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Overview

This document is intended for use by those involved in maintaining, designing, and installing Telecommunications Infrastructure for Columbia University. The purpose of this document is to ensure that Columbia University Information Technology (CUIT) Network Infrastructure design and installation standards are conformed to throughout the course of a construction or renovation project. The need for this revision stems from the convergence of Voice, Video and Data applications/technologies onto the University data network. New design considerations are outlined in this document in order to provide increased resiliency, redundancy, and scalability for the University’s network infrastructure. CATV and E-classrooms are also discussed.

Columbia University Network Protection Policy

Please note that Columbia University’s published Network Protection Policy requires all network, communications and telecommunications-related equipment and devices be installed and maintained by Columbia University Information Technology (CUIT). The entire policy can be found here:

http://policylibrary.columbia.edu/network-protection-policy
Section 1.0 – Definitions

Telecommunications Room (TR)
This facility is a room that serves a floor area of a building with communications services. The TR is the connection point between a building’s backbone and horizontal distribution pathways. The TR provides an environmentally suitable and secure area for installing cables, rack/wall-mounted hardware and technology equipment.

Equipment Room (ER)
This facility differs from a TR in that it is meant to serve as the connection point between inter-building and intra-building distribution systems. The ER is meant to serve the entire building rather than a floor or specific location. The ER is the recognized termination point of all backbone cabling within a building. The ER also houses technology equipment specific to the backbone cabling of a building and provides an environmentally suitable and secure area for this equipment. Note that an ER can serve as both an ER and a TR if necessary. Buildings shall typically be outfitted with dual ER’s for redundancy.

Horizontal Cable
Unshielded Twisted Pair (UTP) and coaxial CATV cable that is run from the TR to the workstation (or work area outlet) are the two most common types of horizontal cabling. See Section 2.0.

WLAN
Wireless Local Area Network

Network Jack
Female connector terminated on the end of the horizontal cable.
Network Outlet
Faceplate in which the network jacks are mounted.

Inter-building Backbone Cable
This is cable that is used to link buildings together. Multi-strand fiber optic cable and multi-pair copper cables are the most common examples here. See Section 4.0.

Intra-building Backbone Cable
This cable is used to connect the Equipment Rooms to the Telecommunications Rooms within a building. Multi-strand fiber optic cable and multi-pair copper cables are the most common examples here. See Section 4.0.
Section 2.0 Horizontal Cable

CUIT will determine the category and manufacturer of horizontal cable to be installed on a per-project basis.

2.1.1 Category 6 UTP

- Conform to ANSI/TIA/EIA-568-B (CSA T520-95) – Commercial Building Telecommunications Cabling Standard
  - T568B pin/pair assignment for UTP cabling
- All vendors and subcontractors working with horizontal cabling shall be Systimax Certified
- Maximum 90 meter run
- Supports up to 1,000 Mbps Ethernet
- Systimax Gigaspeed XL Structured Cabling Solution

<table>
<thead>
<tr>
<th>Systimax Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2071E</td>
<td>Gigaspeed XL Category 6 UTP Cable</td>
</tr>
<tr>
<td>1100GS3</td>
<td>Rack-mountable RJ-45 patch panels</td>
</tr>
<tr>
<td>1100D1-35-19</td>
<td>Horizontal rack-mountable Cable Management Panel</td>
</tr>
<tr>
<td>MGS400BH-246</td>
<td>Electrical Ivory Information Jacks</td>
</tr>
<tr>
<td>760056069</td>
<td>Cap with strain-relief for MGS jack</td>
</tr>
<tr>
<td>M60B – 123</td>
<td>Icons Voice-over-IP PoE (yellow)</td>
</tr>
<tr>
<td>M60B – 003</td>
<td>Icons Traditional Voice (black)</td>
</tr>
<tr>
<td>M60B – 112</td>
<td>Icons Data Only (orange)</td>
</tr>
</tbody>
</table>

