28.00.00 ELECTRONIC SAFETY AND SECURITY

28.01.00 SCOPE OF WORK

1.1 IU Project Personnel

A. At the onset of each project the University will designate a Project Team Leader to be the primary liaison between the University, the Design Team and the Construction Team. The Project Team Leader will designate additional University personnel as required to fulfill various roles. Throughout this document, the term “Owner’s Representative” shall be used to represent the IU Project Team Leader or any person designated by the IU Project Team Leader. Any changes to the scope described in the contract documents shall require the knowledge and approval of the IU Project Team Leader prior to implementation. All changes made without approval from the IU Project Team Leader shall be at the Contractor’s expense, and at the discretion of the University shall be subject to reinstallation per the contract documents at no cost to the University.

1.2 This specification covers the furnishing and installation of materials for electronic security system components and cabling, complete and in operating condition as indicated on the drawings and/or as described herein.

A. The security systems herein specified provides for equipment, functionality, information outlets and other low voltage signaling functions (such as for fire alarm and telecommunication systems) through multi-conductor and twisted pair cable.

B. The system shall provide acceptable outlets for any security device, which requires connection to other devices, networks or information services serving general University security needs.

1.3 Products shall be as listed in this document or as directed by the Owner's Representative.

1.4 Installation procedures shall be in accordance with University procedures, industry acceptable practices, product manufacturer’s recommendations, federal, state and local codes and standards, and shall include demolition and removal of materials as required to support the work.

1.5 This section includes tools, materials, equipment and labor necessary to complete a turnkey installation, including but not limited to the following items:

A. Cabling and cable management hardware

B. Conduit, junction boxes, and raceways

C. Connection hardware and accessories

D. Equipment racks, equipment enclosures, mounting hardware and wire management

E. System components and accessories, including spare parts as required

F. PC or appliance based servers

G. Storage for video surveillance

H. Software and licensing
I. System training
J. Labels for cables and receptacles
K. Modular station receptacles
L. Equipment mounting brackets
M. Painted fire retardant plywood backboards
N. Velcro Tie wraps, bushings, and miscellaneous

28.02.00 REFERENCES

28.02.10 APPLICABLE CODES AND STANDARDS

1.1 Security systems design shall comply with Federal and State codes, regulations, and standards with variances adopted as standards by Indiana University and the State of Indiana. Applicable state and national standards, including but not limited to, the latest editions of:

A. General Administrative Rules (675 IAC 12)
G. Electronic Industry Association (ANSI/EIA/TIA)
H. BICSI
I. National Electrical Manufacturers Association
J. Underwriters Laboratories UL 294, UL 639, UL 1037, UL 1076
K. Federal Communications Commission (FCC) 47 CRF Part 15 and 90
L. IU Telecommunications Design Guidelines
M. IU Facilities Physical Security, Safety, and Privacy Base Bid Standards
N. PS-02 Video and Electronic Surveillance

28.03.00 DEFINITIONS

1.1 GENERAL
A. Station Outlet Box - The standard outlet box for data cabling terminations required for security components. Unless specifically noted otherwise, box shall be a minimum Five Square, 5" x 5" box 2 7/8" deep.

B. DPS (Door Position Switch) - Flush mounted magnetic switch installed in the door and door frame, away from the hinges, that is connected back to card reader controller to report whether the door is open or closed.

C. Monitored Door - Any door consisting of at least (1) door position switch that is being monitored with central system board but without electronic control of the lockset or a card reader near the monitored door.

D. Controlled Door - Any door consisting of at least (1) door position switch that is being monitored with central system board and electronic control of the lockset to allow remote locking and unlocking.

E. LX Switch - Switch located within panic bar mounted on door or inside a mortise type latch to monitor position of the latch.

F. REX (Request-to-Exit) - Switch built into panic bar or door handle which monitors the panic bar or handle position, or separate sensor device which monitors the area around the door, that allows a person on the secured side of a controlled door to exit without triggering an event within the access control system.

G. Power Transfer - Device connected to the door, on hinged side, and to the door frame for the purpose of transferring wires from the door frame to the door for monitoring and controlling the latches.

28.04.00 EXECUTION

28.04.10 QUALITY ASSURANCE

1.1 Contractor’s management team shall have demonstrated compliance with all applicable Indiana University installation requirements as a prime contractor or subcontractor on no less than three (3) Indiana University projects.

A. The Contractor bears the burden of installing the electronic safety and security infrastructure and systems described in the University specifications in such a manner that the final product is fully usable in the manner for which it is intended; that an installation merely meets the letter of the specifications is neither sufficient nor acceptable.

B. The Owner's Representative may, at his/her discretion, require the names, previous project list, and references for the Contractor’s management team and field personnel assigned to this project prior to the start of the work.

C. The Owner's Representative maintains the right to ask for replacement of management or field staff at any time during the project.

1.2 All cabling shall meet ANSI/TIA-568 and BICSI requirements.

1.3 Termination and testing of the security and UTP cabling and components shall be performed by qualified security installer with at least five (5) years’ experience that can assure the installation and testing parameters are met.

A. Experience with installation of multi-conductor access control cabling and Category 6A cabling as applicable is required.

B. Vendors and contractors shall have on staff a Building Industry Consulting Service International (BICSI) Registered Communications Distribution Designer (RCDD).
C. The Vendor shall provide the name, stamp number and date of certificate expiration of the RCDD assigned to this project to the Owner's Representative.

D. The RCDD shall approve construction design and upon completion of installation, certify compliance with the standards and installation practices as specified by this document.


1. Shortcuts to any BICSI installation practices or NEC requirements will not be accepted unless previously authorized by the Owner's Representative in writing, and shall be reworked at the contractor’s expense.

1.4 Prior to commencing the work of this section, the contractor shall convene a meeting with the Owner's Representative and Design Team Representatives as required. Additional required attendees shall be determined by the IU Project Team Leader.

A. The meeting will cover project specifications, addendum, change orders, Security room layouts, security camera placement and views, labeling, and other project work, documents and site conditions.

B. System testing procedures and requirements shall be confirmed at this time.

C. Test report forms and schedules shall be provided for review by the Owner's Representative.

D. Inspection milestones will be set and notifications scheduled.

E. Meeting minutes will be distributed and will include agreements, action items and responsible party(s), for this meeting and for future meetings when required.

1.5 In order to minimize equipment failure, no equipment shall be installed until spaces are enclosed, watertight and dry. Equipment shall be suitably protected from dust and other airborne materials.

1.6 Contractor’s regular job progress meetings shall include at minimum the Owner's Representative. Additional required attendees shall be determined by the IU Project Team Leader.

1.7 University Inspection: Owner's Representative will provide advising as requested.

A. The Owner's Representative may inspect the job as it progresses.

B. Prior to final acceptance of the work, the contractor shall make arrangements with the Owner's Representative for inspection of the construction areas, both to ensure satisfactory completion of the work and to ensure complete cleanup and restoration of areas affected by the work.

C. Temporary protection, coverings, and structures shall be removed at or before time of inspection.

D. Examine areas and conditions with the Installer present for compliance with requirements and other conditions affecting the performance of security systems and signal transmission media.

E. Areas such as ceilings, which will be enclosed permanently (i.e. drywall) or accessible (i.e. lay-in ceilings), and which contain security cabling, must be inspected by the Owner's Representative before enclosure; if not, enclosing materials will be removed and replaced for inspection at no extra cost to the University.

F. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Owner's Representative.
28.04.20 SUBMITTALS

1.1 Submit shop drawings and/or manufacturer's product data for security systems and components, including but not limited to cameras, card readers, software, servers, control processors, I/O modules, emergency phones, panic buttons, security intercom stations, cabling and associated equipment and materials.

   A. Include cut sheets with rated capacities, performance characteristics, operating characteristics, electrical characteristics and other measurements and descriptions which describe these items in detail.

1.2 Submit a schedule of material and an installation schedule based on the construction schedule and construction phasing, to the Architect/Engineer, within four (4) weeks after contract award.

1.3 Submit qualifications data for material installers, supervisors, and the project RCDD (Registered Communications Distribution Designer).

1.4 Submit completed records identifying system topology and location of each component, including floor plans, riser diagrams, functional diagrams, security camera field-of-views, and cabling footages.

1.5 Submit test reports to the Owner's Representative for approval.

   A. Include in the test reports the test data taken and converted values.

   B. Prior to submittal for approval, have test reports signed by authorized witnesses present at tests.

   C. Submit electronic final copies of approved test reports in tester native format to the Owner's Representative.

   D. No services shall be installed until verified reports are submitted, reviewed, and found to be acceptable by the Owner's Representative.

28.04.30 DELIVERY, STORAGE AND HANDLING

1.1 Equipment and materials shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain.

   A. During installation, enclosures, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter; and be cleaned by appropriate methods both inside and outside before testing and operating and repainting if required.

   B. Damaged equipment shall be replaced with new.

   C. Painted surfaces shall be protected.

   D. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer such that repaired areas are not obvious.

1.2 Central Station, Workstations and Controllers:

   A. Electronic components shall be stored in a temperature and humidity controlled environment in original manufacturers' sealed containers. Ambient temperature of storage area should not under any circumstances exceed Manufacturers' temperature recommendations for components.

   B. All shipping containers should be opened upon arrival and contents verified against packing list. Packing list and relevant container identification information should be filed for inclusion with operation and maintenance data.
C. All original manufacturers' containers with packing materials should be recycled as required by project LEED requirements, unless specifically instructed otherwise.

1.3 Handle wire and cable carefully to avoid abrading, puncturing, kinking, and tearing wire and cable insulation and sheathing. Ensure that dielectric resistance and characteristic impedance integrity of transmission media are maintained.

28.04.40 SEQUENCING AND SCHEDULING

1.1 Coordinate installation of wires/cables with installation of electrical boxes and fittings, cable trays, and raceways.

1.2 Interruptions to existing security systems should be avoided where at all possible.

A. If it becomes necessary to interrupt functionality of any security system or service, such interruption must be approved by and scheduled with the Owner's Representative.

