted pair Category 5e, 6, 6A, 7 or 7_A cords are not permitted as their performance degrades with use and can cause false Return Loss failures

3. Results Storage
   a. Must be capable of storing > 10,000 results for all measurements found in 2.1.B.4 below

4. Measurement capabilities
   a. Wire Map
   b. Length
   c. Propagation Delay
   d. Delay Skew
   e. DC Loop Resistance
   f. DC Resistance Unbalance
   g. Insertion Loss
   h. NEXT (Near-End Crosstalk)
   i. PS NEXT (Power Sum Near-End Crosstalk)
   j. ACR-N (Attenuation to Crosstalk Ratio Near-End)
   k. PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End)
   l. ACR-F (Attenuation to Crosstalk Ratio Far-End)
   m. PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
   n. Return Loss
   o. TCL (Transverse Conversion Loss)
   p. ELTCTL (Equal Level Transverse Conversion Transfer Loss)
   q. Time Domain Reflectometer

r. Time Domain Xtalk Analyzer

C. PC Software

1. Windows® based.
2. Must show when 3 dB and 4 dB rules are applied
3. Re-certification capability, where results must have their Cable IDs suffixed with (RC).
4. Built in PDF export – no additional third-party software permitted.
5. Built-in statistical analysis.

2.2 IDENTIFICATION

A. Labels

a. Refer to specification 27 0553 IDENTIFICATION FOR COMMUNICATION SYSTEMS.

2.3 ADMINISTRATION

A. Administration of the documentation shall include test results of each Permanent Link.

B. The test result information for each link shall be recorded in the memory of the field-test instrument upon completion of the test.

C. The test result records saved within the field-test instrument shall be transferred into a Windows® -based database utility that allows for the maintenance, inspection and archiving of these test records.

PART 3 - EXECUTION

3.1 GENERAL

A. All outlets, cables, patch panels and associated components shall be fully assembled and labeled prior to field-testing. Any testing performed on incomplete systems shall be redone on completion of the work.

3.2 BALANCED TWISTED PAIR CABLE TESTING

A. Field-test instruments shall have the latest software and firmware installed.

B. Permanent Link test results including the individual frequency measurements from the tester shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative documentation (reports) may be generated.

C. Testing shall be performed on each cabling segment (connector to connector). Sampling is not acceptable.

D. Permanent Link adapters made from twisted pair Category 5e, 6, 6A, 7 or 7_A cords are not permitted as their performance degrades with use and can cause false Return Loss failures.

E. The installer shall build a reference link. All components shall be anchored so it is not possible to disturb them. The technician is to conduct a Category 6 Permanent Link test each day to ensure no degradation of the tester or its Permanent Link adapters.

F. Wire Map Measurement

1. The wire map test is intended to verify pin-to-pin termination at each end and check for installation connectivity errors. For each of the 8 conductors in the cabling, the wire map indicates:
   a. Continuity to the remote end
   b. Shorts between any two or more conductors
   c. Reversed pairs
   d. Split pairs
   e. Transposed pairs
   f. Distance to open on shield
   g. Any other miss-wiring

2. The correct connectivity of telecommunications outlets/connectors is defined in ANSI/TIA-568-C.2. Two color schemes are permitted. The user shall define which scheme is to be used. The field tester shall document which color scheme was used. Examples are given below:

3. 

G. Length Measurement

1. The length of each balanced twisted pair shall be recorded.
2. Since physical length is determined from electrical length, the physical length of the link calculated using the pair with the shortest electrical delay shall be reported and used for making the pass or fail determination.
3. The pass or fail criteria is based on the maximum length allowed for the Permanent Link as specified in ANSI/TIA-568-C.2 plus the nominal velocity of propagation (NVP) uncertainty of 10%. For a Permanent Link, the length measurement can be 325 ft. (99 m) before a fail is reported.

H. Propagation Delay measurement

1. Is the time it takes for a signal to reach the end of the link.
2. The measurement shall be made at 10 MHz per ANSI/TIA-1152.
3. The propagation delay of each balanced twisted pair shall be recorded.
4. Is not to exceed 498 ns per ANSI/TIA-568-C.2 Section 6.3.18.

I. Delay Skew measurement

1. Is the difference in propagation delay @ 10 MHz between the shortest delay and the delays of the other wire pairs.
2. The delay skew of each balanced twisted pair shall be recorded.
3. Is not to exceed 44 ns per ANSI/TIA-568-C.2 Section 6.3.19.

J. DC Resistance

1. Often reported as Resistance, is the loop resistance of both conductors in the pair.
2. Is not specified in ANSI/TIA-1152 but shall be recorded for all four pairs.

K. DC Resistance Unbalance

1. Often reported as Resistance Unbalance, is the difference in resistance of the two wires within the pair.
2. Is not specified in ANSI/TIA-1152 for a Permanent Link but shall be recorded for all four pairs.

L. Insertion Loss

1. Is the loss of signal strength over the cabling (in dB).
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz
3. Worst case shall be reported for all four pairs in one direction only.
4. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
5. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.7.

M. NEXT (Near-End Crosstalk)

1. Is the difference in amplitude (in dB) between a transmitted signal and the crosstalk received on other wire pairs at the same end of the cabling.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz
3. Shall be measured in both directions. (12 pair to pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.8.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
7. The Time Domain Xtalk data shall be stored for any marginal or failing NEXT results.

N. PS NEXT (Power Sum Near-End Crosstalk)

1. Is the difference (in dB) between the test signal and the crosstalk from the other pairs received at the same end of the cabling.
2. The frequency resolution shall be:

a. 1 – 31.25 MHz: 150 kHz
b. 31.25 – 100 MHz: 250 kHz
c. 100 – 250 MHz: 500 kHz

3. Shall be measured in both directions. (8 pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.9.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
7. The Time Domain Xtalk data shall be stored for any marginal or failing PS NEXT results.

O. ACR-N (Attenuation Crosstalk Ratio Near-End)

1. Is a calculation of NEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be calculated in both directions.
4. Is not specified in ANSI/TIA-1152 but shall be recorded for all 12 possible combinations.

P. PS ACR-N (Power Sum Attenuation Crosstalk Ratio Near-End)

1. Is a calculation of PS NEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be calculated in both directions.
4. Is not specified in ANSI/TIA-1152 but shall be recorded for all 8 possible combinations.

Q. ACR-F (Attenuation Crosstalk Ratio Far-End)

1. Is a calculation of FEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be measured in both directions. (24 pair to pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.11.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).

R. PS ACR-F (Power Sum Attenuation Crosstalk Ratio Far-End)

1. Is a calculation of PS FEXT minus Insertion Loss of the disturbed pair in dB.

2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be measured in both directions. (8 pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.13.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).

S. Return Loss

1. Is the difference (in dB) between the power of a transmitted signal and the power of the signals reflected back.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be measured in both directions. (8 pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Shall be ignored at all frequencies where the Insertion Loss is less than 3 dB for that pair.
6. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.6.
7. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
8. The Time Domain Reflectometer data shall be stored for any marginal or failing Return Loss results.

T. TCL (Transverse Conversion Loss)

1. Is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the near-end on the same wire pair.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be measured in both directions.
4. Is not specified in ANSI/TIA-1152 for a Permanent Link but shall be recorded for all 8 possible combinations.

U. ELTCTL (Equal Level Transverse Conversion Transfer Loss)

1. Is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the far end on the same wire pair minus the Insertion Loss of that pair.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be measured in both directions.
4. Is not specified in ANSI/TIA-1152 for a Permanent Link but shall be recorded for all 8 possible combinations.

3.3 ADMINISTRATION

A. Test results documentation

1. Test results saved within the field-test instrument shall be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of the test records. These test records shall be uploaded to the PC unaltered, i.e., “as saved in the field-test instrument”. The file format, CSV (comma separated value), does not provide adequate protection of these records and shall not be used.
2. The test results documentation shall be available for inspection by the Owner or the Owner’s representative during the installation period and shall be passed to the Owner's representative within 5 working days of completion of tests on cabling served by a telecommunications room or of backbone cabling. The installer shall retain a copy to aid preparation of as-built information.
3. The database for the complete project, including twisted-pair copper cabling links, if applicable, shall be stored and delivered on CD or DVD prior to Owner acceptance of the building. This CD or DVD shall include the software tools required to view, inspect, and print any selection of the test reports.
4. Circuit IDs reported by the test instrument should match the specified label ID (see **Error! Reference source not found.** of this Section).
5. The detailed test results documentation data is to be provided in an electronic database for each tested balance twisted-pair and shall contain the following information
    a. The overall Pass/Fail evaluation of the link-under-test
    b. The date and time the test results were saved in the memory of the tester
    c. The identification of the customer site as specified by the end-user
    d. The name of the test limit selected to execute the stored test results
    e. The name of the personnel performing the test
    f. The version of the test software and the version of the test limit database held within the test instrument
    g. The manufacturer, model and serial number of the field-test instrument
    h. The adapters used
    i. The factory calibration date
    j. Wire Map
    k. Propagation Delay values, for all four pairs
    l. Delay Skew values, for all four pairs
    m. DC Resistance values, for all four pairs
    n. DC Resistance Unbalance, values for all four pairs
    o. Insertion Loss, worst case values for all four pairs
    p. NEXT, worst case margin and worst case values, both directions
    q. PS NEXT, worst case margin and worst case values, both directions
    r. ACR-F, worst case margin and worst case values, both directions
    s. PS ACR-F, worst case margin and worst case values, both directions
    t. Return Loss, worst case margin and worst case values, both directions
    u. TCL, worst case values both directions
    v. ELTCTL, worst case values, both directions.
    w. Time Domain Crosstalk data if the link is marginal or fails
    x. Time Domain Reflectometer data if the link is marginal or fails

B. Record copy and as-built drawings

1. Provide record copy drawings periodically throughout the project as requested by the Construction Manager or Owner, and at end of the project on a CD or DVD. Record copy drawings at the end of the project shall be in CAD format and include notations reflecting the as built conditions of any additions to or variation from the drawings provided such as, but not limited to cable paths and termination point. The as-built drawings shall include, but are not limited to block diagrams, frame and cable labeling, cable termination points, equipment room layouts and frame installation details. The as-builts shall include all field changes made up to construction completion:
   a. Field directed changes to pull schedule.
   b. Horizontal cable routing changes.
   c. Associated detail drawings.

END OF SECTION 27 1700

SECTION 28 1300 - ACCESS CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Failure to consult these documents shall not relieve the Contractor of the requirements therein.

1.2 SUMMARY

A. This Section includes the following:

1. Security Access Devices.
2. Access Control Panel.

1.3 RELATED SECTIONS

A. Section 087100 –Door Hardware
B. Division 26 Section "Electrical" for connections to electrical power system and for low-voltage wiring work.
C. Division 27 Section "Communications" for connections to the LAN.

1.4 REFERENCES

A. ANSI A117.1 (1998) - Accessible and Usable Buildings and Facilities.
B. IBC 2009 - International Building Code.
C. NFPA 70 (2008) - National Electrical Code.
D. NFPA 80 - Fire Doors and Windows.
E. NFPA 101- Life Safety Code.
F. UL 294 - Access Control Systems.
G. UL 1076 - Proprietary Burglar Alarm Units and Systems.
H. Local applicable codes.

1.5 SYSTEM DESCRIPTION

A. Security Access System.

1. Selected Exterior Doors: Control access into Building.
2. Selected Building Areas: Control access into selected areas indicated.
3. System shall be compatible with existing Galaxy System, Software version 9.X or higher

1.6 SUBMITTALS

A. Shop Drawings: Provide system wiring diagram showing each device and wiring connection required.

B. Product Data: Provide electrical characteristics and connection requirements.

C. Test Reports: Indicate satisfactory completion of required tests and inspections.

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

E. Project Record Documents: Record actual locations of access authorization equipment.

F. Operation Data: Operating instructions.

G. Maintenance Data: Maintenance and repair procedures.

1.7 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty years documented experience and with service facilities within 100 miles of Project.

C. Installer Qualifications: Company specializing in installing the products specified in this section with minimum Installer Qualifications: Systems Integrators, verifiably factory trained and certified by the primary product manufacturers, with documented experience installing complete integrated access control systems similar in material, design, and scope to that indicated for this Project and whose work has resulted in construction with a proven record of successful in-service performance. Qualifications include, but are not necessarily limited, to the following:

1. References: Provide a list of references for similar projects including contact name, phone number, name and type of project.
2. Professional Staffing: Firms to have a dedicated access control systems integration department with full time, experienced professionals on staff experienced in providing on site consulting services for both electrified door hardware and integrated access control systems installations.
3. Factory Training: Installation and service technicians are to be competent factory trained and certified personnel capable of maintaining the system.
4. Service Center: Firms to have a service center capable of providing training, in-stock parts, and emergency maintenance and repairs at the Project site with 24-hour/7-days a week maximum response time.

D. Supplier Qualifications: Supplier/Dealers, verifiably authorized and in good standing with the primary product manufacturers, with experience supplying integrated access control systems similar in material, design, and scope to that indicated for this Project and whose work has resulted in construction with a proven record of successful in-service performance.

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article will not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and are in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of the installed access control system hardware and software that fails in materials or workmanship, including all related parts and labor, within specified warranty period after final testing and acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, that is a member company of the National Burglar & Fire Alarm Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7**, and that is acceptable to Owner's insurance underwriter**.

E. Testing Agency's Field Supervisor: Person currently certified as an advanced alarm technician by the National Burglar & Fire Alarm Association to supervise on-site testing specified in Part 3.

1.9 MAINTENANCE SERVICE

A. Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (12) months full maintenance by skilled employees of the Systems Integrator. Include repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 OVERVIEW

A. The devices described herein are intended to provide a reference for the Card Access/Security System and are to be provided as described in the Contract Documents.

B. Certain devices described may not be applicable to all systems. All devices required to complete the installation may not be described but shall be provided as if specifically called for within the Specification. It is the responsibility of the Contractor to provide a complete working system.

C. All system components shall be approved for the function they will perform.

D. The system shall be of an open architecture design and shall support industry standard databases such as Microsoft SQL Server 2000/2005, MSDE or SQL Server 2005 Express.

E. A system server for enterprise wide database services, system programming, system monitoring, administrative services, report and proximity card generation.

F. A workstation computer shall provide interfacing and control of the local, site specific, Access/Security System.

G. The System shall be of a distributed database design, using intelligent microprocessor panels, to make smart decisions at the door.

H. The system shall be capable of utilizing a true client server network configured to support the system database service, all panel services and user interfaces optimizing the users' options for system programming, event monitoring and record keeping.

I. The database service shall be ODBC compliant allowing the system to access an existing compatible ODBC compliant database as the system data source. A single system database shall maintain both credential-holder's records as well as access system information and programming parameters.

2.2 MANUFACTURERS

A. Manufacturers subject to compliance with requirements, provide products by the manufacturers specified.

1. Access Control System- DMP Control Systems
2. Card Readers – HID or approved equivalent.
3. Proximity Cards – Cards will be furnished by Owner.
4. Substitutions: Refer to Division 01 Section "Product Requirements".

2.3 INSTALLING CONTRACTOR

A. Procure services from owner's existing maintenance agreement with existing system install company and utilize them for any additions or modifications to the existing system.

1. Koorsen Fire & Security
3953 Ralph Jones DR. STE B, South Bend, IN 46628
(574) 444-9887

2.4 ACCESS CONTROL PANEL

A. The access control panel shall be an intelligent, modular controller designed to integrate various event management applications on one controller. The system shall be the System Galaxy 600 Series.

B. COMPONENTS

1. Primary Controller: The Primary Controller is the controller responsible for up/downstream communications with the PC/Network. The Primary Controller consists of three major subsystems, software services, hardware and expansion interfaces.

a. Software Services: The software services are a set of common functions and applications that shall be installed on every 600 Series Controller to perform system configuration, generic system event handling and communications between the controller and a host or other controllers.

b. Hardware
   1) Ethernet Port: The 600 Series Controller shall support 10BaseT Ethernet Communication. The interface to the Ethernet services shall be through a standard RJ-45 jack connector native to the controller. Provide as many as required for full system integration.
   2) Inputs/outputs: The 600 Series controller shall have three (3) on-board inputs. The inputs are reserved for tamper, power fail, and low battery.
   3) Serviceable Hot-Swap Modules: The Controller shall allow for "Hot-Swap" serviceability. This allows for communications and door modules to be interchanged without a controller power-down.
   4) Power Requirements: Each 600 Series Control Module shall accept a regulated input voltage of 11.5VDC to 13.8VDC and generate appropriate voltage levels for on-board use as required. The input supply voltage shall be available to be bussed directly to the reader bus connectors to supply operating voltages for field readers. A jumper shall be provided for the ACP modules supporting direct Wiegand support to supply either 12VDC or 5 VDC to the external read heads.
   5) Indicators: There shall be LEDs indicating the status of the received and transmitted data for the onboard communications ports, with active data turning on the LED. These LEDs shall be hardware controlled.
   6) Ports: There shall be multiple ports provided on-board for external read heads, input/output boards. The number of actual ports varies according to the controller configuration.

c. Expansion Interfaces
   1) Inputs: 8 Supervised Class A inputs shall be provided on each Digital I/O board. These inputs shall report secure for user selectable ohms and alarm for open or short. Resistors marked for easy identification shall be located near each input connector to be clipped out by the end user when installing inputs.
   Outputs: 4 Class C relay outputs shall be provided on each Digital I/O board these outputs shall have contacts for Normally Open or Normally Closed states
      a) Each 600 Controller shall support up to five (5) Digital I/O board, adding up to forty (40) supervised inputs and twenty (20) Class C relays.

C. System Enclosure: Sheet metal, of the appropriate gauge for the cabinet size per UL 294, shall be utilized. The cabinet shall be Black in color with a matte finish. The ACP's shall be housed in a locking 18 gauge metal cabinet, suitable for wall mounting. All cabinet locks shall be keyed alike. The cabinet shall be suitably sized to allow installation of the controller and all expansion modules and associated field wiring. The cabinet door shall include illuminated diagnostic indicators, which shall indicate the status of the panel. A single tamper switch shall be incorporated into the door. There shall be at least 4 mounting holes and 10 knockouts on the cabinet. Panel shall be provided with 120 volt power supply along with battery backup and battery charger.

2.5 CARD READERS

A. All readers shall be compatible with Owners 26 bit, HID cards.

B. Readers shall be long range proximity, minimum 8" range, type technology system that complies with UL 294 standards and is certified as complying by Underwriters' Laboratories.

C. Readers shall be single piece indoor/outdoor wall switch proximity reader providing a Wiegand 26 Bit output. Shall mount in a door entry panel electrical box and shall be powered directly from the panel. The reader shall be sealed in a rugged, weatherized enclosure designed to withstand harsh environments as well as provide a high degree of vandal resistance when installed outdoors.

D. Manufacture

1. Wall mount – HID
2. Mullion Mount –HID
3. Vehicle Entrances – HID Maxiprox

E. POWER SUPPLIES

1. Power supplies for mortise and/or strike lock power shall be suitable to provide 24vdc, 4 amp power to Altronix AL-400. Provide one for every eight doors.

F. Key Pad Units.

G. Electric Strikes.

H. Electric Locks.

I. Motion Dectectors.

J. Manual Stations.

K. System Cable.

PART 3 - EXECUTION

3.1 PRE-INSTALL MEETING

A. Prior to commencing installation, the trades shall convene for a coordination meeting including but not limited to the following parties:

1. Architect
2. Electrical Engineer or Systems Designer
3. Construction Manager
4. Frame and Door Installer
5. Door Hardware Installer
6. Electrical and Fire Alarm contractor
7. Low voltage or security systems contractor

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use 16 AWG minimum size conductors for detection and signal circuit conductors. Install wiring in conduit.

C. Make conduit and wiring connections to door hardware devices furnished and installed under Division 08 Section "Door Hardware."

3.3 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Division 01 Section "Quality Control."

3.4 MANUFACTURER'S FIELD SERVICES

A. Include services of technician to supervise installation, adjustments, final connections, system testing, and to train Owner personnel.

3.5 DEMONSTRATION

A. Demonstrate normal and abnormal modes of operation, and required response to each.

B. Provide 4 hours of instruction each for two persons.

1. Conduct instruction at project site with manufacturer's representative.
2. Include travel and living expenses for Owner personnel.

END OF SECTION 28 1300

SECTION 28 1400 – ACCESS CONTROL SYSTEM HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Executive Summary: Includes the procurement and installation of an access control platform, the credentials (fobs, cards, etc.), and the setup and programming of the user's database.

B. Section Includes:

1. Access control panel hardware and power supply requirements
2. One or more security access networked workstations.
3. Security access operating system and application software.
4. Security access controllers connected to high-speed electronic-data transmission network.

C. Related Requirements:

1. Section 28 1500 "Access Control System Hardware Devices" for access control system hardware, such as keypads, card readers, and biometric identity devices.

1.3 DEFINITIONS

A. Credential: Data assigned to an entity and used to identify that entity.

B. DTS: Digital Termination Service. A microwave-based, line-of-sight communication provided directly to the end user.

C. Identifier: A credential card; keypad personal identification number; or code, biometric characteristic, or other unique identification entered as data into the entry-control database for the purpose of identifying an individual. Where this term is presented with an initial capital letter, this definition applies.

D. Location: A Location on the network having a workstation-to-controller communications link, with additional controllers at the Location connected to the workstation-to-controller link with a TIA 485-A communications loop. Where this term is presented with an initial capital letter, this definition applies.

E. Workstation: Personal computer. Applies to the central station, workstations, and file servers.

F. RAS: Remote access services.

G. RF: Radio frequency.

H. ROM: Read-only memory. ROM data are maintained through losses of power.

I. TCP/IP: Transport control protocol/Internet protocol.

J. TWAIN: Technology without an Interesting Name. A programming interface that lets a graphics application, such as an image editing program or desktop publishing program, activate a scanner, frame grabber, or other image-capturing device.

K. WMP: Windows media player.

L. Wiegand: Patented magnetic principle that uses specially treated wires embedded in the credential card.

M. WYSIWYG: What You See Is What You Get. Text and graphics appear on the screen the same as they will in print.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Reference each product to a location on Drawings. Test and evaluation data presented in Product Data shall comply with SIA BIO-01.

1. Any product data sheets with multiple models shall include indication of specific models to be provided per this document.

B. Panel layout information. At the time of submittal, the following information shall be provided on a spreadsheet:

1. Number of network control panels to be provided and initial estimation of access controlled doors/openings per panel;
2. Number of input and output modules and initial estimation of inputs and outputs to be configured

C. Initial programming acknowledgement per door/opening, based on the following:

1. Access control door schedule on plans.
2. Doors to be included in lockdown activation
3. Sequence of operations for unlocked hours, locked hours, and lockdown conditions per door as specified in plans.

D. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Diagrams for cable management system.
2. System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 2 and 3.
3. Wiring Diagrams. For power, signal, and control wiring. Show typical wiring schematics including the following:
   a. Workstation outlets, jacks, and jack assemblies.
   b. Patch cords.
   c. Patch panels.

4. Cable Administration Drawings: As specified in "Identification" Article.
5. Battery and charger calculations for central station, workstations, and controllers.

E. Product Schedules.

F. Samples: For workstation outlets, jacks, jack assemblies, and faceplates. For each exposed product and for each color and texture specified.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For security system to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 7823 "Operation and Maintenance Data," include the following:

1. Workstation operating system documentation.
2. Workstation installation and operating documentation, manuals, and software for the workstation and all installed peripherals. Software shall include system restore, emergency boot diskettes, and drivers for all installed hardware. Provide separately for each workstation.
3. Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on USB media of the hard-copy submittal.
4. System installation and setup guides with data forms to plan and record options and setup decisions.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses of all kinds, power and electronic, equal to 10 percent of amount installed for each size used, but no fewer than three units.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1. Cable installer must have on staff an RCDD certified by Building Industry Consulting Service International.

B. Source Limitations: Obtain central station, workstations, controllers, Identifier readers, and all software through one source from single manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Central Station, Workstations, and Controllers:

1. Store in temperature- and humidity-controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 50 and 85 deg F, and not more than 80 percent relative humidity, noncondensing.

2. Open each container; verify contents against packing list; and file copy of packing list, complete with container identification, for inclusion in operation and maintenance data.
3. Mark packing list with the same designations assigned to materials and equipment for recording in the system labeling schedules that are generated by software specified in "Cable and Asset Management Software" Article.
4. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

1.10 PROJECT CONDITIONS

A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Control Station: Rated for continuous operation in ambient conditions of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
2. Indoor, Controlled Environment: NEMA 250, Type 1 enclosure. System components, except the central-station control unit, installed in air-conditioned indoor environments shall be rated for continuous operation in ambient conditions of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.
3. Indoor, Uncontrolled Environment: NEMA 250, Type 4 enclosures. System components installed in non-air-conditioned indoor environments shall be rated for continuous operation in ambient conditions of 0 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.
4. Outdoor Environment: NEMA 250, NEMA 250, Type 3R enclosures. System components installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick.
5. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
6. Corrosive Environment: For system components subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones, provide NEMA 250, Type 4X enclosures.

PART 2 - PRODUCTS

2.1 ACCESS CONTROL SOFTWARE

A. Manufacturers: Subject to compliance with requirements, **provide products by or based around the following:**

1. Products
    a. Head end software capable of the following:
        1) Database capable, at minimum, of:
            a) 10,000 cardholders
            b) 10 Unique User roles
            c) 5 simultaneous users
            d) 1 million transaction/records/events
            e) Networked communication with head end panels (below)

2) Integration with visitor management systems, Video Management Systems (VMS), and intrusion/burglary systems.
3) Local and remote administration
4) 24/7 remote monitoring by both onsite and offsite personnel
5) Graphic User Interface (GUI) capable of displaying the following:
   a) Building Layout
   b) Devices and their location in the building
   c) Active alarms
   d) Acknowledged events
   e) Recent activity, minimum 25 events
   f) Ability to select a door or device and instantly control (temp lock/unlock, scheduled lock/unlock, recent activity/events, etc.)

b. System Controller and Reader Interfaces
1) Capable of:
   a) Networked communication via LAN and WAN
   b) Communicating and sharing a singular database
   c) Local storage of database and access levels
   d) Local (offline) operation in case of network loss
   e) Expandability to 64 modules per networked controller
   f) Alarm at minimum for tamper, comm loss, and system faults sent to Owner-defined personnel via SMS, email, or other communication method
   g) Preferred Mercury hardware
   h) OSDP *and* Wiegand comm protocol options preferred
2) Programming levels, at minimum:
   a) Door by door scheduling
   b) Grouped door scheduling
3) Controllers capable of expanding up to 64 doors on a single networked controller
4) Reader interfaces capable of operating in a “local” or “offline” mode in case of network failure.

c. Enclosures
1) Preferred access control enclosures centralize controller, reader interface modules, and power supplies in network closet or other determined area, *not* above each door.

d. Power Supplies and enclosures – provide quantities based on manufacturer’s recommendations and size requirements. Power supplies to provide power to both access control and door locking hardware.

2.2 DESCRIPTION

A. Security Access System: Workstation-based central station and field-installed controllers, connected by a high-speed electronic-data transmission network.

B. System Software: Based on 64-bit, central-station, workstation operating system, server operating system, and application software. Software shall have the following capabilities:

1. Multiuser and multitasking to allow for independent activities and monitoring to occur simultaneously at different workstations.
2. Graphical user interface to show pull-down menus and a menu-tree format that complies with interface guidelines of the operating system.
3. System license for the entire system including capability for future additions that are within the indicated system size limits specified in this Section.

4. Open-architecture system that allows importing and exporting of data and interfacing with other systems that are compatible with operating system.
5. Password-protected operator login and access.
6. Open-database-connectivity compliant.

C. Network connecting the central station and workstations shall be a LAN using TCP/IP with a capacity of connecting up to 20 workstations. System shall be portable across multiple communication platforms without changing system software.

D. Network(s) connecting workstations and controllers shall consist of one or more of the following:

1. Local area, IEEE 802.3 Fast Ethernet Gigabit-Ethernet, star topology network based on TCP/IP.
2. Local area, IEEE 802.11 compatible wireless mesh network, based on TCP/IP.

2.3 OPERATION

A. Security access system shall use a single database for access-control and credential-creation functions.

B. Distributed Processing: A fully distributed processing system.

1. Access-control information, including time, date, valid codes, access levels, and similar data, shall be downloaded to controllers so each controller can make access-control decisions.
2. Intermediate controllers for access control are prohibited.
3. In the event that communications with the central controller are lost, controllers shall automatically buffer event transactions until communications are restored, at which time buffered events shall be uploaded to the central station.

C. Number of Locations:

1. Support at least 32 separate Locations using a single workstation with combinations of direct-connect, or TCP/IP LAN connections to each Location.
2. Each Location shall have its own database and history in the central station.
3. Locations may be combined to share a common database.

D. System Network Requirements:

1. System components shall be interconnected and shall provide automatic communication of status changes, commands, field-initiated interrupts, and other communications required for proper system operation.
2. Communication shall not require operator initiation or response and shall return to normal after partial- or total-network interruption such as power loss or transient upset.
3. System shall automatically annunciate communication failures to the operator and shall identify the communications link that has experienced a partial or total failure.
4. Communications controller may be used as an interface between the central-station display systems and the field device network. Communications controller shall provide functions required to attain the specified network communications performance.

E. Central station shall provide operator interface, interaction, display, control, and dynamic and real-time monitoring. Central station shall control system networks to interconnect all system components, including workstations and field-installed controllers.

F. Field equipment shall include controllers, sensors, and controls.

1. Controllers shall serve as an interface between the central station and sensors and controls.
2. Data exchange between the central station and the controllers shall include down-line transmission of commands, software, and databases to controllers.
3. The up-line data exchange from the controller to the central station shall include status data such as intrusion alarms, status reports, and entry-control records.
4. Controllers are classified as alarm-annunciation or entry-control type.

G. False-Alarm Reduction: The design of the central station and controllers shall contain features to reduce false alarms. Equipment and software shall comply with SIA CP-01.

H. Error Detection:

1. Use a cyclic code method to detect single- and double-bit errors, burst errors of eight bits or fewer, and at least 99 percent of all other multibit and burst errors between controllers and the central station.
2. Interactive or product error-detection codes alone will not be acceptable.
3. A message shall be in error if one bit is received incorrectly.
4. Retransmit messages with detected errors.
5. Allow for an operator-assigned two-digit decimal number to each communications link representing the number of retransmission attempts.
6. Central station shall print a communication failure alarm message when the number of consecutive retransmission attempts equals the assigned quantity.
7. Monitor the frequency of data transmission failure for display and logging.

I. Data Line Supervision: System shall initiate an alarm in response to opening, closing, shorting, or grounding of data transmission lines.

J. Door Hardware Interface:

1. Comply with requirements in Section 08 7100 "Door Hardware" and Section 08 7111 "Door Hardware (Descriptive Specification)" for door hardware required to be monitored or controlled by the security access system.
2. Electrical characteristics of controllers shall match the signal and power requirements of door hardware.

2.4 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70, "National Electrical Code."

C. Comply with SIA DC-01 and SIA DC-03 and SIA DC-07.

2.5 APPLICATION SOFTWARE

A. System Software: Based on 32-bit, Microsoft Windows central-station and workstation operating system and application software.

1. Multiuser multitasking shall allow independent activities and monitoring to occur simultaneously at different workstations.
2. Graphical user interface shall show pull-down menus and a menu-tree format.
3. Capability for future additions within the indicated system size limits.
4. Open architecture that allows importing and exporting of data and interfacing with other systems that are compatible with operating system.
5. Password-protected operator login and access.

B. Peer Computer Control Software: Detect a failure of a central computer and cause the other central computer to assume control of all system functions without interruption of operation. Both central computers shall have drivers to support this mode of operation.

C. Application Software: Interface between the alarm annunciation and entry-control controllers to monitor sensors, operate displays, report alarms, generate reports, and help train system operators.

1. Reside at the central station, workstations, and controllers as required to perform specified functions.
2. Operate and manage peripheral devices.
3. Manage files for disk I/O, including creating, deleting, and copying files; and automatically maintain a directory of all files, including size and location of each sequential and random-ordered record.
4. Import custom icons into graphics to represent alarms and I/O devices.
5. Globally link I/O so that any I/O can link to any other I/O within the same Location without requiring interaction with the host workstation. This operation shall be at the controller.
6. Globally code I/O links so that any access-granted event can link to any I/O with the same Location without requiring interaction with the host workstation. This operation shall be at the controller.
7. Messages from workstation to controllers and controllers to controllers shall be on a polled network that utilizes check summing and acknowledgment of each message. Communication shall be automatically verified, buffered, and retransmitted if message is not acknowledged.
8. Selectable poll frequency and message time-out settings shall handle bandwidth and latency issues for TCP/IP, RF, and other workstation-to-controller communications methods by changing the polling frequency and the amount of time the system waits for a response.
9. Automatic and encrypted backups for database and history backups shall be automatically stored at the central-control workstation and encrypted with a nine-character alphanumeric password that must be used to restore or read data contained in backup.
10. Operator audit trail for recording and reporting all changes made to database and system software.
11. Support network protocol and topology, TCP/IP, Novel Netware, Digital Pathworks, Banyan Vines, LAN/WAN, and RAS.

D. Workstation Software:

1. Password levels shall be individually customized at each workstation to allow or disallow operator access to program functions for each Location.
2. Workstation event filtering shall allow user to define events and alarms that will be displayed at each workstation. If an alarm is unacknowledged (not handled by another workstation) for a preset amount of time, the alarm will automatically appear on the filtered workstation.

E. Controller Software:

1. Controllers shall operate as autonomous, intelligent processing units.
   a. Controllers shall make decisions about access control, alarm monitoring, linking functions, and door-locking schedules for their operation, independent of other system components.
   b. Controllers shall be part of a fully distributed processing-control network.

c. The portion of the database associated with a controller, and consisting of parameters, constraints, and the latest value or status of points connected to that controller, shall be maintained in the controller.

2. The following functions shall be fully implemented and operational within each controller:
   a. Monitoring inputs.
   b. Controlling outputs.
   c. Automatically reporting alarms to the central station.
   d. Reporting of sensor and output status to the central station on request.
   e. Maintaining real time, automatically updated by the central station at least once a day.
   f. Communicating with the central station.
   g. Executing controller resident programs.
   h. Diagnosing.
   i. Downloading and uploading data to and from the central station.

3. Controller Operations at a Location:
   a. Up to 64 controllers connected to TIA 485-A communications loop. Globally operating I/O linking and anti-passback functions between controllers within the same Location without central-station or workstation intervention. Linking and anti-passback shall remain fully functional within the same Location even when the central station or workstations are off-line.
   b. In the event of communication failure between the central station and a Location, there shall be no degradation in operations at the controllers at that Location. Controllers at each Location shall be connected to a memory buffer with a capacity to store up to 10,000 events; there shall be no loss of transactions in system history files until the buffer overflows.
   c. Buffered events shall be handled in a first-in-first-out mode of operation.

4. Individual Controller Operation:
   a. Controllers shall transmit alarms, status changes, and other data to the central station when communications circuits are operable. If communications are not available, controllers shall function in a stand-alone mode; operational data, including the status and alarm data normally transmitted to the central station, shall be stored for later transmission to the central station. Storage capacity for the latest 1024 events shall be provided at each controller.
   b. Card-reader ports of a controller shall be custom configurable for at least 120 different card-reader or keypad formats. Multiple reader or keypad formats may be used simultaneously at different controllers or within the same controller.
   c. Controllers shall provide a response to card readers or keypad entries in less than 0.25 seconds, regardless of system size.
   d. Controllers that are reset, or powered up from a nonpowered state, shall automatically request a parameter download and reboot to their proper working state. This shall happen without any operator intervention.
   e. Initial Startup: When controllers are brought on-line, database parameters shall be automatically downloaded to them. After initial download is completed, only database changes shall be downloaded to each controller.
   f. On failure for any reason, controllers shall perform an orderly shutdown and force controller outputs to a predetermined failure-mode state, consistent with the failure modes shown and the associated control device.
   g. After power is restored, following a power failure, startup software shall initiate self-test diagnostic routines, after which controllers shall resume normal operation.
   h. After controller failure, if the database and application software are no longer resident, controllers shall not restart but shall remain in the failure mode until repaired. If database and

application programs are resident, controllers shall immediately resume operation. If not, software shall be restored automatically from the central station.