- Category 6 certification results shall be provided to CUIT in electronic format upon completion
- Test results must comply with TIA/EIA specifications
2.1.2 Category 6A UTP

- Conform to ANSI/TIA/EIA-568-B (CSA T520-95) - Commercial Building Telecommunications Cabling Standard
  - T568B pin/pair assignment for UTP cabling
- All vendors and subcontractors working with horizontal cabling shall be Systimax and/or Belden Certified
- Maximum 90 meter run
- Supports up to 10,000 Mbps Ethernet
- Systimax X10D Structured Cabling Solution:

<table>
<thead>
<tr>
<th>Systimax Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2091E</td>
<td>X10D Category 6A UTP Cable</td>
</tr>
<tr>
<td>760109744</td>
<td>1U Angled 48-port patch panel</td>
</tr>
<tr>
<td>M4800A-1U-GS*</td>
<td></td>
</tr>
<tr>
<td>M4800A</td>
<td></td>
</tr>
<tr>
<td>MGS600BH-246</td>
<td>Electrical Ivory Information Jacks</td>
</tr>
<tr>
<td>760056069</td>
<td>Cap with Strain Relief for MGS jack</td>
</tr>
<tr>
<td>M60B – 123</td>
<td>Icons Voice-over-IP PoE (yellow)</td>
</tr>
<tr>
<td>M60B – 003</td>
<td>Icons Traditional Voice (black)</td>
</tr>
<tr>
<td>M60B – 112</td>
<td>Icons Data Only (orange)</td>
</tr>
</tbody>
</table>

- Belden 10GX Structured Cabling Solution

<table>
<thead>
<tr>
<th>Belden Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10GX13</td>
<td>CAT6A (625MHz), 4-Pair, U/UTP-Unshielded, Plenum-CMP,</td>
</tr>
<tr>
<td>AX104601</td>
<td>KeyConnect Angled Patch Panel, 48-port, 2U, Black (Empty)</td>
</tr>
<tr>
<td>AX102288</td>
<td>10GX Modular Jack, Category 6A, RJ45, KeyConnect Blue (TIA 606)</td>
</tr>
</tbody>
</table>

- Category 6A certification results shall be provided to CUIT in electronic format upon completion
- Test results must comply with TIA/EIA specifications
2.2 CATV

- RG6 horizontal runs shall not exceed 150 feet.
- RG11 is to be installed on any horizontal runs that exceed 150 feet.

<table>
<thead>
<tr>
<th>Systimax Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commscope part# 2275V</td>
<td>CATV RG6 Horizontal Cabling</td>
</tr>
<tr>
<td>Commscope part# 2287V</td>
<td>CATV RG11 Horizontal Cabling</td>
</tr>
<tr>
<td>Systimax M81C</td>
<td>Coupler Information Outlet</td>
</tr>
</tbody>
</table>

Section 3.0 Pathways and Placement for Work Area Outlets

- Conform to ANSI/TIA/EIA-569-A (CSA T530) – Commercial Building Standard for Telecommunications Pathways and Spaces
- Minimum 1 outlet box/faceplate per workstation (5X5 back box with single gang reducer and 1-1/4” stub-up to nearest accessible ceiling)
- Minimum 1 outlet box/faceplate per 100 sq. feet (5X5 back box with single gang reducer and 1-1/4” stub-up to nearest accessible ceiling)
  - The above directive is to be used for estimating purposes. Actual outlet and jack counts shall be determined on a per-project basis
- 3 UTP cables run to each outlet box/faceplate at a typical administrative work station (design must include one discreet port for every IP Phone location)
- Provide Wiremold 4047C-1 cover at each outlet location when utilizing Wiremold 4000/6000 series raceway
- Any floor boxes or other raceways shall accommodate Systimax MGS400/MGS600 or Belden KeyConnect jacks
- Multiple outlet boxes are not to share a single conduit pathway (i.e., no “daisy-chaining”)
All pathways shall be appropriately sized for Systimax 2091 or Belden 10GX13 Cable. Sizing for 2091/10GX13 allows for the possible future migration to Category 6 Augmented UTP Cabling.

