

*(NOTE TO DESIGNER: These Specifications are basic minimum criteria to be met in preparing the final specifications for this section, which is the responsibility of the Designer.)*

SECTION 28 05 28  
PATHWAYS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Interior communications pathways and supports.
- B. Outlets and conduit runs.
- C. Risers in ER/TR(s).
- D. Grounding and bonding of pathways.
- E. Pathway fire stopping requirements.

1.2 RELATED SECTIONS

- A. Section 08 71 00 - Door Hardware.
- B. Section 11 12 00 - Parking Control Equipment.
- C. Section 14 20 10 - Passenger Elevators.
- D. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).
- E. Section 28 05 00 - Common Work Results for Electronic Safety and Security
- F. Section 28 05 26 - Grounding and Bonding for Electronic Safety and Security.
- G. Section 28 05 53 - Identification for Electronic Safety and Security.
- H. Section 28 06 00 - Testing for Electronic Safety and Security.
- I. Section 28 13 00 – Access Control.
- J. Section 28 16 00 – Intrusion Detection.
- K. Section 28 23 00 - Video Surveillance.
- L. Section 28 26 00 - Electronic Personal Protection System.
- M. Division 27 - Communications
- N. University of Houston Campus Design Guideline and Standards Security System Standards (latest edition)

1.3 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. This Section specifies the requirements for the Security Pathways for Communications Systems for University Of Houston (UH) [Project Name] [Insert Project description.].
- C. Conduit, cable tray and back boxes for this system shall be furnished and installed by the electrical contractor under the supervision of the security contractor.
- D. Security conduit must be properly designed and installed. The design and installation practices for

security conduit have some unique requirements beyond those normally seen in standard electrical conduit.

- E. Work furnished and installed by Electrical Contractor as specified in this Section and as shown in E and SC drawings includes:
  - 1. The conduits and back boxes for the device locations.
  - 2. Fire stopping of conduit cable pathway
  
- F. Work furnished and installed by the Security Contractor as specified in this section and as shown in E and SC drawings includes:
  - 1. Access Control, Intrusion Detection and Surveillance End Devices
  - 2. Cabling
  - 3. Hardware
  - 4. Software

## PART 2 – PRODUCTS

### 2.1 GENERAL

- A. Conduits must be designed and installed in the most direct route possible from the security room to the device location.
- B. The maximum length of LAN copper horizontal distribution cable is 90 meters (295 ft) from the device location to the TR or security room termination point, no exceptions. This applies in particular to IP based CCTV cameras or IP based card readers. Where this length would be exceeded the designer will need to add media converters or additional TR's as required.
- C. Security cabling is installed in a home-run fashion with individual cables running from the device location all the way to the security room. Splices in horizontal distribution cable are not allowed.
- D. Factory-manufactured sweeps which meet ANSI/TIA/EIA569-A bend radius requirements shall be used for all security conduit.
- E. The bend radius of the sweeps must be a minimum of 10- times the internal conduit diameter. Bending conduit in the field using manual or mechanical methods is not acceptable. Standard electrical elbows shall not be used. This sweep radius is necessary to insure that the conduits can accept future cabling. All horizontal conduit shall be tested by the conduit installation contractor with a mandrel to prove compliance with the sweep radius requirements throughout the conduit run.
- F. Each security back box shall have an individual conduit routing to the security room, or to the pull box or pulling point, connecting to a major cable pathway routing to the security room. Box shall be located in serviceable space. Looping, or “daisy-chaining,” of conduits between outlet boxes is not allowed.

### 2.2 CONDUITS AND FITTINGS

- A. All conduit ends shall have plastic bushings installed before the cable is pulled into the conduit.
- B. Conduits will not be run next to hot water lines, steam pipes, or other utilities that may present a safety hazard or cause a degradation of system performance.
- C. Conduits entering the Security Room should be designed and located allowing for the most flexibility in the routing and racking of cables.
- D. Conduits or conduit sleeves entering through the floor of the Security Room shall terminate four (4) inches above the finished floor.
- E. All metallic security conduits entering the Security Room, Equipment Room, or Entrance Facility shall be bonded together, and bonded to the Main Grounding Busbar with a #6 AWG ground cable.