1.3 Interruptions to existing voice, data and video systems should be avoided where at all possible.

A. If it becomes necessary to interrupt voice and/or data network services, then such interruptions must be approved by and scheduled with the Owner's Representative.

1. Approval is gained by submitting an M.O.P. (Method of Procedure) to the Owner's Representative, containing the following information:

a. Detailed account(s) of the work to be performed.

b. Proposed outage time(s).

c. Estimated service restoral time(s).

d. A contingency plan in case the work takes longer than anticipated or doesn't go as scheduled.

2. Change management meetings are held on Wednesday of each week.

a. The M.O.P. shall be submitted to the Owner's Representative no later than 4:00 P.M. on the Tuesday of the week in which the work is to be performed.

b. Outages and associated work shall be performed outside of peak hours as follows:

   1) During weekend days.

   2) After 5 P.M. or before 7 A.M. during weekdays.

   3) Actual time(s) should first be approved by the parties affected by the outage(s).

   4) No outages may be scheduled during the first two (2) weeks of a fall or spring semester, during which time there is a "Change Freeze" period.

3. Approval from UITS Change Management must be granted before any scheduled outage can be performed.

   a. In the event that the outage is not approved, a revised M.O.P. will need to be submitted, subject to the requirements listed above for M.O.P. submission.
4. Contractors are solely responsible for the following:
   a. Making all necessary access arrangements in ample time before the work begins.
   b. Notifying all affected parties of the scheduled outage(s).
   c. Notifying repair@indiana.edu.

5. Interruptions to video systems should be coordinated with the IU Building Systems division at http://www.indiana.edu/~phyplant/building_systems.html and reported to repair@indiana.edu.

6. When new IDF's or Security Rooms are created as part of the project, communications work must be completed, tested and accepted four (4) weeks in advance of the substantial completion date to ensure that necessary communications circuits will be available for required building systems.

28.04.50 GENERAL INSTALLATION

1.1 Security Rooms must be clear of mechanicals such as ventilation ducts, water, sewer or steam pipes, and high voltage electric.

1.2 No cable shall be installed in any facilities other than those intended for that use.

1.3 All UTP cabling installed as part of a security system shall be subject to the same requirements as data cabling, as follows:
   A. Install telecommunications transmission media as indicated, in accordance with manufacturer's written instructions, in compliance with applicable requirements of NEC, and in accordance with recognized industry practices.
   B. Plenum rated cable shall be used for all communications cabling.
   C. Coordinate transmission media installation work as necessary to properly interface installation of media with other work.
   D. Do not install compressed, kinked, scored, deformed or abraded cable, or allow such damage to occur.
      1. Damaged materials shall be removed from the jobsite immediately.
   E. Use extreme care in handling, fishing, and pulling-in transmission media to avoid damage to conductors, shielding and jacketing/cladding.
      1. Use pulling means including fish tape, cable, rope, and basket weave wire/cable grips, which will not damage media or raceway.
      2. If power equipment is used to pull cable, the pull speed must not exceed 30 meters per minute.
      3. Use water based lubricant approved by the cable manufacturer to ensure manufacturer’s pulling tensions are not exceeded.
         a. Compound used must not deteriorate conductor or insulation.
   4. Cable bending radii must not be exceeded.
   5. Pulling methods must not cause cable to twist.
6. Cables pulled through pull boxes shall be hand assisted to prevent the cable from being crushed, kinked, or scraped.

F. Provide pull strings in all telecommunications conduit.
   1. To facilitate future cable installations, install a nylon pull cord in each conduit simultaneously with the pull-in of cable.

G. Pull conductors simultaneously where more than one is being installed in same raceway.

H. Splices in building media runs are not permitted.
   1. Building wiring must be continuous and undamaged from outlet to connecting block or connecting block to connecting block.

I. Terminations shall be made with the manufacturer's stated tools and in accordance with the manufacturer's instructions and guidelines.

J. Tighten connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque-tightening values. Where manufacturer’s torque requirements are not indicated, tighten connectors and terminals to comply with tightening torque specified in UL Standard.

K. When necessary within IDFs or Security Rooms, horizontal Station cables shall be secured with Velcro tie wraps. Both Fiber and Copper Entrance and riser cable shall be secured with standard tie wraps. Observe the manufacturer’s recommendations for distances between tie wraps and tightening tension from tie wraps and as specified in ANSI/TIA-568.
   1. Outside of IDFs and Security Rooms, horizontal cabling, entrance cables, and riser cables must be installed within industry standard pathways, such as cable tray, J-hooks, and conduit.

L. Cables shall be permanently identified at each end with an industry approved label.

M. All wall penetrations for telecommunications cabling must be sleeved, with bushings at each end, and firestopped with removable/reusable material which has a minimum 2 hour rating, or in accordance with other architectural details, unless otherwise noted.
   1. Cables must not be installed through unsleeved holes drilled through walls.
   2. Comply with Division 07 requirements for Firestopping.
   3. Comply with TIA 569 on Firestopping.
   4. Comply with UL1479 or ASTM E814, and label with the UL1479 or ASTM E814 reference number.

28.04.60 TESTING AND DOCUMENTATION

1.1 Refer to section 28.08.00 for specific system commissioning requirements.

1.2 Documentation

   A. The documentation format(s) will be agreed upon between the Owner's Representative and the Contractor.
   1. Provide all documentation in electronic format in addition to any original documentation requested.
2. If it is agreed to use proprietary software to provide testing results, the contractor will be required to furnish licensed system software to run it unless the Owner's Representative confirms that the University already owns a licensed version of the contractor’s software.

28.04.70 RECORD DRAWINGS

1.1 Contractor shall be responsible for providing the following as-built and record documents to the Owner's Representative:

A. As-built field mark-ups
   1. Provide one (1) physical copy and one electronic copy in .pdf file format.
   2. Provide .dwg format electronic files.
      a. Files shall be AutoCAD version 2013 or later.
   3. As built field mark-ups shall include overall system topologies, connection types, jack locations, circuit lengths, riser cable lengths, server locations, controller and sub-controller locations, camera locations and fields-of-view, emergency phone locations, access control component locations, and other information as required by the Owner's Representative.
   4. Additionally, Contractor shall provide a list of all existing cabling and equipment removed during project demolition phase(s).

B. Operations & Maintenance (O&M) Manuals
   1. Provide one (1) physical copy and one electronic copy in .pdf file format.

C. COBie Construction Data
   1. Provide one (1) set in .xslx format.

D. Refer to the most recent version of Indiana University as-Built CAD Requirements document for additional details and requirements.

28.04.80 WARRANTY

1.1 The warranty on labor and material installed by the contractor shall be in effect for no less than two (2) years from the date of substantial completion.

1.2 Contractor shall repair, adjust, and/or replace, whichever the Owner's Representative determines to be in the University's best interests, any defective equipment, materials, or workmanship, as well as such parts of the work damaged or destroyed by such defect, during warranty period, at the contractor's sole cost and expense.

1.3 In the event that any of the equipment specified, supplied, and/or installed as part of the work should fail to produce capacities or meet design specification as published or warranted by the manufacturer of the equipment involved or as specified in this document, the contractor shall, in conjunction with the equipment manufacturer, remove and replace such equipment with equipment that will meet requirements without additional cost to the University.
1.4 In the event that the contractor does not affect repair within seven (7) days from the date of notification of such defect, the Owner's Representative may secure repair services from other sources and charge the contractor for such costs without voiding the warranty.

1.5 Guarantees of material, equipment, and workmanship running in favor of the contractor shall be transferred and assigned to the University on completion of the work and acceptance of said work by the Owner's Representative.

28.05.00 COMMON WORK RESULTS

1.1 At all campuses except IU Southeast:

1.1 At IU Southeast:
   A. Contractor shall coordinate all Division 28 work with the Indiana University Southeast designated Security Systems Integrator, ECT Services. Refer to the IU Electronic Safety & Security Design Guideline for additional information.

28.05.09 RELATED SECTIONS

1.1 The following sections from other Divisions may contain work related to this Division:
   A. Section 26.05.00 – Common Work Result for Electrical
   B. Section 26.05.19 – Low-Voltage Electrical Power Conductors and Cables
   C. Section 26.05.26 – Grounding and Bonding for Electrical Systems
   D. Section 26.05.29 – Hangers and Supports for Electrical Systems
   E. Section 26.05.33 – Raceway and Boxes for Electrical Systems
   F. Section 26.05.36 – Cable Trays for Electrical Systems

28.05.26 GROUNDING AND BONDING

1.1 Contractor shall follow all applicable standards and manufacturer recommendations for grounding of equipment, enclosures and conduit.

28.05.28 PATHWAYS

1.1 Separation from EMI sources:
   A. Open cables and cables in nonmetallic raceways and unshielded power:
      1. Electrical less than 2 kVa 5 inch minimum
      2. Electrical 2 kVa to 5 kVa 12 inch minimum
3. Electrical greater than 5 kVA  24 inch minimum
B. Cables in grounded metallic raceways and unshielded power:
1. Electrical less than 2 kVA 2½ inch minimum
2. Electrical 2 kVA to 5 kVA 6 inch minimum
3. Electrical greater than 5 kVA 12 inch minimum

C. Cables in grounded metallic raceways and shielded power:
1. Electrical less than 2 kVA 1 inch minimum
2. Electrical 2 kVA to 5 kVA 2½ inch minimum
3. Electrical greater than 5 kVA 6 inch minimum

D. Cables and electrical motors and transformers:
1. Minimum 48 inches

E. Cables and fluorescent fixtures:
1. Minimum 5 inches

28.05.29 HANGERS AND SUPPORTS

1.1 Hangers and supports must be NRTL (Nationally Recognized Testing Laboratories) labeled for support of Category 6A cabling.

1.2 J-hooks shall be installed where there are no provisions for cabling runways.

1.3 J-Hooks shall be installed per ANSI/TIA 569 Commercial Building Standards for Telecommunications Pathways and Spaces.

28.05.33 CONDUITS AND BACKBOXES

1.1 Station conduit: shall be installed from each station outlet box to the cable tray, clamped to the cable tray and terminated with bushing, size per table or as noted on drawings.