5. Communications Monitoring:
   a. System shall monitor and report status of TIA 485-A communications loop of each Location.
   b. Communication status window shall display which controllers are currently communicating, a total count of missed polls since midnight, and which controller last missed a poll.
   c. Communication status window shall show the type of CPU, the type of I/O board, and the amount of RAM for each controller.

6. Operating systems shall include a real-time clock function that maintains seconds, minutes, hours, day, date, and month. The real-time clock shall be automatically synchronized with the central station at least once a day to plus or minus 10 seconds. The time synchronization shall be automatic, without operator action and without requiring system shutdown.

F. workstation-to-Controller Communications:

1. Central-station or workstation communications shall use the following:
   a. Direct connection using serial ports of the workstation.
   b. TCP/IP LAN interface cards.
   c. Dial-up or cable modems for connections to Locations.

2. Each serial port used for communications shall be individually configurable for "direct communications," "modem communications incoming and outgoing," or "modem communications incoming only," or as an ASCII output port. Serial ports shall have adjustable data transmission rates and shall be selectable under program control.
3. Use multiport communications board if more than two serial ports are needed.
   a. Use a 4-, 8-, or 16-serial port configuration that is expandable to 32- or 64-serial ports.
   b. Connect the first board to an internal PCI bus adapter card.

4. Direct serial, TCP/IP, and dial-up, cable, or satellite communications shall be alike in the monitoring or control of the system except for the connection that must first be made to a dial-up or voice-over IP Location.
5. TCP/IP network interface card (NIV) shall have an option to set the poll-frequency and message-response time-out settings.
6. Workstation-to-controller and controller-to-controller communications (direct, dial-up, or TCP/IP) shall use a polled-communication protocol that checks sum and acknowledges each message. All communications in this subparagraph shall be verified and buffered, and retransmitted if not acknowledged.

G. Direct Serial or TCP/IP workstation-to-Controller Communications:

1. Communication software on the workstation shall supervise the workstation-to-controller communications link.
2. Loss of communications to any controller shall result in an alarm at all workstations running the communication software.
3. When communications are restored, all buffered events shall automatically upload to the workstation, and any database changes shall be automatically sent to the controller.

H. Broadband Workstation-to-Controller Communications:

1. Communication software on the workstation shall supervise the workstation-to-controller communications link during dial-up modem connect times.
2. Communication software shall be programmable to routinely poll each of the remote dial-up or cable modem Locations, collecting event logs and verifying phone lines at operator-selectable time intervals for each Location.
3. System shall be programmable for dialing and connecting to all dial-up or cable modem Locations and for retrieving the accrued history transactions on an automatic basis as often as once every 10 minutes and up to once every 9999 minutes.
4. Failure to communicate to a dial-up Location three times in a row shall result in an alarm at the workstation.
5. Time offset capabilities shall be present so that Locations in a different geographical time zone than the host workstation will be set to, and maintained at, the proper local time. This feature shall allow for geographical time zones that are ahead of or behind the host workstation.
6. The controller connected to a dial-up or cable modem shall automatically buffer all normal transactions until its buffer reaches 80 percent of capacity. When the transaction buffer reaches 80 percent, the controller shall automatically initiate a call to the central station and upload all transactions.
7. Alarms shall be reported immediately.
8. Dial-up or cable modems shall be provided by manufacturer of the system. Modems used at the controller shall be powered by the controller. Power to the modem shall include battery backup if the controller is so equipped.

I. Controller-to-Controller Communications:

1. TIA 485-A, four-wire, point-to-point, regenerative (repeater) communications network methodology.
2. TIA 485-A communications signal shall be regenerated at each controller.

J. Database Downloads:

1. All data transmissions from workstations to a Location, and between controllers at a Location, shall include a complete database checksum to check the integrity of the transmission. If the data checksum does not match, a full data download shall be automatically retransmitted.
2. If a controller is reset for any reason, it shall automatically request and receive a database download from the workstation. The download shall restore data stored at the controller to their normal working state and shall take place with no operator intervention.

K. Operator Interface:

1. Inputs in system shall have two icon representations, one for the normal state and one for the abnormal state.
2. When viewing and controlling inputs, displayed icons shall automatically change to the proper icon to display the current system state in real time. Icons shall also display the input's state, whether armed or bypassed, and if the input is in the armed or bypassed state due to a time zone or a manual command.
3. Outputs in system shall have two icon representations, one for the secure (locked) state and one for the open (unlocked) state.
4. Icons displaying status of the I/O points shall be constantly updated to show their current real-time condition without prompting by the operator.
5. The operator shall be able to scroll the list of I/Os and press the appropriate toolbar button, or right click, to command the system to perform the desired function.
6. Graphic maps or drawings containing inputs, outputs, and override groups shall include the following:

a. Database to import and store full-color maps or drawings and allow for input, output, and override group icons to be placed on maps.
b. Maps to provide real-time display animation and allow for control of points assigned to them.
c. System to allow inputs, outputs, and override groups to be placed on different maps.
d. Software to allow changing the order or priority in which maps will be displayed.

7. Override Groups Containing I/Os:
   a. System shall incorporate override groups that provide the operator with the status and control over user-defined "sets" of I/Os with a single icon.
   b. Icon shall change automatically to show the live summary status of points in that group.
   c. Override group icon shall provide a method to manually control or set to time-zone points in the group.
   d. Override group icon shall allow the expanding of the group to show icons representing the live status for each point in the group, individual control over each point, and the ability to compress the individual icons back into one summary icon.

8. Schedule Overrides of I/Os and Override Groups:
   a. To accommodate temporary schedule changes that do not fall within the holiday parameters, the operator shall have the ability to override schedules individually for each input, output, or override group.
   b. Each schedule shall be composed of a minimum of two dates with separate times for each date.
   c. The first time and date shall be assigned the override state that the point shall advance to when the time and date become current.
   d. The second time and date shall be assigned the state that the point shall return to when the time and date become current.

9. Copy command in database shall allow for like data to be copied and then edited for specific requirements, to reduce redundant data entry.

L. Operator Access Control:

1. Control operator access to system controls through three password-protected operator levels. System operators and managers with appropriate password clearances shall be able to change operator levels for operators.
2. Three successive attempts by an operator to execute functions beyond their defined level during a 24-hour period shall initiate a software tamper alarm.
3. A minimum of 3 unique user accounts shall be available with the system software. System shall display the operator's name or initials in the console's first field. System shall print the operator's name or initials, action, date, and time on the system printer at login and logoff.
4. The password shall not be displayed or printed.
5. Each password shall be definable and assignable for the following:
   a. Selected commands to be usable.
   b. Access to system software.
   c. Access to application software.
   d. Individual zones that are to be accessed.
   e. Access to database.

M. Operator Commands:

1. Command Input: Plain-language words and acronyms shall allow operators to use the system without extensive training or data-processing backgrounds. System prompts shall be a word, a phrase, or an acronym.
2. Command inputs shall be acknowledged and processing shall start in not less than one second(s).
3. Tasks that are executed by operator's commands shall include the following:
    a. Acknowledge Alarms: Used to acknowledge that the operator has observed the alarm message.
    b. Place Zone in Access: Used to remotely disable intrusion-alarm circuits emanating from a specific zone. System shall be structured so that console operator cannot disable tamper circuits.
    c. Place Zone in Secure: Used to remotely activate intrusion-alarm circuits emanating from a specific zone.
    d. System Test: Allows the operator to initiate a system-wide operational test.
    e. Zone Test: Allows the operator to initiate an operational test for a specific zone.
    f. Print reports.
    g. Change Operator: Used for changing operators.
    h. Security Lighting Controls: Allows the operator to remotely turn on or turn off security lights.
    i. Display Graphics: Used to show any graphic displays implemented in the system. Graphic displays shall be completed within 20 seconds from time of operator command.
    j. Run system tests.
    k. Generate and format reports.
    l. Request help with the system operation.
        1) Include in main menus.
        2) Provide unique, descriptive, context-sensitive help for selections and functions with the press of one function key.
        3) Provide navigation to specific topic from within the first help window.
        4) Help shall be accessible outside the application program.
    m. Entry-Control Commands:
        1) Lock (secure) or unlock (open) each controlled entry and exit up to 10 times a day through time-zone programming.
        2) Arm or disarm each monitored input up to 10 times a day through time-zone programming.
        3) Enable or disable readers or keypads up to 5 times a day through time-zone programming.
        4) Enable or disable cards or codes up to 5 times a day per entry point through access-level programming.

4. Command Input Errors: Show operator input assistance when a command cannot be executed because of operator input errors. Assistance screen shall use plain-language words and phrases to explain why the command cannot be executed. Error responses that require an operator to look up a code in a manual or other document are not acceptable. Conditions causing operator assistance messages include the following:
    a. Command entered is incorrect or incomplete.
    b. Operator is restricted from using that command.
    c. Command addresses a point that is disabled or out of service.
    d. Command addresses a point that does not exist.
    e. Command is outside the system's capacity.

N. Alarms:

1. System Setup:

a. Assign manual and automatic responses to incoming-point status change or alarms.
b. Automatically respond to input with a link to other inputs, outputs, or operator-response plans; unique sound with use of WAV files; and maps or images that graphically represent the point location.
c. Sixty-character message field for each alarm.
d. Operator-response-action messages shall allow message length of at least 65,000 characters, with database storage capacity of up to 32,000 messages. Setup shall assign messages to access point.
e. Secondary messages shall be assignable by the operator for printing to provide further information and shall be editable by the operator.
f. Allow 25 secondary messages with a field of four lines of 60 characters each.
g. Store the most recent 1000 alarms for recall by the operator using the report generator.

2. Software Tamper:
a. Annunciate a tamper alarm when unauthorized changes to system database files are attempted. Three consecutive unsuccessful attempts to log onto system shall generate a software tamper alarm.
b. Annunciate a software tamper alarm when an operator or other individual makes three consecutive unsuccessful attempts to invoke functions beyond the authorization level.
c. Maintain a transcript file of the last 5000 commands entered at each central station to serve as an audit trail. System shall not allow write access to system transcript files by any person, regardless of their authorization level.
d. Allow only acknowledgment of software tamper alarms.

3. Read access to system transcript files shall be reserved for operators with the highest password authorization level available in system.
4. Animated Response Graphics: Highlight alarms with flashing icons on graphic maps; display and constantly update the current status of alarm inputs and outputs in real time through animated icons.
5. Alarm Handling: Each input may be configured so that an alarm cannot be cleared unless it has returned to normal, with options of requiring the operator to enter a comment about disposition of alarm. Allow operator to silence alarm sound when alarm is acknowledged.
6. Alarm Automation Interface: High-level interface to central-station alarm automation software systems. Allows input alarms to be passed to and handled by automation systems in the same manner as burglar alarms, using a TIA 232-F ASCII interface.
7. CCTV Alarm Interface: Allow commands to be sent to CCTV systems during alarms (or input change of state) through serial ports.
8. Camera Control: Provides operator ability to select and control cameras from graphic maps.

O. Alarm Monitoring: Monitor sensors, controllers, and DTS circuits and notify operators of an alarm condition. Display higher-priority alarms first and, within alarm priorities, display the oldest unacknowledged alarm first. Operator acknowledgment of one alarm shall not be considered acknowledgment of other alarms nor shall it inhibit reporting of subsequent alarms.

1. Displayed alarm data shall include type and location of alarm.Printed alarm data shall include type of alarm, location of alarm, date and time (to nearest second) of occurrence, and operator responses.
2. Maps shall automatically display the alarm condition for each input assigned to that map if that option is selected for that input location.
3. Alarms initiate a status of "pending" and require the following two handling steps by operators:
a. First Operator Step: "Acknowledged." This action shall silence sounds associated with the alarm. The alarm remains in the system "Acknowledged" but "Un-Resolved."

b. Second Operator Step: Operators enter the resolution or operator comment, giving the disposition of the alarm event. The alarm shall then clear.

4. Each workstation shall display the total pending alarms and total unresolved alarms.
5. Each alarm point shall be programmable to disallow the resolution of alarms until the alarm point has returned to its normal state.
6. Alarms shall transmit to the central station in real time except for allowing connection time for dial-up locations.
7. Alarms shall be displayed and managed from a minimum of four different windows.
   a. Input Status Window: Overlay status icon with a large red blinking icon. Selecting the icon will acknowledge the alarm.
   b. History Log Transaction Window: Display name, time, and date in red text. Selecting red text will acknowledge the alarm.
   c. Alarm Log Transaction Window: Display name, time, and date in red. Selecting red text will acknowledge the alarm.
   d. Graphic Map Display: Display a steady colored icon representing each alarm input location. Change icon to flashing red when the alarm occurs. Change icon from flashing red to steady red when the alarm is acknowledged.
8. Once an alarm is acknowledged, the operator shall be prompted to enter comments about the nature of the alarm and actions taken. Operator's comments may be manually entered or selected from a programmed predefined list, or a combination of both.
9. For locations where there are regular alarm occurrences, provide programmed comments. Selecting that comment shall clear the alarm.
10. The time and name of the operator who acknowledged and resolved the alarm shall be recorded in the database.
11. Identical alarms from the same alarm point shall be acknowledged at the same time the operator acknowledges the first alarm. Identical alarms shall be resolved when the first alarm is resolved.
12. Alarm functions shall have priority over downloading, retrieving, and updating database from workstations and controllers.
13. When a reader-controlled output (relay) is opened, the corresponding alarm point shall be automatically bypassed.

P. Monitor Display: Display text and graphic maps that include zone status integrated into the display. Colors are used for the various components and current data. Colors shall be uniform throughout the system.

1. Color Code:
   a. FLASHING RED: Alerts operator that a zone has gone into an alarm or that primary power has failed.
   b. STEADY RED: Alerts operator that a zone is in alarm and alarm has been acknowledged.
   c. YELLOW: Advises operator that a zone is in access.
   d. GREEN: Indicates that a zone is secure and that power is on.
2. Graphics:
   a. Support 32,000 graphic display maps and allow import of maps from a minimum of 16 standard formats from another drawing or graphics program.
   b. Allow I/O to be placed on graphic maps by the drag-and-drop method.
   c. Operators shall be able to view the inputs, outputs, and the point's name by moving the mouse cursor over the point on the graphic map.
   d. Inputs or outputs may be placed on multiple graphic maps. The operator shall be able to toggle to view graphic maps associated with I/Os.

e. Each graphic map shall have a display-order sequence number associated with it to provide a predetermined order when toggled to different views.
f. Camera icons shall have the ability to be placed on graphic maps that, when selected by an operator, will open a video window, display the camera associated with that icon, and provide pan-tilt-zoom control.
g. Input, output, or camera placed on a map shall allow the ability to arm or bypass an input, open or secure an output, or control the pan-tilt-zoom function of the selected camera.

Q. System test software enables operators to initiate a test of the entire system or of a particular portion of the system.

1. Test Report: The results of each test shall be stored for future display or printout. The report shall document the operational status of system components.

R. Report-Generator Software: Include commands to generate reports for displaying, printing, and storing on disk and tape. Reports shall be stored by type, date, and time. Report printing shall be the lowest-priority activity. Report-generation mode shall be operator selectable but set up initially as periodic, automatic, or on request. Include time and date printed and the name of operator generating the report. Report formats may be configured by operators.

1. Automatic Printing: Setup shall specify, modify, or inhibit the report to be generated; the time the initial report is to be generated; the time interval between reports; the end of the period; and the default printer.
2. Printing on Request: An operator may request a printout of any report.
3. Alarm Reports: Reporting shall be automatic as initially set up. Include alarms recorded by system over the selected time and information about the type of alarm (such as door alarm, intrusion alarm, tamper alarm, etc.), the type of sensor, the location, the time, and the action taken.
4. Access and Secure Reports: Document zones placed in access, the time placed in access, and the time placed in secure mode.
5. Custom Reports: Reports tailored to exact requirements of who, what, when, and where. As an option, custom report formats may be stored for future printing.
6. Automatic History Reports: Named, saved, and scheduled for automatic generation.
7. Cardholder Reports: Include data, or selected parts of the data, as well as the ability to be sorted by name, card number, imprinted number, or by any of the user-defined fields.
8. Cardholder by Reader Reports: Based on who has access to a specific reader or group of readers by selecting the readers from a list.
9. Cardholder by Access-Level Reports: Display everyone that has been assigned to the specified access level.
10. Who Is "In" (Muster) Report:
    a. Emergency Muster Report: One-click operation on toolbar launches report.
    b. Cardholder Report. Contain a count of persons who are "In" at a selected Location and a detailed listing of name, date, and time of last use, sorted by the last reader used or by the group assignment.

11. Panel Labels Reports: Printout of control-panel field documentation including the actual location of equipment, programming parameters, and wiring identification. Maintain system installation data within system database so that data are available on-site at all times.
12. History Reports: Custom reports that allow the operator to select any date, time, event type, device, output, input, operator, Location, name, or cardholder to be included or excluded from the report.
    a. Initially store history on the hard disk of the host workstation.
    b. Permit viewing of the history on workstations or print history to any system printer.

c. The report shall be definable by a range of dates and times with the ability to have a daily start and stop time over a given date range.
d. Each report shall depict the date, time, event type, event description, and device; or I/O name, cardholder group assignment, and cardholder name or code number.
e. Each line of a printed report shall be numbered to ensure that the integrity of the report has not been compromised.
f. Total number of lines of the report shall be given at the end of the report. If the report is run for a single event such as "Alarms," the total shall reflect how many alarms occurred during that period.

13. Reports shall have the following four options:
    a. View on screen.
    b. Print to system printer. Include automatic print spooling and "Print To" options if more than one printer is connected to the system.
    c. "Save to File" with full path statement.
    d. System shall have the ability to produce a report indicating status of system inputs and outputs or of inputs and outputs that are abnormal, out of time zone, manually overridden, not reporting, or in alarm.

14. Custom Code List Subroutine: Allow the access codes of system to be sorted and printed according to the following criteria:
    a. Active, inactive, or future activate or deactivate.
    b. Code number, name, or imprinted card number.
    c. Group, Location access levels.
    d. Start and stop code range.
    e. Codes that have not been used since a selectable number of days.
    f. In, out, or either status.
    g. Codes with trace designation.

15. The reports of system database shall allow options so that every data field may be printed.
16. The reports of system database shall be constructed so that the actual position of the printed data shall closely match the position of the data on the data-entry windows.

S. Anti-Passback:

1. System shall have global and local anti-passback features, selectable by Location. System shall support hard and soft anti-passback.
2. Hard Anti-Passback: Once a credential holder is granted access through a reader with one type of designation (IN or OUT), the credential holder may not pass through that type of reader designation until the credential holder passes through a reader of opposite designation.
3. Soft Anti-Passback: Should a violation of the proper IN or OUT sequence occur, access shall be granted, but a unique alarm shall be transmitted to the control station, reporting the credential holder and the door involved in the violation. A separate report may be run on this event.
4. Timed Anti-Passback: A controller capability that prevents an access code from being used twice at the same device (door) within a user-defined amount of time.
5. Provide four separate zones per Location that can operate without requiring interaction with the host workstation (done at controller). Each reader shall be assignable to one or all four anti-passback zones. In addition, each anti-passback reader can be further designated as "Hard," "Soft," or "Timed" in each of the four anti-passback zones. The four anti-passback zones shall operate independently.
6. The anti-passback schemes shall be definable for each individual door.
7. The Master Access Level shall override anti-passback.

8. System shall have the ability to forgive (or reset) an individual credential holder or the entire credential-holder population anti-passback status to a neutral status.

T. Visitor Assignment:

1. Provide for and allow an operator to be restricted to only working with visitors. The visitor badging subsystem shall assign credentials and enroll visitors. Allow only those access levels that have been designated as approved for visitors.
2. Provide an automated log of visitor name, time and doors accessed, and name of person contacted.
3. Allow a visitor designation to be assigned to a credential holder.
4. Security access system shall be able to restrict the access levels that may be assigned to credentials issued to visitors.
5. Allow operator to recall visitors' credential-holder file once a visitor is enrolled in the system.
6. The operator may designate any reader as one that deactivates the credential after use at that reader. The history log shall show the return of the credential.
7. System shall have the ability to use the visitor designation in searches and reports. Reports shall be able to print all or any visitor activity.

U. Training Software: Enables operators to practice system operation, including alarm acknowledgment, alarm assessment, response force deployment, and response force communications. System shall continue normal operation during training exercises and shall terminate exercises when an alarm signal is received at the console.

V. Entry-Control Enrollment Software: Database management functions that allow operators to add, delete, and modify access data as needed.

1. The enrollment station shall not have alarm response or acknowledgment functions.
2. Provide multiple, password-protected access levels. Database management and modification functions shall require a higher operator access level than personnel enrollment functions.
3. The program shall provide means to disable the enrollment station when it is unattended, to prevent unauthorized use.
4. The program shall provide a method to enter personnel identifying information into the entry-control database files through enrollment stations. In the case of personnel identity-verification subsystems, . Allow entry of personnel identifying information into the system database using menu selections and data fields. The data field names shall be customized during setup to suit user and site needs. Personnel identity-verification subsystems selected for use with the system shall fully support the enrollment function and shall be compatible with the entry-control database files.
5. Cardholder Data: Provide 99 user-defined fields. System shall have the ability to run searches and reports using any combination of these fields. Each user-defined field shall be configurable, using any combination of the following features:
    a. MASK: Determines a specific format with which data must comply.
    b. REQUIRED: Operator is required to enter data into field before saving.
    c. UNIQUE: Data entered must be unique.
    d. DEACTIVATE DATE: Data entered will be evaluated as an additional deactivate date for all cards assigned to this cardholder.
    e. NAME ID: Data entered will be considered a unique ID for the cardholder.

6. Personnel Search Engine: A report generator with capabilities such as search by last name, first name, group, or any predetermined user-defined data field; by codes not used in definable number of days; by skills; or by seven other methods.

7. Multiple Deactivate Dates for Cards: User-defined fields to be configured as additional stop dates to deactivate any cards assigned to the cardholder.
8. Batch card printing.
9. Default card data can be programmed to speed data entry for sites where most card data are similar.
10. Enhanced ASCII File Import Utility: Allows the importing of cardholder data and images.
11. Card Expire Function: Allows readers to be configured to deactivate cards when a card is used at selected devices.

2.6 SYSTEM DATABASE

A. Database and database management software shall define and modify each point in database using operator commands. Definition shall include parameters and constraints associated with each system device.

B. Database Operations:

1. System data management shall be in a hierarchical menu-tree format, with navigation through expandable menu branches and manipulated with use of menus and icons in a main menu and system toolbar.
2. Navigational Aids:
   a. Toolbar icons for add, delete, copy, print, capture image, activate, deactivate, and muster report.
   b. Point and click feature to facilitate data manipulation.
   c. Next and previous command buttons visible when editing database fields to facilitate navigation from one record to the next.
   d. Copy command and copy tool in the toolbar to copy data from one record to create a new similar record.
3. Data entry shall be automatically checked for duplicate and illegal data and shall be verified for valid format.
4. System shall generate a memo or note field for each item that is stored in database, allowing the storing of information about any defining characteristics of the item. Memo field is used for noting the purpose for which the item was entered, reasons for changes that were made, and the like.

C. File Management:

1. File management shall include database backup and restoration system, allowing selection of storage media, including 3.5-inch floppy disk, Zip and Jaz drives, and designated network resources.
2. Operations shall be both manual and automatic modes. The number of automatic sequential backups before the oldest backup will be overwritten; FIFO mode shall be operator selectable.
3. Backup program shall provide manual operation from any workstation on the LAN and shall operate while system remains operational.

D. Operator Passwords:

1. Support up to 32,000 individual system operators, each with a unique password.
2. One to eight alphanumeric characters.
3. Allow passwords to be case sensitive.
4. Passwords shall not be displayed when entered.

5. Passwords shall have unique and customizable password profile, and allow several operators to share a password profile. Include the following features in the password profile:
   a. Predetermine the highest-level password profile for access to all functions and areas of program.
   b. Allow or disallow operator access to any program operation, including the functions of View, Add, Edit, and Delete.
   c. Restrict doors to which an operator can assign access.

6. Operators shall use a user name and password to log on to system. This user name and password shall be used to access database areas and programs as determined by the associated profile.
7. Make provision to allow the operator to log off without fully exiting program. User may be logged off but program will remain running while displaying the login window for the next operator.

E. Access Card/Code Operation and Management: Access authorization shall be by card, by a manually entered code (PIN), or by a combination of both (card plus PIN).

1. Access authorization shall verify the facility code first, the card or card-and-PIN validation second, and the access level (time of day, day of week, date), anti-passback status, and number of uses last.
2. Use data-entry windows to view, edit, and issue access levels. Access-authorization entry-management system shall maintain and coordinate all access levels to prevent duplication or the incorrect creation of levels.
3. Allow assignment of multiple cards/codes to a cardholder.
4. Allow assignment of up to four access levels for each Location to a cardholder. Each access level may contain any combination of doors.
5. Each door may be assigned four time zones.
6. Access codes may be up to 11 digits in length.
7. Software shall allow the grouping of locations so cardholder data can be shared by all locations in the group.
8. Visitor Access: Issue a visitor badge for data tracking or photo ID purposes without assigning that person a card or code.
9. Cardholder Tracing: Allow for selection of cardholder for tracing. Make a special audible and visible annunciation at control station when a selected card or code is used at a designated code reader. Annunciation shall include an automatic display of the cardholder image.
10. Allow each cardholder to be given either an unlimited number of uses or a number from one to 9999 that regulates the number of times the card can be used before it is automatically deactivated.
11. Provide for cards and codes to be activated and deactivated manually or automatically by date. Provide for multiple deactivate dates to be preprogrammed.

F. Security Access Integration:

1. Photo ID badging and photo verification shall use the same database as the security access and may query data from cardholder, group, and other personal information to build a custom ID badge.
2. Automatic or manual image recall and manual access based on photo verification shall also be a means of access verification and entry.
3. System shall allow sorting of cardholders together by group or other characteristic for a fast and efficient method of reporting on, and enabling or disabling, cards or codes.

G. Operator Comments:

1. With the press of one appropriate button on the toolbar, the user shall be permitted to enter operator comments into the history at any time.

2. Automatic prompting of operator comment shall occur before the resolution of each alarm.
3. Operator comments shall be recorded by time, date, and operator number.
4. Comments shall be sorted and viewed through reports and history.
5. The operator may enter comments in two ways; either or both may be used:
   a. Manually entered through keyboard data entry (typed), up to 65,000 characters per each alarm.
   b. Predefined and stored in database for retrieval on request.
6. System shall have a minimum of 999 predefined operator comments with up to 30 characters per comment.

H. Group:

1. Group names may be used to sort cardholders into groups that allow the operator to determine the tenant, vendor, contractor, department, division, or any other designation of a group to which the person belongs.
2. System software shall have the capacity to assign one of 32,000 group names to an access authorization.
3. Make provision in software to deactivate and reactivate all access authorizations assigned to a particular group.
4. Allow sorting of history reports and code list printouts by group name.

I. Time Zones:

1. Each zone consists of a start and stop time for seven days of the week and three holiday schedules. A time zone is assigned to inputs, outputs, or access levels to determine when an input shall automatically arm or disarm, when an output automatically opens or secures, or when access authorization assigned to an access level will be denied or granted.
2. Up to four time zones may be assigned to inputs and outputs to allow up to four arm or disarm periods per day or four lock or unlock periods per day; up to three holiday override schedules may be assigned to a time zone.
3. Data-entry window shall display a dynamically linked bar graph showing active and inactive times for each day and holiday, as start and stop times are entered or edited.
4. System shall have the capacity for 2048 time zones for each Location.

J. Holidays:

1. Three different holiday schedules may be assigned to a time zone. Holiday schedule consists of date in format MM/DD/YYYY and a description. When the holiday date matches the current date of the time zone, the holiday schedule replaces the time-zone schedule for that 24-hour period.
2. System shall have the capacity for 32,000 holidays.
3. Three separate holiday schedules may be applied to a time zone.
4. Holidays have an option to be designated as occurring on the designated date each year. These holidays remain in the system and will not be purged.
5. Holidays not designated to occur each year shall be automatically purged from the database after the date expires.

K. Access Levels:

1. System shall allow for the creation of up to 32,000 access levels.

2. One level shall be predefined as the Master Access Level. The Master Access Level shall work at all doors at all times and override any anti-passback.
3. System shall allow for access to be restricted to any area by reader and by time. Access levels shall determine when and where an Identifier is authorized.
4. System shall be able to create multiple door and time-zone combinations under the same access level so that an Identifier may be valid during different time periods at different readers even if the readers are on the same controller.

L. User-Defined Fields:

1. System shall provide a minimum of 99 user-defined fields, each with up to 50 characters, for specific information about each credential holder.
2. System shall accommodate a title for each field; field length shall be 20 characters.
3. A "Required" option may be applied to each user-defined field that, when selected, forces the operator to enter data in the user-defined field before the credential can be saved.
4. A "Unique" option may be applied to each user-defined field that, when selected, will not allow duplicate data from different credential holders to be entered.
5. Data format option may be assigned to each user-defined field that will require the data to be entered with certain character types in specific spots in the field entry window.
6. A user-defined field, if selected, will define the field as a deactivate date. The selection shall automatically cause the data to be formatted with the windows MM/DD/YYYY date format. The credential of the holder will be deactivated on that date.
7. A search function shall allow any one user-defined field or combination of user-defined fields to be searched to find the appropriate cardholder. The search function shall include a search for a character string.
8. System shall have the ability to print cardholders based on and organized by the user-defined fields.

2.7 SURGE AND TAMPER PROTECTION

A. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor-entry connection to components.

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Section 26 4313 "Surge Protection for Low-Voltage Electrical Power Circuits."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Section 26 4313 "Surge Protection for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.

B. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station control-unit alarm display shall identify tamper alarms and indicate locations.

2.8 CONTROLLERS

A. Controllers: Intelligent peripheral control unit, complying with UL 294, that stores time, date, valid codes, access levels, and similar data downloaded from the central station or workstation for controlling its operation.

B. Subject to compliance with requirements in this article, manufacturers may use multipurpose controllers.

C. Battery Backup: Sealed, lead acid; sized to provide run time during a power outage of 90 minutes, complying with UL 924.

D. Alarm Annunciation Controller:

1. The controller shall automatically restore communication within 10 seconds after an interruption with the field device network.
    a. Inputs: Monitor dry contacts for changes of state that reflect alarm conditions. Provides at least eight alarm inputs, which are suitable for wiring as normally open or normally closed contacts for alarm conditions.
    b. Alarm-Line Supervision:
        1) Supervise the alarm lines by monitoring each circuit for changes or disturbances in the signal, and for conditions as described in UL 1076 for line security equipment by monitoring for abnormal open, grounded, or shorted conditions using dc change measurements. System shall initiate an alarm in response to an abnormal current, which is a dc change of 5 percent or more for longer than 500 ms.
        2) Transmit alarm-line-supervision alarm to the central station during the next interrogation cycle after the abnormal current condition.
    c. Outputs: Managed by central-station software.

2. Auxiliary Equipment Power: A GFI service outlet inside the controller enclosure.

E. Entry-Control Controller:

1. Function: Provide local entry-control functions including one- and two-way communications with access-control devices such as card readers, keypads, door strikes, magnetic latches, gate and door operators, and exit push buttons.
    a. Operate as a stand-alone portal controller using the downloaded database during periods of communication loss between the controller and the field-device network.
    b. Accept information generated by the entry-control devices; automatically process this information to determine valid identification of the individual present at the portal:
        1) On authentication of the credentials or information presented, check privileges of the identified individual, allowing only those actions granted as privileges.
        2) Privileges shall include, but are not limited to, time of day control, day of week control, group control, and visitor escort control.
    c. Maintain a date-, time-, and Location-stamped record of each transaction. A transaction is defined as any successful or unsuccessful attempt to gain access through a controlled portal by the presentation of credentials or other identifying information.

2. Inputs:
    a. Data from entry-control devices; use this input to change modes between access and secure.
    b. Database downloads and updates from the central station that include enrollment and privilege information.

3. Outputs:
    a. Indicate success or failure of attempts to use entry-control devices and make comparisons of presented information with stored identification information.
    b. Grant or deny entry by sending control signals to portal-control devices and mask intrusion-alarm annunciation from sensors stimulated by authorized entries.

c. Maintain a date-, time-, and Location-stamped record of each transaction and transmit transaction records to the central station.
d. Door Prop Alarm: If a portal is held open for longer than 60 seconds, alarm sounds.

4. With power supplies sufficient to power at voltage and frequency required for field devices and portal-control devices.
5. Data Line Problems: For periods of loss of communication with the central station, or when data transmission is degraded and generating continuous checksum errors, the controller shall continue to control entry by accepting identifying information, making authentication decisions, checking privileges, and controlling portal-control devices.
   a. Store up to 1000 transactions during periods of communication loss between the controller and access-control devices for subsequent upload to the central station on restoration of communication.

6. Controller Power: NFPA 70, Class II power-supply transformer, with 12- or 24-V ac secondary, backup battery and charger.
   a. Backup Battery: Premium, valve-regulated, recombinant-sealed, lead-calcium battery; spill proof; with a full one-year warranty and a pro rata 19-year warranty. With single-stage, constant-voltage-current, limited battery charger, comply with battery manufacturer's written instructions for battery terminal voltage and charging current recommendations for maximum battery life.
   b. Backup Battery: Valve-regulated, recombinant-sealed, lead-acid battery; spill proof. With single-stage, constant-voltage-current, limited battery charger, comply with battery manufacturer's written instructions for battery terminal voltage and charging current recommendations for maximum battery life.
   c. Backup Power-Supply Capacity: 90 minutes of battery supply. Submit battery and charger calculations.
   d. Power Monitoring: Provide manual, dynamic battery-load test, initiated and monitored at the control center; with automatic disconnection of the controller when battery voltage drops below controller limits. Report by using local controller-mounted digital displays and by communicating status to central station. Indicate normal power on and battery charger on trickle charge. Indicate and report the following:
      1) Trouble Alarm: Normal power-off load assumed by battery.
      2) Trouble Alarm: Low battery.
      3) Alarm: Power off.

2.9 DOOR AND GATE HARDWARE INTERFACE

A. Exit Device with Alarm: Operation of the exit device shall generate an alarm. Exit device and alarm contacts are specified in Section 08 7100 "Door Hardware."

B. Exit Alarm: Operation of a monitored door shall generate an alarm. Exit devices and alarm contacts are specified in Section 08 7100 "Door Hardware."

C. Electric Door Strikes: Use end-of-line resistors to provide power-line supervision. Signal switches shall transmit data to controller to indicate when the bolt is not engaged and the strike mechanism is unlocked, and they shall report a forced entry. Power and signal shall be from the controller. Electric strikes are specified in Section 08 7100 "Door Hardware."

D. Electromagnetic Locks: End-of-line resistors shall provide power-line supervision. Lock status sensing signal shall positively indicate door is secure. Power and signal shall be from the controller. Electromagnetic locks are specified in Section 08 7100 "Door Hardware."

E. Vehicle Gate Operator: Interface electrical operation of gate with controls in this Section. Vehicle gate operators shall be connected, monitored, and controlled by the security access controllers. Vehicle gate and accessories are specified in Section 32 3113 "Chain Link Fences and Gates."