3.1 Ceiling Pathways

- The design of ceiling pathways shall provide a suitable means for supporting cables from the telecommunications closet to the work areas (Manufacture – Erico fastening products CAT21AFAB3-32-CAT6 or CAT32AFAB3-50-CAT6 or similar).
- Cable shall not be laid directly on the ceiling tile or rails. A minimum of 75 mm (3 in) clear vertical space shall be available above the ceiling tiles for this means of horizontal cabling and pathway.
- Inaccessible ceilings shall not be used as distribution pathways without the installation of access panels

3.2 Cable Trays and Raceways

- Cable trays and wireways (two side rail systems) are prefabricated rigid structures for housing and protecting cables or conductors that are pulled or laid in place after the pathway has been installed as a complete system. These pathways shall be installed in accordance with the applicable electrical code.
- In no case shall the overall fill ratio of the tray or wire way exceed 40%. This practice applies to both header and distribution trays as applicable. Care shall be exercised not to exceed the specified bend radii of the cables or the weight loading of the tray or wireway

3.2.1 Furniture Raceway Systems

- Furniture raceway systems shall be discussed in detail with the CUIT project manager to ensure compliance with sizing requirements and interoperability with other wiring components found in section 2.0
- Cable Trays and Raceways for new construction and for renovated spaces shall be sized as per manufacturers specification for Systimax 2091 cable.
• It is imperative that CUIT work closely with the architect and electricians to provide appropriate cable feeds into the furniture. Cut sheets shall be provided for any proposed systems furniture.

3.3 Conduit

• The use of EMT conduit as a horizontal raceway system for telecommunications cabling must be provided when:
  o It is required by code
  o Outlet locations are inaccessible by any other means
  o The horizontal path transits a mechanical space.

• No section of conduit shall be longer than 30 m (100 ft.) between pull points.

• No section of conduit shall contain more than two 90-degree bends, or equivalent, between pull points (e.g., outlet boxes, telecommunications closets, or pull boxes).

• If there is a reverse (U-shaped) bend in the section, a pull box shall be installed.

• The inside radius of a bend in conduit shall be at least 6 times the internal diameter. Bends in the conduit shall not contain any kinks or other discontinuities that may have a detrimental effect on the cable sheath during cable pulling operations.

• The use of conduit bodies (LB, LR, etc.) is prohibited. Exceptions for use may be granted by CUIT. Any exception would require the use of a telecommunications-style conduit body that is specifically designed to meet minimum cable bend radius requirements.

• Installation of flexible conduit shall be avoided.

• Conduits/Sleeves for new construction and renovations shall be sized allow for the possible migration to Category 6 Augmented UTP Cabling.

• In no case shall the fill ratio of the conduit exceed 40%.
Section 4.0 Backbone Cabling and Infrastructure

4.1 Cable Types

4.1.1 Corning Optical Fiber product line – plenum-rated

<table>
<thead>
<tr>
<th>Corning Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>012T88-33190-29</td>
<td>50-micron OM4 multimode cable, 12-strand minimum</td>
</tr>
<tr>
<td>95-200-42</td>
<td>Uni-Cam connectors – SC Single-mode</td>
</tr>
<tr>
<td>95-050-41-X</td>
<td>Uni-Cam connectors – SC Multi-mode</td>
</tr>
<tr>
<td>CCH-02U, 03U, 04U</td>
<td>“Closet Connector Housing” patch panels</td>
</tr>
<tr>
<td>CCH-CP12-59</td>
<td>“Closet Connector Housing” Cassettes – Single-mode</td>
</tr>
<tr>
<td>CCH-CP12-E7</td>
<td>“Closet Connector Housing” Cassettes – Multi-mode</td>
</tr>
</tbody>
</table>

- Conform to ANSI/TIA/EIA-568-B (CSA T520-95) – Commercial Building Telecommunications Cabling Standard
- When 24 strands (or more) of a single type of fiber are required between two points, multiple 12-strand (minimum) cables shall be used to provide intended strand count.
- Armored fiber should be considered in certain riser applications. Metallic-armored jackets must be grounded in accordance with industry standards and local electrical codes.