<table>
<thead>
<tr>
<th>Trade Size Conduit</th>
<th>&quot;Standard Workstations&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>1</td>
</tr>
<tr>
<td>1¼&quot;</td>
<td>2</td>
</tr>
</tbody>
</table>
1.2 Horizontal distribution conduit shall be installed from junction box joining each station conduit box to the floor telecommunications equipment room, sized per the table below unless specifically noted otherwise on project drawings.

<table>
<thead>
<tr>
<th>Trade Size Conduit</th>
<th>Workstations &amp; (Station Cables)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>1 (2)</td>
</tr>
<tr>
<td>1¼&quot;</td>
<td>2 (4)</td>
</tr>
<tr>
<td>1½&quot;</td>
<td>3 (6)</td>
</tr>
<tr>
<td>2&quot;</td>
<td>5 (10)</td>
</tr>
<tr>
<td>2½&quot;</td>
<td>9 (18)</td>
</tr>
<tr>
<td>3&quot;</td>
<td>13 (26)</td>
</tr>
<tr>
<td>3½&quot;</td>
<td>18 (36)</td>
</tr>
<tr>
<td>4&quot;</td>
<td>23 (46)</td>
</tr>
</tbody>
</table>

1.3 Junction boxes shall be sized according to NEC 314.28, NEC 314.54, Article 770, and to accommodate bending radii as discussed in NEC 300.34 and related TIA documents.

A. In any case, all methods employed for the installation of interior communication cables should not subject the cables to a bend radius less than the following minimums:

1. Copper riser communication cables:
   a. Bending radius not smaller than eight (8) times the cable diameter.

2. Copper station communication cables in conduit:
   a. Bending radius not smaller than three (3) inches, or eight (8) times the cable diameter, whichever is greater.

3. Copper station communication cables in furniture:
   a. Bending radius not smaller than four (4) times the cable diameter.

4. Fiber optic cables, during pulling operations, should not exceed a bending radius smaller than twenty (20) times the cable diameter, or as recommended by the cable manufacturer; after pull is complete, the final cable bend radius should not exceed ten (10) times the cable diameter.

5. Conduits for interior grade telecommunication cables, such as riser rated and horizontal station cables, may be placed in a slab-on-grade, but must never be placed below the slab for any reason. Likewise, horizontal station cables must not be placed in conduit which is exposed to outside weather conditions. Inside building rated cables are not designed to withstand the moisture and condensation which can occur in underground and exterior conduits, which will render the cable(s) unusable in a short period of time. Although such conduits may be placed in the slab as a last result, whenever possible conduits should be placed above slab, but never below.
28.05.36  CABLE TRAYS

1.1  UTP cabling for security systems shall be routed to the appropriate IDF/MDF via the building cable tray.

    A.  All dedicated access control cabling shall be separated from the installed telecommunications cabling. Cabling shall be installed as a separate tier of cable tray or separated via a cable tray divider system.

    B.  If space within the telecommunications tray is not available, properly sized and spaced J-hooks shall be attached to the cable tray or structure to support all dedicated access control cabling from termination to enclosure.

1.2  Horizontal Distribution

    A.  Cable Trays are to be installed as low as possible above the finished ceiling.

        1.  A minimum 18" clearance shall be maintained above the cable tray.

        2.  90° turns shall be made by two (2) 45° turns.

        3.  Cable trays shall not be installed using center point mounts.

1.3  Telecommunication Rooms (IDFs)

    A.  12" wide Ladder Type runways are to circle the IDF room at a minimum 7' height.

        1.  Cable tray systems shall be installed so that installed cables will transition to the ladder rack runway without damage to or strain on the cables.

        2.  Ladder rack also shall be installed perpendicular to and secured to the outward end of the equipment rack(s).

        3.  Additional ladder rack shall be used where necessary to stabilize equipment racks in the room or as needed to provide reasonable and shortest distance routing of cables.

1.4  Refer to Division 26.

28.05.39  SURFACE RACEWAYS

1.1  Surface raceways should be avoided where possible.

    A.  Cabling must not be subjected to sharp or binding edges.

    B.  Surface raceways must be large enough to accommodate all intended cables as well as allow for 30% growth.

    C.  Such raceways and pathways shall installed to support horizontal cabling in accordance with the requirements of ANSI/TIA-569-C.

    D.  Refer to Division 26.

28.05.43  UNDERGROUND DUCTS AND RACEWAYS

1.1  Manholes shall be precast concrete 12 x 6 x 7 A-hole or J-hole type with sump hole.
A. Manhole covers and frames shall have 32" diameter clear opening with heavy duty cast iron lids with penta-head bolts and labeled "Communications".

B. Manholes shall have all racking hardware and pulling irons installed.

C. Beginning from center of side wall, racking shall be installed 24" O.C.

D. Manholes shall be fitted with a manufacturer’s recommended iron ladder.

1.2 Ducts shall be Schedule 40 PVC, 4" ID nominal trade size, unless noted otherwise.

1.3 Duct Installation

A. Ducts shall be installed with a minimum of 30" of cover.

B. Ducts shall be installed a minimum of 12" from electrical conduits.

C. Duct shall be installed with as much separation from steam lines as is practical.

D. Ducts shall be separated and held in place with duct spacers at intervals of no more than 8 feet.

E. Corners and bends of duct runs shall be installed with long radius sweeps, encased in concrete.

F. Ducts shall be installed with a minimum of 3" of fall per 100' toward maintenance holes and away from buildings.

G. Ducts shall be surrounded by a minimum of 3" on all sides with flowable backfill.

H. Ducts shall then be capped with a minimum 3" concrete no less than the width of the backfilled trench.

I. Color top of concrete cap by using Orange chalk dust while still wet.

J. An orange magnetically detectable warning tape shall be installed above the top of the ductbank, 18" below ground level.

K. Where possible, ducts shall be terminated into precast cutout locations.

L. Duct shall NOT penetrate manholes in the collars, in the middle of side walls, or at locations blocked by existing cables in the case of existing manholes.

M. Duct penetration should NOT extend beyond the manhole walls.

N. Duct penetration locations should allow for easy racking of cables around manhole walls.

O. Ducts penetrating manholes, precast handholes, and building entrance wall penetrations which do not land in a pull box, must be terminated flush to the wall(s) using bell ends.

P. Building entrance ducts which penetrate the floor must extend high enough above finished floor for installation of a bushing to protect the cable sheath from the edges of the conduits, but not much higher in order to allow for routing of cables leaving the conduits.

Q. Duct shall be sealed around their outer edges with hydraulic cement to prevent leakage into manholes.

R. Unused ducts shall be plugged at both ends using compression type fittings.

S. Seal maintenance hole penetrations using hydraulic cement.
T. NOTE: Innerduct is no longer used in outside plant communications ducts on Indiana University campuses.
1.4 Installed Duct Preparation

A. Pull round wood or steel test mandrel of recommended size through each duct from both directions to remove obstructions.

B. Pass a wire brush mandrel and/or a rubber duct swab of appropriate size through each duct until all foreign materials and water are removed.

C. Ducts shall be provided with Greenlee, Muletape, or equal continuous measuring tape in each duct.

D. Install a locate wire in one duct of each conduit run and terminate on collar of manholes for easy access.

E. Unused ducts shall be plugged using compression type fittings.

1.5 Handholes

A. Handholes shall be 4 x 4 x 4 precast concrete with sump hole.

B. Ducts shall be Schedule 40 PVC as described above, or ducts suitable for directional boring.

28.05.53 IDENTIFICATION

1.1 Labeling of Horizontal Copper Cabling.

A. The Contractor's onsite representative(s) shall schedule a meeting with the Owner's Representative and UITS (University Information Technology Services) representative prior to the permanent labeling of Information Outlets and patch panels.

B. Information Outlet receptacles, cables, and terminations shall be labeled with a standard identification tag at both the Information Outlet and on the jackfields in the IDF/Wire Closet.

1. Tags shall be preprinted or computer printed with indelible water proof ink and mechanically secured in a permanent fashion; for example, such as using an appropriate label maker with \(\frac{3}{8}\)\" tape.

2. Handwritten labels are NOT acceptable.

3. Labels shall be mounted in a manner which permits easy access and viewing.

4. The station cable serving each receptacle must be labeled at the room receptacle and the IDF rack.

C. Information Outlet receptacles in rooms are to be labeled -A through -ZZ in each room beginning with the first receptacle to the left of the main entrance to the room and continuing clockwise around the room.

1. All labeling will be done in all capital letters.

2. For example, a jack labeled 246A-A would be because:

   a. Room 246A is the room number.

   b. The Information Outlet designation is “A” (first receptacle in room from the left of the door).

3. Station cables within a given room shall be labeled in sequential order, i.e. – 246A-A, 246A-B, 246A-C, 246A-D, etc. If double letters are needed, the progression would be -Y, -Z, -AA, -AB, etc. -AZ, -BA, -BB, etc.
D. Information Outlets for special purposes shall have a unique identifier listed with the jack ID.

1. The identifier shall be inserted into the Outlet ID, between the room number and the Outlet designator, as shown below.