2.10 FIELD-PROCESSING SOFTWARE

A. Operating System:

1. Local processors shall contain an operating system that controls and schedules that local processor's activities in real time.
2. Local processor shall maintain a point database in its memory that includes parameters, constraints, and the latest value or status of all points connected to that local processor.
3. Execution of local processor application programs shall utilize the data in memory resident files.
4. Operating system shall include a real-time clock function that maintains the seconds, minutes, hours, date, and month, including day of the week.
5. Local processor real-time clock shall be automatically synchronized with the central station at least once per day to plus or minus 10 seconds (the time synchronization shall be accomplished automatically, without operator action and without requiring system shutdown).

B. Startup Software:

1. Causes automatic commencement of operation without human intervention, including startup of all connected I/O functions.
2. Local processor restart program based on detection of power failure at the local processor shall be included in the local processor software.
3. Initiates operation of self-test diagnostic routines.
4. Upon failure of the local processor, if the database and application software are no longer resident, the local processor shall not restart and systems shall remain in the failure mode indicated until the necessary repairs are made.
5. If the database and application programs are resident, the local processor shall immediately resume operation.

C. Operating Mode:

1. Local processors shall control and monitor inputs and outputs as specified, independent of communications with the central station or designated workstations.
2. Alarms, status changes, and other data shall be transmitted to the central station or designated workstations when communications circuits are operable.
3. If communications are not available, each local processor shall function in a stand-alone mode and operational data, including the status and alarm data normally transmitted to the central station or designated workstations, shall be stored for later transmission to the central station or designated workstations.
4. Storage for the latest 4000 events shall be provided at local processors, as a minimum.
5. Local processors shall accept software downloaded from the central station.
6. Panel shall support flash ROM technology to accomplish firmware downloads from a central location.

D. Failure Mode: Upon failure for any reason, each local processor shall perform an orderly shutdown and force all local processor outputs to a predetermined (failure-mode) state, consistent with the failure modes shown and the associated control device.

E. Functions:

1. Monitoring of inputs.
2. Control of outputs.
3. Reporting of alarms automatically to the central station.
4. Reporting of sensor and output status to central station upon request.
5. Maintenance of real time, automatically updated by the central station at least once a day.
6. Communication with the central station.
7. Execution of local processor resident programs.
8. Diagnostics.
9. Download and upload data to and from the central station.

2.11 FIELD-PROCESSING HARDWARE

A. Alarm Annunciation Local Processor:

1. Respond to interrogations from the field device network, recognize and store alarm status inputs until they are transmitted to the central station, and change outputs based on commands received from the central station.
2. Local processor shall also automatically restore communication within 10 seconds after an interruption with the field device network and provide dc line supervision on each of its alarm inputs.
3. Local processor inputs shall monitor dry contacts for changes of state that reflect alarm conditions.
4. Local processor shall have at least eight alarm inputs which allow wiring contacts as normally open or normally closed for alarm conditions; and shall provide line supervision for each input by monitoring each input for abnormal open, grounded, or shorted conditions using dc current change measurements.
5. Local processor shall report line supervision alarms to the central station.
6. Alarms shall be reported for any condition that remains abnormal at an input for longer than 500 milliseconds.
7. Alarm condition shall be transmitted to the central computer during the next interrogation cycle.
8. Local processor outputs shall reflect the state of commands issued by the central station.
9. Outputs shall be a form C contact and shall include normally open and normally closed contacts.
10. Local processor shall have at least four command outputs.
11. Local processor shall be able to communicate with the central station via RS-485 or TCP/IP as a minimum.

B. Processor Power Supply:

1. Local processor and sensors shall be powered from an uninterruptible power source.
2. Uninterruptible power source shall provide eight hours of battery back-up power in the event of primary power failure and shall automatically fully recharge the batteries within 12 hours after primary power is restored.
3. If the facility is without an emergency generator, the uninterruptible power source shall provide 24 hours of battery backup power.
4. There shall be no equipment malfunctions or perturbations or loss of data during the switch from primary to battery power and vice versa.

5. Batteries shall be sealed, non-outgassing type.
6. Power supply shall be equipped with an indicator for ac input power and an indicator for dc output power.
7. Loss of primary power shall be reported to the central station as an alarm.

C. Auxiliary Equipment Power: A GFI service outlet shall be furnished inside the local processor's enclosure.

D. Entry-Control Local Processor:

1. Entry-control local processor shall respond to interrogations from the field device network, recognize and store alarm status inputs until they are transmitted to the central station, and change outputs based on commands received from the central station.
2. Local processor shall also automatically restore communication within 10 seconds after an interruption with the field device network and provide dc line supervision on each of its alarm inputs.
3. Entry-control local processor shall provide local entry-control functions including communicating with field devices such as card readers, keypads, door strikes, magnetic latches, gate and door operators, and exit push buttons.
4. Processor shall also accept data from entry-control field devices as well as database downloads and updates from the central station that include enrollment and privilege information.
5. Processor shall send indications of successful or failed attempts to use entry-control field devices and shall make comparisons of presented information with stored identification information.
6. Processor shall grant or deny entry by sending control signals to portal-control devices and mask intrusion-alarm annunciation from sensors stimulated by authorized entries.
7. Entry-control local processor shall use inputs from entry-control devices to change modes between access and secure.
8. Local processor shall maintain a date-time- and location-stamped record of each transaction and transmit transaction records to the central station.
9. Processor shall operate as a stand-alone portal controller using the downloaded database during periods of communication loss between the local processor and the central station.
10. Processor shall store a minimum of 4000 transactions during periods of communication loss between the local processor and the central station for subsequent upload to the central station upon restoration of communication.
11. Local processor inputs shall monitor dry contacts for changes of state that reflect alarm conditions.
12. Local processor shall have at least eight alarm inputs which allow wiring contacts as normally open or normally closed for alarm conditions; and shall also provide line supervision for each input by monitoring each input for abnormal open, grounded, or shorted conditions using dc current change measurements.
13. Local processor shall report line supervision alarms to the central station.
14. Alarms shall be reported for any condition that remains abnormal at an input for longer than 500 ms.
15. Alarm condition shall be transmitted to the central station during the next interrogation cycle.
16. Entry-control local processor shall include the necessary software drivers to communicate with entry-control field devices. Information generated by the entry-control field devices shall be accepted by the local processor and automatically processed to determine valid identification of the individual present at the portal.
17. Upon authentication of the credentials or information presented, the local processor shall automatically check privileges of the identified individual, allowing only those actions granted as privileges.
18. Privileges shall include, but are not limited to, time of day control, day of week control, group control, and visitor escort control. The local processor shall maintain a date-time- and location-stamped record of each transaction.

19. Transaction is defined as any successful or unsuccessful attempt to gain access through a controlled portal by the presentation of credentials or other identifying information.
20. Local processor outputs shall reflect the state of commands issued by the central station.
21. Outputs shall be a form C contact and shall include normally open and normally closed contacts.
22. Local processor shall have at least four addressable outputs.
23. The entry-control local processor shall also provide control outputs to portal-control devices.
24. Local processor shall be able to communicate with the central station via RS-485 or TCP/IP as a minimum.
25. The system manufacturer shall provide strategies for downloading database information for panel configurations and cardholder data to minimize the required download time when using IP connectivity.

2.12 TRANSFORMERS

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

B. Examine roughing-in for LAN and control cable conduit systems to workstations, controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with recommendations in SIA CP-01.

B. Comply with TIA 606-B, "Administration Standard for Commercial Telecommunications Infrastructure."

C. Product Schedules: Obtain detailed product schedules from manufacturer of access-control system or develop product schedules to suit Project. Fill in all data available from Project plans and specifications and publish as Product Schedules for review and approval.

1. Record setup data for control station and workstations.
2. For each Location, record setup of controller features and access requirements.
3. Propose start and stop times for time zones and holidays, and match up access levels for doors.
4. Assign action message names and compose messages.
5. Set up alarms. Establish interlocks between alarms, intruder detection, and video surveillance features.
6. Prepare and install alarm graphic maps.

7. Develop user-defined fields.
8. Develop screen layout formats.
9. Discuss badge layout options; design badges.
10. Complete system diagnostics and operation verification.
11. Prepare a specific plan for system testing, startup, and demonstration.
12. Develop acceptance test concept and, on approval, develop specifics of the test.
13. Develop cable and asset-management system details; input data from construction documents. Include system schematics and Visio Technical Drawings in electronic format.

D. In meetings with Architect and Owner, present Product Schedules and review, adjust, and prepare final setup documents. Use approved, final Product Schedules to set up system software.

3.3 IDENTIFICATION

A. In addition to requirements in this article, comply with applicable requirements in Section 27 0553 "Identification for Communications Systems" and with TIA 606-B.

B. Using software specified in "Cable and Asset Management Software" Article, develop cable administration drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with the same designation. Use logical and systematic designations for facility's architectural arrangement.

C. Label each panel with the readers and inputs/outputs controlled by the controller.

D. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

1. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
2. Each wire connected to building-mounted devices is not required to be numbered at the device if the color of the wire is consistent with the associated wire connected and numbered within the panel or cabinet.

E. At completion, cable and asset management software shall reflect as-built conditions.

3.4 SYSTEM SOFTWARE AND HARDWARE

A. Develop, install, and test software and hardware, and perform database tests for the complete and proper operation of systems involved. Assign software license to Owner.

B. Coordinate database integration with Owner of each system.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to supervise and assist with startup service.

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

2. Enroll and prepare badges and access cards for Owner's operators, management, and security personnel.
3. Train personnel pursuant to 3.7 Demonstration.

3.6 PROTECTION

A. Maintain strict security during the installation of equipment and software. Rooms housing the control station, and workstations that have been powered up shall be locked and secured with an activated burglar alarm and access-control system reporting to a central station complying with UL 1610, "Central-Station Burglar-Alarm Units," during periods when a qualified operator in the employ of Contractor is not present.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain security access system. See Section 01 7900 "Demonstration and Training."

B. Develop separate training modules for the following:

1. Computer system administration personnel to manage and repair the LAN and databases and to update and maintain software.
2. Operators who prepare and input credentials to man the control station and workstations and to enroll personnel.
3. Security personnel.
4. Hardware maintenance personnel.
5. Other administration staff, e.g. facilities director

END OF SECTION 28 1400

SECTION 28 1500 - ACCESS CONTROL HARDWARE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Card readers, credential cards, and keypads
2. Access control peripheral devices
3. Electrified locking devices and accessories
4. Lockdown controls and signals
5. Cables
6. Transformers

B. Related Requirements:

1. Section 08 7100 “Door Hardware” for information on power supply specifications and door sequence of operations.
2. Section 25 5000 “Integrated Automation Facility Controls” for integration with BMS/HVAC systems.
3. Section 28 1300 "Access Control System Software and Database Management" for control and monitoring applications, workstations, and interfaces.
4. Section 28 1523 “Intercom Entry Systems” for interface with intercom system.
5. Section 28 2000 “Video Surveillance” for integration with surveillance system.
6. Section 28 3100 “Fire Detection and Alarm” for integration with fire system.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Device layout information, including the following:
   a. Lockdown devices, including signal lights and initiation controls.
      1) Wiring diagrams indicating their connection to the access control system.
   b. Initial wiring diagrams and connections between all devices requiring relays to/from the access control system, including:
      1) Access control intercom (reference specification section 28 1353)
      2) Access control release buttons and toggle switches
      3) Lockdown systems
      4) Dialing and signaling requirements on lockdown events

2. Initial access control programming schedules for unlock/lock times.

3. Diagrams for cable management system.
4. System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 2 and 3.
5. Wall plate options: provide cutsheets of all wall plate types for signal controls.
6. Wiring Diagrams. For power, signal, and control wiring. Show typical wiring schematics including the following:
   a. Workstation outlets, jacks, and jack assemblies.
   b. Patch cords.
   c. Patch panels.
7. Cable Administration Drawings: As specified in "Identification" Article.
8. Battery and charger calculations for central station, workstations, and controllers.

C. Product Schedules.

D. Samples: For workstation outlets, jacks, jack assemblies, and faceplates. For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses of all kinds, power and electronic, equal to 10 percent of amount installed for each size used, but no fewer than three units.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1. Cable installer must have on staff an RCDD certified by Building Industry Consulting Service International.

B. Source Limitations: Obtain central station, workstations, controllers, Identifier readers, and all software through one source from single manufacturer.

1.8 PROJECT CONDITIONS

A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Control Station: Rated for continuous operation in ambient conditions of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
2. Indoor, Controlled Environment: NEMA 250, Type 1 enclosure. System components, except the central-station control unit, installed in temperature-controlled indoor environments shall be rated for continuous operation in ambient conditions of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.
3. Indoor, Uncontrolled Environment: NEMA 250, Type 4 enclosures. System components installed in non-temperature-controlled indoor environments shall be rated for continuous operation in ambient conditions of 0 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.
4. Outdoor Environment: NEMA 250, NEMA 250, Type 4X enclosures. System components installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 36 inches thick.
5. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
6. Corrosive Environment: For system components subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones, provide NEMA 250, Type 4X enclosures.

PART 2 - PRODUCTS

2.1 OPERATION

A. Security access system hardware shall use a single database for access-control and credential-creation functions.

2.2 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70, "National Electrical Code."

C. Comply with SIA DC-01 and SIA DC-03 and SIA DC-07.

2.3 CARD READERS, CREDENTIAL CARDS, AND KEYPADS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. HID Global
   a. Card Readers
      1) HID multiClass RP15

2) HID multiclass RP40
3) Equivalent substitutions are subject to Owner review prior to contract award. Equivalent substitutions must meet the following criteria:
a) Weigand or OSDP protocol options
b) Multi-technology read capability (125kHz and 13.56MHz minimum)
c) Offer low-profile (mullion mounted) options

b. Credentials
1) Coordinate with owner prior to sign off to obtain access cards for programming into system.

B. Card Readers:

1. Card-Reader Power: Powered from its associated controller, including its standby power source, and shall not dissipate more than 5 W.
2. Response Time: Card reader shall respond to passage requests by generating a signal that is sent to the controller. Response time shall be 800 ms or less, from the time the card reader finishes reading the credential card until a response signal is generated.
3. Enclosure: Suitable for surface, semi-flush, pedestal, or weatherproof mounting. Mounting types shall additionally be suitable for installation in the following locations:
a. Indoors, controlled environment.
b. Indoors, uncontrolled environment.
c. Outdoors, with built-in heaters or other cold-weather equipment to extend the operating temperature range as needed for operation at the site.

4. Display: Digital visual indicator shall provide visible and audible status indications and user prompts. Indicate power on or off, whether user passage requests have been accepted or rejected, and whether the door is locked or unlocked.
5. Stripe Swipe Readers: Bidirectional, reading cards swiped in both directions, powered by the controller. Reader shall be set up for ABA Track.
a. Readers for outdoors shall be in a polymeric plastic enclosure with all electronics potted in plastic. Rated for operation in ambient conditions of minus 40 to plus 160 deg F in a humidity range of 10 to 90 percent.

6. Wiegand Swipe Reader: Set up for 33 or 26-bit data cards. Comply with SIA AC-01.
7. Touch-Plate and Proximity Readers:
a. Active-detection proximity card readers shall provide power to compatible credential cards through magnetic induction, and shall receive and decode a unique identification code number transmitted from the credential card.
b. Passive-detection proximity card readers shall use a swept-frequency, RF field generator to read the resonant frequencies of tuned circuits laminated into compatible credential cards. The resonant frequencies read shall constitute a unique identification code number.
c. The card reader shall read proximity cards in a range from direct contact to at least 6 inches from the reader.

2.4 ACCESS CONTROL PERIPHERAL DEVICES

1. Items listed below are basis of design
a. Request to Exit
1) Bosch Security Systems, Inc
a) DS160 Series High Performance Request-to-exit

b) White
c) With SLI

b. Door Position Switch
1) Assa Abloy
a) Securitron DPS-M-GY
2) Securitron DPS-W-BK

2.5 CABLES

A. General Cable Requirements: Comply with requirements in Section 27 0513 "Conductors and Cables for Communications Systems" and as recommended by system manufacturer for integration requirement.

B. PVC-Jacketed, TIA 232-F.

1. Nine, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Polypropylene insulation.
3. Aluminum foil-polyester tape shield with 100 percent shield coverage.
4. PVC jacket.
5. Conductors are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with UL 1581.

C. Plenum-Rated TIA 232-F Cables:

1. Nine, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PE insulation.
3. Aluminum foil-polyester tape shield with 100 percent shield coverage.
4. Fluorinated ethylene propylene jacket.
5. Conductors are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

D. PVC-Jacketed, TIA 485-A Cables:

1. Paired, two pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. NFPA 70 Type: Type CM.
6. Flame Resistance: Comply with UL 1581.

E. Plenum-Rated TIA 485-A Cables:

1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. NFPA 70 Type: Type CMP
6. Flame Resistance: NFPA 262, Flame Test.

F. Multiconductor, PVC, Reader and Wiegand Keypad Cables:

1. No. 22 AWG, paired and twisted multiple conductors, stranded (7x30) tinned copper conductors, semirigid PVC insulation, overall aluminum-foil/polyester-tape shield with 100 percent shield coverage, plus tinned copper braid shield with 65 percent shield coverage, and PVC jacket.
2. NFPA 70, Type CMG.
3. Flame Resistance: UL 1581 vertical tray.
4. For TIA 232-F applications.

G. Paired, PVC, Toggle Switch Button Cables:

1. Four pairs, No. 18 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, individual aluminum-foil/polyester-tape shielded pairs each with No. 18 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
2. NFPA 70, Type CM.
3. Flame Resistance: UL 1581 vertical tray.

H. Paired, PVC, Reader and Wiegand Keypad Cables:

1. Three pairs, twisted, No. 20 AWG, stranded (7x28) tinned copper conductors, polyethylene (polyolefin) insulation, individual aluminum-foil/polyester-tape shielded pairs each with No. 22 AWG, stranded (19x34) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
2. NFPA 70, Type CM.
3. Flame Resistance: UL 1581 vertical tray.

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

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

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

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

K. LAN Cabling:

1. Comply with requirements in Section 27 1513 "Communications Copper Horizontal Cabling."

2.6 TRANSFORMERS

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

PART 3 - EXECUTION

3.1 SPECIAL REQUIREMENTS

A. At the exterior entry doors into common/shared space, ensure each card reader is connected to both Township Fire and Police systems.

3.2 INSTALLATION

A. Comply with recommendations in SIA CP-01.

B. Comply with TIA 606-B, "Administration Standard for Commercial Telecommunications Infrastructure."

C. Product Schedules: Obtain detailed product schedules from manufacturer of access-control system or develop product schedules to suit Project. Fill in all data available from Project plans and specifications and publish as Product Schedules for review and approval.

D. In meetings with Architect and Owner, present Product Schedules and review, adjust, and prepare final setup documents. Use approved, final Product Schedules to set up system software.

3.3 CABLING

A. Comply with NECA 1, "Good Workmanship in Electrical Construction."

B. Install cables and wiring according to requirements in Section 27 0513 "Conductors and Cables for Communications Systems."

C. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters. Conceal raceway and wiring except in unfinished spaces.

D. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use NRTL-listed plenum cable in environmental airspaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.

E. Install LAN cables using techniques, practices, and methods that are consistent with Category 5e rating of components and optical fiber rating of components, and that ensure Category 6 and optical fiber performance of completed and linked signal paths, end to end.

F. Boxes and enclosures containing security-system components or cabling, and which are easily accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered accessible. Junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.

G. Install end-of-line resistors at the field device location and not at the controller or panel location.

3.4 CABLE APPLICATION

A. Comply with TIA 569-D, "Commercial Building Standard for Telecommunications Pathways and Spaces."

B. Cable application requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.

C. TIA 232-F Cabling: Install at a maximum distance of 50 ft. between terminations.

D. TIA 485-A Cabling: Install at a maximum distance of 4000 ft. between terminations.

E. Card Readers and Keypads:

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

F. Install minimum No. 16 AWG cable from controller to electrically powered locks. Do not exceed 500 ft. between terminations.

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

3.5 GROUNDING

A. Comply with Section 27 0526 "Grounding and Bonding for Communications Systems."

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

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

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

E. Signal Ground:

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

3.6 IDENTIFICATION

A. In addition to requirements in this article, comply with applicable requirements in Section 27 0553 "Identification for Communications Systems" and with TIA 606-B.

3.7 SYSTEM SOFTWARE AND HARDWARE

A. Develop, install, and test software and hardware, and perform database tests for the complete and proper operation of systems involved. Assign software license to Owner.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

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

B. Tests and Inspections:

1. LAN Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use tester approved for type and kind of installed cable. Test for faulty connectors, splices, and terminations. Test according to TIA 568-C.1, "Commercial Building Telecommunications Cabling Standards - Part 1: General Requirements." Link performance for balanced twisted-pair cables must comply with minimum criteria in TIA 568-C.1.
2. Test each circuit and component of each system. Tests shall include, but are not limited to, measurements of power-supply output under maximum load, signal loop resistance, and leakage to ground where applicable. System components with battery backup shall be operated on battery power for a period of not less than 10 percent of the calculated battery operating time. Provide special equipment and software if testing requires special or dedicated equipment.
3. Operational Test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.

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

D. Prepare test and inspection reports.

3.9 STARTUP SERVICE

A. Engage a factory-authorized service representative to supervise and assist with startup service.

1. Complete installation and startup checks according to approved procedures that were developed in "Preparation" Article and with manufacturer's written instructions.
2. Enroll and prepare badges and access cards for Owner's operators, management, and security personnel.

END OF SECTION 28 1500

SECTION 28 1523 – INTERCOM ENTRY SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. IP Video Intercom Door Station
B. Video Intercom Master Station

1.2 RELATED SECTIONS

A. Section 27 1513 – Communications Copper Horizontal Cabling
B. Section 28 1300 - Access Control Software and Database Management
C. Section 28 1500 – Access Control Hardware Devices

1.3 REFERENCES

A. American National Standards Institute (ANSI/TIA/EIA) 568 - Commercial Building Telecommunications Cabling Standard.
B. International Organization for Standards (ISO) 9001:2000 - Quality Management Systems - Requirements.

1.4 SYSTEM DESCRIPTION

A. 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 onsite visitors from an offsite location, broadcast emergency announcements, and communicate using a PoE network.

1. Power Source: Power over Ethernet (802.3af).
2. Network Interface: 10 BASE-T / 100 BASE-TX Ethernet (RJ-45).
3. Network Protocols: IPv4, IPv6, TCP, UDP, SIP, HTTP, HTTPS, MJPEG, RTSP, RTP, RTCP, IGMP, MLD, SMTP, DHCP, NTP, DNS.
4. Bandwidth Usage:
   a. G.711: 64Kbps x 2 per video call.
   b. 64Kbps per monitor.
   c. .264: 24Kbps ~ 2,048Kbps.
5. Communication: Hands-free (VOX), push-to-talk (simplex), or handset (full-duplex).
6. Video Display: 3-1/2 inches (89 mm) color LCD.
7. Camera: Type:
   a. 1/4 inch (6 mm) color CMOS.
   b. View Area: 2 feet 2 inches (660 mm) vertical x 3 feet 1 inch (940 mm) horizontal at 20 inches (508 mm).
8. Video Stream: ONVIF Profile S.

9. 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.
10. Wire Type: CAT-5e or CAT-6.
11. Distance:
    a. Any station to Network Node: 330 feet (100 meters).

1.5 SUBMITTALS

A. Submit under provisions of Section 01 3000 - Administrative Requirements.
B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Submit the following:

1. Wiring Diagrams: Indicate wiring for each item of equipment and interconnections between items of equipment.
2. Include manufacturer's names, model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.

D. Installation and Operation Manuals:

1. Submit manufacturer's installation and operation manual, including operation instructions and component wiring diagrams.
2. Provide detailed information required for Owner to properly operate equipment.

E. Warranty: Submit manufacturer's standard warranty.
F. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
G. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001:2008 certified company.
B. Installer Qualifications: Factory trained and experienced with system installations of scope and size required for the Project.
C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship is approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
C. Handling: Protect materials during handling and installation to prevent damage.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS AND OPERATION

A. See 2.4 FUNCTIONAL COMPONENTS for full list of requirements. Door station and Master shall be connected to Access Control Platform (see 28 1300 and 28 1500) for interfacing with the electrified lock systems, and shall be programmed to shunt/bypass “door forced open” alarming.

2.2 AUDIO VIDEO DOOR STATIONS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Aiphone Corporation
   a. IX
      1) Provide Contact input at door station
      2) Provide ONVIF Profile S camera input
      3) Provide audio/video streaming via ONVIF Profile S
      4) Provide selective door/gate release and connect to locking hardware through access control platform, *not* directly to lock.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000 - Product Requirements.

2.3 IP VIDEO INTERCOM MASTER STATIONS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Aiphone Corporation
   a. IX

B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000 - Product Requirements.

2.4 FUNCTIONAL COMPONENTS:

A. Functional Components: As indicated on the drawings or as required to complete system.

1. Video Master Station:
   a. An IP addressable video master station with a 3.5 inch (89 mm) color LCD monitor. It can be wall or desk mounted (desk stand included). Offers handset (duplex) and hands-free (VOX/PTT) communication and call up to 500 other stations. It connects directly to a network using CAT-5e/6 cable. This station requires a 802.3af compliant Power-over-Ethernet network.

2. Audio/Video Door Station:
   a. Flush mount or surface station connects to a PoE network using CAT-5e/6 cable. Will call up to 20 masters or instances of mobile devices as required by Owner. The door station features a stainless steel face plate, a form C contact for door release, a 600 ohm output for paging or an amplified speaker, call placed/answered indication, and a contact input.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive integrated security and communication system.
B. Notify Architect of conditions that would adversely affect installation or subsequent use.
C. Do not begin installation until unacceptable conditions are corrected.

3.2 PREPARATION

A. Verify the following compliance before starting installation.

1. The unit turns inoperative during power failure.
2. Keep the intercom wires at least 1 foot (30 cm) away from strong electrical wiring (AC 100-240 V) including, in particular, wiring for inverter electrical appliances. Noise and malfunction could result.
3. If a strong light shines on the main unit screen, the picture may turn white or only silhouettes will be visible.
4. Other manufacturer's devices (such as sensor, detectors, door releases) used with this system, comply with the manufacturer's installation requirements.
5. The LCD panel is manufactured with very high precision techniques, inevitably will have a very small portion of its picture elements always lit or not lit at all. This is not considered a unit malfunction. Please be aware of this in advance.

3.3 INSTALLATION

A. Install integrated security and communication system in accordance with manufacturer's instructions at locations indicated on the Drawings.
B. Mount equipment plumb, level, square, and secure. For video entrance stations and video door stations, comply with manufacturer's design requirements to provide optimum picture quality of station monitoring.

3.4 SET-UP AND ADJUSTING

A. Adjust integrated security and communication system for proper operation in accordance with manufacturer's instructions.

3.5 DEMONSTRATION AND TRAINING

A. Demonstration:

1. Demonstrate that integrated security and communication system functions properly.
2. Perform demonstration at final system inspection by qualified representative of manufacturer.

B. Instruction and Training:

1. Provide instruction and training of Owner's personnel as required for operation of integrated security and communication system.
2. Provide hands-on demonstration of operation of system components and complete system, including user-level program changes and functions.
3. Provide instruction and training by qualified representative of manufacturer.

3.6 PROTECTION

A. Protect installed integrated security and communication system from damage during construction.

END OF SECTION 28 1523.

SECTION 28 2000 - VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes a video surveillance system consisting of cameras, data transmission wiring and associated equipment.

1.2 ACTION SUBMITTALS

A. Provide product data sheets with specific part numbers highlighted.

B. IP Based Cameras.

C. Camera Mounting Accessories.

1.3 INFORMATIONAL SUBMITTALS

A. Camera Aiming Documentation.

1. Create a spreadsheet with the following columns and submit during submittal process. Camera name (on drawings), camera name (as directed by owner), Camera Make/Model, MAC address, IP Address, View, Camera Image, Status, Comments, and Sign Off. Leave all fields blank except for Camera Name (drawings) and camera Make/Model. Camera Name (drawings) and camera make/model shall be completed as part of submittal.
    a. Camera name (drawings): Device number provided by architect
    b. Camera name (owner): Device name provided by owner
    c. Camera make and model.
    d. MAC address
    e. IP address: as provided by owner
    f. View: what the view is aiming to achieve Status: camera status at time of document iteration
    g. Comments: Any additional aiming that needs to be completed.
    h. Sign Off: for architect and owner to sign off each camera as complete.

B. Shop Drawings: For video surveillance. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, accessories, method of field assembly, components, and location and size of each field connection.
2. Show cable types and sizes.
3. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
4. Wiring Diagrams: For power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. As-Built Drawings.

1. Provide electronic (minimum .pdf) copy of as built conditions of cameras, mounts, their cable's port, rack, and closet number, and aiming views (along with a screenshot of view at time of completion).

B. Operation and Maintenance Data.

1.5 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Control Station: Rated for continuous operation in ambient temperatures of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
2. Interior, Controlled Environment: System components, except central-station control unit, installed in air-conditioned interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
3. Interior, Uncontrolled Environment: System components installed in non- temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 0 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 3R enclosures.
4. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick. Use NEMA 250, Type 3S enclosures.
5. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.6 WARRANTY

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

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. Video Management System and cameras as installed and programmed *must* meet the requirements set forth in LARA Rule 27, including (but not limited to):

1. Clear and certain identification of person(s), including facial features and activities, of all recorded areas
2. Any area where marihuana products are weighed, packed, stored, loaded, unloaded for transportation, prepared, or moved within the facility.
3. Limited access areas and security rooms
4. Transfers of product and secured items between rooms
5. Entrances and exits of the facility, from both interior and exterior vantage points.
6. 24/7 continuous recording with timestamps on each view
7. 14 days minimum recorded video storage
8. Alarms and notification system for camera comm failure, network outage, tamper, or any other failure or disruption of the VMS and its server(s).
9. Logs of any activity including the removal, destruction, and/or modification of recordings or recording equipment.

B. Resolution of cameras shall meet LARA Rule 27 requirements above, achieving minimum 40 px/ft “clearly identify and recognize”.

C. Video-signal format shall comply with NTSC standard, at a minimum resolution of 720p.

D. Surge Protection: Protect components from voltage surges entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Section 26 4313 "Surge Protection for Low-Voltage Electrical Power Circuits."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Section 26 4313 "Surge Protection for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.

E. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display shall identify tamper alarms and indicate locations.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Video surveillance system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NECA 1.

D. Comply with NFPA 70.

E. Electronic data exchange between video surveillance system with an access-control system shall comply with SIA TVAC.

2.3 IP BASED CAMERAS

A. Basis of Design – refer to drawings for camera type requirement at each location.

1. Recommended Manufacturers:
   a. Axis Communications
      1) P Series
         a) 1448 LE
         b) 3225, 3228 LVE
      2) Q Series
         a) 1798 LE

2. Substitutions: Requests for submissions shall be made prior to submittal and only at the acceptance of the owner.

B. Description:

1. Cameras shall provide high-quality delivery and processing of IP-based video, audio, and control data using standard Ethernet-based networks.
2. Cameras shall be powered over ethernet (PoE) and where data cable distance or model type requires, be supported by PoE injectors and/or power assist methods.
3. Cameras shall meet the following standards:
   a. Interior: IP66, IK10, FCC Class A, CE, Vandal resistant
   b. Exterior: IP66, IK10, FCC Class A, CE, Vandal resistant
4. Camera models shall be installed at their intended locations and all necessary supporting equipment, including brackets, mounts, and housings, shall be provided.
5. System shall have seamless integration of all video surveillance and control functions.
6. Graphical user interface software shall manage all IP-based video matrix switching and camera control functions, two-way audio communication, alarm monitoring and control, and recording and archive/retrieval management. IP system shall also be capable of integrating into larger system environments.
7. System design shall include all necessary compression software for high-performance (H.264 or better), dual-stream, MPEG-4 video or better, and transmission via unicast or multicast. Unit shall provide connections for all video cameras, camera PTZ control data, bidirectional audio, discreet sensor inputs, and control system outputs.
8. All camera signals shall be compressed, encoded, and delivered onto the network for processing and control by the IP video-management software.
9. Camera system units shall be ruggedly built and designed for extreme adverse environments, complying with NEMA Type environmental standards.

2.4 All system interconnect cables, workstation PCs, PTZ joysticks, and network intermediate devices shall be provided for full performance of specified system.

2.5 CAMERA-SUPPORTING EQUIPMENT

1. Provide supporting equipment to install a complete system, including but not limited to:
   a. Pendant mounts
   b. Wall mounts
   c. Corner mounting brackets
   d. NPT/threaded adapters
   e. Caulk/sealant as necessary

B. Minimum Load Rating: Rated for load in excess of the total weight supported times a minimum safety factor of two.

C. Mounting Brackets for Fixed Cameras: Type matched to items supported and mounting conditions. Include manual pan-and-tilt adjustment. Include all necessary components for specified devices.

2.6 NETWORK VIDEO RECORDERS

A. Requirements

1. NVR(s) must be sized appropriately to retain *at least* 14 days of continuously (24/7) recorded video of each camera. Thirty (30) days recorded video is best practice and recommended.
2. NVR(s) must be capable of camera throughput (bandwidth) at a rate with minimum 25% added capacity for future growth. Fiber NICs are suggested on any instance in which there are less than (3) servers.
3. Rack-mounted NVRs are recommended; if cloud-based or workstation-style servers are used, provide Owner with information prior to contract award.

B. Recommended Manufacturers

1. Avigilon Corporation
2. Axis Communications

2.7 LICENSING

A. Provide licensing as required per camera and/or per server.

PART 3 - EXECUTION

3.1 WIRING

A. For communication wiring, comply with the following:

1. Section 27 1313 "Communications Copper Backbone Cabling."
2. Section 27 1513 "Communications Copper Horizontal Cabling."

3. Section 27 1523 "Communications Optical Fiber Horizontal Cabling."

B. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.2 VIDEO SURVEILLANCE SYSTEM INSTALLATION

A. Cameras, NVR, and all supporting equipment must be installed by an installer with manufacturer-specific training, including but not limited to Axis Certified Professional designation.

B. Cameras and NVRs shall be installed to be separate and independent of each other.

C. Install cameras with 24-inchminimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.

D. Prior to install, the following process must be completed:

1. Default camera username and password configured to owner-provided standard.
2. Obtain submittal document from Architect with “Views” column completed.
3. Provide document to Owner and Architect with MAC addresses filled out

E. Prior to installation, set views according to returned submittal document. The following items shall be completed prior to project closeout:

1. Verify final views with owner while installing. If owner or architect cannot be reached, obtain a digital image and send to owner and architect for review of final positioning.
2. Connect all controls and alarms and adjust.
3. Obtain owner/architect sign off on spreadsheet.

F. Confirm power and data connectivity on device and network side; for devices that do not have sufficient power or full data transmission, provide PoE+ injector.

G. Identify system components, wiring, cabling, and terminals according to Section 27 0553 "Identification for Communications Systems."

1. Labeling: Label each camera housing with the corresponding device number on prints as well as closet number and port of data drop associated to camera. Labeling shall be visible without removing the camera housing.