4.1.2 Multi-Pair Copper Backbone Cable

- Provide Category 3 UTP backbone riser cables from the ER to each TR.
- Terminate all UTP Category 3 cables in the ER onto wall mounted 110 type termination blocks.
- Terminate all UTP Category 3 cables in each TR onto RJ-45 patch panels.
- Pair counts shall be determined by CUIT.
4.1.3 CATV Backbone/Riser Cabling

- Riser - Commscope part# 3212
- Single mode fiber as per Section 4.1.1 is used for inter-building CATV backbone cabling.
- Angled polish connectors (APC) shall be used along entire path of fiber used for CATV.
- If a project requires an inter-building CATV backbone cable, additional design consideration shall be taken in order to accommodate the CATV strands. CUIT shall provide direction on a per-project basis.

4.1.4 CATV

- CUIT provides an unencrypted cable signal, which generally does not require a CATV tuner.
- If tuner-less LCD monitors are required then a CATV tuner must be provided.

4.2 Fiber Testing

- Fiber optic strands must be individually tested at the relevant wavelengths using a power meter and source.
- 850/1300nm – Multimode Cabling
- 1310/1550nm – Single mode Cabling
- Test results shall be documented in Excel format for submission to CUIT upon completion.
- Attenuation loss shall not exceed the manufacturer’s acceptable loss parameters found on the data sheet of the relevant cable.
- .5dB loss is allowed per connector pair
4.3 Design Guidelines

**Scenario 1**

- Dual Equipment Rooms exist (or are being designed within the project scope)
  - Each TR shall be linked with two physically diverse pathways to each ER via a 12-strand multimode cable and a 12-strand single-mode cable (two separate cables). Refer to fiber specifications in section 4.1.1.specification
Scenario 2
Equipment Rooms do not exist (will not exist – outside of project scope)
  • Each Telecom Room shall be linked to the nearest two CUIT Equipment Rooms with a minimum 12-strand single-mode cable via physically diverse pathways.
    o Multimode cable may be required in addition to the single-mode cable where applicable.
    o In this scenario, the Equipment Rooms are not in the same building as the Telecom Rooms, but the concept conveyed by Figure 4.1 still applies.
    o When 24 strands (or more) of a single type of fiber are required between two points, multiple 12, 24 or 36-strand cables shall be used to provide intended strand count.
    o Separate cables shall be used when running Multimode and Single mode cables along the same path, i.e. no “hybrid” cables.

4.4 Wide Area Networking Considerations
Some construction projects will require special network design and equipment because of their unique nature.
  • Examples include, but are not limited to:
    o CU occupation of a portion of a non-CU property, e.g. Chrysler Building
    o CU property is remotely located relative to Morningside or CUMC campus, e.g. Studebaker Building, 3280 Broadway, Lamont-Doherty
  • Special needs include, but are not limited to:
    o Leased circuits from local carriers such as Verizon
    o Trenching of NYC streets (includes petitioning NYC DOT for Revocable Consent, payment of annual RevCon franchise fees and renewal of RevCon agreements)
    o Leasing underground pathways from local companies such as Empire City Subway
    o Rooftop Wireless Solutions
Section 5.0 Telecommunications/Equipment Room Construction Specs and Location

Conform to ANSI/TIA/EIA-569-A (CSA T530) – Commercial Building Standard for Telecommunications Pathways and Spaces

5.1 Room Details

• TR’s are needed, at a minimum, every third floor
  o High densities of cabling in an area may dictate more than one TR per 3 floors.
  o CUIT shall participate in and approve design decisions regarding the number of required TR rooms based on the project scope.
  o Shall be wired to emergency/generator power if available.
  o 4 copies of keys provided to CUIT Network Operations Center (NOC).
  o TR must be accessible by CUIT on a 24x7x365 basis.
  o Access to TR must be via a public space (hallway, etc). Access via private office or classroom space is not acceptable. Access via mechanical spaces only with CUIT and CU Facilities Operations approval.