2. The following identifiers shall be used, as necessary:
   a. Security Camera "246A+SC-A"
   b. Access Control "246A+AC-A"
   c. Building Automation "246A+BA-A"
   d. Fire Panel "246A+FP-A"
   e. Wireless Access Point "246A+WD-A" (Wireless Data)

E. ALL LABELING SHALL BE COORDINATED WITH AND APPROVED BY THE OWNER'S REPRESENTATIVE AND UITS.

1.2 Identification of components shall be completed according to the most recent revision of TIA 606-B.

28.06.00 SCHEDULES FOR ELECTRONIC SAFETY AND SECURITY

1.1 Grounding.

A. Grounding Bus Bars shall comply with J-STD-607-B

B. TMGB

1. 4" x 16" Copper
   a. Hubbell HBBB14416H or equivalent

2. 4" x 16" Tin Plated Copper
   a. Hubbell HBBB14416HTP or equivalent

3. 4" x 20" Copper
   a. Hubbell HBBB14420J or equivalent

4. 4" x 20" Tin Plated Copper
   a. Hubbell HBBB14420JTP or equivalent

C. TGB

1. 2" x 10" Copper
   a. Hubbell HBBB14210A or equivalent

2. 2" x 10" Tin Plated Copper
   a. Hubbell HBBB14210ATP or equivalent
3. 2" x 24" Copper
   a. Hubbell HBBB14224B or equivalent

4. 2" x 24" Tin Plated Copper
   a. Hubbell HBBB14224BTP or equivalent

D. Horizontal Cabinet or Equipment Rack Busbar - 19"
1. 19" Grounding Busbar kit
   a. Panduit RGRB19
2. ¾" x 19" x ¼" Copper
   a. Hubbell HBBBHR19KT or equivalent
3. ¾" x 19" x ¼" Tin Plated Copper
   a. Hubbell HBBBHR19KTTP or equivalent

E. Vertical Cabinet or Equipment Rack Busbar - 36" to 72"
1. ¾" x 36" x ¼" Copper
   a. Hubbell HBBBVR36KT or equivalent
2. ¾" x 36" x ¼" Tin Plated Copper
   a. Hubbell HBBBVR36KTTP or equivalent

F. Compression Lugs
1. ¼" holes x ⅝" spacing
   a. 0°
      1) Hubbell HGBLXXD or equivalent
   b. 45°
      1) Hubbell HGBLXXD45 or equivalent
   c. 90°
      1) Hubbell HGBLXXD90 or equivalent
2. ¼" holes x ⅝" spacing
   a. 0°
      1) Hubbell HGBLXXDA or equivalent
3. ⅜" holes x 1" spacing
   a. 0°
      1) Hubbell HGBLXXDB or equivalent
   b. 90°
      1) Hubbell HGBLXXDB90 or equivalent

G. C Tap
   1. Main Run 6-4 AWG - Tap 6 AWG
      a. Hubbel HYC4C6 or equivalent
   2. Main Run 6-4 AWG - Tap 4 AWG
      a. Hubbel HYC4C4 or equivalent
   3. Main Run 2 AWG - Tap 8-4 AWG
      a. Hubbel HYC2C4 or equivalent
   4. Main Run 2 AWG - Tap 2 AWG
      a. Hubbel HYC2C2 or equivalent
   5. Main Run 1/0-2/0 AWG - Tap 8-2 AWG
      a. Hubbel HYC26C2 or equivalent
   6. Main Run 1/0-2/0 AWG - Tap 1/0-2/0 AWG
      a. Hubbel HYC26C26 or equivalent

H. H Tap
   1. Main Run 4/0-2 AWG - Tap 2-8 AWG
      a. Hubbel HYH292C or equivalent
   2. Main Run 2-8 AWG - Tap 2-8 AWG
      a. Hubbel HYH2C2C or equivalent
   3. Main Run 6-10 AWG - Tap 6 AWG
      a. Hubbel HYH6C6C or equivalent

I. I-Beam Tap
   1. I-Beam Steel with Standard Flange
      a. Hubbel HYGIBS#### or equivalent
2. I-Beam Steel with Wide Flange
   a. Hubbel HYGIBW#### or equivalent

J. Busbar Tap
   1. Busbar Thickness ¼", Main Run 2 AWG - Tap 6 AWG
      a. Hubbel HYG14B2TC2C6C or equivalent
   2. Busbar Thickness ¼", Main Run 2 AWG - Tap 2 AWG
      a. Hubbel HYG14B2TC2C2C or equivalent
   3. Busbar Thickness ¼", Main Run 4/0-1/0 AWG
      a. Hubbel HYGBTC28 or equivalent

K. Ladder Rack Bonding Conductors
   1. Stranded THHN, Green
      a. Hubbell HGRKTD12D or equivalent
   2. Stranded THHN, Green
      a. Hubbell HGRKTKA9KA5 or equivalent
   3. Stranded THHN, Green
      a. Hubbell HGRKTKLU9KLU5 or equivalent
   4. Braided Jumper
      a. Hubbell HGBBD12 or equivalent

L. Basket Tray Conductors
   1. Hubbell HGBKS17 or equivalent
   2. Hubbell HGRKTWC45 or equivalent
   3. Hubbell HGRKTWB5 or equivalent

M. Wrist Strap ESD Port
   1. Hubbell HGBESDKT10 or equivalent

N. Raised Floor Grounding Clamp
   1. Grid or Parallel
      a. Hubbell HGBGX1828RF or equivalent
   2. Parallel
      a. Hubbell HGBGP1526G1 or equivalent
3. Parallel
   a. Hubbell HGBGRF4C3 or equivalent

4. Stringer ¾"-1½" Round or Square
   a. Hubbell HGBGXP1828RF or equivalent

5. Stringer 1"-1¼" Round
   a. Hubbell HGBGP1526G1 or equivalent

6. Stringer ¾"-1" Round or Square
   a. Hubbell HGBGRF4C3 or equivalent

7. Wire Range 6 - 4/0 AWG
   a. Hubbell HGBGXP1828RF or equivalent

8. Wire Range 4 - 2/0 AWG
   a. Hubbell HGBGP1526G1 or equivalent

9. Wire Range 8 - 2 AWG
   a. Hubbell HGBGRF4C3 or equivalent

1.2 Hangers.
   A. Horizontal Cable Hangers
      1. Panduit J-Pro Series (preferred)
      2. Panduit J-Mod Series
      3. Erico Caddy CAT J-Hook: Cat32
      4. Erico Caddy CableCat Wide Base Cable Support Clips

1.3 Conduit and Backboxes
   A. Refer to section 26 05 33 for conduit.
   B. Standard Information Outlet, single gang face
      1. 5 square electrical box
         a. RANDL T-55017 5 Square x 2-7/8" Deep outlet box
      2. Mud ring (⅝” drywall)
         a. RANDL D-51G058 5 Square x One Gang Extension Ring
   C. Standard Information Outlet, double gang face
1. 5 square electrical box  
   a. RANDL T-55017 5 Square x 2-7/8” Deep outlet box 

2. Mud ring (¾” drywall)  
   a. RANDL L-52G058 5 Square x Double Gang Extension Ring 

D. Standard Security Camera Outlet  
   1. 5 square electrical box  
      a. RANDL T-55017 5 Square x 2-7/8” Deep outlet box  
   2. Mud ring (¾” drywall)  
      a. RANDL D-51G058 5 Square x One Gang Extension Ring  
   3. If the camera model selected for the project by PSIA is incompatible with the standard components listed above, Contractor shall provide back box and mounting accessories recommended by the manufacturer.

E. Standard Security Wall Phone Outlet  
   1. 5 square electrical box  
      a. RANDL T-55017 5 Square x 2-7/8” Deep outlet box  
   2. Mud ring (¾” drywall)  
      a. RANDL D-51G058 5 Square x One Gang Extension Ring  
   3. If the wall phone model selected for the project by PSIA is incompatible with the standard components listed above, Contractor shall provide back box and mounting accessories recommended by the manufacturer.

1.4 Cable Tray  
   A. Comply with NEMA VE 2 and TIA-569 cable tray (Not in IDF) or cable basket 12” or larger as needed.

1.5 Equipment Racks  
   A. 7’ x 19” Equipment Rack  
      1. Panduit CMR 19x84  
   B. Wire management  
      1. Horizontal  
         a. Panduit WMPH2E  
      2. Intermediate 12"  
         a. Panduit Patchrunner PEV12
3. Hinged Door 12"
   a. Panduit PED12

4. End Panel
   a. Panduit PEVEPB1

C. Equipment Cabinet (Small buildings only: Use must be preapproved)
   1. Cooper B-Line VLWM2425PB
      a. Plexiglass door, Black

1.6 Terminus
   A. Copper Backbone Termination Block
      1. Panduit Pan-Punch 110 Category 5e system
   B. Horizontal Copper Cabling Patch Panel
      1. Panduit CPPLA24WBLY
   C. Voice Patch Panel
      1. Panduit VP24382TV25Y with RJ21 connector
   D. Patch Panel Jack Modules
      1. Category 6A station cable
         a. Panduit CJ6X88TGVL TX6 PLUS, Violet, Cat 6A
   E. 4U Fiber Cabinet, XFM (Standard/Preferred)
      1. AFL FM001090-BE 12-slot rack mount patch panel, black, empty
   F. 1U Fiber Cabinet (Requires prior UITS approval)
      1. AFL FM001038-BE 3-slot rack mount patch panel, black, empty
   G. 2U Fiber Cabinet (Requires prior UITS approval)
      1. AFL FM001029-BE 6-slot rack mount patch panel, black, empty
   H. 12 fiber LC Cassette, 50 um Multimode
      1. AFL FM000273-B, Black LGX118, Standard Grade
   I. 24 fiber LC Cassette, 50 um Multimode
      1. AFL FM000692-B, Black LGX118, Standard Grade
   J. 12 fiber Singlemode Riser Cables
      1. AFL FM002996-B XFM Optical Cassette, 12-LC/APC, SM, Gray, Aligned Keyway Adapter
K. 24 fiber Singlemode Riser Cables
   1. AFL FM002058-B XFM Optical Cassette, 24-LC/APC, SM, Gray, Aligned Keyway Adapter

L. Adapter, AFL Cassettes in Corning shelf
   1. AFL FM001636 adapter plate

M. Adapter plate, 6 Duplex LC SM couplers
   1. AFL C215993, loaded with Singlemode LC couplers

N. Adapter plate, 6 Duplex SC SM couplers
   1. AFL C220853, loaded with Singlemode SC couplers

O. Information Outlet Terminations
   1. Category 6A
      a. Panduit CJ6X88TGVL TX6 PLUS, Violet
   2. Security Wall Phone
      a. Hubbell P630S
   3. F-Connector
      a. Panduit CMFIW 75-ohm F-connector module, off-white

1.7 Cable Management and Ladder Rack
   A. Ladder Rack (in IDF/MDF or Security Room)
      1. Chatsworth 10250-712 and associated parts as required
         a. 12” or wider, as required