- F. All in-use and spare conduits entering the Security Room, Equipment Room, or Entrance Facility shall be sealed to prevent the intrusion of water, gasses, and rodents throughout the construction project. Within five days of releasing the conduit for the installation of cable, the conduit installation contractor shall prove all conduits to be clean and dry.
- G. All conduits and cables that penetrate fire rated walls or floors must be fire stopped.
- H. All OSP conduits and inner-duct, used and spare, shall be plugged with watertight plugs at both ends to prevent the intrusion of water, gasses, and rodents throughout the construction project.
- I. All OSP conduits shall have pull lines rated at a minimum of 90 kg (200 lb) pulling tension installed. The pull lines must be re-pulled each time an additional cable is installed.
- J. Prior to releasing the conduit for the installation of cables, all OSP conduits must be cleaned with a brush pulled through the conduit at least two times in the same direction and swabbed with clean rags until the rag comes out of the conduit clean and dry.
- K. All OSP conduits must be tested with a mandrel to prove compliance with the sweep radius requirements throughout the conduit run. Within five days of releasing the conduit for the installation of cable, the conduit installation contractor shall prove all conduits to be clean and dry.

### 2.3 INSIDE PLANT PULLBOXES

- A. Pull boxes used with security conduits in interior locations shall be rated NEMA-1. Pull boxes used in damp or wet locations such as plumbing chases or out of doors shall be rated NEMA-3R. Pull boxes shall be installed in conduits at an interval no greater than every 100 feet. Add appropriately sized pull box shall be installed in conduit runs whenever there are two 90°sweeps, or a total of 180°of sweeps, in a conduit run. Any deviations from these criteria must have prior approval from University of Houston Public Safety (UHPS), Facilities Planning & Construction Department (FP&C).

## PART 3 - EXECUTION

### 3.1 SUMMARY

- A. The Inside Plant (ISP) security substructure are the cable pathways and support structures necessary for routing security cabling between security rooms, and from the security room to the device location. There are numerous different products and methods that can be employed to build the substructure. Some of these methods include: Enclosed conduit system, open or enclosed cable trays, routing above a false ceiling using cable supports, and in-slab floor ducts. Security cable pathways shall be separate from IT pathways whenever and where ever possible, if it is necessary to route security cabling in the same cable pathway as IT cables a metallic divider must be installed between the cables.
- B. The conduit system shall be routed inside ceilings, floors, and walls to the greatest extent possible. Surface mounted conduit shall be used only when there is no other route to provide service to the desired location.
- C. For the main floor in, "slab on grade constructed buildings", conduit will route in walls and ceilings not in or under the slab. If this design is not possible, an alternate must be presented and approved following the "Approval for Alternate Design Solutions". If an under slab route solution is approved, the conduit must be installed with at least 1" of concrete encasement around all sides of the conduit.
- D. All device locations shall have a minimum ¾" conduit. Increase the conduit size as necessary for the quantity of cables to be installed. Cable fill shall not exceed 40% and plan on 25% growth.
- E. Security cable and conduit shall maintain the minimum separation distance from power as listed below.
  - 1. For power systems operating at 480V or greater, maintain a minimum separation distance of 3m (10 ft) from all security cabling. Pathways should cross perpendicular to electrical power cables or conduits.

2. For large electrical motors or transformers, maintain a minimum separation distance of 1.2m (4 ft) from all security cabling.
3. For lightning protection system conductors (NEC 800-13), maintain a minimum separation distance of 1.8m (6 ft) from all security cabling.
4. For power systems operating at less than 480V, including all conduit and cables used for electrical power distribution, maintain a minimum separation distance of 0.6m (2 ft) from all security cabling. Pathways should cross perpendicular to electrical power cables or conduits.
5. For fluorescent lighting, maintain a minimum separation distance of 12cm (5 in) from all security cabling. Pathways should cross at right angles to fluorescent lighting.
6. For branch circuits (secondary) power (120/240V, 20A) where electric light or power circuits coexist with security cabling, maintain a minimum separation distance of 2in.

END OF SECTION