• Room requirements:
  o Interior fire retardant 3/4”plywood walls.
  o 5’ wide x 5’ high wall space needed for CATV equipment.
  o Raised concrete pad in basements and flood prone areas.
  o Drip pan on ceiling if leaks from above are possible.
  o Air cooling system to keep temperature below 75° F with 20,000 BTUH heat dissipation. CUIT will provide final heat load figures during design phase.
  o No other utilities shall be placed in any TR. (E.g. electrical panels, plumbing, Verizon, etc.).
  o Placement of CUIT security hardware and fire alarm panels in a TR shall be considered by CUIT on a case-by-case basis.
Open relay racks are the most widely used in CUIT Telecom Rooms – Chatsworth Part# 55053-503
Vertical wire managers are also utilized between relay racks for cable management – Chatsworth Part# 12096-503 or 11729-503 depending on cabling density.
Ground busbar connected to building steel or nearest building ground electrode (EIA/TIA-607).

5.2 Physical Redundancy Requirements

- Dual Equipment Rooms are required for new construction and gut renovation projects.
  - Equipment Rooms are to be located in the vicinity of Interbuilding Backbone Cable points-of-entry, most likely on a basement level (refer to drawing in section 4.3).

  OR

  - If Equipment Rooms are not located on the same level as the point-of-entry, then physically diverse pathways must be designed to connect the points-of-entry to the Equipment Rooms (refer to drawing in section 4.3).
  - Equipment Rooms can “double” as Telecommunications Rooms.

- Each Telecom Room shall be connected via fiber optic cable (Section 4.0) to BOTH Equipment Rooms via physically diverse pathways (see Figure 4.3).

- Physical Redundancy between ER and TR rooms creates resiliency in the event of a cable cut, equipment failure, or power failure preventing voice and data network downtime.

- Electrical circuits that are dedicated to equipment within the same Telecom Room shall be on different phases to reduce the probability of a complete electrical failure. These would generally be the 20-amp and 30-amp circuits.
5.3 Electrical Details

- Fluorescent lighting sufficient to illuminate the front and back of equipment racks and all wall fields racks, controlled by a wall switch.
- Two (2) NEMA L14-30R outlets.
- Two (2) dedicated 20 amp circuits with a NEMA 5-20R quad outlets.
- One (1) 15-amp convenience duplex outlet.
- All electrical circuits are to have dedicated neutrals and dedicated grounds.
- Electrical circuits shall be labeled inside the panels to denote “Telecom Room” and the respective floor.
- Electrical outlets shall be labeled with circuit ID.
- Electrical circuits shall be commissioned by the installer in the presence of CUIT Network Engineering and Project Management staff to ensure conformity with this document.
- When emergency power is available, CUIT requires that ER and TR electrical circuits be tied into the building back-up generator. A red receptacle shall distinguish these circuits.

5.4 “Room-ready” requirements:

- The TR/ER will be deemed ready for turnover to CUIT for network equipment installation and network testing when
  - the room is secure (lockable)
  - all painting, flooring and ceiling finishes are complete
  - all electrical, lighting and grounding components are installed and tested
  - cooling and ventilation equipment is installed and tested
  - all copper and fiber cabling is completely installed, terminated and tested
- In summary, the room must be clean and secure and all other trades must have completed their scope of work within the room.
5.5 Cable ID info

- Typical work area outlet faceplate label: 10-001-A
  - “10” indicates floor # of faceplate location
  - “001” indicates faceplate number on the floor
  - “A” indicates jack(cable) in the faceplate