1.8 Backbone Copper (Riser)
   A. Category 3 Copper Backbone Cable
      1. OFS Type CMP, #24 AWG, twisted pair, solid copper Category 3, suitable for placement in plenum space
         a. Belden Corporation equivalent
         b. General Cable, Guardian Products, equivalent
         c. Mohawk Wire and Cable Corporation equivalent
         d. Commscope, General Instrument, equivalent
   B. Riser Cable to Patch Panel Tie Cable
      1. Type CMP 25-pair amphenol style cable, #24 AWG twisted pair, solid copper Category 3
1.9 Backbone Fiber Cable

A. AFL 12 fiber 50 micron Multimode OM4 Riser Cables, MTP/MTP
   1. FTF-FTF-PL-012R-C-0020-PE-METHOD B
      a. Cable, pulling eye one end only, 20 meters
   2. FTF-FTF-PL-012R-C-0030-PE-METHOD B
      a. Cable, pulling eye one end only, 30 meters
   3. FTF-FTF-PL-012R-C-0040-PE-METHOD B
      a. Cable, pulling eye one end only, 40 meters
   4. FTF-FTF-PL-012R-C-0050-PE-METHOD B
      a. Cable, pulling eye one end only, 50 meters
   5. FTF-FTF-PL-012R-C-0060-PE-METHOD B
      a. Cable, pulling eye one end only, 60 meters
   6. FTF-FTF-PL-012R-C-0070-PE-METHOD B
      a. Cable, pulling eye one end only, 70 meters
   7. FTF-FTF-PL-012R-C-0080-PE-METHOD B
      a. Cable, pulling eye one end only, 80 meters
   8. FTF-FTF-PL-012R-C-0090-PE-METHOD B
      a. Cable, pulling eye one end only, 90 meters
   9. FTF-FTF-PL-012R-C-0100-PE-METHOD B
      a. Cable, pulling eye one end only, 100 meters
  10. FTF-FTF-PL-012R-C-0110-PE-METHOD B
      a. Cable, pulling eye one end only, 110 meters
  11. FTF-FTF-PL-012R-C-0120-PE-METHOD B
      a. Cable, pulling eye one end only, 120 meters
  12. FTF-FTF-PL-012R-C-0130-PE-METHOD B
      a. Cable, pulling eye one end only, 130 meters

B. AFL 12 fiber Singlemode Riser Cables, MTP/MTP
   1. ATF-ATF-PL-012R-Q-0020-PE-METHOD B
      a. Cable, pulling eye one end only, 20 meters
2. ATF-ATF-PL-012R-Q-0030-PE-METHOD B
   a. Cable, pulling eye one end only, 30 meters
3. ATF-ATF-PL-012R-Q-0040-PE-METHOD B
   a. Cable, pulling eye one end only, 40 meters
4. ATF-ATF-PL-012R-Q-0050-PE-METHOD B
   a. Cable, pulling eye one end only, 50 meters
5. ATF-ATF-PL-012R-Q-0060-PE-METHOD B
   a. Cable, pulling eye one end only, 60 meters
6. ATF-ATF-PL-012R-Q-0070-PE-METHOD B
   a. Cable, pulling eye one end only, 70 meters
7. ATF-ATF-PL-012R-Q-0080-PE-METHOD B
   a. Cable, pulling eye one end only, 80 meters
8. ATF-ATF-PL-012R-Q-0090-PE-METHOD B
   a. Cable, pulling eye one end only, 90 meters
9. ATF-ATF-PL-012R-Q-0100-PE-METHOD B
   a. Cable, pulling eye one end only, 100 meters
10. ATF-ATF-PL-012R-Q-0110-PE-METHOD B
    a. Cable, pulling eye one end only, 110 meters
11. ATF-ATF-PL-012R-Q-0120-PE-METHOD B
    a. Cable, pulling eye one end only, 120 meters
12. ATF-ATF-PL-012R-Q-0130-PE-METHOD B
    a. Cable, pulling eye one end only, 130 meters

1.10 Horizontal Copper Cabling

A. Category 6A:
   1. Horizontal Station Cable, 6A Plenum
      a. Superior Essex 10 Gain XP 6A Plenum P/N 6H-272-7A Purple, .275 inches, bend radius 1.20"
      b. General Genspeed 10MTP6A Plenum P/N 7131855 Purple, .292 inches, bend radius 1.25"
      c. Bertek LANmark-XTP 6A Plenum P/N 11085661 Violet
      d. Belden 10GXS13 6A Plenum P/N 0071000 Violet
B. For outdoor emergency phones, and conduits in slab-on-grade

1. Horizontal Station Cable, Category 6A filled
   a. Superior Essex 04-001-A5 OSP BBDG
   b. Superior Essex 04-001-A4 OSP BBDN

1.11 Information Outlets

A. Faceplates

1. Single gang
   a. Panduit CFPE4IWY Executive Series, 4-port, off-white faceplate

2. Double gang
   a. Panduit CFPE10IW-2GY Executive Series, 4-port, off-white

3. Security Wall Phone
   a. Hubbell P630S

B. Blank modules
   a. Panduit CMBIW-X Mini-Com blank module insert, off-white

28.08.00 COMMISSIONING OF ELECTRONIC SAFETY AND SECURITY

1.1 The objectives of commissioning are to ensure that security systems perform as designed, meet the needs of Indiana University, properly integrate with existing University systems, and minimize nuisance alarms that can undermine the operators' confidence in the systems. Benefits of commissioning include validated system documentation, reinforced owner training, increased system effectiveness and improved system maintenance by having a baseline of expected system performance. Failure to adequately commission a security system can result in the delay of system startup, owner dissatisfaction, increased maintenance, professional liability claims, warranty issues, and placing utility assets at risk.

1.2 The commissioning process begins with a plan that establishes and identifies the major elements of commissioning: systems and components to be commissioned, participants in commissioning, and participant roles. Pre-startup testing ensures that the system equipment is ready to be started, and functional testing provides the formal commissioning of the system (ensuring correct system operation and performance). Retesting occurs when a system does not pass functional testing, after a repair to a system, or on a periodic basis. After completion of functional testing and any re-tests of failed functional tests, a testing report, along with the system operation and maintenance manuals, is submitted to the Owner's Representative. Indiana University then assumes responsibility for operating and maintaining the system, including retesting.

1.3 Commissioning shall be coordinated with the campus designated Security Systems Integrator to ensure all system components are installed and integration is completed prior to functional testing.
1.4 Commissioning Process

A. At the beginning of the project, a commissioning team shall be established. The required participants shall be identified by the Owner's Representative. Once the team is established, a meeting shall be scheduled by the Owner's Representative to formulate team member roles and responsibilities, review documentation requirements and review acceptance procedures.

B. The Contractor shall provide the Owner's Representative with a list of all systems, equipment, and components to be commissioned.

C. The commissioning team shall review forms and checklists for the functional testing of equipment and components to ensure that functional test procedures encompass all required elements of system installation and performance.

1. Appendix 2 contains form and checklists for use as part of the commissioning process. The forms are intended to be a template, and may be modified as required to fit specific requirements of an individual project. All additions, subtractions or changes to any commissioning form shall be approved by the Owner's Representative prior to use.

D. Pre-startup tests shall be performed by the Contractor prior to formal functional testing to verify that equipment and components are powered, calibrated, operational and otherwise ready for functional testing. Pre-startup testing allows components which were delivered in a non-functional state to be discovered and replaced prior to functional testing, and provides an opportunity for adjustment and calibration that will minimize the issues during functional testing.

E. Functional testing is the formal testing of the entire security system under full operation. Successful completion of functional testing commissions the system. The purpose of functional testing is to thoroughly review and document the equipment and installation to verify that functional and performance requirements in the contract documents are met. The functional performance test consists of individual component testing and progresses to the testing of entire systems as an integrated security platform. The system is operated through all the modes of operation and under varying conditions, and each component verified to be responding during the process is documented.

F. During functional testing, temporary modifications may be necessary as the test proceeds. The specific tests required and the order of tests will vary depending on the type and size of systems, number of systems, sequence of installation, and relationship with the building elements (e.g., heating, ventilation, and air conditioning; building doors). Testing of systems may occur in stages depending on the progress of work or as proposed by the contractor. For example, an internet connection may not be available until after completion of building construction. Commissioning of portions of the system can occur prior to the internet connection, but the portions that require an interconnect connection are commissioned at a later date. The commissioning team uses the agreed upon functional test forms and checklists to coordinate and document the testing. The tests are typically performed by the installing contractor or vendor, and witnessed by members of the commissioning team at the discretion of the Owner's Representative.

G. Retesting shall be required in the following instances:

1. Contractor shall perform retesting of any system which does not pass the functional testing procedure upon restoration of the system to a functional state.

2. Contractor shall perform retesting of a system when any changes or repairs are made to that system after the completion of functional testing. This includes any repair completed by the Contractor within the warranty period.
3. Periodic retesting of commissioned systems shall be conducted semi-annually, annually or bi-annually as determined by the Owner's Representative. Within the warranty period periodic retesting shall be performed by the Contractor. At the conclusion of the warranty period periodic shall be performed by the University.

H. Upon completion of functional testing, and retesting if necessary, the Contractor shall prepare a functional performance test report covering all measured data, data sheets, and a comprehensive summary describing system operation at the time of the functional testing. The test report shall also include any agreed upon forms and checklists completed during functional testing. The completed test report shall be submitted to the Owner's Representative.

28.10.00 ELECTRONIC ACCESS CONTROL AND INTRUSION DETECTION

28.13.00 ACCESS CONTROL

PART 1 - General

1.1 The work required under this section consists of providing labor, equipment, supplies, materials, testing unless otherwise specified, and to perform the following operations recognized as necessary for the installation, termination, labeling, of conduits, boxes, raceways, etc., certain access control components, and the wiring of the Access control system. Access control wiring includes cables for doors, card readers, door contacts, and electrical door latches.

A. Refer to IU Electronic Safety and Security Design Guideline for additional information on division of responsibilities.