H. Obtain sign off of camera views from primary representative of each system – Township and Police – as well as the technology consultant.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

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

B. Tests and Inspections:

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

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

D. Prepare test and inspection reports.

3.4 DEMONSTRATION

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

END OF SECTION 28 2000

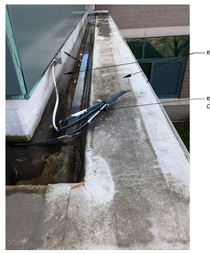
KEYED NOTED - ARCHITECTURAL ROOF - DEMOLITION

1 REMOVE HEAT TRACE TAPE ON ROOF AND PREP FOR NEW

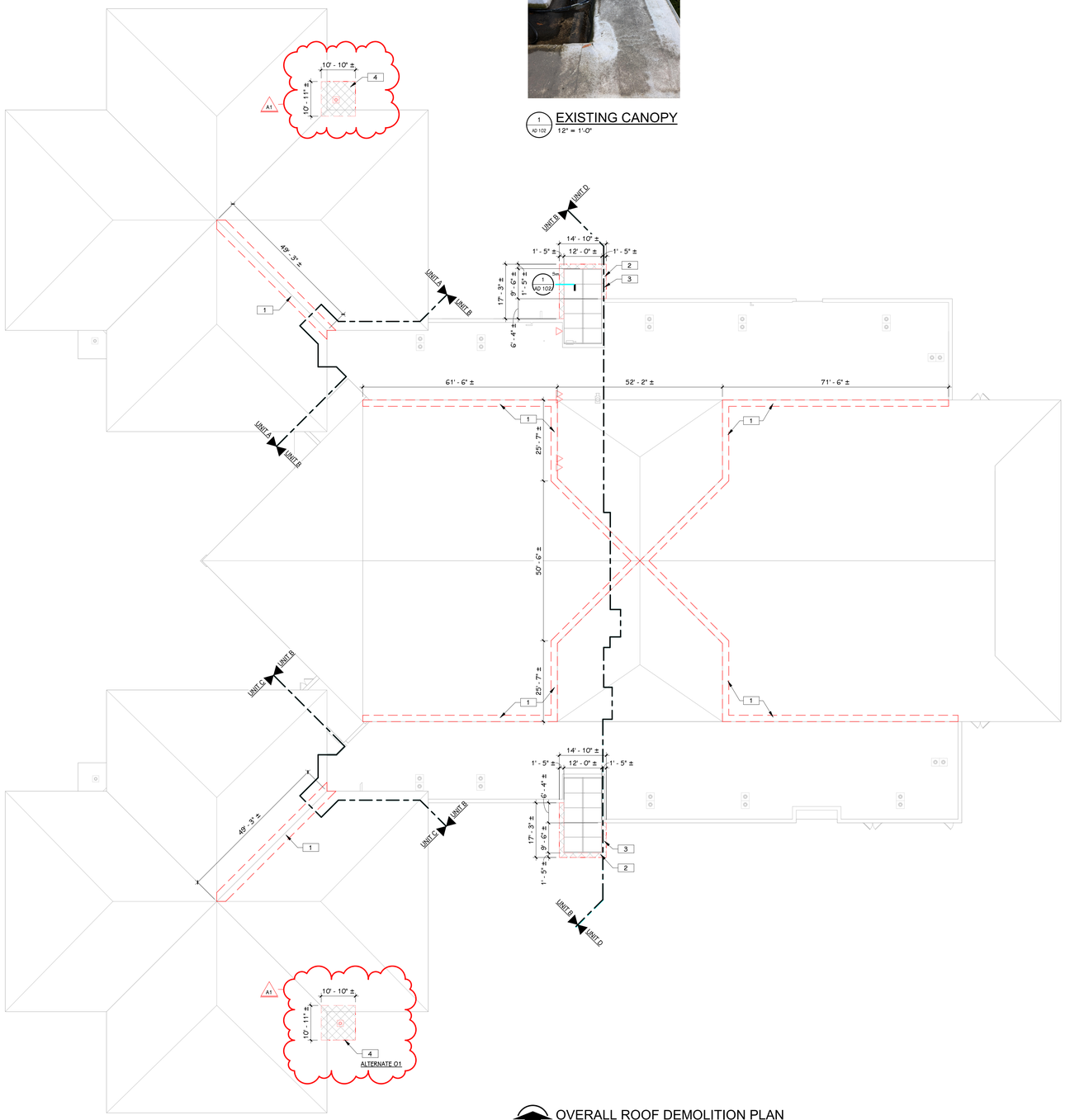
2 REMOVE EXISTING EPDM ROOF MEMBRANE AND EDGE METAL, EXISTING INSULATION TO REMAIN (AREA SHOWN WITH CROSS HATCH)

3 REMOVE HEAT TRACE TAPE ON PORTION OF ROOF AND PIPES

A1 4 REMOVE ALL INSULATION, ROOF MEMBRANE, ROOF DRAIN AND EDGE METAL (AREA SHOWN WITH CROSS HATCH)



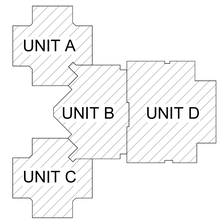
1 / AD 102 EXISTING CANOPY
12" = 1'-0"



OVERALL ROOF DEMOLITION PLAN
1/16" = 1'-0"

THIS DRAWING SHEET IS INTENDED TO BE PLOTTED IN COLOR. IF THIS TEXT APPEARS IN BLACK AND WHITE, IT IS PLOTTED INCORRECTLY. DISCARD AND OBTAIN AN ACCURATE DRAWING

EDWARDSBURG INTERMEDIATE SCHOOL



KEY PLAN
SCALE: NO SCALE

TowerPinkster
Architecture · Engineering · Interiors
TOWERPINKSTER.COM

ISSUED FOR	DATE
ADDENDUM #1	03-07-2025

PROJECT TITLE
EDWARDSBURG INTERMEDIATE SCHOOL

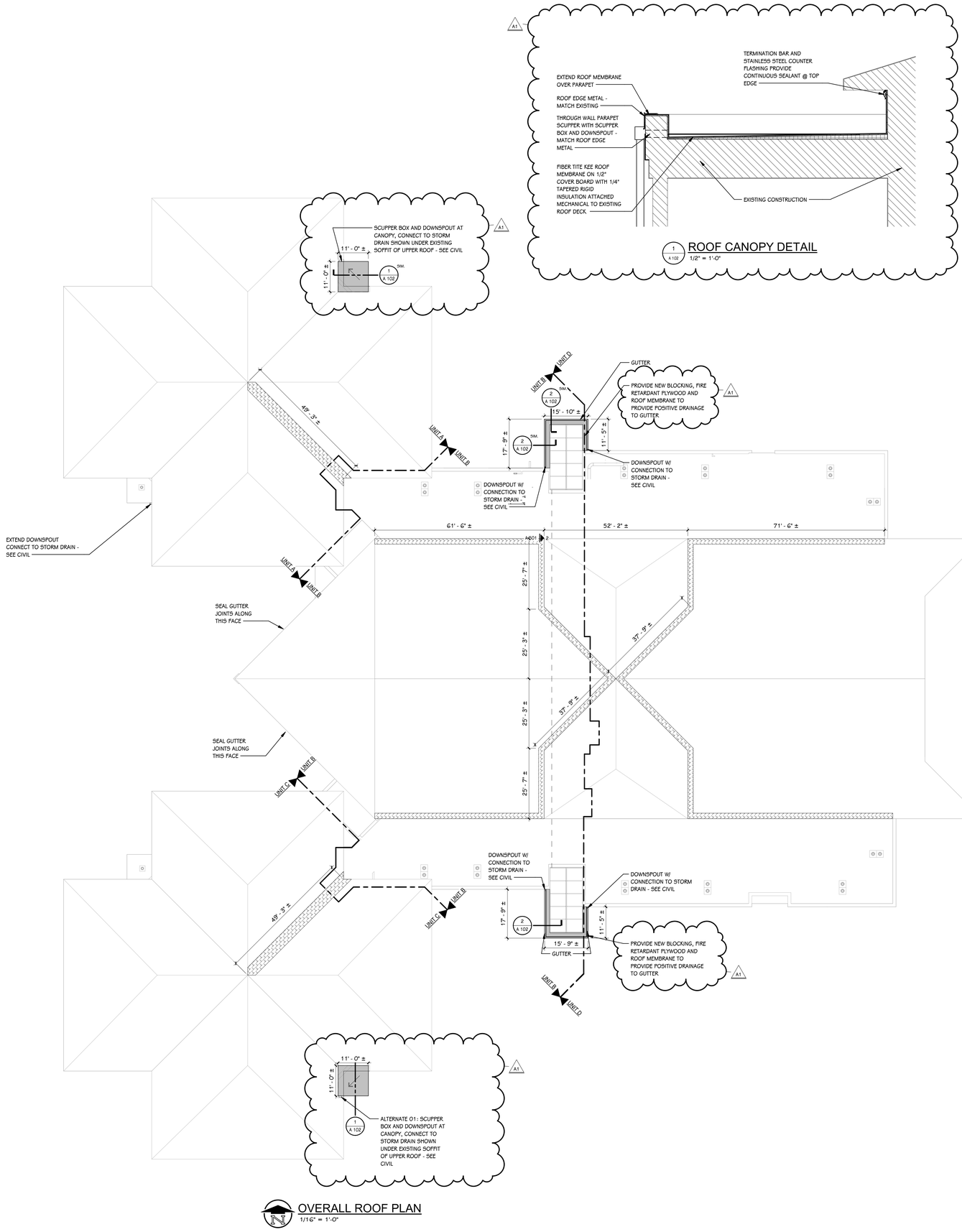
OWNER
EDWARDSBURG PUBLIC SCHOOLS

Edwardsburg, Michigan

SHEET TITLE
OVERALL ROOF DEMOLITION PLAN

DATE
FEBRUARY 10, 2025

SHEET NUMBER
AD 102
21-201.030



ROOF PLAN KEY

FIBER TITE KEE MEMBRANE ROOF SYSTEM WITH MECHANICALLY FASTENED 1/2" COVER BOARD AND NEW TAPERED INSULATION TO DIRECT WATER TO NEW SCUPPER AS SHOWN ON PLAN

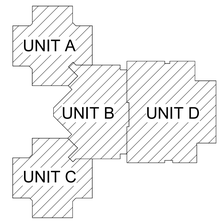
HEAT TAPE - PROVIDE TYPICAL "W" PATTERN

R.D.	ROOF DRAIN - REFER TO PLUMBING DRAWINGS
O.D.	OVERFLOW DRAIN - REFER TO PLUMBING DRAWINGS
←	ROOF SLOPE DUE TO TAPERED INSULATION OR SLOPED STRUCTURE - REFER TO STRUCTURAL DRAWINGS
AHU OR RTU	ROOF TOP UNIT - REFER TO MECHANICAL DRAWINGS
ACCU	CONDENSING UNIT - REFER TO MECHANICAL DRAWINGS
E.F.	EXHAUST FAN / HOOD - REFER TO MECHANICAL DRAWINGS

NOTES

1. PROVIDE ROOF MANUFACTURERS STANDARD ROOFING TERMINATION DETAILS AT ALL PARAPETS, PRE-MANUFACTURED ROOF EDGE SYSTEMS, CURBS, PIPE PENETRATIONS, ETC.
2. PROVIDE CRICKETS AS REQUIRED AT ALL MECHANICAL UNITS, VENTS, ETC. TO MAINTAIN POSITIVE SLOPE
3. FIELD VERIFY ALL ROOF DRAIN LOCATIONS PRIOR TO INSTALLATION OF NEW ROOF.

EDWARDSBURG INTERMEDIATE SCHOOL



KEY PLAN
SCALE: NO SCALE

TowerPinkster
Architecture · Engineering · Interiors
TOWERPINKSTER.COM

ADDENDUM #1	03-07-2025
ISSUED FOR	DATE

PROJECT TITLE
EDWARDSBURG INTERMEDIATE SCHOOL

OWNER
EDWARDSBURG PUBLIC SCHOOLS

Edwardsburg, Michigan

SHEET TITLE
OVERALL ROOF PLAN

DATE
FEBRUARY 10, 2025

SHEET NUMBER
A 102
21-201.030

TowerPinkster
Architecture · Engineering · Interiors

ADDENDUM NO. 1

DATE OF ISSUANCE:	**March 7, 2025**
PROJECT:	**Edwardsburg Primary School - Renovation** **69100 Section St** **Edwardsburg, MI 49112**
OWNER:	**Edwardsburg Public Schools**

ARCHITECT'S PROJECT NO.: 21-201.010

ORIGINAL BID ISSUE DATE: January 27, 2025

SCOPE OF WORK

This Addendum includes changes to, or clarifications of, the original Bidding Documents and any previously issued addenda, and shall be included in the Bid. All of these Addendum items form a part of the Contract Documents. The Bidder shall acknowledge receipt of this Addendum in the appropriate space provided on the Bid Form. Failure to do so may result in disqualification of the Bid.

DOCUMENTS INCLUDED IN THIS ADDENDUM

This Addendum includes **2** pages of text and the following documents:

- Bidding Documents: **None**
- Contract Conditions: **None**
- Specification Sections: **087000, 27 0500, 27 0528, 27 0553, 27 1513, 27 1700, 28 1300, 28 1400, 28 1500, 28 1523, 28 2000**
  Drawings: **None**

CHANGES TO PREVIOUSLY ISSUED ADDENDA

None.

CHANGES TO SPECIFICATIONS

ADD-1 Item No. S-1 - Door Hardware

Refer to Specification Section: 08 7000

Adding door hardware specification.

ADD-1 Item No. S-2 - Technology Specifications

Refer to Specification Section: 27 0500, 27 0528, 27 0553, 27 1513, 27 1700, 28 1300, 28 1400, 28 1500, 28 1523, 28 2000

Adding technology specifications.

END OF ADDENDUM.

SECTION 08 7100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware.
2. Electronic access control system components.
3. Field verification, preparation and modification of existing doors and frames to receive new door hardware.

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 “General Requirements” sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
2. Division 06 Section “Rough Carpentry”
3. Division 06 Section "Finish Carpentry”
4. Division 07 Section “Joint Sealants” for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
   a. “Metal Doors and Frames”
   b. “Flush Wood Doors”
   c. “Stile and Rail Wood Doors”
   d. “Interior Aluminum Doors and Frames”
   e. "Aluminum-Framed Entrances and Storefronts"
6. Division 09 sections for touchup, finishing or refinishing of existing openings modified by this section.
7. Division 26 “Electrical” sections for connections to electrical power system and for low-voltage wiring.
8. Division 28 “Electronic Safety and Security” sections for coordination with other components of electronic access control system and fire alarm system.

1.2 REFERENCES

A. UL, LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies

3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.3 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
   a. Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.
   b. Review drawings and Sections from related trades to verify compatibility with specified hardware.
   c. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
   a. Wiring Diagrams: For power, signal, and control wiring and including:
      1) Details of interface of electrified door hardware and building safety and security systems.

2) Schematic diagram of systems that interface with electrified door hardware.
3) Point-to-point wiring.
4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
   a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:
   a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
   b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
   c. Indicate complete designations of each item required for each opening, include:
      1) Door Index: door number, heading number, and Architect's hardware set number.
      2) Quantity, type, style, function, size, and finish of each hardware item.
      3) Name and manufacturer of each item.
      4) Fastenings and other pertinent information.
      5) Location of each hardware set cross-referenced to indications on Drawings.
      6) Explanation of all abbreviations, symbols, and codes contained in schedule.
      7) Mounting locations for hardware.
      8) Door and frame sizes and materials.
      9) Degree of door swing and handing.
      10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:
   a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
   b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
   c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
   d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
   e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
   f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.

2. Provide Product Data:
   a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
   b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
   a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
   b. Catalog pages for each product.
   c. Final approved hardware schedule edited to reflect conditions as installed.
   d. Final keying schedule
   e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
   f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
   a. fire door assemblies, in compliance with NFPA 80.
   b. required egress door assemblies, in compliance with NFPA 101.

1.4 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
   a. For door hardware: DHI certified AHC or DHC.
   b. Can provide installation and technical data to Architect and other related subcontractors.
   c. Can inspect and verify components are in working order upon completion of installation.
   d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.

4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
   a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
   b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:
   a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
   b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware
   a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:
   a. Comply with governing accessibility regulations cited in “REFERENCES” article 08 7100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
   a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      2) Preliminary key system schematic diagram.
      3) Requirements for key control system.
      4) Requirements for access control.
      5) Address for delivery of keys.

2. Pre-installation Conference
   a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   b. Inspect and discuss preparatory work performed by other trades.
   c. Inspect and discuss electrical roughing-in for electrified door hardware.
   d. Review sequence of operation for each type of electrified door hardware.
   e. Review required testing, inspecting, and certifying procedures.
   f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:

a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

D. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.

E. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.

F. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

G. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

H. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

I. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.5 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation.

1.6 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.

1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.

a. Mechanical Warranty
    1) Locks
        a) Schlage L Series: 10 years
    2) Exit Devices
        a) Von Duprin: 10 years
    3) Closers
        a) LCN 4000 Series: 30 years
    4) Automatic Operators
        a) LCN: 2 years
b. Electrical Warranty
    1) Exit Devices
        a) Von Duprin: 3 years

1.7 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: “No Substitute.”

1. Where “No Substitute” is noted, submittals and substitution requests for other products will not be considered.

B. Approval of alternate manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category are only to be considered by official substitution request in accordance in section 01 2500.

C. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.

D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.

1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
2. Use materials which match materials of adjacent modified areas.
3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.

C. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

D. Cable and Connectors:

1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.3 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

   a. Ives 5BB series

2. Acceptable Manufacturers and Products:
   a. McKinney TB series
   b. Best FBB series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.

2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch thick doors, up to and including 36 inches wide:
   a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches high
   b. Interior: Standard weight, steel, 4-1/2 inches high

4. 1-3/4 inch thick doors over 36 inches wide:
   a. Exterior: Heavy weight, bronze/stainless steel, 5 inches high
   b. Interior: Heavy weight, steel, 5 inches high

5. 2 inches or thicker doors:
   a. Exterior: Heavy weight, bronze or stainless steel, 5 inches high
   b. Interior: Heavy weight, steel, 5 inches high

6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches or less in height, and one additional hinge for each 30 inches of additional door height.
8. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
9. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   a. Steel Hinges: Steel pins
   b. Non-Ferrous Hinges: Stainless steel pins
   c. Out-Swinging Exterior Doors: Non-removable pins
   d. Out-Swinging Interior Lockable Doors: Non-removable pins
   e. Interior Non-lockable Doors: Non-rising pins

2.4 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:

   a. Ives

2. Acceptable Manufacturers:
   a. Select
   b. Pemko

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.

6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.5 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Von Duprin EPT-10

2. Acceptable Manufacturers and Products:
   a. Securitron CEPT-10
   b. Precision EPT-12C

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.6 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch steel or brass rods at doors up to 90 inches in height. For doors over 90 inches in height increase top rods by 6 inches for each additional 6 inches of door height. Provide dust-proof strikes at each bottom flush bolt.

2.7 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.8 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage L9000 series

2. Acceptable Manufacturers and Products:
   a. Sargent 8200 series
   b. Best 45H series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-3/5-inch x 3/5 inch with 180-degree visibility. Provide messages color-coded using ANSI Z535 Safety Red with full text and/or symbols, as scheduled, for easy visibility. When applicable allows for lock status indication on both sides of the door.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to “KEYING” article, herein.
5. Provide locks with standard 2-3/4 inches backset with full 3/4 inch throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
   a. Lever Design: As indicated in sets.

2.9 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
a. Von Duprin 98/35A series

2. Acceptable Manufacturers and Products:
a. Precision APEX 2000 series
b. Sargent 19-43-GL-80 series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer’s approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches x 3 inches steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.10 ELECTRIC STRIKES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
a. Von Duprin 6000 series

2. Acceptable Manufacturers and Products:
a. HES 1006 series

B. Requirements:

1. Provide electric strikes designed for use with type of locks shown at each opening.
2. Provide electric strikes UL Listed as burglary resistant that are tested to a minimum endurance test of 1,000,000 cycles.
3. Where required, provide electric strikes UL Listed for fire doors and frames.
4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.11 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Ilco Kaba Peaks Plus

2. Acceptable Manufacturers and Products:

   a. No Substitute

B. Requirements:

1. Provide interchangeable cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

2.12 KEYING

A. Scheduled System:

1. Existing factory registered system:
   a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:
   a. Replaceable Construction Cores.
      1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
         a) 3 construction control keys
         b) 12 construction change (day) keys.
      2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2. Permanent Keying:
   a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
      1) Master Keying system as directed by the Owner.

b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
c. Provide keys with the following features:
    1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
    2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
d. Identification:
    1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
    2) Identification stamping provisions must be approved by the Architect and Owner.
    3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
    4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
    5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
e. Quantity: Furnish in the following quantities.
    1) Change (Day) Keys: 3 per cylinder/core that is keyed differently.
    2) Permanent Control Keys: 3.
    3) Master Keys: 6.
    4) Key Blanks: quantity as determined in the keying meeting.

2.13 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
    a. LCN 4010/4110 series

2. Acceptable Manufacturers and Products:
    a. Sargent 281 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch diameter with 11/16-inch diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.

7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
11. **Through-bolt all wood door closers.**

1.01 ELECTRO-HYDRAULIC AUTOMATIC OPERATORS

C. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

a. LCN 4600 series

2. Acceptable Manufacturers and Products:

b. Norton 6000 series

c. Besam Power Swing

D. Requirements:

1. Provide low energy automatic operator units with hydraulic closer complying with ANSI/BHMA A156.19.
2. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
3. Provide units with conventional door closer opening and closing forces unless power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
5. Provide drop plates, brackets, and adapters for arms as required for details.
6. Provide hard-wired actuator switches and receivers for operation as specified.
7. Provide weather-resistant actuators at exterior applications.
8. Provide key switches with LED's, recommended and approved by manufacturer of automatic operator as required for function described in operation description of hardware group below. Cylinders: Refer to "KEYING" article, herein.
9. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.

10. Provide units with vestibule inputs that allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

1.02 DOOR TRIM

E. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood

F. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.14 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.15 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
   a. Glynn-Johnson

2. Acceptable Manufacturers:
   a. Rixson

b. ABH

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.16 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide overhead stops.

2.17 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Zero International

2. Acceptable Manufacturers:
   a. National Guard
   b. Reese

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch high by 5 inches wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.18 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.19 FINISHES

A. Finish: Generally, Satin Chromium, BHMA 626/652 (US26D). Provide finish for each item as indicated in sets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.

C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

D. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Where on-site modification of doors and frames is required:

1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.

2. Field modify and prepare existing doors and frames for new hardware being installed.
3. When modifications are exposed to view, use concealed fasteners, when possible.
4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
   a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
   b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
   c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.3 INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.
3. Furnish permanent cores to Owner for installation.

J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect's opening number.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

L. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.

M. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

N. Overhead Stops/Holders: Mount overhead stopes/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

P. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

Q. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

R. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
2. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

Primary School

Hardware Group No. 01

For use on Door #(s):
A146A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050L 06A 09-544	626	SCH
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER	626	KAB
1	EA	OH STOP	100S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

NOTES:
1) MATCH EXISTING LEVER STYLE OF SCHOOL. LEVER STYLE 06A SPECIFIED AS BASIS OF DESIGN.

Hardware Group No. 02

For use on Door #(s):
A147

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070L 06A	626	SCH
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER	626	KAB
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

NOTES:
1) MATCH EXISTING LEVER STYLE OF SCHOOL. LEVER STYLE 06A SPECIFIED AS BASIS OF DESIGN.

Hardware Group No. 03

For use on Door #(s):
A144A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD		315AN	IVE
1	EA	STOREROOM LOCK	L9080L 06A		626	SCH
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6211AL FSE CON	✓	630	VON
1	EA	OH STOP	100S		BLK	GLY
1	EA	SURF. AUTO OPERATOR	4642	✓	693	LCN
2	EA	ACTUATOR, JAMB MOUNT	8310-818T	✓	630	LCN
2	EA	SURFACE MOUNT BOX	8310-819S			LCN
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY	✓		SCH
1	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
1	EA	INTERCOM SYSTEM	PROVIDED BY SECURITY CONTRACTOR	✓		
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER RATED SEALS BY DOOR/FRAME MANUFACTURER	✓		VON

NOTES:
1) MATCH EXISTING LEVER STYLE OF SCHOOL. LEVER STYLE 06A SPECIFIED AS BASIS OF DESIGN.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO THE READER OR PRESSING INTERCOM DOOR RELEASE BUTTON WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE (ALLOWING ACCESS) AND ACTIVATE EXTERIOR AUTO OPERATOR ACTUATOR. PUSHING EXTERIOR AUTO OPERATOR ACTUATOR AT THIS TIME WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE DOOR. PUSH INTERIOR ACTUATOR AT ANY TIME WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE AND SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE DOOR.

DOOR TO REMAIN LOCKED WITH LOSS OF POWER OR ACTIVATION OF THE FIRE ALARM. FREE EGRESS AT ALL TIMES.

Hardware Group No. 04

For use on Door #(s):
A144B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	INSTITUTION LOCK	L9082L 06A		626	SCH
2	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6211 FSE CON	✓	630	VON
1	EA	SURFACE CLOSER	4011		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488S		BK	ZER
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY	✓		SCH
2	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
1	EA	PUSH-TO-ENTER BUTTON	PROVIDED BY SECURITY CONTRACTOR	✓	630	SCE
1	EA	DOOR RELEASE BUTTON	PROVIDED BY SECURITY CONTRACTOR	✓	628	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	✓		VON

NOTES:
1) MATCH EXISTING LEVER STYLE OF SCHOOL. LEVER STYLE 06A SPECIFIED AS BASIS OF DESIGN.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

UNLOCKED HOURS: DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM AND PUSH-TO-ENTER BUTTON ON SCHOOL CORRIDOR SIDE SHALL BE ENABLED BY ACCESS CONTROL SYSTEM. PRESSING PUSH-TO-ENTER BUTTON ON SCHOOL CORRIDOR SIDE WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS FROM SCHOOL CORRIDOR INTO OFFICE. OFFICE SIDE ALWAYS LOCKED PREVENTING FREE PASSAGE FROM OFFICE INTO THE SCHOOL. PRESENTING A VALID CREDENTIAL TO THE READER ON SCHOOL OFFICE SIDE, OR PRESSING DOOR RELEASE BUTTON LOCATED AT RECEPTION DESK, WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS FROM OFFICE INTO SCHOOL.

LOCKED HOURS: DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM AND PUSH-TO-ENTER BUTTON ON SCHOOL CORRIDOR SIDE SHALL BE DISABLED BY ACCESS CONTROL SYSTEM, THUS LOCKED IN BOTH DIRECTIONS. PRESENTING A VALID CREDENTIAL TO THE READER ON EITHER SIDE OR PRESSING DOOR RELEASE BUTTON LOCATED AT RECEPTION DESK, WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS.

DOOR TO REMAIN LOCKED WITH LOSS OF POWER, ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS), OR ACTIVATION OF THE FIRE ALARM.

Hardware Group No. 05

For use on Door #(s):
A145

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	INSTITUTION LOCK	L9082L 06A		626	SCH
2	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6211 FSE CON	↯	630	VON
1	EA	SURFACE CLOSER	4011		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488S		BK	ZER
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY	↯		SCH
2	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	↯	BLK	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	↯		VON

NOTES:
1) MATCH EXISTING LEVER STYLE OF SCHOOL. LEVER STYLE 06A SPECIFIED AS BASIS OF DESIGN.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO EITHER READER WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS. DOOR TO REMAIN LOCKED UPON LOSS OF POWER OR ACTIVATION OF THE FIRE ALARM.

Hardware Group No. 06

For use on Door #(s):
A146B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	INSTITUTION LOCK	L9082L 06A		626	SCH
2	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6211 FSE CON	↯	630	VON
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4011 ST-1544		689	LCN
1	EA	MOUNTING PLATE	4020-18		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488S		BK	ZER
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY	↯		SCH
2	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	↯	BLK	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	↯		VON

NOTES:
1) MATCH EXISTING LEVER STYLE OF SCHOOL. LEVER STYLE 06A SPECIFIED AS BASIS OF DESIGN.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO EITHER READER WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS. DOOR TO REMAIN LOCKED UPON LOSS OF POWER OR ACTIVATION OF THE FIRE ALARM.

Hardware Group No. 07

For use on Door #(s):
A143A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112HD EPT		315AN	IVE
2	EA	POWER TRANSFER	EPT10 CON	✓	622	VON
1	EA	REMOVABLE MULLION	KR4954 STAB		693	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-98-EO-CON	✓	626	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-98-NL-OP-110MD-CON - RHRA	✓	626	VON
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	IC RIM CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
2	EA	90 DEG OFFSET PULL	8190EZHD 12" O		630-316	IVE
2	EA	OH STOP	100S		BLK	GLY
1	EA	SURFACE CLOSER	4111 EDA		693	LCN
1	EA	SURF. AUTO OPERATOR	4642 - RHRA	✓	693	LCN
1	EA	BLADE STOP SPACER	4110-61		693	LCN
1	EA	WEATHER RING	8310-801			LCN
1	EA	ACTUATOR, JAMB MOUNT	8310-818T	✓	630	LCN
1	EA	SURFACE MOUNT BOX	8310-819S			LCN
1	EA	ACTUATOR, WALL MOUNT	8310-853T	✓	630	LCN
1	EA	SURFACE MOUNT BOX	8310-867S			LCN
1	EA	MULLION SEAL	8780N		BK	ZER
2	EA	DOOR SWEEP	8192BK		BK	ZER
1	EA	THRESHOLD	655A		A	ZER
2	EA	WIRE HARNESS	CON-XX/XXP (AS REQ'D) - ELECTRIFIED HARDWARE TO POWER TRANSFER (EVALUATE CONDITIONS AND MODIFY WIRE LENGTH AS REQ'D)	✓		SCH
2	EA	WIRE HARNESS	CON-192P	✓		SCH
1	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
2	EA	DOOR CONTACT	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	✓		VON
			WEATHERSTRIP BY DOOR/FRAME MANUFACTURER			

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

UNLOCKED HOURS: DOORS ELECTRONICALLY DOGGED DOWN VIA ACCESS CONTROL SYSTEM, THUS IN PUSH/PULL MODE. PUSHING EITHER AUTO OPERATOR ACTUATOR WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE ONE LEAF.

DOORS NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO THE READER WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH (ALLOWING ACCESS) AND ACTIVATE EXTERIOR AUTO OPERATOR ACTUATOR. PUSHING EXTERIOR AUTO OPERATOR ACTUATOR AT THIS TIME WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN ONE LEAF. PUSH INTERIOR ACTUATOR AT ANY TIME WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH AND SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN ONE LEAF.

THE REQUEST TO EXIT FEATURE (RX) OF THE DEVICES TO SHUNT THE ALARM OUTPUT OF THE DOOR CONTACTS DURING VALID EGRESS. DOOR CONTACTS MONITOR WHETHER THE DOORS ARE OPENED, CLOSED OR HELD OPEN TOO LONG. DOORS TO REMAIN LOCKED WITH LOSS OF POWER OR ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS). FREE EGRESS AT ALL TIMES.

Intermediate School

Hardware Group No. 01

For use on Door #(s):
B123B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	L9010 03A	626	SCH
2	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 02

For use on Door #(s):
B128

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CORRIDOR LOCK W/OUTSIDE INDICATOR	L9456L 03A 09-544 OS-OCC	626	SCH
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER	626	KAB
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488S	BK	ZER

Hardware Group No. 03

For use on Door #(s):
B127

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070L 03A	626	SCH
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER	626	KAB
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 04

For use on Door #(s):
B121A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	INSTITUTION LOCK	L9082L 03A	626	SCH
2	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER	626	KAB
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

NOTES:
1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING FRAME PREPARATIONS.

Hardware Group No. 05

For use on Door #(s):
B123A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD		315AN	IVE
1	EA	STOREROOM LOCK	L9080L 03A		626	SCH
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6211AL FSE CON	↯	630	VON
1	EA	OH STOP	100S		BLK	GLY
1	EA	SURF. AUTO OPERATOR	4642	↯	693	LCN
2	EA	ACTUATOR, JAMB MOUNT	8310-818T	↯	630	LCN
2	EA	SURFACE MOUNT BOX	8310-819S			LCN
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY	↯		SCH
1	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	↯	BLK	SCE
1	EA	INTERCOM SYSTEM	PROVIDED BY SECURITY CONTRACTOR	↯		
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	↯		VON
			WEATHERSTRIP BY DOOR/FRAME MANUFACTURER			

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO THE READER OR PRESSING INTERCOM DOOR RELEASE BUTTON WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE (ALLOWING ACCESS) AND ACTIVATE EXTERIOR AUTO OPERATOR ACTUATOR. PUSHING EXTERIOR AUTO OPERATOR ACTUATOR AT THIS TIME WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE DOOR. PUSH INTERIOR ACTUATOR AT ANY TIME WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE AND SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE DOOR.

DOOR TO REMAIN LOCKED WITH LOSS OF POWER. FREE EGRESS AT ALL TIMES.

Hardware Group No. 06

For use on Door #(s):
B123C

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	POWER TRANSFER	EPT10 CON	✓	689	VON
1	EA	CONST LATCHING BOLT	FB51P		630	IVE
1	EA	DUST PROOF STRIKE	DP2		626	IVE
1	EA	INSTITUTION LOCK	L9082L 03A		626	SCH
2	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6223 FSE CON	✓	630	VON
1	EA	COORDINATOR	COR X FL		628	IVE
2	EA	MOUNTING BRACKET	MB (AS REQ'D)		689	IVE
2	EA	SURFACE CLOSER	4111 SCUSH		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	SILENCER	SR64		GRY	IVE
1	EA	WIRE HARNESS	CON-XX/XXP (AS REQ'D) - ELECTRIFIED HARDWARE TO POWER TRANSFER (EVALUATE CONDITIONS AND MODIFY WIRE LENGTH AS REQ'D)	✓		SCH
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM POWER TRANSFER TO POWER SUPPLY	✓		SCH
2	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
1	EA	PUSH-TO-ENTER BUTTON	PROVIDED BY SECURITY CONTRACTOR	✓	630	SCE
1	EA	DOOR RELEASE BUTTON	PROVIDED BY SECURITY CONTRACTOR	✓	628	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	✓		VON

NOTES:
1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING FRAME PREPARATIONS.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

UNLOCKED HOURS: DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM AND PUSH-TO-ENTER BUTTON ON SCHOOL CORRIDOR SIDE SHALL BE ENABLED BY ACCESS CONTROL SYSTEM. PRESSING PUSH-TO-ENTER BUTTON ON SCHOOL CORRIDOR SIDE WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS FROM SCHOOL CORRIDOR INTO OFFICE. OFFICE SIDE ALWAYS LOCKED PREVENTING FREE PASSAGE FROM OFFICE INTO THE SCHOOL. PRESENTING A VALID CREDENTIAL TO THE READER ON SCHOOL OFFICE SIDE, OR PRESSING DOOR RELEASE BUTTON LOCATED AT RECEPTION DESK, WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS FROM OFFICE INTO SCHOOL.

LOCKED HOURS: DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM AND PUSH-TO-ENTER BUTTON ON SCHOOL CORRIDOR SIDE SHALL BE DISABLED BY ACCESS CONTROL SYSTEM, THUS LOCKED IN BOTH DIRECTIONS. PRESENTING A VALID CREDENTIAL TO THE READER ON EITHER SIDE OR PRESSING DOOR RELEASE BUTTON LOCATED AT RECEPTION DESK, WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS.

DOOR TO REMAIN LOCKED WITH LOSS OF POWER OR ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS).

Hardware Group No. 07

For use on Door #(s):
B124A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	INSTITUTION LOCK	L9082L 03A		626	SCH
2	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	ELECTRIC STRIKE	6211 FSE CON	↯	630	VON
1	EA	SURFACE CLOSER	4111 SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
3	EA	SILENCER	SR64		GRY	IVE
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY	↯		SCH
2	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	↯	BLK	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	↯		VON

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO EITHER READER WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS. DOOR TO REMAIN LOCKED UPON LOSS OF POWER.