1.2 Related Sections

A. 08.70.00 Door Hardware
B. 26.00.00 Electrical
C. 27.00.00 Communications

1.3 Intent of drawings and specifications

A. These specifications, together with the drawings accompanying them, are intended to depict the installation requirements necessary to support this project and provide the infrastructure required by the Indiana University designated Security Systems Integrator to complete installation of Access Control Systems. Contractor shall furnish materials shown and/or called for on the drawings but not mentioned in the specifications, or vice versa, that are necessary for the installation and support of access control systems, whether or not specifically called for in both. In addition, contractor shall provide incidental equipment and materials required for the completion of systems included in this contract whether or not specified or shown on the drawings.

1.4 Submittals

A. Product Data: For each type of product indicated.
B. Shop Drawings: Detail the system infrastructure, including the following:
   1. Wiring Diagrams: Detail cabling part numbers, lengths and endpoints.
   2. Equipment Cabinet Drawings: Dimensioned and to scale.
1.5 Installer Certificates
   A. Signed by manufacturer certifying that installers comply with requirements. On request, submit evidence of experience and of relationship with equipment manufacturer.

1.6 Manufacturer Certificates
   A. Signed by manufacturers certifying that they comply with requirements.

1.7 Field Tests Reports and Observations
   A. Include record of final adjustments certified by the contractor.

1.8 Maintenance Data
   A. Include the following in maintenance manuals specified in Division 1:
      1. Operating instructions.
      2. Troubleshooting guide.
      3. Wiring terminal identification.
      4. Equipment parts list.

1.9 Quality Assurance
   A. Installer Qualifications
      1. An experienced installer who is an authorized representative of the product manufacturer for both installation and maintenance of units required for this project. The installer shall have a minimum of three (3) years documented experience installing and servicing access control systems.

   B. Manufacturer Qualifications
      1. A firm experienced in manufacturing equipment similar to that indicated for this project and that maintains technical support services capable of providing user with training, parts, and emergency maintenance and repair with a 24-hour- maximum response time. The manufacturer of the product specified in this section shall have a minimum of five (5) years of documented experience in the manufacture and design of access control systems.

   C. Source Limitations
      1. Obtain security equipment components through one source from a single manufacturer.

   D. Electrical Components, Devices, and Accessories
      1. Listed and labeled according to UL 1069 as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

   E. The access control system shall conform to all local and state jurisdiction requirements.
1.10 Extra Materials

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Coordinate with Owner's Representative for storage location.

1. Door controller board: Furnish quantity equal to no less than 10% of quantity installed, but never less than one (1).

2. Card Readers: Furnish quantity equal to no less than 10% of quantity installed, but never less than one (1).

3. Door position switches: Furnish quantity equal to no less than 5% of quantity installed, but never less than two (2).

4. Request-To-Exit Devices: Furnish quantity equal to no less than 5% of quantity installed, but never less than one (1).

PART 2 - Products

2.1 System Requirements

A. All access control components provided by the Contractor on any project shall be fully compatible with the existing access control software platforms at each campus as follows:

1. IU Southeast:
   a. All components shall be fully compatible with the University Lenel OnGuard system.

2. IU Bloomington RPS (Residential Programs & Services) facilities only:
   a. Components installed for the purpose of controlling Telecommunications Rooms shall be fully compatible with the University Open Options DNA Fusion system.
   b. Components installed in all other building areas shall be fully compatible with the University CBORD CS Access system.

3. All other campuses and IU Bloomington non-RPS facilities:
   a. All components shall be fully compatible with the University Open Options DNA Fusion system.

B. Coordinate the features of materials and equipment to form an integrated system. Match components and interconnections for optimum performance of specified functions.

C. Resistance to electrostatic discharge: system, components, and cabling, and the selection, arrangement, and connection of materials and circuits, shall be protected against damage or diminished performance when subjected to electrostatic discharges of up to 25,000 V in an environment with a relative humidity of 20 percent or less.

2.2 Access Control Software

A. All campuses except IU Southeast

B. IU Southeast
   1. Provided by IUS designated Security Systems Integrator, ECT.

2.3 Access Control System Enclosure
A. All campuses except IU Southeast:

B. IU Southeast:
   1. Provided and installed by IUS designated Security Systems Integrator, ECT.

C. Headend System Enclosure
   1. Mier Products BW-103G

D. Headend System Enclosure Lock
   1. Mier Products BW-3000

2.4 System Control Processor
A. All campuses except IU Southeast:

B. IU Southeast:
   1. Provided and installed by IUS designated Security Systems Integrator, ECT.

2.5 Sub-Controller Modules
A. All campuses except IU Southeast:

B. IU Southeast:
   1. Provided and installed by IUS designated Security Systems Integrator, ECT.

2.6 Door Controller I/O Modules
A. All campuses except IU Southeast:

B. IU Southeast:
   1. Provided and installed by IUS designated Security Systems Integrator, ECT.
2.7 Card Readers
   A. Specific card reader models shall be determined by IU during the design of each project.
   B. Provided and installed by the Contractor.

2.8 Credentials
   A. All campuses except IU Southeast:
   B. IU Southeast:
      1. Provided by IUS designated Security Systems Integrator, ECT.

2.9 Door Position Switches
   A. Steel Door Contacts
      1. UTC-Interlogix 1076/1078
   B. Provided and installed by the Contractor.

2.10 Request to exit (REX) switches
   A. Specific REX Switch models shall be determined by IU during the design of each project.
   B. Provided and installed by the Contractor.

2.11 Access Control Cables
   A. Provided and installed by the Contractor.
   B. Composite Access Control Cabling – Plenum
      1. Windy City Wire 4461030-S (YELLOW)
   C. Composite Access Control Cabling – Plenum
      1. Belden 658AFJ (YELLOW)
   D. Emergency Phone Alarm Cabling – Plenum
      1. Windy City Wire 18/2 – 442322
   E. Emergency Phone Alarm Cabling – Plenum
      1. Belden 18/2 – 6300FE

2.12 Electronic Locking Technology (Provided by Division 8)
   A. The security contractor shall coordinate with the door hardware contractor on the placement of required electronic locking hardware. The door contractor will provide and install all electric locking hardware with the associated line voltage power supplies. The security contractor will provide all necessary wire and cable, low voltage power supplies, terminate all connections, and shall interface this equipment with the integrated security system.
1. Coordinate power requirements to ensure sufficient emergency power generation where necessary.

B. Power supplies for delayed egress panic devices and electric latch retraction type locks shall be provided by the door hardware contractor. This required device has been specified under Division 8.

PART 3 - Execution

3.1 Installation

A. Wiring Method

1. Access Control wiring shall be concealed and protected from unauthorized access wherever possible.

B. Install exposed raceways and cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours. Secure and support cables by straps, staples, or similar fittings designed and installed so as not to damage cables. Secure cable at intervals not exceeding 30" (760 mm) and not more than 6" (150mm) from cabinets, boxes, or fittings.

C. Wiring within Enclosures

1. Provide adequate length of conductors. Bundle, lace, and train conductors to terminal points with no excess. Provide and use lacing bars in cabinets.

D. Separation of Wires

1. Run in separate raceways or, if exposed or in same enclosure, provide 12" (300 mm) minimum separation between conductors adjacent to parallel power and telephone wiring. Provide separation as recommended by equipment manufacturer for other conductors.

E. Splices, Taps, and Terminations

1. All access control cabling shall be continuous between device and controller board. No splices shall be allowed.

F. Impedance and Level Matching

1. Carefully match input and output impedances and signal levels at signal interfaces. Provide matching networks if required.

G. Identification of Conductors and Cables

1. Retain color-coding of conductors and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams. Label stations, controls, and indications using approved consistent nomenclature.

3.2 Grounding

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

B. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding except at connection to main building ground bus.

C. Grounding Provisions

1. Comply with grounding requirements in Division 26.
3.3 Controlled Doors
   A. Refer to door details in Appendix 1 for infrastructure requirements for standard door types.

3.4 Card Reader Doors
   A. Refer to door details in Appendix 1 for infrastructure requirements for standard door types.

3.5 Field Quality Control
   A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field assembled components and testing and adjusting of system.
   B. Test Procedure: Comply with the following:
      1. Schedule tests a minimum of seven (7) days in advance of performance of tests.
      2. Report: Submit a written record of test results.
      3. Operational Test: Perform an operational system test to verify compliance of system with these Specifications.
   C. Retesting: Rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at contractor's expense. Verify by the system test that the total system meets these Specifications and complies with applicable standards. Report results in writing.
   D. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
   E. System Testing:
      1. All controlled doors shall be tested for proper operation as follows:
         a. With door(s) closed and locked, verify all switches are closed, zero resistance, and multiplexer board is indicating inactive status, for the particular point.
         b. With door(s) closed and locked, push each panic bar or handle without opening door to verify LX switches open, infinite resistance, and board is indicating active status for the particular point. Release bar or handle to verify status changes back to inactive and LX switch(s) close, zero resistance.
         c. With door(s) closed and locked, open each door individually to verify door switches open, infinite resistance, and board is indicating active status for the particular point. Close door to verify status changes back to inactive.
         d. Contact Owner's Representative to verify computer control of door location.
      2. All Card Reader doors shall be tested for proper operation as follows:
         a. With door(s) closed and locked, verify all switches are closed, zero resistance.
         b. With door(s) closed and locked, push each panic bar or handle without opening door to verify LX switches are opening, infinite resistance. Release bar or handle to verify LX changes back to a closed state, zero resistance.
c. Contact Owner's Representative to verify computer control door location and confirm unit is online.

d. Swipe valid card through read-head to verify door unlocks, opens, and closes.

3.6 Demonstration

A. If required, engage a factory-authorized service representative to train University personnel as designated by the Owner's Representative.

1. Schedule training with the Owner's Representative with at least seven (7) days' advance notice.

2. Train University personnel as designated by the Owner's Representative on procedures and schedules related to starting and stopping, troubleshooting, servicing, and preventive maintenance. Provide a minimum of two (2) hours of training.