Hardware Group No. 08

For use on Door #(s):
B129A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112HD EPT		315AN	IVE
2	EA	POWER TRANSFER	EPT10 CON	✓	622	VON
1	EA	REMOVABLE MULLION	KR4954 STAB		693	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-98-EO-CON	✓	626	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-98-NL-OP-110MD-CON - RHRA	✓	626	VON
1	EA	IC RIM CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
1	EA	IC MORTISE CYLINDER	KEYED TO OWNER STANDARD -COORDINATE W/OWNER		626	KAB
2	EA	90 DEG OFFSET PULL	8190EZHD 12" O		630-316	IVE
2	EA	OH STOP	100S		BLK	GLY
1	EA	SURFACE CLOSER	4111 EDA		693	LCN
1	EA	SURF. AUTO OPERATOR	4642 - RHRA	✓	693	LCN
1	EA	BLADE STOP SPACER	4110-61		693	LCN
1	EA	WEATHER RING	8310-801			LCN
1	EA	ACTUATOR, JAMB MOUNT	8310-818T	✓	630	LCN
1	EA	SURFACE MOUNT BOX	8310-819S			LCN
1	EA	ACTUATOR, WALL MOUNT	8310-853T	✓	630	LCN
1	EA	SURFACE MOUNT BOX	8310-867S			LCN
1	EA	MULLION SEAL	8780N		BK	ZER
2	EA	DOOR SWEEP	8192BK		BK	ZER
1	EA	THRESHOLD	655A		A	ZER
2	EA	WIRE HARNESS	CON-XX/XXP (AS REQ'D) - ELECTRIFIED HARDWARE TO POWER TRANSFER (EVALUATE CONDITIONS AND MODIFY WIRE LENGTH AS REQ'D)	✓		SCH
2	EA	WIRE HARNESS	CON-192P	✓		SCH
1	EA	CARD READER	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
2	EA	DOOR CONTACT	PROVIDED BY SECURITY CONTRACTOR	✓	BLK	SCE
1	EA	POWER SUPPLY	PROVIDED BY SECURITY CONTRACTOR - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER	✓		VON
			WEATHERSTRIP BY DOOR/FRAME MANUFACTURER			

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES. COORDINATE ALL WIRING AND INSTALLATION WITH ELECTRICAL AND SECURITY CONTRACTORS.

DOORS NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO THE READER WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH (ALLOWING ACCESS) AND ACTIVATE EXTERIOR AUTO OPERATOR ACTUATOR. PUSHING EXTERIOR AUTO OPERATOR ACTUATOR AT THIS TIME WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN ONE LEAF. PUSH INTERIOR ACTUATOR AT ANY TIME WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH AND SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN ONE LEAF.

THE REQUEST TO EXIT FEATURE (RX) OF THE DEVICES TO SHUNT THE ALARM OUTPUT OF THE DOOR CONTACTS DURING VALID EGRESS. DOOR CONTACTS MONITOR WHETHER THE DOORS ARE OPENED, CLOSED OR HELD OPEN TOO LONG. DOORS TO REMAIN LOCKED WITH LOSS OF POWER OR ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS). FREE EGRESS AT ALL TIMES.

END OF SECTION 08 7100

SECTION 27 0500 – COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 Documents

A. This section of the of the specification is part of the contract documents and is to be read, interpreted and coordinated with all other parts.

1.2 Summary

A. Section Includes:

1. Overview
2. Abbreviations
3. Contractor Qualifications
4. Standards and Guidelines
5. Quality Assurance
6. Permits and Inspections
7. Low Voltage Cable Bundling

1.3 Overview

A. This document must be read, interpreted and coordinated with all other related specifications to deliver a complete Telecommunications infrastructure system.

B. This specification prescribes mandatory requirements for the Telecommunications infrastructure system.

C. A structured approach is specified which will ensure a flexible distribution system that will minimize the future costs of moves, additions and changes.

D. The Contractor will supply, furnish, and install all material, labor, tools, equipment and services required for construction and put into regular operation the complete Telecommunications system as shown on the Telecommunications drawings, described in the specifications, and any attached appendices.

E. Any and all proposed changes to this specification shall be subject to approval in writing to the Architect prior to implementation.

1.4 Abbreviations

A. 8P8C: 8-position, 8-contact

B. ANSI: American National Standards Institute

C. ASTM: American Society for Testing and Materials

D. 10Gig: 10-Gig Active Ethernet

E. 10GPON: 10-Gigabit Symmetrical Passive Optical Network

F. A/V: Audio Visual

G. AC: Alternating Current

H. AHJ: Authority Having Jurisdiction

I. APC: Angled Physical Contact

J. BICSI: Building Industry Consulting Service International.

K. Coated RMC: PVC Coated Rigid Metallic Conduit

L. DC: Direct Current

M. EF: Entrance Facility

N. EIA: Electronic Industries Alliance

O. EMI: Electromagnetic Interference

P. EMT: Electrical Metallic Tubing

Q. ENT: Electrical Non-metallic Tubing

R. ER: Equipment Room

S. GRC: Galvanized rigid steel conduit

T. IDF: Intermediate Distribution Frame

U. IP: Internet Protocol

V. IMC: Intermediate metal conduit

W. LAN: Local Area Network

X. MDF: Main Distribution Frame

Y. MPTL: Modular Plug Terminated Link

Z. NTP: Network Time Protocol

AA. OSP: Outside Plant Wiring

BB. PDU: Power Distribution Unit

CC. PoE: Power over Ethernet

DD. RCDD: Registered Communications Distribution Designer (BICSI)

EE. RGS: Rigid Galvanized Steel

FF. RU: Rack Unit

GG. SFP: Small Form Pluggable

HH. SMF: Single Mode Fiber

II. STP: Shielded Twisted Pair

JJ. TDMM: Telecommunications Distribution Methods Manual (BICSI)

KK. TECH: Technician (BICSI Certified)

LL. TI: Technology Integrator

MM. TIA: Telecommunications Industry Association

NN. TR: Telecommunications Room

OO. UL: Listed by Underwriters Laboratories (United States)

PP. UPC: Ultra Physical Contact

QQ. UPS: Uninterruptable Power Supply

RR. UTP: Unshielded Twisted Pairs

SS. WAO: Work Area Outlet

TT. WAP: Wireless Access Point

1.5 Contractor Qualifications

A. The Contractor will have experience in the installation and testing of similar systems as specified herein and will have completed at least two projects of similar size and scope within the last 24 months. The contractor will provide references upon request (including the project name, address, date of implementation, client name, title, telephone number and project description).

B. All members of the installation team must be certified by the Manufacturer as having completed the necessary training to complete their part of the installation. All personnel will be adequately trained in the use of such tools and equipment as required.

C. The Contractor must be certified to install a certified fire-stop system.

D. The Contractor will own and maintain tools, installation equipment, and test equipment necessary for successful installation and testing of optical and Category 6 and 6a premise distribution systems.

E. The Contractor must maintain a state Contractor's license as required by the state.

F. The Contractor installing the structured cabling shall have a Registered Communication Distribution Designer (RCDD) as a Project Superintendent.

G. The Contractor's lead installer shall have a current BICSI TECH certification and shall be onsite for the duration of the project.

1.6 Standards and Guidelines

A. The following organizations publish telecommunications construction standards with provisions that, through reference in this text, constitute provisions of this Document. At the time of publication of this Document, the editions of the standards published by the organizations indicated were valid. Installers of telecommunications and networking services for this project must adhere to the telecommunication standards published by these organizations, all standards are subject to revision; parties to agreements based on this Document shall apply the most recent editions of the standards published by the organizations indicated.

1. Federal Communications Commission (FCC)
2. Institute of Electrical and Electronics Engineers, Inc (IEEE)
3. National Fire Protection Association (NFPA)
4. National Electrical Safety Code (NESC)
5. American National Standards Institute (ANSI)
6. Telecommunications Industry Association (TIA)
7. Electronic Industries Alliance (EIA)
8. Building Industry Consulting Service International (BICSI)

B. Applicable Standards and Guidelines

1. The following list of methods and standards included are considered part of this specification. This is a list of primary references and does not limit the applicability of other standards that are incorporated into the work described in these specifications. They incorporate generally accepted communications infrastructure practices described in Standards documents (and addenda) published by recognized standards bodies and organizations. These include standards published by the Telecommunications Industry Association/Electronics Industries Alliance (TIA/EIA) and Building Industry Consultant Services International (BICSI).
   a. ANSI/TIA/ EIA 568B, Commercial Building Telecommunications Cabling Standard This prescribes the requirements for Intrabuilding copper and optical fiber cable performance, installation and testing
   b. ANSI/TIA/EIA 569B, Telecommunication Standard for Pathways and Spaces. This standard includes specifications for the design and construction of pathways and spaces within buildings required to support information technology equipment and cable media.
   c. ANSI/TIA/EIA 607, Commercial Building Grounding and Bonding Requirement. This document includes the components of an effective grounding system for communication systems within public and commercial buildings.
   d. ANSI/TIA/EIA 758, BICSI Customer Owned Outside Plant Telecommunications Cabling
   e. Standard. This standard provides specifications for Interbuilding communication facilities that
   f. include cable media, pathways and spaces.
   g. ANSI/TIA/EIA 862, Building Automation Systems Cabling Standard for Commercial Buildings. This standard describes the generic cable system for building automation systems (BAS) that are intended to support a multi-product, multi-vendor automation environment within public and commercial buildings.

h. Building Industry Consulting Services International (BICSI) Telecommunications Distribution Methods Manual, 14th Edition. This is a manual of proven design guidelines and methods accepted by the telecommunications industry.

i. ANSI/NFPA 70, National Electrical Code, (NEC) Current Edition. In addition to standards related to electrical safety, the NEC has several sections that specifically address low voltage cable installation.

1.7 Quality Assurance

A. The latest National Electrical Code shall be observed and shall govern the character of work, style, quantity and the size of all material used.

B. All materials shall conform with the standards of the Underwriter's Laboratories in every case where such standards have been established for the particular type of material in question.

C. All material and equipment shall be UL listed and bear the UL label where such listing and labeling exists.

D. The complete electrical installation shall comply with all the requirements of the MI.O.S.H.A.

E. Codes shall be used as minimum requirements, and where the Specifications or Plans call for an installation that exceeds and does not violate the Code requirements, the Specifications and Plans shall be followed.

1.8 Permits and Inspections

A. The Contractor shall obtain and pay for all permits required by the State of Michigan Labor Department, Electrical Division.

B. The Contractor shall submit, to precede request for final payment, a copy of the Certificate of Inspection as required by the State of Michigan.

1.9 Low Voltage Cable Bundling

A. Cable Ties

1. Cable ties shall not be allowed for the final bundling of data, security and audio/video cables.
   a. Cable ties can be used on a temporary basis during cable installation.
   b. All cable ties shall be removed after temporary use.
   c. All temporary zip ties shall be plenum rated, where required.

B. Hook and Loop

1. Hook & Loop (also known as Velcro) shall be used in final data, security and audio/video cable installations.
   a. All low voltage cables shall be bundled neatly using hook & loop.
   b. Hook & Loop shall be black except in exposed areas or otherwise noted in drawings and/or specifications.
   c. The Hook & Loop color in exposed areas shall be approved by Architect prior to installation.
   d. All Hook & Loop shall be a minimum of ¾" in width.
   e. All Hook & Loop shall be plenum rated, where required.

END OF SECTION 27 0500

SECTION 27 0528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Work covered by this Section shall consist of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the installation of pathways as described on the Drawings and/or required by these specifications.

B. Section Includes:

1. Non-Continuous Cable Supports.
2. Hook & Loop (Velcro)

C. Related Requirements:

1. Division 26 Section "Raceways and Boxes for Electrical Systems" for conduits, wireways, surface raceways, boxes, enclosures, cabinets, handholes, and faceplate adapters serving electrical systems.
2. Division 28 Section "Pathways for Electronic Safety and Security" for conduits, surface pathways, innerduct, boxes, and faceplate adapters serving electronic safety and security.

1.2 ACTION SUBMITTALS

A. Non-Continuous Cable Supports

B. Hook & Loop (Velcro)

1. Refer to specification 27 500 COMMON WORK RESULTS FOR COMMUNICATIONS.

1.3 INFORMATIONAL SUBMITTALS

A. Installer Credentials:

1. BICSI TECH certification is required for the lead installer that will be onsite at all times.
2. Valid certificates shall be provided to TowerPinkster prior to project kick-off.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1. As-built Drawings.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer shall have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings, cabling administration Drawings, and field-testing program development by a BICSI TECH.
2. Installation Supervision: Installation shall be under the direct supervision of a BICSI TECH, who shall be present at all times when Work of this Section is performed at Project site.

PART 2 - PRODUCTS

2.1 NON-CONTINUOUS CABLE SUPPORTS

A. General Requirements for non-continuous cable supports:

1. Shall be UL Listed
2. Shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables per ANSI/TIA 568.0-D
3. Shall have flared edges to prevent damage while installing cables Comply with TIA-569-D.
4. Shall have a cable retainer wire form to provide containment of cables within the hanger. The cable retainer shall be removable and reusable.
5. Shall have a hot-dipped galvanized or G60 finish and shall be rated for indoor use in non-corrosive environments.
6. Acceptable products: PENTAIR CADDY CAT32HP, CAT48HP, CAT64HP.
7. Non-continuous cable supports shall be a minimum of 2-inches.

2.2 HOOK & LOOP (VELCRO)

A. Refer to specification 27 500 COMMON WORK RESULTS FOR COMMUNICATIONS.

PART 3 - EXECUTION

3.1 INSTALLATION

1. Installation and configuration shall conform to the requirements of the current revision levels of ANSI/ EIA/TIA Standards 568 & 569, NFPA 70 (National Electrical Code), applicable local codes, and to the manufacturer's installation instructions.
2. Install cables using techniques, practices, and methods that are consistent with Category 5e or higher requirements and that supports Category 5e or higher performance of completed and linked signal paths, end to end.
3. Install cables without damaging conductors, shield, or jacket.
4. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by manufacturer or by TIA 568.
5. Pull cables without exceeding cable manufacturer's recommended pulling tensions or outlined in TIA 569. Use pulling means that will not damage media.
6. Do not exceed load ratings specified by manufacturer.
7. Non-continuous supports shall be installed a minimum 3 inches above ceilings.

8. Non-continuous supports shall be installed so there is no more than 5ft between supports, measured horizontally.

B. Comply with NECA 1, NECA 101, and TIA-569-B for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum pathways. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

C. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab.

E. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.

F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Pathways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot intervals.
2. Arrange pathways to cross building expansion joints at right angles with expansion fittings.
3. Arrange pathways to keep a minimum of 1 inch of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.

H. Stub-ups to Above Recessed Ceilings:

1. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

I. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.

J. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

K. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

L. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound.

M. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service pathway enters a building or structure.
3. Where otherwise required by NFPA 70.

N. Mount boxes at heights indicated on Drawings in accordance with ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

3.2 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.3 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or deterioration.

END OF SECTION 27 0528

SECTION 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Color and legend requirements for labels and signs.
2. Labels.
3. Fasteners for labels and signs.

1.2 ACTION SUBMITTALS

A. Labels

1.3 INFORMATIONAL SUBMITTALS

A. Installer Credentials:

1. BICSI TECH certification is required for the lead installer that will be onsite at all times.
2. Valid certificates shall be provided to TowerPinkster prior to project kick-off.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer shall have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings, cabling administration Drawings, and field-testing program development by a BICSI TECH.
2. Installation Supervision: Installation shall be under the direct supervision of a BICSI TECH, who shall be present at all times when Work of this Section is performed at Project site.
3. Testing Supervisor: Currently certified by BICSI as a TECH to supervise on-site testing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70 and TIA 606-B.

B. Comply with ANSI Z535.4 for safety signs and labels.

C. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Equipment Identification Labels:

1. White letters on a Black field.

2.3 LABELS

A. Self-Adhesive Wraparound Labels: computer printed, 3-mil-thick, vinyl flexible labels with acrylic pressure-sensitive adhesive.

1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating protective shields over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
2. Marker for Labels: Permanent, waterproof black ink marker recommended by tag manufacturer.
3. Marker for Labels: Machine-printed, permanent, waterproof black ink recommended by printer manufacturer.
4. Handwritten labels are not approved.

B. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Minimum Nominal Size:
   a. 1-1/2 by 6 inches for raceway and conductors
   b. 3-1/2 by 5 inches for equipment.
   c. As required by authorities having jurisdiction.

2.4 FASTENERS FOR LABELS AND SIGNS

A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Verify identity of each item before installing identification products.

C. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

D. Apply identification devices to surfaces that require finish after completing finish work.

E. Install signs with approved legend to facilitate proper identification, operation, and maintenance of communications systems and connected items.

F. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

G. Self-Adhesive Wraparound Labels:

1. Secure tight to surface at a location with high visibility and accessibility.
2. Provide label within 12 inches from each cable end.

H. Self-Adhesive Labels:

1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.

3.2 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations with high visibility. Identify by system and circuit designation.

C. Accessible Fittings for Raceways and Cables within Buildings: Identify covers of each junction and pull box with self-adhesive labels containing wiring system legend.

1. System legends shall be as follows:
   a. Telecommunications.

D. Faceplates: Label individual faceplates with self-adhesive labels. Place label at top of faceplate. Each faceplate shall be labeled with its individual, sequential designation, numbered clockwise when entering room from primary egress, composed of the following, in the order listed:

1. Refer to detail drawings

E. Equipment Room Labeling:

1. Racks, Frames, and Enclosures: Identify front and rear of each with self-adhesive labels containing equipment designation.
2. Patch Panels: Label individual rows and outlets, starting at to left and working down, with self-adhesive labels.

F. Backbone Cables: Label each cable with a self-adhesive wraparound label indicating the location of the far or other end of the backbone cable. Patch panel or punch down block where cable is terminated should be labeled identically.

1. Fiber optic cables shall be labeled on each end within 12 inches of where fiber cable enters enclosure.

G. Horizontal Cables: Label each cable with a self-adhesive wraparound label indicating the following, in the order listed:

1. Refer to detail drawings.

H. Instructional Signs: Self-adhesive labels.

I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures: Self-adhesive labels.

1. Apply to exterior of door, cover, or other access.

J. Equipment Identification Labels:

1. Indoor Equipment: Self-adhesive label.
2. Outdoor Equipment: Laminated-acrylic or melamine-plastic sign.
3. Equipment to Be Labeled:
   a. Communications cabinets.
   b. Uninterruptible power supplies.
   c. Computer room air conditioners.
   d. Fire-alarm and suppression equipment.
   e. Egress points.
   f. Power distribution components.

END OF SECTION 27 0553

SECTION 27 1513 – COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Work covered by this Section shall consist of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the installation, termination, and labeling of copper horizontal cabling infrastructure as described on the Drawings and/or required by these specifications.

B. Section Includes:

1. CAT6 Cable.
2. CAT6 Termination Hardware.
3. CAT6 Patch Cables.
4. Labeling.
5. Certification Testing.
6. As-Built Drawings.
7. Grounding provisions for twisted pair cable.
8. Cable Manufacturer Warranty

1.2 COPPER HORIZONTAL CABLING DESCRIPTION

A. Horizontal cabling system shall provide interconnections between Distributor A, Distributor B, or Distributor C, and the equipment outlet, otherwise known as "Cabling Subsystem 1," in the telecommunications cabling system structure. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.

1. TIA-568.2-D requires that a minimum of two equipment outlets be installed for each work area.
2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications equipment outlet.
3. Bridged taps and splices shall not be installed in the horizontal cabling.

B. A work area is approximately 100 sq. ft. and includes the components that extend from the equipment outlets to the station equipment.

C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

1.3 ACTION SUBMITTALS

A. Cabling Manufacturer Certified Installer Certificate

B. CAT6 Cable

C. CAT6 Termination Hardware

D. CAT6 Patch Cables

E. Shop Drawings: Reviewed by a current BICSI RCDD.

1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
3. Cabling administration Drawings and printouts.
4. Wiring diagrams and installation details of telecommunications equipment, to show location and layout of telecommunications equipment.

F. Twisted pair cable testing plan.

1.4 INFORMATIONAL SUBMITTALS

A. Installer Credentials:

1. Each installer is required to be certified by the manufacturer of the products that are installed (i.e. Panduit, Belden, Hubbell, Commscope)
2. BICSI TECH certification is required for the lead installer that will be onsite at all times.
3. Valid certificates shall be provided to TowerPinkster prior to project kick-off.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1. As-built Drawings.
2. Certification results for all installed cables (PDF & Certification tester format)
3. Cabling Manufacturer Warranty Certificate

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer shall have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings, cabling administration Drawings, and field-testing program development by a BICSI TECH.
2. Installation Supervision: Installation shall be under the direct supervision of a BICSI TECH, who shall be present at all times when Work of this Section is performed at Project site.
3. Testing Supervisor: Currently certified by BICSI as a TECH to supervise on-site testing.

B. Testing Agency Qualifications: Testing agency is required to have personnel certified by BICSI on staff.

1. Testing Agency's Field Supervisor: Currently certified by BICSI as a TECH.

1.7 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568.1-D, when tested according to test procedures of this standard.

B. Telecommunications Pathways and Spaces: Comply with TIA-569-E.

C. Grounding: Comply with TIA-607-D.

2.2 GENERAL CABLE CHARACTERISTICS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and NFPA 70 for the following types:

1. Communications Plenum Rated: Type CMP complying with UL 1685.
2. Communications, Plenum Rated: Type CM, Type CMG, Type CMP, Type CMR, or Type CMX in metallic conduit installed according to NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."

B. RoHS compliant.

2.3 CAT6 CABLE

A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6 cable at frequencies up to 350MHz.

B. Standard Compliances:

1. ANSI/TIA 568.2-D
2. NEC/CEC Type CMR (UL 1666) for Non-Plenum
3. NEC/CEC Type CMP (NFPA 262) for Plenum
4. UL Listed CMP-LP (0.5A) for Plenum
5. UL 444
6. RoHS Compliant Directive 2011/65/EU
7. ANSI/TIA 862 (Building Automation)
8. ICEA S-116-732
9. ICEA S-102-700
10. ISO/IEC 11801 Ed. 2.0 (Class E)

C. Applications

1. IEEE 802.3: 1000 BASE-T, 100 BASE-TX, 10 BASE-T, PoE, PoE+
2. ANSI/TIA 854: 1000 BASE-TX
3. CDDI, Token Ring, ATM
4. Digital Video
5. Broadband and Baseband Analog Video

D. Conductors: 100-ohm, 23 AWG solid copper.

E. Shielding/Screening: Unshielded twisted pairs (UTP).

F. Refer to drawings for cable manufacturer and part numbers.

2.4 CAT6 TERMINATION HARDWARE

A. Description: This section covers patch panels, jack modules, modular plugs, faceplates and surface mount boxes.

B. Patch Panels

1. Mounts to standard EIA 19" rack
2. All metal modular patch panels.
3. Stainless steel, painted black
4. Accept shielded and non-shielded jacks.
5. Write-on areas and option adhesive labels for port identification.
6. 24 and 48 port.
7. Flat and angled design.
8. Refer to drawings for manufacturer and part numbers.

C. Jack Modules

1. CAT6/Class E, 8-position
2. Exceeds channel requirements of ANSI/TIA-568.2-D Category 6 and ISO 11801 Class E standards at swept frequencies 1 to 250 MHz
3. Meets ANSI/TIA-1096-A contacts plated with 50 microinches of gold for superior performance
4. Rated for 2500 cycles with IEEE 802.3af / 802.3at and 802.3bt type 3 and type 4. Supports Power over HDBaseT up to 100 watts
5. Operating Temp: -10°C to 65°C (14°F to 149°F)
6. Terminate 4-pair, 22-26 AWG
7. 100 Ohm
8. Several available color options
9. Refer to drawings for manufacturer and part numbers.

D. Modular Plugs

1. CAT6/Class E, 8-position/8 wire
2. Exceeds ANSI/TIA Category 6 and ISO Class E performance requirements when properly terminated to CAT 6
3. Terminate 23-24 AWG (solid or stranded)
4. 100 Ohm
5. Supports PoE, PoE+, and proposed Type 3 and 4 PoE++ applications for up to 100 W

6. Refer to drawings for manufacturer and part numbers.

E. Faceplates - Plastic

1. Available in 1, 2, 3, 4 and 6 port single-gang
2. Optional label windows
3. Accepts variety of CAT6 jacks and AV inserts
4. Refer to drawings for manufacturer and part numbers.

F. Faceplates – Stainless Steel

1. Available in 2, 4 and 6 port single-gang
2. Optional label windows
3. Accepts variety of CAT6 jacks and AV inserts
4. Refer to drawings for manufacturer and part numbers.

G. Surface Mount Boxes

1. Low profile design
2. Variety of port densities
3. Accepts variety of CAT6 jacks and AV inserts
4. Breakouts for use with surface raceway
5. Made of ABS
6. UL 1863 rated
7. Refer to drawings for manufacturer and part numbers.

2.5 CAT6 PATCH CABLES

A. Description: Patch cord cable shall be offered in multiple colored UTP cable for design flexibility with a clear strain relief boot on each modular plug.

1. CAT6/Class E
2. Compatible with both T568A and T568B wiring schemes
3. Exceeds all ANSI/TIA-568.2-D and ISO 11801 Class E standards for all frequencies from 1 to 250 MHz
4. Meets ANSI/TIA-1096-A (formerly FCC Part 68); contacts plated with 50 microinches of gold for superior performance
5. UL 1863 approved
6. A variety of lengths shall be available for design flexibility.
7. PoE compliance: Rated for 2500 cycles with IEEE 802.3af / 802.3at and 802.3bt type 3 and type 4
8. Rated to 2500 mating cycles.
9. Field terminated patch cables shall not be allowed in any situation.
10. Refer to drawings for manufacturer and part numbers.

2.6 LABELING

A. Description: Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-B requirements for the following:

1. Cables use flexible vinyl or polyester that flexes as cables are bent.

2. All labels shall be installed on each end of installed cable within 12 inches of termination.
3. Labels shall be:
    a. Self-laminating vinyl labels
    b. Permanent acrylic tape that adheres to surfaces that are smooth, rough or powder coated
    c. Machine-printed labels indicating:
        1) Telecommunication Room
        2) Patch Panel
        3) Patch panel port

4. Hand-Written labels shall **NOT** be allowed in any situation.

2.7 AS-BUILT DRAWINGS

A. Description: Drawings submitted by contractor upon completion of project reflecting all changes made and documenting all installations.

1. As-built drawings shall be submitted to TowerPinkster for any/all structured cabling projects.
2. Each as-built shall indicate locations of all installed cables.
3. As-built drawing shall only have typed text (No hand-written as-builts).
4. As-builts shall be submitted in PDF format.
    a. Any other format requires approval prior to submittal.

2.8 GROUNDING PROVISIONS FOR TWISTED PAIR CABLING

A. Comply with requirements in Section 27 0526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.

B. Comply with TIA-607-D.

2.9 CABLE MANUFACTURER WARRANTY

A. A cabling manufacturer warranty shall be provided by the installation contractor for all structured cabling projects.

1. Warranty shall be 25-year standards-based performance warranty that applies to all registered links and/or channels in an installation.
2. Warranty shall be submitted within 30 days of project completion.

PART 3 - EXECUTION

3.1 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

A. Comply with NECA 1 and NECA/BICSI 568.

B. Wiring Method: Install cables in raceways and cable trays, except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, attics, and gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables, except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements for raceways and boxes specified in Section 27 0528 "Pathways for Communications Systems."

C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

D. General Requirements for Cabling:

1. Comply with TIA-568.2-D.
2. Comply with BICSI's Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section.
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
5. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
8. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section. Use lacing bars and distribution spools.
9. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
10. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
11. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
12. Pulling Cable: Comply with BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Pulling and Installing Cable" Section. Monitor cable pull tensions.
13. Provide 5ft service loop at each location (security cameras & wireless access points shall have 15ft)
14. Bundle CAT6 cables in groups of no more than 24 cables as they route on ladder rack to patch panel in all exposed areas of Telecommunication Rooms.

E. Group connecting hardware for cables into separate logical fields.

F. Separation from EMI Sources:

1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.

3.2 FIRESTOPPING

A. Comply with requirements in Section 07 8413 "Penetration Firestopping."

B. Comply with TIA-569-D, Annex A, "Firestopping."

C. Comply with "Firestopping Systems" Article in BISCI's "Telecommunications Distribution Methods Manual."

3.3 GROUNDING

A. Install grounding according to the "Grounding, Bonding, and Electrical Protection" chapter in BICSI's "Telecommunications Distribution Methods Manual."

B. Comply with TIA-607-D and NECA/BICSI-607.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall, allowing at least a 2-inch clearance behind the grounding bus bar. Connect grounding bus bar to suitable electrical building ground, using a minimum No. 4 AWG grounding electrode conductor.

D. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568.2-D.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test twisted pair cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

C. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similarly to Table 10.1 in BICSI's "Telecommunications Distribution Methods Manual," or shall be transferred from the instrument to the computer, saved as text files, printed, and submitted.

D. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

E. End-to-end cabling will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 27 1513

SECTION 27 1700 - TESTING, ID. AND ADMIN OF BALANCED TWISTED PAIR INFRASTRUCTURE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide all labor, materials, tools, field-test instruments and equipment required for the complete testing, identification and administration of the work called for in the Contract Documents.

B. In order to conform to the overall project event schedule, the cabling contractor shall survey the work areas and coordinate cabling testing with other applicable trades.

C. In addition to the tests detailed in this document, the contractor shall notify the Owner or the Owner's representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor shall carry out and record any additional measurement results at no additional charge

1.2 SCOPE

A. This Section includes the minimum requirements for the test certification, identification and administration of horizontal balanced twisted pair cabling.

1.3 SECTION INCLUDES:

1. Copper cabling test instruments
2. Copper cabling testing
3. Identification
    a. Labels and labeling
4. Administration
    a. Test results documentation
    b. As-built drawings

B. Testing shall be carried out in accordance with this document.

C. Testing shall be performed on each cabling link including MPTL (modular plug terminated link). (100% testing)

D. All tests shall be documented.

1.4 QUALITY ASSURANCE

A. All testing procedures and field-test instruments shall comply with applicable requirements of:

1. ANSI/TIA-1152, Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
2. ANSI/TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises.

3. ANSI/TIA-568-C.1, Commercial Building Telecommunications Cabling Standard
4. ANSI/TIA-568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
5. ANSI/TIA-606-C, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by the customer, unless the customer specifies their own labeling requirements.

B. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:

1. Manufacturer of the connectors or cable.
2. Manufacturer of the test equipment used for the field certification.
3. Training organizations (e.g., BICSI, A Telecommunications Association headquarters in Tampa, Florida.

C. The Owner or the Owner's representative shall be invited to witness and/or review field-testing.

1. The Owner or the Owner's representative shall be notified of the start date of the testing phase five (5) business days before testing commences.
2. The Owner or the Owner's representative will select a random sample of 5% of the installed links. The Owner or the Owner's representative shall test these randomly selected links and the results are to be stored in accordance with Part 3 of this document. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the representative shall repeat 100% testing at no cost to the Owner.

1.5 SUBMITTALS

A. Manufacturers catalog sheets and specifications for the test equipment.

B. A schedule (list) of all balanced twisted-pair copper links to be tested.

C. Sample test reports.

D. Certification results for all installed data cables.

1.6 ACCEPTANCE OF TEST RESULTS

A. Unless otherwise specified by the Owner or the Owners representative, each cabling link shall be in tested for:

1. Wire Map
2. Length
3. Propagation Delay
4. Delay Skew
5. DC Loop Resistance – recorded for information only
6. DC Resistance Unbalance – recorded for information only
7. Insertion Loss

8. NEXT (Near-End Crosstalk)
9. PS NEXT (Power Sum Near-End Crosstalk)
10. ACR-N (Attenuation to Crosstalk Ratio Near-End) – recorded for information only
11. PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End) – recorded for information only
12. ACR-F (Attenuation to Crosstalk Ratio Far-End)
13. PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
14. Return Loss
15. TCL (Transverse Conversion Loss) – recorded for information only
16. ELTCTL (Equal Level Transverse Conversion Transfer Loss) – recorded for information only

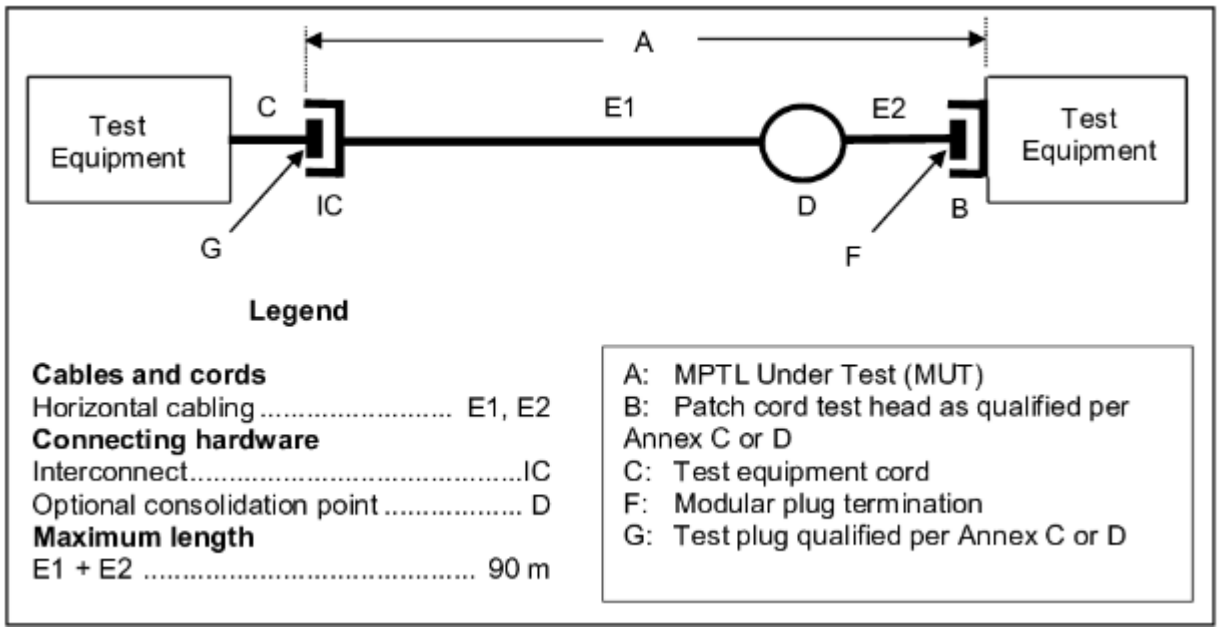
B. All installed cabling Permanent Links shall be field-tested and pass the test requirements and analysis as described in Part 3. Any Permanent Link that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected Permanent Link meets performance requirements. The final and passing result of the tests for all Permanent Links shall be provided in the test results documentation in accordance with Part 3.

C. Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the Owner.

1.7 MODULAR PLUG TERMINATED LINK (MPTL)

A. The ANSI/TIA-568.2-D standard requires that horizontal cable be terminated on a telecommunications outlet to provide flexible access to the user. In certain limited cases there may be a need to terminate horizontal cables to a plug that is directly plugged into a device. This will sometimes be done to service a security camera, a radio enabled wireless access device, or another device which is not often moved or rearranged.

B.



1. (A) Modular plug terminated link under test (MUT)
2. (B) Patch cord test head qualifier per Annex C or D in ANSI/TIA-568.2-D
3. (C) Test equipment patch cord
4. (D) Optional consolidated point

5. (E) Horizontal cable
6. (F) Test plug qualified per Annex C or D in ANSI/TIA-568.2-D

C. Modular plug terminated link transmission requirements

1. Modular plug terminated link shall comply with the permanent link transmission requirements of the ANSI/TIA-568.2-D standard.

PART 2 - PRODUCTS

2.1 BALANCED TWISTED-PAIR CABLE TESTERS

A. A The field-test instrument shall be within the calibration period recommended by the manufacturer, typically 12 months.