28.20.00 ELECTRONIC SURVEILLANCE

PART 1 - General

1.1 Related Documents

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

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.2 Summary

A. Provide all work as detailed in the Contract Drawings as a turn-key installation including integration into the existing facility systems, all material, labor, programming, as-built documentation, warranties, taxes, freight and permits. Only items and requirements specifically stated to be provided under another section shall not be a requirement for this section of the work.

B. The Contractor shall provide the following Electronic surveillance Systems and Equipment:

1. Video Surveillance cameras, housings and mounts

2. Wire and cable

1.3 Reference Standards

A. The latest published edition of a reference shall be applicable to this project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this contract shall be applicable to this project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the Contract Documents.
1.4 Quality Assurance

A. Contractor Qualifications:

1. All work specified herein shall be the responsibility of the Contractor. Contractors shall document a minimum of five (5) years’ experience in the installation of systems of similar complexity as specified herein. The documentation shall include the names, locations and points of contact for at least three (3) installations of the type and complexity specified herein. The contractor shall provide a brief overview of each system detailing what Video Management System (VMS) was used; the amount of equipment installed; and certify that the system has been in operation for a minimum of 24 months.

2. The contractor shall have a service facility and organization with staffing capable of providing comprehensive maintenance and service to the specified systems within four (4) hours after being called, 24 hours per day and 7 days per week.

3. The contractor shall provide in-house engineering and project management capabilities consistent with the requirements of the work. The contractor shall have a project manager and field supervisor in place which oversees the entire project until completion of the project. The assigned project manager will be responsible for coordination, scheduling, manpower, commissioning etc. of the project. The contractor’s field supervisor shall be present during the full duration of the project to oversee field installations and to coordinate with other trades to ensure progress on the project.

4. The contractor must be familiar with all codes and contract conditions pertaining to this project.

5. As required, the contractor shall provide a training sessions of four (4) hours each with the University. The training shall occur at the earliest time after project completion agreed upon between the Contractor and the Owner's Representative. The training shall cover operation, control, and maintenance of the entire observation camera system.

B. Product Standards

1. All materials installed on this or any other project must be new and the latest specification and version from the manufacturer.

PART 2 - Products

2.1 All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of Authorities Having Jurisdiction.

2.2 Video Surveillance System

A. All campuses except IU Southeast:

1. All products installed as part of the video surveillance system shall be fully compatible with the existing Milestone XProtect Video Management Software.

B. IU Southeast:

1. All products installed as part of the video surveillance system shall be fully compatible with the existing Lenel Video Management Software.

C. The Video Surveillance System shall be Internet Protocol (IP) based utilizing camera models determined by the Owner's Representative and PSIA during the design process and mounted at specific locations identified in the T-Series Drawings.
D. Each camera location shall require ceiling, wall or pole mounting. Contractor shall include all mounting hardware as needed, including gooseneck mounts as required, for a complete and functional camera location.

E. Video from each camera shall be transmitted on the building local area network. The University provided network switches shall provide power over ethernet (PoE) to each camera location.

    1. In instances where exterior cameras require heater units that are not capable of being powered by the PoE, the Contractor shall be responsible for providing power supplies and cabling to power each heater unit. Contractor shall confirm all power requirements with the Owner's Representative prior to commencing work.

F. If cable extenders are utilized they shall be mounted on a wall adjacent to the University frame and shall not be mounted on the frame.

2.3 Network Video Storage and Licensing

A. Provided and installed by the designated Security Systems Integrator for the campus.

2.4 Video Surveillance System Cameras, Housings, and Mounts

A. All camera models and locations shall be determined by the Owner's Representative and PSIA during the design process.

    1. All accessories required shall be specifically designed for or fully compatible with each camera model.

B. Exterior camera installation shall meet the requirements for lightning protection of NEC Article 800.90.

C. Provided and installed by the Contractor.

2.5 Exterior Camera Power Supplies

A. Contractor shall provide and install power supplies for exterior cameras when heater unit of camera is not capable of being powered over Ethernet cabling.

    1. Power supplies shall meet or exceed the following specifications:

        a. 12V or 24V AC output to match camera requirements.

        b. Minimum of four (4) individual outputs per unit.

        c. Each output shall be separately fused.

2.6 Wire and Cable

A. Provided and installed by the Contractor.

B. All camera locations shall be provided with a single Category 6A cable to camera location. Termination and installation of the wire shall comply with all UTP cabling requirements listed within this document.

C. Exterior camera locations requiring a separate heater power supply shall also be provided with a 2 conductor power wire.

    1. Wire size shall be as recommended by the Manufacturer, or determined using basic voltage over distance calculation, and shall comply with NEC low voltage cable requirements.
PART 3 - Execution

3.1 Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of Authorities Having Jurisdiction.

3.2 All installation shall be in accordance with manufacturers’ specifications and published recommendations.

3.3 Camera fields-of-view shall be set based on views determined by the Owner's Representative and PSIA during design process. Once installed, Contractor shall review final camera alignments with the Owner's Representative and PSIA to ensure that views are acceptable.

3.4 Cabling shall be concealed and protected where possible, and shall not be exposed in any area readily accessible to non-university personnel.

3.5 Utilize cable trays for UTP cabling.

3.6 All cabling shall be plenum rated.

3.7 Provide code compliant fire proofing techniques for all penetrations of fire rated partitions and slabs.

3.8 Fasten cables throughout cable paths securely to building structure every 5 feet at minimum.

3.9 Cable runs shall be continuous from device location to the final point of termination.

3.10 Provide grommets and strain relief material where necessary to avoid abrasion of wire and excess tension on wire and cable.

3.11 Prepare wire ends for attachment to components in accordance with manufacturer recommendations.

3.12 Wire nuts shall not be an acceptable means of connecting wire and cable. All connections shall be made by crimp connection only.

28.26.00 ELECTRONIC PERSONAL PROTECTION SYSTEMS

PART 1 - General

1.1 Related Documents

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

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.2 Summary

A. Provide all work as detailed in the Contract Drawings as a turn-key installation including integration into the existing facility systems, all material, labor, programming, as-built documentation, warranties, taxes, freight and permits. Only items and requirements specifically stated to be provided under another section shall not be a requirement for this section of the work.

B. Provide the following Systems and Equipment:

1. Emergency Phones

2. Duress Alarms
3. Wire and cable

1.3 Reference Standards
   A. The latest published edition of a reference shall be applicable to this project unless identified by a specific edition date.
   B. All reference amendments adopted prior to the effective date of this contract shall be applicable to this project.
   C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the Contract Documents.

1.4 Quality Assurance
   A. Contractor Qualifications:
      1. All work specified herein shall be the responsibility of the Contractor. Contractors shall document a minimum of five (5) years’ experience in the installation of systems of similar complexity as specified herein. The documentation shall include the names, locations and points of contact for at least three (3) similar installations.
      2. The contractor shall have a service facility and organization with staffing capable of providing comprehensive maintenance and service to the specified systems within four (4) hours after being called, 24 hours per day and 7 days per week.
      3. The contractor must be familiar with all codes and contract conditions pertaining to this project.
   B. Product Standards
      1. All materials installed on this or any other project must be new and the latest specification and version from the manufacturer.

PART 2 - Products

2.1 All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of Authorities Having Jurisdiction.

2.2 Emergency phones
   A. IU Bloomington and IU South Bend campuses:
      1. All new emergency phones shall be manufactured by Ramtel.
         a. Specific models and locations shall be determined by IU during the design process.
   B. IU Southeast:
      1. All new emergency phones shall be manufactured by Stentofon.
         a. Specific models and locations shall be determined by IU during the design process.
   C. All other campuses:
      1. All new emergency phones shall be manufactured by Code Blue.
         a. Specific models and locations shall be determined by IU during the design process.
D. Wall mounted emergency phones
   1. Wall phone locations shall be flush mounted where possible.
   2. Manufacturer provided backbox shall be used for wall mount installations.
   3. All interior emergency phones shall be monitored by video surveillance.

E. Emergency phone towers
   1. IU Bloomington and IU South Bend campuses
      a. Emergency phone tower columns shall be as follows:
         1) Ramtel PLC-8A Stainless Steel Column
         2) Color shall be Architect Brown
         3) White "Emergency" lettering
         4) Where required, column shall include camera mount bracket as follows:
            a) Ramtel 800-1127 gooseneck camera mount bracket
            b) Color shall be Architect Brown

2.3 Duress Alarms
   A. Duress alarms shall be provided as required.
      1. Models and locations shall be determined by the Owner's Representative and PSIA during the design process.
   B. Duress/Panic alarms shall meet UL 305 Standard for Panic Alarms. To reduce the possibility of false alarms and ensure installation functionality UL 636 Standard for Holdup Alarms standards shall be met.
   C. All spaces covered by a duress alarm shall also be monitored by video surveillance.

2.4 Wire and Cable
   A. All types and quantities of cabling required shall be confirmed with the University designated Security Systems Integrator for the campus prior to ordering.
   B. Emergency phones
      1. Power wires shall be minimum 18 AWG and plenum or outdoor rated as required.
      2. UTP cabling shall be Category 6A cabling and plenum or outdoor rated as required.
      3. Outdoor emergency phone tower installation shall meet the requirements for lightning protection of NEC Article 800.90.
   C. Duress alarms
      1. Wire shall be minimum 18 AWG and plenum rated.
PART 3 - Execution

3.1 Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of Authorities Having Jurisdiction.

3.2 All installation shall be in accordance with manufacturers’ specifications and published recommendations.

3.3 Cabling shall be concealed and protected where possible, and shall not be exposed in any area readily accessible to non-university personnel.

3.4 All cabling shall be plenum rated.

3.5 Provide code compliant fire proofing techniques for all penetrations of fire rated partitions and slabs.

3.6 Fasten cables throughout cable paths securely to building structure every 5 feet at minimum.

3.7 Cable runs shall be continuous from device location to the final point of termination.

3.8 Provide grommets and strain relief material where necessary to avoid abrasion of wire and excess tension on wire and cable.

3.9 Prepare wire ends for attachment to components in accordance with manufacturer recommendations.

3.10 Wire nuts shall not be an acceptable means of connecting wire and cable. All connections shall be made by crimp connection only.