B. Certification tester

1. Accuracy
   a. Level IIIe accuracy in accordance with ANSI/TIA-1152
   b. Independent verification of accuracy

2. Permanent Link Adapters
   a. RJ45 plug must meet the requirements for NEXT, FEXT and Return Loss in accordance with ANSI/TIA-568-C.2 Annex C
   b. Twisted pair Category 5e, 6, 6A, 7 or 7_A cords are not permitted as their performance degrades with use and can cause false Return Loss failures

3. Results Storage
   a. Must be capable of storing > 10,000 results for all measurements found in 2.1.B.4 below

4. Measurement capabilities
   a. Wire Map
   b. Length
   c. Propagation Delay
   d. Delay Skew
   e. DC Loop Resistance
   f. DC Resistance Unbalance
   g. Insertion Loss
   h. NEXT (Near-End Crosstalk)
   i. PS NEXT (Power Sum Near-End Crosstalk)
   j. ACR-N (Attenuation to Crosstalk Ratio Near-End)
   k. PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End)
   l. ACR-F (Attenuation to Crosstalk Ratio Far-End)
   m. PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
   n. Return Loss
   o. TCL (Transverse Conversion Loss)
   p. ELTCTL (Equal Level Transverse Conversion Transfer Loss)
   q. Time Domain Reflectometer

r. Time Domain Xtalk Analyzer

C. PC Software

1. Windows® based.
2. Must show when 3 dB and 4 dB rules are applied
3. Re-certification capability, where results must have their Cable IDs suffixed with (RC).
4. Built in PDF export – no additional third-party software permitted.
5. Built-in statistical analysis.

2.2 IDENTIFICATION

A. Labels

a. Refer to specification 27 0553 IDENTIFICATION FOR COMMUNICATION SYSTEMS.

2.3 ADMINISTRATION

A. Administration of the documentation shall include test results of each Permanent Link.

B. The test result information for each link shall be recorded in the memory of the field-test instrument upon completion of the test.

C. The test result records saved within the field-test instrument shall be transferred into a Windows® -based database utility that allows for the maintenance, inspection and archiving of these test records.

PART 3 - EXECUTION

3.1 GENERAL

A. All outlets, cables, patch panels and associated components shall be fully assembled and labeled prior to field-testing. Any testing performed on incomplete systems shall be redone on completion of the work.

3.2 BALANCED TWISTED PAIR CABLE TESTING

A. Field-test instruments shall have the latest software and firmware installed.

B. Permanent Link test results including the individual frequency measurements from the tester shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative documentation (reports) may be generated.

C. Testing shall be performed on each cabling segment (connector to connector). Sampling is not acceptable.

D. Permanent Link adapters made from twisted pair Category 5e, 6, 6A, 7 or 7_A cords are not permitted as their performance degrades with use and can cause false Return Loss failures.

E. The installer shall build a reference link. All components shall be anchored so it is not possible to disturb them. The technician is to conduct a Category 6 Permanent Link test each day to ensure no degradation of the tester or its Permanent Link adapters.

F. Wire Map Measurement

1. The wire map test is intended to verify pin-to-pin termination at each end and check for installation connectivity errors. For each of the 8 conductors in the cabling, the wire map indicates:
   a. Continuity to the remote end
   b. Shorts between any two or more conductors
   c. Reversed pairs
   d. Split pairs
   e. Transposed pairs
   f. Distance to open on shield
   g. Any other miss-wiring

2. The correct connectivity of telecommunications outlets/connectors is defined in ANSI/TIA-568-C.2. Two color schemes are permitted. The user shall define which scheme is to be used. The field tester shall document which color scheme was used. Examples are given below:

3. 

G. Length Measurement

1. The length of each balanced twisted pair shall be recorded.
2. Since physical length is determined from electrical length, the physical length of the link calculated using the pair with the shortest electrical delay shall be reported and used for making the pass or fail determination.
3. The pass or fail criteria is based on the maximum length allowed for the Permanent Link as specified in ANSI/TIA-568-C.2 plus the nominal velocity of propagation (NVP) uncertainty of 10%. For a Permanent Link, the length measurement can be 325 ft. (99 m) before a fail is reported.

H. Propagation Delay measurement

1. Is the time it takes for a signal to reach the end of the link.
2. The measurement shall be made at 10 MHz per ANSI/TIA-1152.
3. The propagation delay of each balanced twisted pair shall be recorded.
4. Is not to exceed 498 ns per ANSI/TIA-568-C.2 Section 6.3.18.

I. Delay Skew measurement

1. Is the difference in propagation delay @ 10 MHz between the shortest delay and the delays of the other wire pairs.
2. The delay skew of each balanced twisted pair shall be recorded.
3. Is not to exceed 44 ns per ANSI/TIA-568-C.2 Section 6.3.19.

J. DC Resistance

1. Often reported as Resistance, is the loop resistance of both conductors in the pair.
2. Is not specified in ANSI/TIA-1152 but shall be recorded for all four pairs.

K. DC Resistance Unbalance

1. Often reported as Resistance Unbalance, is the difference in resistance of the two wires within the pair.
2. Is not specified in ANSI/TIA-1152 for a Permanent Link but shall be recorded for all four pairs.

L. Insertion Loss

1. Is the loss of signal strength over the cabling (in dB).
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz
3. Worst case shall be reported for all four pairs in one direction only.
4. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
5. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.7.

M. NEXT (Near-End Crosstalk)

1. Is the difference in amplitude (in dB) between a transmitted signal and the crosstalk received on other wire pairs at the same end of the cabling.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz
3. Shall be measured in both directions. (12 pair to pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.8.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
7. The Time Domain Xtalk data shall be stored for any marginal or failing NEXT results.

N. PS NEXT (Power Sum Near-End Crosstalk)

1. Is the difference (in dB) between the test signal and the crosstalk from the other pairs received at the same end of the cabling.
2. The frequency resolution shall be:

a. 1 – 31.25 MHz: 150 kHz
b. 31.25 – 100 MHz: 250 kHz
c. 100 – 250 MHz: 500 kHz

3. Shall be measured in both directions. (8 pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.9.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
7. The Time Domain Xtalk data shall be stored for any marginal or failing PS NEXT results.

O. ACR-N (Attenuation Crosstalk Ratio Near-End)

1. Is a calculation of NEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be calculated in both directions.
4. Is not specified in ANSI/TIA-1152 but shall be recorded for all 12 possible combinations.

P. PS ACR-N (Power Sum Attenuation Crosstalk Ratio Near-End)

1. Is a calculation of PS NEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be calculated in both directions.
4. Is not specified in ANSI/TIA-1152 but shall be recorded for all 8 possible combinations.

Q. ACR-F (Attenuation Crosstalk Ratio Far-End)

1. Is a calculation of FEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be measured in both directions. (24 pair to pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.11.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).

R. PS ACR-F (Power Sum Attenuation Crosstalk Ratio Far-End)

1. Is a calculation of PS FEXT minus Insertion Loss of the disturbed pair in dB.

2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be measured in both directions. (8 pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.13.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).

S. Return Loss

1. Is the difference (in dB) between the power of a transmitted signal and the power of the signals reflected back.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be measured in both directions. (8 pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Shall be ignored at all frequencies where the Insertion Loss is less than 3 dB for that pair.
6. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568-C.2 Section 6.3.6.
7. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
8. The Time Domain Reflectometer data shall be stored for any marginal or failing Return Loss results.

T. TCL (Transverse Conversion Loss)

1. Is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the near-end on the same wire pair.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be measured in both directions.
4. Is not specified in ANSI/TIA-1152 for a Permanent Link but shall be recorded for all 8 possible combinations.

U. ELTCTL (Equal Level Transverse Conversion Transfer Loss)

1. Is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the far end on the same wire pair minus the Insertion Loss of that pair.
2. The frequency resolution shall be:
   a. 1 – 31.25 MHz: 150 kHz
   b. 31.25 – 100 MHz: 250 kHz
   c. 100 – 250 MHz: 500 kHz

3. Shall be measured in both directions.
4. Is not specified in ANSI/TIA-1152 for a Permanent Link but shall be recorded for all 8 possible combinations.

3.3 ADMINISTRATION

A. Test results documentation

1. Test results saved within the field-test instrument shall be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of the test records. These test records shall be uploaded to the PC unaltered, i.e., “as saved in the field-test instrument”. The file format, CSV (comma separated value), does not provide adequate protection of these records and shall not be used.
2. The test results documentation shall be available for inspection by the Owner or the Owner’s representative during the installation period and shall be passed to the Owner's representative within 5 working days of completion of tests on cabling served by a telecommunications room or of backbone cabling. The installer shall retain a copy to aid preparation of as-built information.
3. The database for the complete project, including twisted-pair copper cabling links, if applicable, shall be stored and delivered on CD or DVD prior to Owner acceptance of the building. This CD or DVD shall include the software tools required to view, inspect, and print any selection of the test reports.
4. Circuit IDs reported by the test instrument should match the specified label ID (see **Error! Reference source not found.** of this Section).
5. The detailed test results documentation data is to be provided in an electronic database for each tested balance twisted-pair and shall contain the following information
    a. The overall Pass/Fail evaluation of the link-under-test
    b. The date and time the test results were saved in the memory of the tester
    c. The identification of the customer site as specified by the end-user
    d. The name of the test limit selected to execute the stored test results
    e. The name of the personnel performing the test
    f. The version of the test software and the version of the test limit database held within the test instrument
    g. The manufacturer, model and serial number of the field-test instrument
    h. The adapters used
    i. The factory calibration date
    j. Wire Map
    k. Propagation Delay values, for all four pairs
    l. Delay Skew values, for all four pairs
    m. DC Resistance values, for all four pairs
    n. DC Resistance Unbalance, values for all four pairs
    o. Insertion Loss, worst case values for all four pairs
    p. NEXT, worst case margin and worst case values, both directions
    q. PS NEXT, worst case margin and worst case values, both directions
    r. ACR-F, worst case margin and worst case values, both directions
    s. PS ACR-F, worst case margin and worst case values, both directions
    t. Return Loss, worst case margin and worst case values, both directions
    u. TCL, worst case values both directions
    v. ELTCTL, worst case values, both directions.
    w. Time Domain Crosstalk data if the link is marginal or fails
    x. Time Domain Reflectometer data if the link is marginal or fails

B. Record copy and as-built drawings

1. Provide record copy drawings periodically throughout the project as requested by the Construction Manager or Owner, and at end of the project on a CD or DVD. Record copy drawings at the end of the project shall be in CAD format and include notations reflecting the as built conditions of any additions to or variation from the drawings provided such as, but not limited to cable paths and termination point. The as-built drawings shall include, but are not limited to block diagrams, frame and cable labeling, cable termination points, equipment room layouts and frame installation details. The as-builts shall include all field changes made up to construction completion:
   a. Field directed changes to pull schedule.
   b. Horizontal cable routing changes.
   c. Associated detail drawings.

END OF SECTION 27 1700

SECTION 28 1300 - ACCESS CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Failure to consult these documents shall not relieve the Contractor of the requirements therein.

1.2 SUMMARY

A. This Section includes the following:

1. Security Access Devices.
2. Access Control Panel.

1.3 RELATED SECTIONS

A. Section 087100 –Door Hardware
B. Division 26 Section "Electrical" for connections to electrical power system and for low-voltage wiring work.
C. Division 27 Section "Communications" for connections to the LAN.

1.4 REFERENCES

A. ANSI A117.1 (1998) - Accessible and Usable Buildings and Facilities.
B. IBC 2009 - International Building Code.
C. NFPA 70 (2008) - National Electrical Code.
D. NFPA 80 - Fire Doors and Windows.
E. NFPA 101- Life Safety Code.
F. UL 294 - Access Control Systems.
G. UL 1076 - Proprietary Burglar Alarm Units and Systems.
H. Local applicable codes.

1.5 SYSTEM DESCRIPTION

A. Security Access System.

1. Selected Exterior Doors: Control access into Building.
2. Selected Building Areas: Control access into selected areas indicated.
3. System shall be compatible with existing Galaxy System, Software version 9.X or higher

1.6 SUBMITTALS

A. Shop Drawings: Provide system wiring diagram showing each device and wiring connection required.

B. Product Data: Provide electrical characteristics and connection requirements.

C. Test Reports: Indicate satisfactory completion of required tests and inspections.

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

E. Project Record Documents: Record actual locations of access authorization equipment.

F. Operation Data: Operating instructions.

G. Maintenance Data: Maintenance and repair procedures.

1.7 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty years documented experience and with service facilities within 100 miles of Project.

C. Installer Qualifications: Company specializing in installing the products specified in this section with minimum Installer Qualifications: Systems Integrators, verifiably factory trained and certified by the primary product manufacturers, with documented experience installing complete integrated access control systems similar in material, design, and scope to that indicated for this Project and whose work has resulted in construction with a proven record of successful in-service performance. Qualifications include, but are not necessarily limited, to the following:

1. References: Provide a list of references for similar projects including contact name, phone number, name and type of project.
2. Professional Staffing: Firms to have a dedicated access control systems integration department with full time, experienced professionals on staff experienced in providing on site consulting services for both electrified door hardware and integrated access control systems installations.
3. Factory Training: Installation and service technicians are to be competent factory trained and certified personnel capable of maintaining the system.
4. Service Center: Firms to have a service center capable of providing training, in-stock parts, and emergency maintenance and repairs at the Project site with 24-hour/7-days a week maximum response time.

D. Supplier Qualifications: Supplier/Dealers, verifiably authorized and in good standing with the primary product manufacturers, with experience supplying integrated access control systems similar in material, design, and scope to that indicated for this Project and whose work has resulted in construction with a proven record of successful in-service performance.

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article will not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and are in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of the installed access control system hardware and software that fails in materials or workmanship, including all related parts and labor, within specified warranty period after final testing and acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, that is a member company of the National Burglar & Fire Alarm Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7**, and that is acceptable to Owner's insurance underwriter**.

E. Testing Agency's Field Supervisor: Person currently certified as an advanced alarm technician by the National Burglar & Fire Alarm Association to supervise on-site testing specified in Part 3.

1.9 MAINTENANCE SERVICE

A. Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (12) months full maintenance by skilled employees of the Systems Integrator. Include repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 OVERVIEW

A. The devices described herein are intended to provide a reference for the Card Access/Security System and are to be provided as described in the Contract Documents.

B. Certain devices described may not be applicable to all systems. All devices required to complete the installation may not be described but shall be provided as if specifically called for within the Specification. It is the responsibility of the Contractor to provide a complete working system.

C. All system components shall be approved for the function they will perform.

D. The system shall be of an open architecture design and shall support industry standard databases such as Microsoft SQL Server 2000/2005, MSDE or SQL Server 2005 Express.

E. A system server for enterprise wide database services, system programming, system monitoring, administrative services, report and proximity card generation.

F. A workstation computer shall provide interfacing and control of the local, site specific, Access/Security System.

G. The System shall be of a distributed database design, using intelligent microprocessor panels, to make smart decisions at the door.

H. The system shall be capable of utilizing a true client server network configured to support the system database service, all panel services and user interfaces optimizing the users' options for system programming, event monitoring and record keeping.

I. The database service shall be ODBC compliant allowing the system to access an existing compatible ODBC compliant database as the system data source. A single system database shall maintain both credential-holder's records as well as access system information and programming parameters.

2.2 MANUFACTURERS

A. Manufacturers subject to compliance with requirements, provide products by the manufacturers specified.

1. Access Control System- DMP Control Systems
2. Card Readers – HID or approved equivalent.
3. Proximity Cards – Cards will be furnished by Owner.
4. Substitutions: Refer to Division 01 Section "Product Requirements".

2.3 INSTALLING CONTRACTOR

A. Procure services from owner's existing maintenance agreement with existing system install company and utilize them for any additions or modifications to the existing system.

1. Koorsen Fire & Security
3953 Ralph Jones DR. STE B, South Bend, IN 46628
(574) 444-9887

2.4 ACCESS CONTROL PANEL

A. The access control panel shall be an intelligent, modular controller designed to integrate various event management applications on one controller. The system shall be the System Galaxy 600 Series.

B. COMPONENTS

1. Primary Controller: The Primary Controller is the controller responsible for up/downstream communications with the PC/Network. The Primary Controller consists of three major subsystems, software services, hardware and expansion interfaces.

a. Software Services: The software services are a set of common functions and applications that shall be installed on every 600 Series Controller to perform system configuration, generic system event handling and communications between the controller and a host or other controllers.

b. Hardware
   1) Ethernet Port: The 600 Series Controller shall support 10BaseT Ethernet Communication. The interface to the Ethernet services shall be through a standard RJ-45 jack connector native to the controller. Provide as many as required for full system integration.
   2) Inputs/outputs: The 600 Series controller shall have three (3) on-board inputs. The inputs are reserved for tamper, power fail, and low battery.
   3) Serviceable Hot-Swap Modules: The Controller shall allow for "Hot-Swap" serviceability. This allows for communications and door modules to be interchanged without a controller power-down.
   4) Power Requirements: Each 600 Series Control Module shall accept a regulated input voltage of 11.5VDC to 13.8VDC and generate appropriate voltage levels for on-board use as required. The input supply voltage shall be available to be bussed directly to the reader bus connectors to supply operating voltages for field readers. A jumper shall be provided for the ACP modules supporting direct Wiegand support to supply either 12VDC or 5 VDC to the external read heads.
   5) Indicators: There shall be LEDs indicating the status of the received and transmitted data for the onboard communications ports, with active data turning on the LED. These LEDs shall be hardware controlled.
   6) Ports: There shall be multiple ports provided on-board for external read heads, input/output boards. The number of actual ports varies according to the controller configuration.

c. Expansion Interfaces
   1) Inputs: 8 Supervised Class A inputs shall be provided on each Digital I/O board. These inputs shall report secure for user selectable ohms and alarm for open or short. Resistors marked for easy identification shall be located near each input connector to be clipped out by the end user when installing inputs.
   Outputs: 4 Class C relay outputs shall be provided on each Digital I/O board these outputs shall have contacts for Normally Open or Normally Closed states
      a) Each 600 Controller shall support up to five (5) Digital I/O board, adding up to forty (40) supervised inputs and twenty (20) Class C relays.

C. System Enclosure: Sheet metal, of the appropriate gauge for the cabinet size per UL 294, shall be utilized. The cabinet shall be Black in color with a matte finish. The ACP's shall be housed in a locking 18 gauge metal cabinet, suitable for wall mounting. All cabinet locks shall be keyed alike. The cabinet shall be suitably sized to allow installation of the controller and all expansion modules and associated field wiring. The cabinet door shall include illuminated diagnostic indicators, which shall indicate the status of the panel. A single tamper switch shall be incorporated into the door. There shall be at least 4 mounting holes and 10 knockouts on the cabinet. Panel shall be provided with 120 volt power supply along with battery backup and battery charger.

2.5 CARD READERS

A. All readers shall be compatible with Owners 26 bit, HID cards.

B. Readers shall be long range proximity, minimum 8" range, type technology system that complies with UL 294 standards and is certified as complying by Underwriters' Laboratories.

C. Readers shall be single piece indoor/outdoor wall switch proximity reader providing a Wiegand 26 Bit output. Shall mount in a door entry panel electrical box and shall be powered directly from the panel. The reader shall be sealed in a rugged, weatherized enclosure designed to withstand harsh environments as well as provide a high degree of vandal resistance when installed outdoors.

D. Manufacture

1. Wall mount – HID
2. Mullion Mount –HID
3. Vehicle Entrances – HID Maxiprox

E. POWER SUPPLIES

1. Power supplies for mortise and/or strike lock power shall be suitable to provide 24vdc, 4 amp power to Altronix AL-400. Provide one for every eight doors.

F. Key Pad Units.

G. Electric Strikes.

H. Electric Locks.

I. Motion Dectectors.

J. Manual Stations.

K. System Cable.

PART 3 - EXECUTION

3.1 PRE-INSTALL MEETING

A. Prior to commencing installation, the trades shall convene for a coordination meeting including but not limited to the following parties:

1. Architect
2. Electrical Engineer or Systems Designer
3. Construction Manager
4. Frame and Door Installer
5. Door Hardware Installer
6. Electrical and Fire Alarm contractor
7. Low voltage or security systems contractor

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use 16 AWG minimum size conductors for detection and signal circuit conductors. Install wiring in conduit.

C. Make conduit and wiring connections to door hardware devices furnished and installed under Division 08 Section "Door Hardware."

3.3 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Division 01 Section "Quality Control."

3.4 MANUFACTURER'S FIELD SERVICES

A. Include services of technician to supervise installation, adjustments, final connections, system testing, and to train Owner personnel.

3.5 DEMONSTRATION

A. Demonstrate normal and abnormal modes of operation, and required response to each.

B. Provide 4 hours of instruction each for two persons.

1. Conduct instruction at project site with manufacturer's representative.
2. Include travel and living expenses for Owner personnel.

END OF SECTION 28 1300

SECTION 28 1400 – ACCESS CONTROL SYSTEM HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Executive Summary: Includes the procurement and installation of an access control platform, the credentials (fobs, cards, etc.), and the setup and programming of the user's database.

B. Section Includes:

1. Access control panel hardware and power supply requirements
2. One or more security access networked workstations.
3. Security access operating system and application software.
4. Security access controllers connected to high-speed electronic-data transmission network.

C. Related Requirements:

1. Section 28 1500 "Access Control System Hardware Devices" for access control system hardware, such as keypads, card readers, and biometric identity devices.

1.3 DEFINITIONS

A. Credential: Data assigned to an entity and used to identify that entity.

B. DTS: Digital Termination Service. A microwave-based, line-of-sight communication provided directly to the end user.

C. Identifier: A credential card; keypad personal identification number; or code, biometric characteristic, or other unique identification entered as data into the entry-control database for the purpose of identifying an individual. Where this term is presented with an initial capital letter, this definition applies.

D. Location: A Location on the network having a workstation-to-controller communications link, with additional controllers at the Location connected to the workstation-to-controller link with a TIA 485-A communications loop. Where this term is presented with an initial capital letter, this definition applies.

E. Workstation: Personal computer. Applies to the central station, workstations, and file servers.

F. RAS: Remote access services.

G. RF: Radio frequency.

H. ROM: Read-only memory. ROM data are maintained through losses of power.

I. TCP/IP: Transport control protocol/Internet protocol.

J. TWAIN: Technology without an Interesting Name. A programming interface that lets a graphics application, such as an image editing program or desktop publishing program, activate a scanner, frame grabber, or other image-capturing device.

K. WMP: Windows media player.

L. Wiegand: Patented magnetic principle that uses specially treated wires embedded in the credential card.

M. WYSIWYG: What You See Is What You Get. Text and graphics appear on the screen the same as they will in print.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Reference each product to a location on Drawings. Test and evaluation data presented in Product Data shall comply with SIA BIO-01.

1. Any product data sheets with multiple models shall include indication of specific models to be provided per this document.

B. Panel layout information. At the time of submittal, the following information shall be provided on a spreadsheet:

1. Number of network control panels to be provided and initial estimation of access controlled doors/openings per panel;
2. Number of input and output modules and initial estimation of inputs and outputs to be configured

C. Initial programming acknowledgement per door/opening, based on the following:

1. Access control door schedule on plans.
2. Doors to be included in lockdown activation
3. Sequence of operations for unlocked hours, locked hours, and lockdown conditions per door as specified in plans.

D. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Diagrams for cable management system.
2. System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 2 and 3.
3. Wiring Diagrams. For power, signal, and control wiring. Show typical wiring schematics including the following:
   a. Workstation outlets, jacks, and jack assemblies.
   b. Patch cords.
   c. Patch panels.

4. Cable Administration Drawings: As specified in "Identification" Article.
5. Battery and charger calculations for central station, workstations, and controllers.

E. Product Schedules.

F. Samples: For workstation outlets, jacks, jack assemblies, and faceplates. For each exposed product and for each color and texture specified.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For security system to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 7823 "Operation and Maintenance Data," include the following:

1. Workstation operating system documentation.
2. Workstation installation and operating documentation, manuals, and software for the workstation and all installed peripherals. Software shall include system restore, emergency boot diskettes, and drivers for all installed hardware. Provide separately for each workstation.
3. Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on USB media of the hard-copy submittal.
4. System installation and setup guides with data forms to plan and record options and setup decisions.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses of all kinds, power and electronic, equal to 10 percent of amount installed for each size used, but no fewer than three units.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1. Cable installer must have on staff an RCDD certified by Building Industry Consulting Service International.

B. Source Limitations: Obtain central station, workstations, controllers, Identifier readers, and all software through one source from single manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Central Station, Workstations, and Controllers:

1. Store in temperature- and humidity-controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 50 and 85 deg F, and not more than 80 percent relative humidity, noncondensing.

2. Open each container; verify contents against packing list; and file copy of packing list, complete with container identification, for inclusion in operation and maintenance data.
3. Mark packing list with the same designations assigned to materials and equipment for recording in the system labeling schedules that are generated by software specified in "Cable and Asset Management Software" Article.
4. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

1.10 PROJECT CONDITIONS

A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Control Station: Rated for continuous operation in ambient conditions of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
2. Indoor, Controlled Environment: NEMA 250, Type 1 enclosure. System components, except the central-station control unit, installed in air-conditioned indoor environments shall be rated for continuous operation in ambient conditions of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.
3. Indoor, Uncontrolled Environment: NEMA 250, Type 4 enclosures. System components installed in non-air-conditioned indoor environments shall be rated for continuous operation in ambient conditions of 0 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.
4. Outdoor Environment: NEMA 250, NEMA 250, Type 3R enclosures. System components installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick.
5. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
6. Corrosive Environment: For system components subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones, provide NEMA 250, Type 4X enclosures.

PART 2 - PRODUCTS

2.1 ACCESS CONTROL SOFTWARE

A. Manufacturers: Subject to compliance with requirements, **provide products by or based around the following:**

1. Products
    a. Head end software capable of the following:
        1) Database capable, at minimum, of:
            a) 10,000 cardholders
            b) 10 Unique User roles
            c) 5 simultaneous users
            d) 1 million transaction/records/events
            e) Networked communication with head end panels (below)

2) Integration with visitor management systems, Video Management Systems (VMS), and intrusion/burglary systems.
3) Local and remote administration
4) 24/7 remote monitoring by both onsite and offsite personnel
5) Graphic User Interface (GUI) capable of displaying the following:
   a) Building Layout
   b) Devices and their location in the building
   c) Active alarms
   d) Acknowledged events
   e) Recent activity, minimum 25 events
   f) Ability to select a door or device and instantly control (temp lock/unlock, scheduled lock/unlock, recent activity/events, etc.)

b. System Controller and Reader Interfaces
1) Capable of:
   a) Networked communication via LAN and WAN
   b) Communicating and sharing a singular database
   c) Local storage of database and access levels
   d) Local (offline) operation in case of network loss
   e) Expandability to 64 modules per networked controller
   f) Alarm at minimum for tamper, comm loss, and system faults sent to Owner-defined personnel via SMS, email, or other communication method
   g) Preferred Mercury hardware
   h) OSDP *and* Wiegand comm protocol options preferred
2) Programming levels, at minimum:
   a) Door by door scheduling
   b) Grouped door scheduling
3) Controllers capable of expanding up to 64 doors on a single networked controller
4) Reader interfaces capable of operating in a “local” or “offline” mode in case of network failure.

c. Enclosures
1) Preferred access control enclosures centralize controller, reader interface modules, and power supplies in network closet or other determined area, *not* above each door.

d. Power Supplies and enclosures – provide quantities based on manufacturer’s recommendations and size requirements. Power supplies to provide power to both access control and door locking hardware.

2.2 DESCRIPTION

A. Security Access System: Workstation-based central station and field-installed controllers, connected by a high-speed electronic-data transmission network.

B. System Software: Based on 64-bit, central-station, workstation operating system, server operating system, and application software. Software shall have the following capabilities:

1. Multiuser and multitasking to allow for independent activities and monitoring to occur simultaneously at different workstations.
2. Graphical user interface to show pull-down menus and a menu-tree format that complies with interface guidelines of the operating system.
3. System license for the entire system including capability for future additions that are within the indicated system size limits specified in this Section.

4. Open-architecture system that allows importing and exporting of data and interfacing with other systems that are compatible with operating system.
5. Password-protected operator login and access.
6. Open-database-connectivity compliant.

C. Network connecting the central station and workstations shall be a LAN using TCP/IP with a capacity of connecting up to 20 workstations. System shall be portable across multiple communication platforms without changing system software.

D. Network(s) connecting workstations and controllers shall consist of one or more of the following:

1. Local area, IEEE 802.3 Fast Ethernet Gigabit-Ethernet, star topology network based on TCP/IP.
2. Local area, IEEE 802.11 compatible wireless mesh network, based on TCP/IP.

2.3 OPERATION

A. Security access system shall use a single database for access-control and credential-creation functions.

B. Distributed Processing: A fully distributed processing system.

1. Access-control information, including time, date, valid codes, access levels, and similar data, shall be downloaded to controllers so each controller can make access-control decisions.
2. Intermediate controllers for access control are prohibited.
3. In the event that communications with the central controller are lost, controllers shall automatically buffer event transactions until communications are restored, at which time buffered events shall be uploaded to the central station.

C. Number of Locations:

1. Support at least 32 separate Locations using a single workstation with combinations of direct-connect, or TCP/IP LAN connections to each Location.
2. Each Location shall have its own database and history in the central station.
3. Locations may be combined to share a common database.

D. System Network Requirements:

1. System components shall be interconnected and shall provide automatic communication of status changes, commands, field-initiated interrupts, and other communications required for proper system operation.
2. Communication shall not require operator initiation or response and shall return to normal after partial- or total-network interruption such as power loss or transient upset.
3. System shall automatically annunciate communication failures to the operator and shall identify the communications link that has experienced a partial or total failure.
4. Communications controller may be used as an interface between the central-station display systems and the field device network. Communications controller shall provide functions required to attain the specified network communications performance.

E. Central station shall provide operator interface, interaction, display, control, and dynamic and real-time monitoring. Central station shall control system networks to interconnect all system components, including workstations and field-installed controllers.

F. Field equipment shall include controllers, sensors, and controls.

1. Controllers shall serve as an interface between the central station and sensors and controls.
2. Data exchange between the central station and the controllers shall include down-line transmission of commands, software, and databases to controllers.
3. The up-line data exchange from the controller to the central station shall include status data such as intrusion alarms, status reports, and entry-control records.
4. Controllers are classified as alarm-annunciation or entry-control type.

G. False-Alarm Reduction: The design of the central station and controllers shall contain features to reduce false alarms. Equipment and software shall comply with SIA CP-01.

H. Error Detection:

1. Use a cyclic code method to detect single- and double-bit errors, burst errors of eight bits or fewer, and at least 99 percent of all other multibit and burst errors between controllers and the central station.
2. Interactive or product error-detection codes alone will not be acceptable.
3. A message shall be in error if one bit is received incorrectly.
4. Retransmit messages with detected errors.
5. Allow for an operator-assigned two-digit decimal number to each communications link representing the number of retransmission attempts.
6. Central station shall print a communication failure alarm message when the number of consecutive retransmission attempts equals the assigned quantity.
7. Monitor the frequency of data transmission failure for display and logging.

I. Data Line Supervision: System shall initiate an alarm in response to opening, closing, shorting, or grounding of data transmission lines.

J. Door Hardware Interface:

1. Comply with requirements in Section 08 7100 "Door Hardware" and Section 08 7111 "Door Hardware (Descriptive Specification)" for door hardware required to be monitored or controlled by the security access system.
2. Electrical characteristics of controllers shall match the signal and power requirements of door hardware.

2.4 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70, "National Electrical Code."

C. Comply with SIA DC-01 and SIA DC-03 and SIA DC-07.

2.5 APPLICATION SOFTWARE

A. System Software: Based on 32-bit, Microsoft Windows central-station and workstation operating system and application software.

1. Multiuser multitasking shall allow independent activities and monitoring to occur simultaneously at different workstations.
2. Graphical user interface shall show pull-down menus and a menu-tree format.
3. Capability for future additions within the indicated system size limits.
4. Open architecture that allows importing and exporting of data and interfacing with other systems that are compatible with operating system.
5. Password-protected operator login and access.

B. Peer Computer Control Software: Detect a failure of a central computer and cause the other central computer to assume control of all system functions without interruption of operation. Both central computers shall have drivers to support this mode of operation.

C. Application Software: Interface between the alarm annunciation and entry-control controllers to monitor sensors, operate displays, report alarms, generate reports, and help train system operators.

1. Reside at the central station, workstations, and controllers as required to perform specified functions.
2. Operate and manage peripheral devices.
3. Manage files for disk I/O, including creating, deleting, and copying files; and automatically maintain a directory of all files, including size and location of each sequential and random-ordered record.
4. Import custom icons into graphics to represent alarms and I/O devices.
5. Globally link I/O so that any I/O can link to any other I/O within the same Location without requiring interaction with the host workstation. This operation shall be at the controller.
6. Globally code I/O links so that any access-granted event can link to any I/O with the same Location without requiring interaction with the host workstation. This operation shall be at the controller.
7. Messages from workstation to controllers and controllers to controllers shall be on a polled network that utilizes check summing and acknowledgment of each message. Communication shall be automatically verified, buffered, and retransmitted if message is not acknowledged.
8. Selectable poll frequency and message time-out settings shall handle bandwidth and latency issues for TCP/IP, RF, and other workstation-to-controller communications methods by changing the polling frequency and the amount of time the system waits for a response.
9. Automatic and encrypted backups for database and history backups shall be automatically stored at the central-control workstation and encrypted with a nine-character alphanumeric password that must be used to restore or read data contained in backup.
10. Operator audit trail for recording and reporting all changes made to database and system software.
11. Support network protocol and topology, TCP/IP, Novel Netware, Digital Pathworks, Banyan Vines, LAN/WAN, and RAS.

D. Workstation Software:

1. Password levels shall be individually customized at each workstation to allow or disallow operator access to program functions for each Location.
2. Workstation event filtering shall allow user to define events and alarms that will be displayed at each workstation. If an alarm is unacknowledged (not handled by another workstation) for a preset amount of time, the alarm will automatically appear on the filtered workstation.

E. Controller Software:

1. Controllers shall operate as autonomous, intelligent processing units.
   a. Controllers shall make decisions about access control, alarm monitoring, linking functions, and door-locking schedules for their operation, independent of other system components.
   b. Controllers shall be part of a fully distributed processing-control network.

c. The portion of the database associated with a controller, and consisting of parameters, constraints, and the latest value or status of points connected to that controller, shall be maintained in the controller.

2. The following functions shall be fully implemented and operational within each controller:
   a. Monitoring inputs.
   b. Controlling outputs.
   c. Automatically reporting alarms to the central station.
   d. Reporting of sensor and output status to the central station on request.
   e. Maintaining real time, automatically updated by the central station at least once a day.
   f. Communicating with the central station.
   g. Executing controller resident programs.
   h. Diagnosing.
   i. Downloading and uploading data to and from the central station.

3. Controller Operations at a Location:
   a. Up to 64 controllers connected to TIA 485-A communications loop. Globally operating I/O linking and anti-passback functions between controllers within the same Location without central-station or workstation intervention. Linking and anti-passback shall remain fully functional within the same Location even when the central station or workstations are off-line.
   b. In the event of communication failure between the central station and a Location, there shall be no degradation in operations at the controllers at that Location. Controllers at each Location shall be connected to a memory buffer with a capacity to store up to 10,000 events; there shall be no loss of transactions in system history files until the buffer overflows.
   c. Buffered events shall be handled in a first-in-first-out mode of operation.

4. Individual Controller Operation:
   a. Controllers shall transmit alarms, status changes, and other data to the central station when communications circuits are operable. If communications are not available, controllers shall function in a stand-alone mode; operational data, including the status and alarm data normally transmitted to the central station, shall be stored for later transmission to the central station. Storage capacity for the latest 1024 events shall be provided at each controller.
   b. Card-reader ports of a controller shall be custom configurable for at least 120 different card-reader or keypad formats. Multiple reader or keypad formats may be used simultaneously at different controllers or within the same controller.
   c. Controllers shall provide a response to card readers or keypad entries in less than 0.25 seconds, regardless of system size.
   d. Controllers that are reset, or powered up from a nonpowered state, shall automatically request a parameter download and reboot to their proper working state. This shall happen without any operator intervention.
   e. Initial Startup: When controllers are brought on-line, database parameters shall be automatically downloaded to them. After initial download is completed, only database changes shall be downloaded to each controller.
   f. On failure for any reason, controllers shall perform an orderly shutdown and force controller outputs to a predetermined failure-mode state, consistent with the failure modes shown and the associated control device.
   g. After power is restored, following a power failure, startup software shall initiate self-test diagnostic routines, after which controllers shall resume normal operation.
   h. After controller failure, if the database and application software are no longer resident, controllers shall not restart but shall remain in the failure mode until repaired. If database and

application programs are resident, controllers shall immediately resume operation. If not, software shall be restored automatically from the central station.

5. Communications Monitoring:
   a. System shall monitor and report status of TIA 485-A communications loop of each Location.
   b. Communication status window shall display which controllers are currently communicating, a total count of missed polls since midnight, and which controller last missed a poll.
   c. Communication status window shall show the type of CPU, the type of I/O board, and the amount of RAM for each controller.

6. Operating systems shall include a real-time clock function that maintains seconds, minutes, hours, day, date, and month. The real-time clock shall be automatically synchronized with the central station at least once a day to plus or minus 10 seconds. The time synchronization shall be automatic, without operator action and without requiring system shutdown.

F. workstation-to-Controller Communications:

1. Central-station or workstation communications shall use the following:
   a. Direct connection using serial ports of the workstation.
   b. TCP/IP LAN interface cards.
   c. Dial-up or cable modems for connections to Locations.

2. Each serial port used for communications shall be individually configurable for "direct communications," "modem communications incoming and outgoing," or "modem communications incoming only," or as an ASCII output port. Serial ports shall have adjustable data transmission rates and shall be selectable under program control.
3. Use multiport communications board if more than two serial ports are needed.
   a. Use a 4-, 8-, or 16-serial port configuration that is expandable to 32- or 64-serial ports.
   b. Connect the first board to an internal PCI bus adapter card.

4. Direct serial, TCP/IP, and dial-up, cable, or satellite communications shall be alike in the monitoring or control of the system except for the connection that must first be made to a dial-up or voice-over IP Location.
5. TCP/IP network interface card (NIV) shall have an option to set the poll-frequency and message-response time-out settings.
6. Workstation-to-controller and controller-to-controller communications (direct, dial-up, or TCP/IP) shall use a polled-communication protocol that checks sum and acknowledges each message. All communications in this subparagraph shall be verified and buffered, and retransmitted if not acknowledged.

G. Direct Serial or TCP/IP workstation-to-Controller Communications:

1. Communication software on the workstation shall supervise the workstation-to-controller communications link.
2. Loss of communications to any controller shall result in an alarm at all workstations running the communication software.
3. When communications are restored, all buffered events shall automatically upload to the workstation, and any database changes shall be automatically sent to the controller.

H. Broadband Workstation-to-Controller Communications:

1. Communication software on the workstation shall supervise the workstation-to-controller communications link during dial-up modem connect times.
2. Communication software shall be programmable to routinely poll each of the remote dial-up or cable modem Locations, collecting event logs and verifying phone lines at operator-selectable time intervals for each Location.
3. System shall be programmable for dialing and connecting to all dial-up or cable modem Locations and for retrieving the accrued history transactions on an automatic basis as often as once every 10 minutes and up to once every 9999 minutes.
4. Failure to communicate to a dial-up Location three times in a row shall result in an alarm at the workstation.
5. Time offset capabilities shall be present so that Locations in a different geographical time zone than the host workstation will be set to, and maintained at, the proper local time. This feature shall allow for geographical time zones that are ahead of or behind the host workstation.
6. The controller connected to a dial-up or cable modem shall automatically buffer all normal transactions until its buffer reaches 80 percent of capacity. When the transaction buffer reaches 80 percent, the controller shall automatically initiate a call to the central station and upload all transactions.
7. Alarms shall be reported immediately.
8. Dial-up or cable modems shall be provided by manufacturer of the system. Modems used at the controller shall be powered by the controller. Power to the modem shall include battery backup if the controller is so equipped.

I. Controller-to-Controller Communications:

1. TIA 485-A, four-wire, point-to-point, regenerative (repeater) communications network methodology.
2. TIA 485-A communications signal shall be regenerated at each controller.

J. Database Downloads:

1. All data transmissions from workstations to a Location, and between controllers at a Location, shall include a complete database checksum to check the integrity of the transmission. If the data checksum does not match, a full data download shall be automatically retransmitted.
2. If a controller is reset for any reason, it shall automatically request and receive a database download from the workstation. The download shall restore data stored at the controller to their normal working state and shall take place with no operator intervention.

K. Operator Interface:

1. Inputs in system shall have two icon representations, one for the normal state and one for the abnormal state.
2. When viewing and controlling inputs, displayed icons shall automatically change to the proper icon to display the current system state in real time. Icons shall also display the input's state, whether armed or bypassed, and if the input is in the armed or bypassed state due to a time zone or a manual command.
3. Outputs in system shall have two icon representations, one for the secure (locked) state and one for the open (unlocked) state.
4. Icons displaying status of the I/O points shall be constantly updated to show their current real-time condition without prompting by the operator.
5. The operator shall be able to scroll the list of I/Os and press the appropriate toolbar button, or right click, to command the system to perform the desired function.
6. Graphic maps or drawings containing inputs, outputs, and override groups shall include the following:

a. Database to import and store full-color maps or drawings and allow for input, output, and override group icons to be placed on maps.
b. Maps to provide real-time display animation and allow for control of points assigned to them.
c. System to allow inputs, outputs, and override groups to be placed on different maps.
d. Software to allow changing the order or priority in which maps will be displayed.

7. Override Groups Containing I/Os:
   a. System shall incorporate override groups that provide the operator with the status and control over user-defined "sets" of I/Os with a single icon.
   b. Icon shall change automatically to show the live summary status of points in that group.
   c. Override group icon shall provide a method to manually control or set to time-zone points in the group.
   d. Override group icon shall allow the expanding of the group to show icons representing the live status for each point in the group, individual control over each point, and the ability to compress the individual icons back into one summary icon.

8. Schedule Overrides of I/Os and Override Groups:
   a. To accommodate temporary schedule changes that do not fall within the holiday parameters, the operator shall have the ability to override schedules individually for each input, output, or override group.
   b. Each schedule shall be composed of a minimum of two dates with separate times for each date.
   c. The first time and date shall be assigned the override state that the point shall advance to when the time and date become current.
   d. The second time and date shall be assigned the state that the point shall return to when the time and date become current.

9. Copy command in database shall allow for like data to be copied and then edited for specific requirements, to reduce redundant data entry.

L. Operator Access Control:

1. Control operator access to system controls through three password-protected operator levels. System operators and managers with appropriate password clearances shall be able to change operator levels for operators.
2. Three successive attempts by an operator to execute functions beyond their defined level during a 24-hour period shall initiate a software tamper alarm.
3. A minimum of 3 unique user accounts shall be available with the system software. System shall display the operator's name or initials in the console's first field. System shall print the operator's name or initials, action, date, and time on the system printer at login and logoff.
4. The password shall not be displayed or printed.
5. Each password shall be definable and assignable for the following:
   a. Selected commands to be usable.
   b. Access to system software.
   c. Access to application software.
   d. Individual zones that are to be accessed.
   e. Access to database.

M. Operator Commands:

1. Command Input: Plain-language words and acronyms shall allow operators to use the system without extensive training or data-processing backgrounds. System prompts shall be a word, a phrase, or an acronym.
2. Command inputs shall be acknowledged and processing shall start in not less than one second(s).
3. Tasks that are executed by operator's commands shall include the following:
    a. Acknowledge Alarms: Used to acknowledge that the operator has observed the alarm message.
    b. Place Zone in Access: Used to remotely disable intrusion-alarm circuits emanating from a specific zone. System shall be structured so that console operator cannot disable tamper circuits.
    c. Place Zone in Secure: Used to remotely activate intrusion-alarm circuits emanating from a specific zone.
    d. System Test: Allows the operator to initiate a system-wide operational test.
    e. Zone Test: Allows the operator to initiate an operational test for a specific zone.
    f. Print reports.
    g. Change Operator: Used for changing operators.
    h. Security Lighting Controls: Allows the operator to remotely turn on or turn off security lights.
    i. Display Graphics: Used to show any graphic displays implemented in the system. Graphic displays shall be completed within 20 seconds from time of operator command.
    j. Run system tests.
    k. Generate and format reports.
    l. Request help with the system operation.
        1) Include in main menus.
        2) Provide unique, descriptive, context-sensitive help for selections and functions with the press of one function key.
        3) Provide navigation to specific topic from within the first help window.
        4) Help shall be accessible outside the application program.
    m. Entry-Control Commands:
        1) Lock (secure) or unlock (open) each controlled entry and exit up to 10 times a day through time-zone programming.
        2) Arm or disarm each monitored input up to 10 times a day through time-zone programming.
        3) Enable or disable readers or keypads up to 5 times a day through time-zone programming.
        4) Enable or disable cards or codes up to 5 times a day per entry point through access-level programming.

4. Command Input Errors: Show operator input assistance when a command cannot be executed because of operator input errors. Assistance screen shall use plain-language words and phrases to explain why the command cannot be executed. Error responses that require an operator to look up a code in a manual or other document are not acceptable. Conditions causing operator assistance messages include the following:
    a. Command entered is incorrect or incomplete.
    b. Operator is restricted from using that command.
    c. Command addresses a point that is disabled or out of service.
    d. Command addresses a point that does not exist.
    e. Command is outside the system's capacity.

N. Alarms:

1. System Setup:

a. Assign manual and automatic responses to incoming-point status change or alarms.
b. Automatically respond to input with a link to other inputs, outputs, or operator-response plans; unique sound with use of WAV files; and maps or images that graphically represent the point location.
c. Sixty-character message field for each alarm.
d. Operator-response-action messages shall allow message length of at least 65,000 characters, with database storage capacity of up to 32,000 messages. Setup shall assign messages to access point.
e. Secondary messages shall be assignable by the operator for printing to provide further information and shall be editable by the operator.
f. Allow 25 secondary messages with a field of four lines of 60 characters each.
g. Store the most recent 1000 alarms for recall by the operator using the report generator.

2. Software Tamper:
a. Annunciate a tamper alarm when unauthorized changes to system database files are attempted. Three consecutive unsuccessful attempts to log onto system shall generate a software tamper alarm.
b. Annunciate a software tamper alarm when an operator or other individual makes three consecutive unsuccessful attempts to invoke functions beyond the authorization level.
c. Maintain a transcript file of the last 5000 commands entered at each central station to serve as an audit trail. System shall not allow write access to system transcript files by any person, regardless of their authorization level.
d. Allow only acknowledgment of software tamper alarms.

3. Read access to system transcript files shall be reserved for operators with the highest password authorization level available in system.
4. Animated Response Graphics: Highlight alarms with flashing icons on graphic maps; display and constantly update the current status of alarm inputs and outputs in real time through animated icons.
5. Alarm Handling: Each input may be configured so that an alarm cannot be cleared unless it has returned to normal, with options of requiring the operator to enter a comment about disposition of alarm. Allow operator to silence alarm sound when alarm is acknowledged.
6. Alarm Automation Interface: High-level interface to central-station alarm automation software systems. Allows input alarms to be passed to and handled by automation systems in the same manner as burglar alarms, using a TIA 232-F ASCII interface.
7. CCTV Alarm Interface: Allow commands to be sent to CCTV systems during alarms (or input change of state) through serial ports.
8. Camera Control: Provides operator ability to select and control cameras from graphic maps.

O. Alarm Monitoring: Monitor sensors, controllers, and DTS circuits and notify operators of an alarm condition. Display higher-priority alarms first and, within alarm priorities, display the oldest unacknowledged alarm first. Operator acknowledgment of one alarm shall not be considered acknowledgment of other alarms nor shall it inhibit reporting of subsequent alarms.

1. Displayed alarm data shall include type and location of alarm.Printed alarm data shall include type of alarm, location of alarm, date and time (to nearest second) of occurrence, and operator responses.
2. Maps shall automatically display the alarm condition for each input assigned to that map if that option is selected for that input location.
3. Alarms initiate a status of "pending" and require the following two handling steps by operators:
a. First Operator Step: "Acknowledged." This action shall silence sounds associated with the alarm. The alarm remains in the system "Acknowledged" but "Un-Resolved."

b. Second Operator Step: Operators enter the resolution or operator comment, giving the disposition of the alarm event. The alarm shall then clear.

4. Each workstation shall display the total pending alarms and total unresolved alarms.
5. Each alarm point shall be programmable to disallow the resolution of alarms until the alarm point has returned to its normal state.
6. Alarms shall transmit to the central station in real time except for allowing connection time for dial-up locations.
7. Alarms shall be displayed and managed from a minimum of four different windows.
   a. Input Status Window: Overlay status icon with a large red blinking icon. Selecting the icon will acknowledge the alarm.
   b. History Log Transaction Window: Display name, time, and date in red text. Selecting red text will acknowledge the alarm.
   c. Alarm Log Transaction Window: Display name, time, and date in red. Selecting red text will acknowledge the alarm.
   d. Graphic Map Display: Display a steady colored icon representing each alarm input location. Change icon to flashing red when the alarm occurs. Change icon from flashing red to steady red when the alarm is acknowledged.
8. Once an alarm is acknowledged, the operator shall be prompted to enter comments about the nature of the alarm and actions taken. Operator's comments may be manually entered or selected from a programmed predefined list, or a combination of both.
9. For locations where there are regular alarm occurrences, provide programmed comments. Selecting that comment shall clear the alarm.
10. The time and name of the operator who acknowledged and resolved the alarm shall be recorded in the database.
11. Identical alarms from the same alarm point shall be acknowledged at the same time the operator acknowledges the first alarm. Identical alarms shall be resolved when the first alarm is resolved.
12. Alarm functions shall have priority over downloading, retrieving, and updating database from workstations and controllers.
13. When a reader-controlled output (relay) is opened, the corresponding alarm point shall be automatically bypassed.

P. Monitor Display: Display text and graphic maps that include zone status integrated into the display. Colors are used for the various components and current data. Colors shall be uniform throughout the system.

1. Color Code:
   a. FLASHING RED: Alerts operator that a zone has gone into an alarm or that primary power has failed.
   b. STEADY RED: Alerts operator that a zone is in alarm and alarm has been acknowledged.
   c. YELLOW: Advises operator that a zone is in access.
   d. GREEN: Indicates that a zone is secure and that power is on.
2. Graphics:
   a. Support 32,000 graphic display maps and allow import of maps from a minimum of 16 standard formats from another drawing or graphics program.
   b. Allow I/O to be placed on graphic maps by the drag-and-drop method.
   c. Operators shall be able to view the inputs, outputs, and the point's name by moving the mouse cursor over the point on the graphic map.
   d. Inputs or outputs may be placed on multiple graphic maps. The operator shall be able to toggle to view graphic maps associated with I/Os.

e. Each graphic map shall have a display-order sequence number associated with it to provide a predetermined order when toggled to different views.
f. Camera icons shall have the ability to be placed on graphic maps that, when selected by an operator, will open a video window, display the camera associated with that icon, and provide pan-tilt-zoom control.
g. Input, output, or camera placed on a map shall allow the ability to arm or bypass an input, open or secure an output, or control the pan-tilt-zoom function of the selected camera.

Q. System test software enables operators to initiate a test of the entire system or of a particular portion of the system.

1. Test Report: The results of each test shall be stored for future display or printout. The report shall document the operational status of system components.

R. Report-Generator Software: Include commands to generate reports for displaying, printing, and storing on disk and tape. Reports shall be stored by type, date, and time. Report printing shall be the lowest-priority activity. Report-generation mode shall be operator selectable but set up initially as periodic, automatic, or on request. Include time and date printed and the name of operator generating the report. Report formats may be configured by operators.

1. Automatic Printing: Setup shall specify, modify, or inhibit the report to be generated; the time the initial report is to be generated; the time interval between reports; the end of the period; and the default printer.
2. Printing on Request: An operator may request a printout of any report.
3. Alarm Reports: Reporting shall be automatic as initially set up. Include alarms recorded by system over the selected time and information about the type of alarm (such as door alarm, intrusion alarm, tamper alarm, etc.), the type of sensor, the location, the time, and the action taken.
4. Access and Secure Reports: Document zones placed in access, the time placed in access, and the time placed in secure mode.
5. Custom Reports: Reports tailored to exact requirements of who, what, when, and where. As an option, custom report formats may be stored for future printing.
6. Automatic History Reports: Named, saved, and scheduled for automatic generation.
7. Cardholder Reports: Include data, or selected parts of the data, as well as the ability to be sorted by name, card number, imprinted number, or by any of the user-defined fields.
8. Cardholder by Reader Reports: Based on who has access to a specific reader or group of readers by selecting the readers from a list.
9. Cardholder by Access-Level Reports: Display everyone that has been assigned to the specified access level.
10. Who Is "In" (Muster) Report:
    a. Emergency Muster Report: One-click operation on toolbar launches report.
    b. Cardholder Report. Contain a count of persons who are "In" at a selected Location and a detailed listing of name, date, and time of last use, sorted by the last reader used or by the group assignment.

11. Panel Labels Reports: Printout of control-panel field documentation including the actual location of equipment, programming parameters, and wiring identification. Maintain system installation data within system database so that data are available on-site at all times.
12. History Reports: Custom reports that allow the operator to select any date, time, event type, device, output, input, operator, Location, name, or cardholder to be included or excluded from the report.
    a. Initially store history on the hard disk of the host workstation.
    b. Permit viewing of the history on workstations or print history to any system printer.

c. The report shall be definable by a range of dates and times with the ability to have a daily start and stop time over a given date range.
d. Each report shall depict the date, time, event type, event description, and device; or I/O name, cardholder group assignment, and cardholder name or code number.
e. Each line of a printed report shall be numbered to ensure that the integrity of the report has not been compromised.
f. Total number of lines of the report shall be given at the end of the report. If the report is run for a single event such as "Alarms," the total shall reflect how many alarms occurred during that period.

13. Reports shall have the following four options:
    a. View on screen.
    b. Print to system printer. Include automatic print spooling and "Print To" options if more than one printer is connected to the system.
    c. "Save to File" with full path statement.
    d. System shall have the ability to produce a report indicating status of system inputs and outputs or of inputs and outputs that are abnormal, out of time zone, manually overridden, not reporting, or in alarm.

14. Custom Code List Subroutine: Allow the access codes of system to be sorted and printed according to the following criteria:
    a. Active, inactive, or future activate or deactivate.
    b. Code number, name, or imprinted card number.
    c. Group, Location access levels.
    d. Start and stop code range.
    e. Codes that have not been used since a selectable number of days.
    f. In, out, or either status.
    g. Codes with trace designation.

15. The reports of system database shall allow options so that every data field may be printed.
16. The reports of system database shall be constructed so that the actual position of the printed data shall closely match the position of the data on the data-entry windows.

S. Anti-Passback:

1. System shall have global and local anti-passback features, selectable by Location. System shall support hard and soft anti-passback.
2. Hard Anti-Passback: Once a credential holder is granted access through a reader with one type of designation (IN or OUT), the credential holder may not pass through that type of reader designation until the credential holder passes through a reader of opposite designation.
3. Soft Anti-Passback: Should a violation of the proper IN or OUT sequence occur, access shall be granted, but a unique alarm shall be transmitted to the control station, reporting the credential holder and the door involved in the violation. A separate report may be run on this event.
4. Timed Anti-Passback: A controller capability that prevents an access code from being used twice at the same device (door) within a user-defined amount of time.
5. Provide four separate zones per Location that can operate without requiring interaction with the host workstation (done at controller). Each reader shall be assignable to one or all four anti-passback zones. In addition, each anti-passback reader can be further designated as "Hard," "Soft," or "Timed" in each of the four anti-passback zones. The four anti-passback zones shall operate independently.
6. The anti-passback schemes shall be definable for each individual door.
7. The Master Access Level shall override anti-passback.

8. System shall have the ability to forgive (or reset) an individual credential holder or the entire credential-holder population anti-passback status to a neutral status.

T. Visitor Assignment:

1. Provide for and allow an operator to be restricted to only working with visitors. The visitor badging subsystem shall assign credentials and enroll visitors. Allow only those access levels that have been designated as approved for visitors.
2. Provide an automated log of visitor name, time and doors accessed, and name of person contacted.
3. Allow a visitor designation to be assigned to a credential holder.
4. Security access system shall be able to restrict the access levels that may be assigned to credentials issued to visitors.
5. Allow operator to recall visitors' credential-holder file once a visitor is enrolled in the system.
6. The operator may designate any reader as one that deactivates the credential after use at that reader. The history log shall show the return of the credential.
7. System shall have the ability to use the visitor designation in searches and reports. Reports shall be able to print all or any visitor activity.

U. Training Software: Enables operators to practice system operation, including alarm acknowledgment, alarm assessment, response force deployment, and response force communications. System shall continue normal operation during training exercises and shall terminate exercises when an alarm signal is received at the console.

V. Entry-Control Enrollment Software: Database management functions that allow operators to add, delete, and modify access data as needed.

1. The enrollment station shall not have alarm response or acknowledgment functions.
2. Provide multiple, password-protected access levels. Database management and modification functions shall require a higher operator access level than personnel enrollment functions.
3. The program shall provide means to disable the enrollment station when it is unattended, to prevent unauthorized use.
4. The program shall provide a method to enter personnel identifying information into the entry-control database files through enrollment stations. In the case of personnel identity-verification subsystems, . Allow entry of personnel identifying information into the system database using menu selections and data fields. The data field names shall be customized during setup to suit user and site needs. Personnel identity-verification subsystems selected for use with the system shall fully support the enrollment function and shall be compatible with the entry-control database files.
5. Cardholder Data: Provide 99 user-defined fields. System shall have the ability to run searches and reports using any combination of these fields. Each user-defined field shall be configurable, using any combination of the following features:
    a. MASK: Determines a specific format with which data must comply.
    b. REQUIRED: Operator is required to enter data into field before saving.
    c. UNIQUE: Data entered must be unique.
    d. DEACTIVATE DATE: Data entered will be evaluated as an additional deactivate date for all cards assigned to this cardholder.
    e. NAME ID: Data entered will be considered a unique ID for the cardholder.

6. Personnel Search Engine: A report generator with capabilities such as search by last name, first name, group, or any predetermined user-defined data field; by codes not used in definable number of days; by skills; or by seven other methods.

7. Multiple Deactivate Dates for Cards: User-defined fields to be configured as additional stop dates to deactivate any cards assigned to the cardholder.
8. Batch card printing.
9. Default card data can be programmed to speed data entry for sites where most card data are similar.
10. Enhanced ASCII File Import Utility: Allows the importing of cardholder data and images.
11. Card Expire Function: Allows readers to be configured to deactivate cards when a card is used at selected devices.

2.6 SYSTEM DATABASE

A. Database and database management software shall define and modify each point in database using operator commands. Definition shall include parameters and constraints associated with each system device.

B. Database Operations:

1. System data management shall be in a hierarchical menu-tree format, with navigation through expandable menu branches and manipulated with use of menus and icons in a main menu and system toolbar.
2. Navigational Aids:
   a. Toolbar icons for add, delete, copy, print, capture image, activate, deactivate, and muster report.
   b. Point and click feature to facilitate data manipulation.
   c. Next and previous command buttons visible when editing database fields to facilitate navigation from one record to the next.
   d. Copy command and copy tool in the toolbar to copy data from one record to create a new similar record.
3. Data entry shall be automatically checked for duplicate and illegal data and shall be verified for valid format.
4. System shall generate a memo or note field for each item that is stored in database, allowing the storing of information about any defining characteristics of the item. Memo field is used for noting the purpose for which the item was entered, reasons for changes that were made, and the like.

C. File Management:

1. File management shall include database backup and restoration system, allowing selection of storage media, including 3.5-inch floppy disk, Zip and Jaz drives, and designated network resources.
2. Operations shall be both manual and automatic modes. The number of automatic sequential backups before the oldest backup will be overwritten; FIFO mode shall be operator selectable.
3. Backup program shall provide manual operation from any workstation on the LAN and shall operate while system remains operational.

D. Operator Passwords:

1. Support up to 32,000 individual system operators, each with a unique password.
2. One to eight alphanumeric characters.
3. Allow passwords to be case sensitive.
4. Passwords shall not be displayed when entered.

5. Passwords shall have unique and customizable password profile, and allow several operators to share a password profile. Include the following features in the password profile:
   a. Predetermine the highest-level password profile for access to all functions and areas of program.
   b. Allow or disallow operator access to any program operation, including the functions of View, Add, Edit, and Delete.
   c. Restrict doors to which an operator can assign access.

6. Operators shall use a user name and password to log on to system. This user name and password shall be used to access database areas and programs as determined by the associated profile.
7. Make provision to allow the operator to log off without fully exiting program. User may be logged off but program will remain running while displaying the login window for the next operator.

E. Access Card/Code Operation and Management: Access authorization shall be by card, by a manually entered code (PIN), or by a combination of both (card plus PIN).

1. Access authorization shall verify the facility code first, the card or card-and-PIN validation second, and the access level (time of day, day of week, date), anti-passback status, and number of uses last.
2. Use data-entry windows to view, edit, and issue access levels. Access-authorization entry-management system shall maintain and coordinate all access levels to prevent duplication or the incorrect creation of levels.
3. Allow assignment of multiple cards/codes to a cardholder.
4. Allow assignment of up to four access levels for each Location to a cardholder. Each access level may contain any combination of doors.
5. Each door may be assigned four time zones.
6. Access codes may be up to 11 digits in length.
7. Software shall allow the grouping of locations so cardholder data can be shared by all locations in the group.
8. Visitor Access: Issue a visitor badge for data tracking or photo ID purposes without assigning that person a card or code.
9. Cardholder Tracing: Allow for selection of cardholder for tracing. Make a special audible and visible annunciation at control station when a selected card or code is used at a designated code reader. Annunciation shall include an automatic display of the cardholder image.
10. Allow each cardholder to be given either an unlimited number of uses or a number from one to 9999 that regulates the number of times the card can be used before it is automatically deactivated.
11. Provide for cards and codes to be activated and deactivated manually or automatically by date. Provide for multiple deactivate dates to be preprogrammed.

F. Security Access Integration:

1. Photo ID badging and photo verification shall use the same database as the security access and may query data from cardholder, group, and other personal information to build a custom ID badge.
2. Automatic or manual image recall and manual access based on photo verification shall also be a means of access verification and entry.
3. System shall allow sorting of cardholders together by group or other characteristic for a fast and efficient method of reporting on, and enabling or disabling, cards or codes.

G. Operator Comments:

1. With the press of one appropriate button on the toolbar, the user shall be permitted to enter operator comments into the history at any time.

2. Automatic prompting of operator comment shall occur before the resolution of each alarm.
3. Operator comments shall be recorded by time, date, and operator number.
4. Comments shall be sorted and viewed through reports and history.
5. The operator may enter comments in two ways; either or both may be used:
   a. Manually entered through keyboard data entry (typed), up to 65,000 characters per each alarm.
   b. Predefined and stored in database for retrieval on request.
6. System shall have a minimum of 999 predefined operator comments with up to 30 characters per comment.

H. Group:

1. Group names may be used to sort cardholders into groups that allow the operator to determine the tenant, vendor, contractor, department, division, or any other designation of a group to which the person belongs.
2. System software shall have the capacity to assign one of 32,000 group names to an access authorization.
3. Make provision in software to deactivate and reactivate all access authorizations assigned to a particular group.
4. Allow sorting of history reports and code list printouts by group name.

I. Time Zones:

1. Each zone consists of a start and stop time for seven days of the week and three holiday schedules. A time zone is assigned to inputs, outputs, or access levels to determine when an input shall automatically arm or disarm, when an output automatically opens or secures, or when access authorization assigned to an access level will be denied or granted.
2. Up to four time zones may be assigned to inputs and outputs to allow up to four arm or disarm periods per day or four lock or unlock periods per day; up to three holiday override schedules may be assigned to a time zone.
3. Data-entry window shall display a dynamically linked bar graph showing active and inactive times for each day and holiday, as start and stop times are entered or edited.
4. System shall have the capacity for 2048 time zones for each Location.

J. Holidays:

1. Three different holiday schedules may be assigned to a time zone. Holiday schedule consists of date in format MM/DD/YYYY and a description. When the holiday date matches the current date of the time zone, the holiday schedule replaces the time-zone schedule for that 24-hour period.
2. System shall have the capacity for 32,000 holidays.
3. Three separate holiday schedules may be applied to a time zone.
4. Holidays have an option to be designated as occurring on the designated date each year. These holidays remain in the system and will not be purged.
5. Holidays not designated to occur each year shall be automatically purged from the database after the date expires.

K. Access Levels:

1. System shall allow for the creation of up to 32,000 access levels.

2. One level shall be predefined as the Master Access Level. The Master Access Level shall work at all doors at all times and override any anti-passback.
3. System shall allow for access to be restricted to any area by reader and by time. Access levels shall determine when and where an Identifier is authorized.
4. System shall be able to create multiple door and time-zone combinations under the same access level so that an Identifier may be valid during different time periods at different readers even if the readers are on the same controller.

L. User-Defined Fields:

1. System shall provide a minimum of 99 user-defined fields, each with up to 50 characters, for specific information about each credential holder.
2. System shall accommodate a title for each field; field length shall be 20 characters.
3. A "Required" option may be applied to each user-defined field that, when selected, forces the operator to enter data in the user-defined field before the credential can be saved.
4. A "Unique" option may be applied to each user-defined field that, when selected, will not allow duplicate data from different credential holders to be entered.
5. Data format option may be assigned to each user-defined field that will require the data to be entered with certain character types in specific spots in the field entry window.
6. A user-defined field, if selected, will define the field as a deactivate date. The selection shall automatically cause the data to be formatted with the windows MM/DD/YYYY date format. The credential of the holder will be deactivated on that date.
7. A search function shall allow any one user-defined field or combination of user-defined fields to be searched to find the appropriate cardholder. The search function shall include a search for a character string.
8. System shall have the ability to print cardholders based on and organized by the user-defined fields.

2.7 SURGE AND TAMPER PROTECTION

A. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor-entry connection to components.

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Section 26 4313 "Surge Protection for Low-Voltage Electrical Power Circuits."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Section 26 4313 "Surge Protection for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.

B. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station control-unit alarm display shall identify tamper alarms and indicate locations.

2.8 CONTROLLERS

A. Controllers: Intelligent peripheral control unit, complying with UL 294, that stores time, date, valid codes, access levels, and similar data downloaded from the central station or workstation for controlling its operation.

B. Subject to compliance with requirements in this article, manufacturers may use multipurpose controllers.

C. Battery Backup: Sealed, lead acid; sized to provide run time during a power outage of 90 minutes, complying with UL 924.

D. Alarm Annunciation Controller:

1. The controller shall automatically restore communication within 10 seconds after an interruption with the field device network.
    a. Inputs: Monitor dry contacts for changes of state that reflect alarm conditions. Provides at least eight alarm inputs, which are suitable for wiring as normally open or normally closed contacts for alarm conditions.
    b. Alarm-Line Supervision:
        1) Supervise the alarm lines by monitoring each circuit for changes or disturbances in the signal, and for conditions as described in UL 1076 for line security equipment by monitoring for abnormal open, grounded, or shorted conditions using dc change measurements. System shall initiate an alarm in response to an abnormal current, which is a dc change of 5 percent or more for longer than 500 ms.
        2) Transmit alarm-line-supervision alarm to the central station during the next interrogation cycle after the abnormal current condition.
    c. Outputs: Managed by central-station software.

2. Auxiliary Equipment Power: A GFI service outlet inside the controller enclosure.

E. Entry-Control Controller:

1. Function: Provide local entry-control functions including one- and two-way communications with access-control devices such as card readers, keypads, door strikes, magnetic latches, gate and door operators, and exit push buttons.
    a. Operate as a stand-alone portal controller using the downloaded database during periods of communication loss between the controller and the field-device network.
    b. Accept information generated by the entry-control devices; automatically process this information to determine valid identification of the individual present at the portal:
        1) On authentication of the credentials or information presented, check privileges of the identified individual, allowing only those actions granted as privileges.
        2) Privileges shall include, but are not limited to, time of day control, day of week control, group control, and visitor escort control.
    c. Maintain a date-, time-, and Location-stamped record of each transaction. A transaction is defined as any successful or unsuccessful attempt to gain access through a controlled portal by the presentation of credentials or other identifying information.

2. Inputs:
    a. Data from entry-control devices; use this input to change modes between access and secure.
    b. Database downloads and updates from the central station that include enrollment and privilege information.

3. Outputs:
    a. Indicate success or failure of attempts to use entry-control devices and make comparisons of presented information with stored identification information.
    b. Grant or deny entry by sending control signals to portal-control devices and mask intrusion-alarm annunciation from sensors stimulated by authorized entries.

c. Maintain a date-, time-, and Location-stamped record of each transaction and transmit transaction records to the central station.
d. Door Prop Alarm: If a portal is held open for longer than 60 seconds, alarm sounds.

4. With power supplies sufficient to power at voltage and frequency required for field devices and portal-control devices.
5. Data Line Problems: For periods of loss of communication with the central station, or when data transmission is degraded and generating continuous checksum errors, the controller shall continue to control entry by accepting identifying information, making authentication decisions, checking privileges, and controlling portal-control devices.
   a. Store up to 1000 transactions during periods of communication loss between the controller and access-control devices for subsequent upload to the central station on restoration of communication.

6. Controller Power: NFPA 70, Class II power-supply transformer, with 12- or 24-V ac secondary, backup battery and charger.
   a. Backup Battery: Premium, valve-regulated, recombinant-sealed, lead-calcium battery; spill proof; with a full one-year warranty and a pro rata 19-year warranty. With single-stage, constant-voltage-current, limited battery charger, comply with battery manufacturer's written instructions for battery terminal voltage and charging current recommendations for maximum battery life.
   b. Backup Battery: Valve-regulated, recombinant-sealed, lead-acid battery; spill proof. With single-stage, constant-voltage-current, limited battery charger, comply with battery manufacturer's written instructions for battery terminal voltage and charging current recommendations for maximum battery life.
   c. Backup Power-Supply Capacity: 90 minutes of battery supply. Submit battery and charger calculations.
   d. Power Monitoring: Provide manual, dynamic battery-load test, initiated and monitored at the control center; with automatic disconnection of the controller when battery voltage drops below controller limits. Report by using local controller-mounted digital displays and by communicating status to central station. Indicate normal power on and battery charger on trickle charge. Indicate and report the following:
      1) Trouble Alarm: Normal power-off load assumed by battery.
      2) Trouble Alarm: Low battery.
      3) Alarm: Power off.

2.9 DOOR AND GATE HARDWARE INTERFACE

A. Exit Device with Alarm: Operation of the exit device shall generate an alarm. Exit device and alarm contacts are specified in Section 08 7100 "Door Hardware."

B. Exit Alarm: Operation of a monitored door shall generate an alarm. Exit devices and alarm contacts are specified in Section 08 7100 "Door Hardware."

C. Electric Door Strikes: Use end-of-line resistors to provide power-line supervision. Signal switches shall transmit data to controller to indicate when the bolt is not engaged and the strike mechanism is unlocked, and they shall report a forced entry. Power and signal shall be from the controller. Electric strikes are specified in Section 08 7100 "Door Hardware."