END OF SECTION 28.00.00
DOOR DETAIL 1
SINGLE DOOR
NO ELECTRONIC LOCKING/UNLOCKING
DOOR POSITION MONITORING

NOTE:
DOOR HARDWARE PROVIDED UNDER DIVISION 8
DOOR DETAIL 2
SINGLE DOOR
ELECTRONIC LOCKING/UNLOCKING
DOOR POSITION MONITORING
POWER TRANSFER

NOTE:
DOOR POWER SUPPLY, POWER TRANSFER DEVICES AND ELECTRIFIED HARDWARE PROVIDED UNDER DIVISION 8
DOOR DETAIL 4
SINGLE DOOR
ELECTRONIC LOCKING/UNLOCKING
DOOR POSITION MONITORING
CARD READER
REQUEST TO EXIT SENSOR

NOTE:
DOOR POWER SUPPLY, POWER TRANSFER DEVICES AND ELECTRIFIED HARDWARE PROVIDED UNDER DIVISION 8
DOOR DETAIL 5
SINGLE DOOR
ELECTRONIC LOCKING/UNLOCKING
DOOR POSITION MONITORING
CARD READER
ADA OPERATOR
POWER TRANSFER

NOTE:
DOOR POWER SUPPLY, POWER TRANSFER
DEVICES, ELECTRIFIED HARDWARE,
AUTOMATIC DOOR OPERATOR AND ADA
BUTTON PROVIDED UNDER DIVISION 9
DOOR DETAIL 6
DOUBLE DOOR
NO ELECTRONIC LOCKING/UNLOCKING
DOOR POSITION MONITORING

NOTE:
DOOR HARDWARE PROVIDED UNDER DIVISION B
DOOR DETAIL 7
DOUBLE DOOR
ELECTRONIC LOCKING/UNLOCKING
DOOR POSITION MONITORING
POWER TRANSFER

3/4" CONDUIT

6" x 6" x 4" JUNCTION BOX

CABLES TO SECURITY HEAD END
CONNECT TO 120V POWER SOURCE (EC)

DOOR POWER SUPPLY

ACCESSIBLE CEILING

3/4" CONDUIT INTO FRAME

DPDT DOOR STATUS SWITCH FULLY CONCEALED WITHIN DOOR FRAME

COMPLETE WIRING WITHIN FRAME

MATING PASSIVE MAGNET CONCEALED IN DOOR FRAME

ARMORED LOOP POWER TRANSFER

PANIC DEVICE OR ELECTRIC LATCH

NOTE:
DOOR POWER SUPPLY, POWER TRANSFER DEVICES AND ELECTRIFIED HARDWARE PROVIDED UNDER DIVISION 8
DOOR DETAIL 8
DOUBLE DOOR
ELECTRONIC LOCKING/UNLOCKING
DOOR POSITION MONITORING
CARD READER
POWER TRANSFER

NOTE
DOOR POWER SUPPLY, POWER TRANSFER DEVICES AND ELECTRIFIED HARDWARE PROVIDED UNDER DIVISION 8
DOOR DETAIL 9
DOUBLE DOOR
ELECTRONIC LOCKING/UNLOCKING
DOOR POSITION MONITORING
CARD READER
REQUEST TO EXIT SENSOR

NOTE
DOOR POWER SUPPLY, POWER TRANSFER DEVICES AND ELECTRIFIED HARDWARE PROVIDED UNDER DIVISION 8
DOOR DETAIL 10
DOUBLE DOOR
ELECTRONIC LOCKING/UNLOCKING
DOOR POSITION MONITORING
CARD READER
ADA OPERATOR
POWER TRANSFER

NOTE:
DOOR POWER SUPPLY, POWER TRANSFER
DEVICES, ELECTRIFIED HARDWARE
AUTOMATIC DOOR OPERATOR AND ADA
BUTTON PROVIDED UNDER DIVISION 8
INTERIOR EMERGENCY PHONE

MINIMUM 18 AWG CABLE TO NEAREST EM TR

MINIMUM 18 AWG CABLE TO SECURITY HEAD END

1" EMT CONDUIT TO WITHIN 24" OF HORIZONTAL DISTRIBUTION SYSTEM

PLENUM UTP TO IDF/MDF

FLUSH MOUNTED MANUFACTURER PROVIDED BACKBOX

EMERGENCY PHONE FACEPLATE
EXTERIOR EMERGENCY PHONE PEDASTAL

- Video Surveillance Camera
- Emergency Phone Tower
- Emergency Phone Faceplate

Provide weather protection for exposed cabling and conduit to prevent damage prior to installation of tower.

Set concrete base at finished grade.

30" Min. Depth

1" Conduit for Electrical Wiring

2" Conduit to IDF/MDF

Two (2) outdoor rated UTP cables to IDF/MDF
APPENDIX 2
COMMISSIONING FORMS
ACCESS CONTROL SYSTEMS

Job #: _______________  Project Name & Building: ________________________________________________
Panel #: ________________ Port #: __________________ Address: ___________________________________
Unique Identifier: ____________________________________________________________________________

Performed by: ___________________________________________________  Date: ______________________
Witnessed By: ___________________________________________________  Date: ______________________
Access-Controlled Door:    □ New    □ Upgrade

A. General Notes:
   1. The following procedure is to confirm the installation and operation of the Security Access System for
      compliance with the Contract Documents and its intended operation.

B. Checklist:
1. Door unlock time, entry reader (present card and doesn’t open door)          __________ Seconds
2. Valid entry – No alarms? □ No  □ Yes  □ N/A
3. Forced door alarms? □ No  □ Yes  □ N/A
4. Held door alarm after valid card read? (present card and hold door open) □ No  □ Yes  □ N/A
5. Held door alarm after Request to Exit (REX)? □ No  □ Yes  □ N/A
6. Local noise operates when door held too long? □ No  □ Yes  □ N/A
7. Door relocks upon? (opening, closing or other – specify)    ____________________
8. Valid card read while REX active? □ No  □ Yes  □ N/A
9. REX shunts alarm functions on exit? □ No  □ Yes  □ N/A
10. REX operates when approached from all directions? □ No  □ Yes  □ N/A
11. Does REX NOT unlock the door? □ No  □ Yes  □ N/A
12. “No Special Knowledge” required to exit? □ No  □ Yes  □ N/A
    (If NO, write explanation under “Comments”)
13. Door unlock time, exit reader? (present card and doesn’t open door) □ No  □ Yes  □ N/A
14. Local noise operates when card not used □ No  □ Yes  □ N/A
15. Does door close and lock securely? □ No  □ Yes  □ N/A
16. Theft-resistant screws installed? □ No  □ Yes  □ N/A
17. Invalid card detected? □ No  □ Yes  □ N/A
18. Workmanship clean and neat? □ No  □ Yes  □ N/A
19. Wire tagging and panel label per specifications? □ No  □ Yes  □ N/A

Comments:
___________________________________________________________________________________________
___________________________________________________________________________________________
VIDEO SURVEILLANCE SYSTEMS

Job #: ______________ Project Name & Building: ________________________________

FIXED POSITION CAMERA

Point Identification: _____________ Location: ___________________________________________________

Performed By: ___________________________ Date: ____________________________

Witnessed By: ___________________________ Date: ____________________________

☐ New  ☐ Upgrade

A. General Notes:
   1. The following procedure is to confirm the installation and operation of the Video Surveillance System for compliance with the Contract Documents, the National Electrical Code, and industry-accepted standards.

B. Checklist:

1. Transformer location:
2. Workmanship clean and neat?  □ No  □ Yes  □ N/A
3. Back-focus adjustment appropriate?  □ No  □ Yes  □ N/A
4. Lens adjustment appropriate?  □ No  □ Yes  □ N/A
5. Auto Iris lens functioning correctly?  □ No  □ Yes  □ N/A
6. Wire tagging per specifications?  □ No  □ Yes  □ N/A
7. Proper device per specifications and drawings?  □ No  □ Yes  □ N/A
8. Housing property installed?  □ No  □ Yes  □ N/A
9. Housing and mount stout enough for expected conditions?  □ No  □ Yes  □ N/A
10. Blower working?  □ No  □ Yes  □ N/A
11. Heater working?  □ No  □ Yes  □ N/A
12. Fiber transmitter functional?  □ No  □ Yes  □ N/A
13. Video synchronization adjusted?  □ No  □ Yes  □ N/A
14. Theft resistant screws installed?  □ No  □ Yes  □ N/A
15. Field of view
16. Changes from day to night view successfully?  □ No  □ Yes  □ N/A
17. Low light vision tested?  □ No  □ Yes  □ N/A
18. Backlight compensation tested?  □ No  □ Yes  □ N/A
19. System acts as required on power loss?  □ No  □ Yes  □ N/A

Comments:
___________________________________________________________________________________________
___________________________________________________________________________________________
**PAN, TILT AND ZOOM (PTZ) CAMERA**

Point Identification: _____________  Location: ___________________________________________________

Performed By: ___________________________________________  Date: ____________________________

Witnessed By: ___________________________________________  Date: ____________________________

□  New  □  Upgrade

A. General Notes:

1. The following procedure is to confirm the installation and operation of the Video Surveillance System for compliance with the Contract Documents, the National Electrical Code, and industry-accepted standards.

B. Checklist:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1. Transformer location:</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>2. Workmanship clean and neat?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>3. Wire tagging per specifications?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>4. Housing property installed?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>5. Blower working?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>6. Heater working?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>7. Fiber transmitter functional?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>8. Pan left and right?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>9. Theft resistant screws installed?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>10. Tilt up and down?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>11. Mechanical stops set?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>12. Electronic stops set?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>13. Limit stops on pant-tilt motor functional?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>14. Receiver drive test modes all functional?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>15. Receiver drive address</td>
<td>□ Emergency □ Utility □ UPS</td>
<td></td>
</tr>
<tr>
<td>16. Power source</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>17. Panelboard and circuit number:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Video synchronization adjusted?</td>
<td>□ No □ Yes □ N/A</td>
<td></td>
</tr>
<tr>
<td>19. Field of view:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

_____________________________________________________________________________________________
_____________________________________________________________________________________________