D. Electromagnetic Locks: End-of-line resistors shall provide power-line supervision. Lock status sensing signal shall positively indicate door is secure. Power and signal shall be from the controller. Electromagnetic locks are specified in Section 08 7100 "Door Hardware."

E. Vehicle Gate Operator: Interface electrical operation of gate with controls in this Section. Vehicle gate operators shall be connected, monitored, and controlled by the security access controllers. Vehicle gate and accessories are specified in Section 32 3113 "Chain Link Fences and Gates."

2.10 FIELD-PROCESSING SOFTWARE

A. Operating System:

1. Local processors shall contain an operating system that controls and schedules that local processor's activities in real time.
2. Local processor shall maintain a point database in its memory that includes parameters, constraints, and the latest value or status of all points connected to that local processor.
3. Execution of local processor application programs shall utilize the data in memory resident files.
4. Operating system shall include a real-time clock function that maintains the seconds, minutes, hours, date, and month, including day of the week.
5. Local processor real-time clock shall be automatically synchronized with the central station at least once per day to plus or minus 10 seconds (the time synchronization shall be accomplished automatically, without operator action and without requiring system shutdown).

B. Startup Software:

1. Causes automatic commencement of operation without human intervention, including startup of all connected I/O functions.
2. Local processor restart program based on detection of power failure at the local processor shall be included in the local processor software.
3. Initiates operation of self-test diagnostic routines.
4. Upon failure of the local processor, if the database and application software are no longer resident, the local processor shall not restart and systems shall remain in the failure mode indicated until the necessary repairs are made.
5. If the database and application programs are resident, the local processor shall immediately resume operation.

C. Operating Mode:

1. Local processors shall control and monitor inputs and outputs as specified, independent of communications with the central station or designated workstations.
2. Alarms, status changes, and other data shall be transmitted to the central station or designated workstations when communications circuits are operable.
3. If communications are not available, each local processor shall function in a stand-alone mode and operational data, including the status and alarm data normally transmitted to the central station or designated workstations, shall be stored for later transmission to the central station or designated workstations.
4. Storage for the latest 4000 events shall be provided at local processors, as a minimum.
5. Local processors shall accept software downloaded from the central station.
6. Panel shall support flash ROM technology to accomplish firmware downloads from a central location.

D. Failure Mode: Upon failure for any reason, each local processor shall perform an orderly shutdown and force all local processor outputs to a predetermined (failure-mode) state, consistent with the failure modes shown and the associated control device.

E. Functions:

1. Monitoring of inputs.
2. Control of outputs.
3. Reporting of alarms automatically to the central station.
4. Reporting of sensor and output status to central station upon request.
5. Maintenance of real time, automatically updated by the central station at least once a day.
6. Communication with the central station.
7. Execution of local processor resident programs.
8. Diagnostics.
9. Download and upload data to and from the central station.

2.11 FIELD-PROCESSING HARDWARE

A. Alarm Annunciation Local Processor:

1. Respond to interrogations from the field device network, recognize and store alarm status inputs until they are transmitted to the central station, and change outputs based on commands received from the central station.
2. Local processor shall also automatically restore communication within 10 seconds after an interruption with the field device network and provide dc line supervision on each of its alarm inputs.
3. Local processor inputs shall monitor dry contacts for changes of state that reflect alarm conditions.
4. Local processor shall have at least eight alarm inputs which allow wiring contacts as normally open or normally closed for alarm conditions; and shall provide line supervision for each input by monitoring each input for abnormal open, grounded, or shorted conditions using dc current change measurements.
5. Local processor shall report line supervision alarms to the central station.
6. Alarms shall be reported for any condition that remains abnormal at an input for longer than 500 milliseconds.
7. Alarm condition shall be transmitted to the central computer during the next interrogation cycle.
8. Local processor outputs shall reflect the state of commands issued by the central station.
9. Outputs shall be a form C contact and shall include normally open and normally closed contacts.
10. Local processor shall have at least four command outputs.
11. Local processor shall be able to communicate with the central station via RS-485 or TCP/IP as a minimum.

B. Processor Power Supply:

1. Local processor and sensors shall be powered from an uninterruptible power source.
2. Uninterruptible power source shall provide eight hours of battery back-up power in the event of primary power failure and shall automatically fully recharge the batteries within 12 hours after primary power is restored.
3. If the facility is without an emergency generator, the uninterruptible power source shall provide 24 hours of battery backup power.
4. There shall be no equipment malfunctions or perturbations or loss of data during the switch from primary to battery power and vice versa.

5. Batteries shall be sealed, non-outgassing type.
6. Power supply shall be equipped with an indicator for ac input power and an indicator for dc output power.
7. Loss of primary power shall be reported to the central station as an alarm.

C. Auxiliary Equipment Power: A GFI service outlet shall be furnished inside the local processor's enclosure.

D. Entry-Control Local Processor:

1. Entry-control local processor shall respond to interrogations from the field device network, recognize and store alarm status inputs until they are transmitted to the central station, and change outputs based on commands received from the central station.
2. Local processor shall also automatically restore communication within 10 seconds after an interruption with the field device network and provide dc line supervision on each of its alarm inputs.
3. Entry-control local processor shall provide local entry-control functions including communicating with field devices such as card readers, keypads, door strikes, magnetic latches, gate and door operators, and exit push buttons.
4. Processor shall also accept data from entry-control field devices as well as database downloads and updates from the central station that include enrollment and privilege information.
5. Processor shall send indications of successful or failed attempts to use entry-control field devices and shall make comparisons of presented information with stored identification information.
6. Processor shall grant or deny entry by sending control signals to portal-control devices and mask intrusion-alarm annunciation from sensors stimulated by authorized entries.
7. Entry-control local processor shall use inputs from entry-control devices to change modes between access and secure.
8. Local processor shall maintain a date-time- and location-stamped record of each transaction and transmit transaction records to the central station.
9. Processor shall operate as a stand-alone portal controller using the downloaded database during periods of communication loss between the local processor and the central station.
10. Processor shall store a minimum of 4000 transactions during periods of communication loss between the local processor and the central station for subsequent upload to the central station upon restoration of communication.
11. Local processor inputs shall monitor dry contacts for changes of state that reflect alarm conditions.
12. Local processor shall have at least eight alarm inputs which allow wiring contacts as normally open or normally closed for alarm conditions; and shall also provide line supervision for each input by monitoring each input for abnormal open, grounded, or shorted conditions using dc current change measurements.
13. Local processor shall report line supervision alarms to the central station.
14. Alarms shall be reported for any condition that remains abnormal at an input for longer than 500 ms.
15. Alarm condition shall be transmitted to the central station during the next interrogation cycle.
16. Entry-control local processor shall include the necessary software drivers to communicate with entry-control field devices. Information generated by the entry-control field devices shall be accepted by the local processor and automatically processed to determine valid identification of the individual present at the portal.
17. Upon authentication of the credentials or information presented, the local processor shall automatically check privileges of the identified individual, allowing only those actions granted as privileges.
18. Privileges shall include, but are not limited to, time of day control, day of week control, group control, and visitor escort control. The local processor shall maintain a date-time- and location-stamped record of each transaction.

19. Transaction is defined as any successful or unsuccessful attempt to gain access through a controlled portal by the presentation of credentials or other identifying information.
20. Local processor outputs shall reflect the state of commands issued by the central station.
21. Outputs shall be a form C contact and shall include normally open and normally closed contacts.
22. Local processor shall have at least four addressable outputs.
23. The entry-control local processor shall also provide control outputs to portal-control devices.
24. Local processor shall be able to communicate with the central station via RS-485 or TCP/IP as a minimum.
25. The system manufacturer shall provide strategies for downloading database information for panel configurations and cardholder data to minimize the required download time when using IP connectivity.

2.12 TRANSFORMERS

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

B. Examine roughing-in for LAN and control cable conduit systems to workstations, controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with recommendations in SIA CP-01.

B. Comply with TIA 606-B, "Administration Standard for Commercial Telecommunications Infrastructure."

C. Product Schedules: Obtain detailed product schedules from manufacturer of access-control system or develop product schedules to suit Project. Fill in all data available from Project plans and specifications and publish as Product Schedules for review and approval.

1. Record setup data for control station and workstations.
2. For each Location, record setup of controller features and access requirements.
3. Propose start and stop times for time zones and holidays, and match up access levels for doors.
4. Assign action message names and compose messages.
5. Set up alarms. Establish interlocks between alarms, intruder detection, and video surveillance features.
6. Prepare and install alarm graphic maps.

7. Develop user-defined fields.
8. Develop screen layout formats.
9. Discuss badge layout options; design badges.
10. Complete system diagnostics and operation verification.
11. Prepare a specific plan for system testing, startup, and demonstration.
12. Develop acceptance test concept and, on approval, develop specifics of the test.
13. Develop cable and asset-management system details; input data from construction documents. Include system schematics and Visio Technical Drawings in electronic format.

D. In meetings with Architect and Owner, present Product Schedules and review, adjust, and prepare final setup documents. Use approved, final Product Schedules to set up system software.

3.3 IDENTIFICATION

A. In addition to requirements in this article, comply with applicable requirements in Section 27 0553 "Identification for Communications Systems" and with TIA 606-B.

B. Using software specified in "Cable and Asset Management Software" Article, develop cable administration drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with the same designation. Use logical and systematic designations for facility's architectural arrangement.

C. Label each panel with the readers and inputs/outputs controlled by the controller.

D. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

1. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
2. Each wire connected to building-mounted devices is not required to be numbered at the device if the color of the wire is consistent with the associated wire connected and numbered within the panel or cabinet.

E. At completion, cable and asset management software shall reflect as-built conditions.

3.4 SYSTEM SOFTWARE AND HARDWARE

A. Develop, install, and test software and hardware, and perform database tests for the complete and proper operation of systems involved. Assign software license to Owner.

B. Coordinate database integration with Owner of each system.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to supervise and assist with startup service.

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

2. Enroll and prepare badges and access cards for Owner's operators, management, and security personnel.
3. Train personnel pursuant to 3.7 Demonstration.

3.6 PROTECTION

A. Maintain strict security during the installation of equipment and software. Rooms housing the control station, and workstations that have been powered up shall be locked and secured with an activated burglar alarm and access-control system reporting to a central station complying with UL 1610, "Central-Station Burglar-Alarm Units," during periods when a qualified operator in the employ of Contractor is not present.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain security access system. See Section 01 7900 "Demonstration and Training."

B. Develop separate training modules for the following:

1. Computer system administration personnel to manage and repair the LAN and databases and to update and maintain software.
2. Operators who prepare and input credentials to man the control station and workstations and to enroll personnel.
3. Security personnel.
4. Hardware maintenance personnel.
5. Other administration staff, e.g. facilities director

END OF SECTION 28 1400

SECTION 28 1500 - ACCESS CONTROL HARDWARE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Card readers, credential cards, and keypads
2. Access control peripheral devices
3. Electrified locking devices and accessories
4. Lockdown controls and signals
5. Cables
6. Transformers

B. Related Requirements:

1. Section 08 7100 “Door Hardware” for information on power supply specifications and door sequence of operations.
2. Section 25 5000 “Integrated Automation Facility Controls” for integration with BMS/HVAC systems.
3. Section 28 1300 "Access Control System Software and Database Management" for control and monitoring applications, workstations, and interfaces.
4. Section 28 1523 “Intercom Entry Systems” for interface with intercom system.
5. Section 28 2000 “Video Surveillance” for integration with surveillance system.
6. Section 28 3100 “Fire Detection and Alarm” for integration with fire system.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Device layout information, including the following:
   a. Lockdown devices, including signal lights and initiation controls.
      1) Wiring diagrams indicating their connection to the access control system.
   b. Initial wiring diagrams and connections between all devices requiring relays to/from the access control system, including:
      1) Access control intercom (reference specification section 28 1353)
      2) Access control release buttons and toggle switches
      3) Lockdown systems
      4) Dialing and signaling requirements on lockdown events

2. Initial access control programming schedules for unlock/lock times.

3. Diagrams for cable management system.
4. System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 2 and 3.
5. Wall plate options: provide cutsheets of all wall plate types for signal controls.
6. Wiring Diagrams. For power, signal, and control wiring. Show typical wiring schematics including the following:
   a. Workstation outlets, jacks, and jack assemblies.
   b. Patch cords.
   c. Patch panels.
7. Cable Administration Drawings: As specified in "Identification" Article.
8. Battery and charger calculations for central station, workstations, and controllers.

C. Product Schedules.

D. Samples: For workstation outlets, jacks, jack assemblies, and faceplates. For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses of all kinds, power and electronic, equal to 10 percent of amount installed for each size used, but no fewer than three units.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1. Cable installer must have on staff an RCDD certified by Building Industry Consulting Service International.

B. Source Limitations: Obtain central station, workstations, controllers, Identifier readers, and all software through one source from single manufacturer.

1.8 PROJECT CONDITIONS

A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Control Station: Rated for continuous operation in ambient conditions of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
2. Indoor, Controlled Environment: NEMA 250, Type 1 enclosure. System components, except the central-station control unit, installed in temperature-controlled indoor environments shall be rated for continuous operation in ambient conditions of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.
3. Indoor, Uncontrolled Environment: NEMA 250, Type 4 enclosures. System components installed in non-temperature-controlled indoor environments shall be rated for continuous operation in ambient conditions of 0 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.
4. Outdoor Environment: NEMA 250, NEMA 250, Type 4X enclosures. System components installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 36 inches thick.
5. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
6. Corrosive Environment: For system components subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones, provide NEMA 250, Type 4X enclosures.

PART 2 - PRODUCTS

2.1 OPERATION

A. Security access system hardware shall use a single database for access-control and credential-creation functions.

2.2 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70, "National Electrical Code."

C. Comply with SIA DC-01 and SIA DC-03 and SIA DC-07.

2.3 CARD READERS, CREDENTIAL CARDS, AND KEYPADS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. HID Global
   a. Card Readers
      1) HID multiClass RP15

2) HID multiclass RP40
3) Equivalent substitutions are subject to Owner review prior to contract award. Equivalent substitutions must meet the following criteria:
a) Weigand or OSDP protocol options
b) Multi-technology read capability (125kHz and 13.56MHz minimum)
c) Offer low-profile (mullion mounted) options

b. Credentials
1) Coordinate with owner prior to sign off to obtain access cards for programming into system.

B. Card Readers:

1. Card-Reader Power: Powered from its associated controller, including its standby power source, and shall not dissipate more than 5 W.
2. Response Time: Card reader shall respond to passage requests by generating a signal that is sent to the controller. Response time shall be 800 ms or less, from the time the card reader finishes reading the credential card until a response signal is generated.
3. Enclosure: Suitable for surface, semi-flush, pedestal, or weatherproof mounting. Mounting types shall additionally be suitable for installation in the following locations:
a. Indoors, controlled environment.
b. Indoors, uncontrolled environment.
c. Outdoors, with built-in heaters or other cold-weather equipment to extend the operating temperature range as needed for operation at the site.

4. Display: Digital visual indicator shall provide visible and audible status indications and user prompts. Indicate power on or off, whether user passage requests have been accepted or rejected, and whether the door is locked or unlocked.
5. Stripe Swipe Readers: Bidirectional, reading cards swiped in both directions, powered by the controller. Reader shall be set up for ABA Track.
a. Readers for outdoors shall be in a polymeric plastic enclosure with all electronics potted in plastic. Rated for operation in ambient conditions of minus 40 to plus 160 deg F in a humidity range of 10 to 90 percent.

6. Wiegand Swipe Reader: Set up for 33 or 26-bit data cards. Comply with SIA AC-01.
7. Touch-Plate and Proximity Readers:
a. Active-detection proximity card readers shall provide power to compatible credential cards through magnetic induction, and shall receive and decode a unique identification code number transmitted from the credential card.
b. Passive-detection proximity card readers shall use a swept-frequency, RF field generator to read the resonant frequencies of tuned circuits laminated into compatible credential cards. The resonant frequencies read shall constitute a unique identification code number.
c. The card reader shall read proximity cards in a range from direct contact to at least 6 inches from the reader.

2.4 ACCESS CONTROL PERIPHERAL DEVICES

1. Items listed below are basis of design
a. Request to Exit
1) Bosch Security Systems, Inc
a) DS160 Series High Performance Request-to-exit

b) White
c) With SLI

b. Door Position Switch
1) Assa Abloy
a) Securitron DPS-M-GY
2) Securitron DPS-W-BK

2.5 CABLES

A. General Cable Requirements: Comply with requirements in Section 27 0513 "Conductors and Cables for Communications Systems" and as recommended by system manufacturer for integration requirement.

B. PVC-Jacketed, TIA 232-F.

1. Nine, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Polypropylene insulation.
3. Aluminum foil-polyester tape shield with 100 percent shield coverage.
4. PVC jacket.
5. Conductors are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with UL 1581.

C. Plenum-Rated TIA 232-F Cables:

1. Nine, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PE insulation.
3. Aluminum foil-polyester tape shield with 100 percent shield coverage.
4. Fluorinated ethylene propylene jacket.
5. Conductors are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

D. PVC-Jacketed, TIA 485-A Cables:

1. Paired, two pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. NFPA 70 Type: Type CM.
6. Flame Resistance: Comply with UL 1581.

E. Plenum-Rated TIA 485-A Cables:

1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. NFPA 70 Type: Type CMP
6. Flame Resistance: NFPA 262, Flame Test.

F. Multiconductor, PVC, Reader and Wiegand Keypad Cables:

1. No. 22 AWG, paired and twisted multiple conductors, stranded (7x30) tinned copper conductors, semirigid PVC insulation, overall aluminum-foil/polyester-tape shield with 100 percent shield coverage, plus tinned copper braid shield with 65 percent shield coverage, and PVC jacket.
2. NFPA 70, Type CMG.
3. Flame Resistance: UL 1581 vertical tray.
4. For TIA 232-F applications.

G. Paired, PVC, Toggle Switch Button Cables:

1. Four pairs, No. 18 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, individual aluminum-foil/polyester-tape shielded pairs each with No. 18 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
2. NFPA 70, Type CM.
3. Flame Resistance: UL 1581 vertical tray.

H. Paired, PVC, Reader and Wiegand Keypad Cables:

1. Three pairs, twisted, No. 20 AWG, stranded (7x28) tinned copper conductors, polyethylene (polyolefin) insulation, individual aluminum-foil/polyester-tape shielded pairs each with No. 22 AWG, stranded (19x34) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
2. NFPA 70, Type CM.
3. Flame Resistance: UL 1581 vertical tray.

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

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

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

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

K. LAN Cabling:

1. Comply with requirements in Section 27 1513 "Communications Copper Horizontal Cabling."

2.6 TRANSFORMERS

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

PART 3 - EXECUTION

3.1 SPECIAL REQUIREMENTS

A. At the exterior entry doors into common/shared space, ensure each card reader is connected to both Township Fire and Police systems.

3.2 INSTALLATION

A. Comply with recommendations in SIA CP-01.

B. Comply with TIA 606-B, "Administration Standard for Commercial Telecommunications Infrastructure."

C. Product Schedules: Obtain detailed product schedules from manufacturer of access-control system or develop product schedules to suit Project. Fill in all data available from Project plans and specifications and publish as Product Schedules for review and approval.

D. In meetings with Architect and Owner, present Product Schedules and review, adjust, and prepare final setup documents. Use approved, final Product Schedules to set up system software.

3.3 CABLING

A. Comply with NECA 1, "Good Workmanship in Electrical Construction."

B. Install cables and wiring according to requirements in Section 27 0513 "Conductors and Cables for Communications Systems."

C. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters. Conceal raceway and wiring except in unfinished spaces.

D. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use NRTL-listed plenum cable in environmental airspaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.

E. Install LAN cables using techniques, practices, and methods that are consistent with Category 5e rating of components and optical fiber rating of components, and that ensure Category 6 and optical fiber performance of completed and linked signal paths, end to end.

F. Boxes and enclosures containing security-system components or cabling, and which are easily accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered accessible. Junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.

G. Install end-of-line resistors at the field device location and not at the controller or panel location.

3.4 CABLE APPLICATION

A. Comply with TIA 569-D, "Commercial Building Standard for Telecommunications Pathways and Spaces."

B. Cable application requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.

C. TIA 232-F Cabling: Install at a maximum distance of 50 ft. between terminations.

D. TIA 485-A Cabling: Install at a maximum distance of 4000 ft. between terminations.

E. Card Readers and Keypads:

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

F. Install minimum No. 16 AWG cable from controller to electrically powered locks. Do not exceed 500 ft. between terminations.

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

3.5 GROUNDING

A. Comply with Section 27 0526 "Grounding and Bonding for Communications Systems."

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

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

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

E. Signal Ground:

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

3.6 IDENTIFICATION

A. In addition to requirements in this article, comply with applicable requirements in Section 27 0553 "Identification for Communications Systems" and with TIA 606-B.

3.7 SYSTEM SOFTWARE AND HARDWARE

A. Develop, install, and test software and hardware, and perform database tests for the complete and proper operation of systems involved. Assign software license to Owner.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

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

B. Tests and Inspections:

1. LAN Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use tester approved for type and kind of installed cable. Test for faulty connectors, splices, and terminations. Test according to TIA 568-C.1, "Commercial Building Telecommunications Cabling Standards - Part 1: General Requirements." Link performance for balanced twisted-pair cables must comply with minimum criteria in TIA 568-C.1.
2. Test each circuit and component of each system. Tests shall include, but are not limited to, measurements of power-supply output under maximum load, signal loop resistance, and leakage to ground where applicable. System components with battery backup shall be operated on battery power for a period of not less than 10 percent of the calculated battery operating time. Provide special equipment and software if testing requires special or dedicated equipment.
3. Operational Test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.

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

D. Prepare test and inspection reports.

3.9 STARTUP SERVICE

A. Engage a factory-authorized service representative to supervise and assist with startup service.

1. Complete installation and startup checks according to approved procedures that were developed in "Preparation" Article and with manufacturer's written instructions.
2. Enroll and prepare badges and access cards for Owner's operators, management, and security personnel.

END OF SECTION 28 1500

SECTION 28 1523 – INTERCOM ENTRY SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. IP Video Intercom Door Station
B. Video Intercom Master Station

1.2 RELATED SECTIONS

A. Section 27 1513 – Communications Copper Horizontal Cabling
B. Section 28 1300 - Access Control Software and Database Management
C. Section 28 1500 – Access Control Hardware Devices

1.3 REFERENCES

A. American National Standards Institute (ANSI/TIA/EIA) 568 - Commercial Building Telecommunications Cabling Standard.
B. International Organization for Standards (ISO) 9001:2000 - Quality Management Systems - Requirements.

1.4 SYSTEM DESCRIPTION

A. 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 onsite visitors from an offsite location, broadcast emergency announcements, and communicate using a PoE network.

1. Power Source: Power over Ethernet (802.3af).
2. Network Interface: 10 BASE-T / 100 BASE-TX Ethernet (RJ-45).
3. Network Protocols: IPv4, IPv6, TCP, UDP, SIP, HTTP, HTTPS, MJPEG, RTSP, RTP, RTCP, IGMP, MLD, SMTP, DHCP, NTP, DNS.
4. Bandwidth Usage:
   a. G.711: 64Kbps x 2 per video call.
   b. 64Kbps per monitor.
   c. .264: 24Kbps ~ 2,048Kbps.
5. Communication: Hands-free (VOX), push-to-talk (simplex), or handset (full-duplex).
6. Video Display: 3-1/2 inches (89 mm) color LCD.
7. Camera: Type:
   a. 1/4 inch (6 mm) color CMOS.
   b. View Area: 2 feet 2 inches (660 mm) vertical x 3 feet 1 inch (940 mm) horizontal at 20 inches (508 mm).
8. Video Stream: ONVIF Profile S.

9. 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.
10. Wire Type: CAT-5e or CAT-6.
11. Distance:
    a. Any station to Network Node: 330 feet (100 meters).

1.5 SUBMITTALS

A. Submit under provisions of Section 01 3000 - Administrative Requirements.
B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Submit the following:

1. Wiring Diagrams: Indicate wiring for each item of equipment and interconnections between items of equipment.
2. Include manufacturer's names, model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.

D. Installation and Operation Manuals:

1. Submit manufacturer's installation and operation manual, including operation instructions and component wiring diagrams.
2. Provide detailed information required for Owner to properly operate equipment.

E. Warranty: Submit manufacturer's standard warranty.
F. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
G. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001:2008 certified company.
B. Installer Qualifications: Factory trained and experienced with system installations of scope and size required for the Project.
C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship is approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
C. Handling: Protect materials during handling and installation to prevent damage.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS AND OPERATION

A. See 2.4 FUNCTIONAL COMPONENTS for full list of requirements. Door station and Master shall be connected to Access Control Platform (see 28 1300 and 28 1500) for interfacing with the electrified lock systems, and shall be programmed to shunt/bypass “door forced open” alarming.

2.2 AUDIO VIDEO DOOR STATIONS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Aiphone Corporation
   a. IX
      1) Provide Contact input at door station
      2) Provide ONVIF Profile S camera input
      3) Provide audio/video streaming via ONVIF Profile S
      4) Provide selective door/gate release and connect to locking hardware through access control platform, *not* directly to lock.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000 - Product Requirements.

2.3 IP VIDEO INTERCOM MASTER STATIONS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Aiphone Corporation
   a. IX

B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000 - Product Requirements.

2.4 FUNCTIONAL COMPONENTS:

A. Functional Components: As indicated on the drawings or as required to complete system.

1. Video Master Station:
   a. An IP addressable video master station with a 3.5 inch (89 mm) color LCD monitor. It can be wall or desk mounted (desk stand included). Offers handset (duplex) and hands-free (VOX/PTT) communication and call up to 500 other stations. It connects directly to a network using CAT-5e/6 cable. This station requires a 802.3af compliant Power-over-Ethernet network.

2. Audio/Video Door Station:
   a. Flush mount or surface station connects to a PoE network using CAT-5e/6 cable. Will call up to 20 masters or instances of mobile devices as required by Owner. The door station features a stainless steel face plate, a form C contact for door release, a 600 ohm output for paging or an amplified speaker, call placed/answered indication, and a contact input.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive integrated security and communication system.
B. Notify Architect of conditions that would adversely affect installation or subsequent use.
C. Do not begin installation until unacceptable conditions are corrected.

3.2 PREPARATION

A. Verify the following compliance before starting installation.

1. The unit turns inoperative during power failure.
2. Keep the intercom wires at least 1 foot (30 cm) away from strong electrical wiring (AC 100-240 V) including, in particular, wiring for inverter electrical appliances. Noise and malfunction could result.
3. If a strong light shines on the main unit screen, the picture may turn white or only silhouettes will be visible.
4. Other manufacturer's devices (such as sensor, detectors, door releases) used with this system, comply with the manufacturer's installation requirements.
5. The LCD panel is manufactured with very high precision techniques, inevitably will have a very small portion of its picture elements always lit or not lit at all. This is not considered a unit malfunction. Please be aware of this in advance.

3.3 INSTALLATION

A. Install integrated security and communication system in accordance with manufacturer's instructions at locations indicated on the Drawings.
B. Mount equipment plumb, level, square, and secure. For video entrance stations and video door stations, comply with manufacturer's design requirements to provide optimum picture quality of station monitoring.

3.4 SET-UP AND ADJUSTING

A. Adjust integrated security and communication system for proper operation in accordance with manufacturer's instructions.

3.5 DEMONSTRATION AND TRAINING

A. Demonstration:

1. Demonstrate that integrated security and communication system functions properly.
2. Perform demonstration at final system inspection by qualified representative of manufacturer.

B. Instruction and Training:

1. Provide instruction and training of Owner's personnel as required for operation of integrated security and communication system.
2. Provide hands-on demonstration of operation of system components and complete system, including user-level program changes and functions.
3. Provide instruction and training by qualified representative of manufacturer.

3.6 PROTECTION

A. Protect installed integrated security and communication system from damage during construction.

END OF SECTION 28 1523.

SECTION 28 2000 - VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes a video surveillance system consisting of cameras, data transmission wiring and associated equipment.

1.2 ACTION SUBMITTALS

A. Provide product data sheets with specific part numbers highlighted.

B. IP Based Cameras.

C. Camera Mounting Accessories.

1.3 INFORMATIONAL SUBMITTALS

A. Camera Aiming Documentation.

1. Create a spreadsheet with the following columns and submit during submittal process. Camera name (on drawings), camera name (as directed by owner), Camera Make/Model, MAC address, IP Address, View, Camera Image, Status, Comments, and Sign Off. Leave all fields blank except for Camera Name (drawings) and camera Make/Model. Camera Name (drawings) and camera make/model shall be completed as part of submittal.
    a. Camera name (drawings): Device number provided by architect
    b. Camera name (owner): Device name provided by owner
    c. Camera make and model.
    d. MAC address
    e. IP address: as provided by owner
    f. View: what the view is aiming to achieve Status: camera status at time of document iteration
    g. Comments: Any additional aiming that needs to be completed.
    h. Sign Off: for architect and owner to sign off each camera as complete.

B. Shop Drawings: For video surveillance. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, accessories, method of field assembly, components, and location and size of each field connection.
2. Show cable types and sizes.
3. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
4. Wiring Diagrams: For power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. As-Built Drawings.

1. Provide electronic (minimum .pdf) copy of as built conditions of cameras, mounts, their cable's port, rack, and closet number, and aiming views (along with a screenshot of view at time of completion).

B. Operation and Maintenance Data.

1.5 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Control Station: Rated for continuous operation in ambient temperatures of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
2. Interior, Controlled Environment: System components, except central-station control unit, installed in air-conditioned interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
3. Interior, Uncontrolled Environment: System components installed in non- temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 0 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 3R enclosures.
4. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick. Use NEMA 250, Type 3S enclosures.
5. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.6 WARRANTY

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

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. Video Management System and cameras as installed and programmed *must* meet the requirements set forth in LARA Rule 27, including (but not limited to):

1. Clear and certain identification of person(s), including facial features and activities, of all recorded areas
2. Any area where marihuana products are weighed, packed, stored, loaded, unloaded for transportation, prepared, or moved within the facility.
3. Limited access areas and security rooms
4. Transfers of product and secured items between rooms
5. Entrances and exits of the facility, from both interior and exterior vantage points.
6. 24/7 continuous recording with timestamps on each view
7. 14 days minimum recorded video storage
8. Alarms and notification system for camera comm failure, network outage, tamper, or any other failure or disruption of the VMS and its server(s).
9. Logs of any activity including the removal, destruction, and/or modification of recordings or recording equipment.

B. Resolution of cameras shall meet LARA Rule 27 requirements above, achieving minimum 40 px/ft “clearly identify and recognize”.

C. Video-signal format shall comply with NTSC standard, at a minimum resolution of 720p.

D. Surge Protection: Protect components from voltage surges entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Section 26 4313 "Surge Protection for Low-Voltage Electrical Power Circuits."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Section 26 4313 "Surge Protection for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.

E. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display shall identify tamper alarms and indicate locations.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Video surveillance system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NECA 1.

D. Comply with NFPA 70.

E. Electronic data exchange between video surveillance system with an access-control system shall comply with SIA TVAC.

2.3 IP BASED CAMERAS

A. Basis of Design – refer to drawings for camera type requirement at each location.

1. Recommended Manufacturers:
   a. Axis Communications
      1) P Series
         a) 1448 LE
         b) 3225, 3228 LVE
      2) Q Series
         a) 1798 LE

2. Substitutions: Requests for submissions shall be made prior to submittal and only at the acceptance of the owner.

B. Description:

1. Cameras shall provide high-quality delivery and processing of IP-based video, audio, and control data using standard Ethernet-based networks.
2. Cameras shall be powered over ethernet (PoE) and where data cable distance or model type requires, be supported by PoE injectors and/or power assist methods.
3. Cameras shall meet the following standards:
   a. Interior: IP66, IK10, FCC Class A, CE, Vandal resistant
   b. Exterior: IP66, IK10, FCC Class A, CE, Vandal resistant
4. Camera models shall be installed at their intended locations and all necessary supporting equipment, including brackets, mounts, and housings, shall be provided.
5. System shall have seamless integration of all video surveillance and control functions.
6. Graphical user interface software shall manage all IP-based video matrix switching and camera control functions, two-way audio communication, alarm monitoring and control, and recording and archive/retrieval management. IP system shall also be capable of integrating into larger system environments.
7. System design shall include all necessary compression software for high-performance (H.264 or better), dual-stream, MPEG-4 video or better, and transmission via unicast or multicast. Unit shall provide connections for all video cameras, camera PTZ control data, bidirectional audio, discreet sensor inputs, and control system outputs.
8. All camera signals shall be compressed, encoded, and delivered onto the network for processing and control by the IP video-management software.
9. Camera system units shall be ruggedly built and designed for extreme adverse environments, complying with NEMA Type environmental standards.

2.4 All system interconnect cables, workstation PCs, PTZ joysticks, and network intermediate devices shall be provided for full performance of specified system.

2.5 CAMERA-SUPPORTING EQUIPMENT

1. Provide supporting equipment to install a complete system, including but not limited to:
   a. Pendant mounts
   b. Wall mounts
   c. Corner mounting brackets
   d. NPT/threaded adapters
   e. Caulk/sealant as necessary

B. Minimum Load Rating: Rated for load in excess of the total weight supported times a minimum safety factor of two.

C. Mounting Brackets for Fixed Cameras: Type matched to items supported and mounting conditions. Include manual pan-and-tilt adjustment. Include all necessary components for specified devices.

2.6 NETWORK VIDEO RECORDERS

A. Requirements

1. NVR(s) must be sized appropriately to retain *at least* 14 days of continuously (24/7) recorded video of each camera. Thirty (30) days recorded video is best practice and recommended.
2. NVR(s) must be capable of camera throughput (bandwidth) at a rate with minimum 25% added capacity for future growth. Fiber NICs are suggested on any instance in which there are less than (3) servers.
3. Rack-mounted NVRs are recommended; if cloud-based or workstation-style servers are used, provide Owner with information prior to contract award.

B. Recommended Manufacturers

1. Avigilon Corporation
2. Axis Communications

2.7 LICENSING

A. Provide licensing as required per camera and/or per server.

PART 3 - EXECUTION

3.1 WIRING

A. For communication wiring, comply with the following:

1. Section 27 1313 "Communications Copper Backbone Cabling."
2. Section 27 1513 "Communications Copper Horizontal Cabling."

3. Section 27 1523 "Communications Optical Fiber Horizontal Cabling."

B. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.2 VIDEO SURVEILLANCE SYSTEM INSTALLATION

A. Cameras, NVR, and all supporting equipment must be installed by an installer with manufacturer-specific training, including but not limited to Axis Certified Professional designation.

B. Cameras and NVRs shall be installed to be separate and independent of each other.

C. Install cameras with 24-inchminimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.

D. Prior to install, the following process must be completed:

1. Default camera username and password configured to owner-provided standard.
2. Obtain submittal document from Architect with “Views” column completed.
3. Provide document to Owner and Architect with MAC addresses filled out

E. Prior to installation, set views according to returned submittal document. The following items shall be completed prior to project closeout:

1. Verify final views with owner while installing. If owner or architect cannot be reached, obtain a digital image and send to owner and architect for review of final positioning.
2. Connect all controls and alarms and adjust.
3. Obtain owner/architect sign off on spreadsheet.

F. Confirm power and data connectivity on device and network side; for devices that do not have sufficient power or full data transmission, provide PoE+ injector.

G. Identify system components, wiring, cabling, and terminals according to Section 27 0553 "Identification for Communications Systems."

1. Labeling: Label each camera housing with the corresponding device number on prints as well as closet number and port of data drop associated to camera. Labeling shall be visible without removing the camera housing.

H. Obtain sign off of camera views from primary representative of each system – Township and Police – as well as the technology consultant.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

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

B. Tests and Inspections:

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

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

D. Prepare test and inspection reports.

3.4 DEMONSTRATION

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

END OF SECTION 28 2000