Section 6.0 Data/Voice/Video/CATV Equipment

- Data and voice equipment shall be specified, designed, and installed by CUIT Network Engineering and Project Management.
- CUIT Network Engineering and Project Management shall provide voice and data equipment specifications on a per-project basis.
- Equipment ordering must take place at least 6 months prior to Telecom Infrastructure installation commencement date.
- CUIT must receive approval and an account number before ordering.
- Project schedule shall accommodate the installation of data/voice/video/catv equipment by CUIT (non-union) staff members.
- CUIT provides an unencrypted analog CATV feed.
- Specifications for any hardware interfacing with CUIT provided CATV shall be submitted to CUIT for review.

Section 7.0 Wireless Networking and Cellular

Wireless networking infrastructure is a requirement of all renovation and new construction projects.

7.1 Horizontal cabling for WLAN

- CUIT Network Engineering and Project Management shall specify network outlet placement for wireless networking after floor plans have been submitted.
Network Infrastructure Specifications

- WLAN outlets for wireless access points are usually located above drop ceilings or integrated with drop ceilings via special WLAN hardware mounting provisions.
- All access points shall be mounted on a wall or column, exposed, below the lowest ceiling.
- See “Ceiling Pathways” section 3.1 for cable pathway considerations.
- CUIT shall require the project to install mounting provisions for WLAN hardware where appropriate.
- Two Cat6A UTP cables shall be run to each WLAN outlet.
- WLAN electronics shall be specified, designed, and installed by CUIT Network Infrastructure.
- In-building cellular coverage needs shall be considered early in the design process. CUIT shall investigate cellular distribution systems if required.

7.2 Potential RF conflicts to be considered

The CUIT WLAN is increasingly becoming the primary means of network connectivity for Columbia University students, faculty and staff. Consequently, devices that impact the RF environment and may affect the wireless local area network (WLAN) must be reviewed and approved by the CUIT Network Engineering and Project Management prior to installation or deployment.

Certain occupancy sensors will cause interference with/degrade the performance of 802.11 Wi-Fi networks. If wireless occupancy sensors are to be installed, CUIT requires infrared or ultrasonic sensors be specified in lieu of the 5.8Ghz microwave sensors.

7.3 Design for 5GHz ubiquitous coverage

- Ubiquitous wireless coverage indicates that all spaces within a defined area are covered in the 5GHz spectrum. This includes restrooms, mechanical spaces, hallways, lounges, lobbies, kitchens, etc. If a space does not require ubiquitous coverage, excluded spaces shall be explicitly documented.
• Wireless access point locations shall be determined by CUIT Network Engineering and Project Management engineers. Access points shall be a minimum of 10 feet apart.
• All wireless coverage shall be designed to provide 802.11ac service.
• As of April 2014, CUIT is only deploying 802.11ac Aruba wireless access points.
• All access points shall be mounted on a wall or column, exposed, below the lowest ceiling.
Section 8.0 Building Systems, Public Safety

- Systems such as Fire and Environmental controls require access to the CU data network. CUIT Network Engineering and Project Management in conjunction with Columbia University Facilities IT shall provide direction as to the technical infrastructure needs of these systems on a per-project basis.
- Public Safety surveillance hardware requires access to the CU data network. CUIT Network Engineering and Project Management in conjunction with Columbia University Department of Public Safety shall provide direction as to the technical infrastructure needs of these systems on a per-project basis.
- Refer to diagrams 8.1, 8.2 and 8.3 for typical box and conduit requirements for Department of Public Safety IP camera installations.
8.1 Typical Wall-Mount Camera Conduit Design

1. 3/4" Plenum Rated Flexible Conduit (Length not to exceed 3 ft.) to be secured every 18" using clips or plenum rated Ty-Straps.
2. Security Contractor to use 3/4" flexible conduit to route CAT-5 Patch Cord from Information Outlet to Camera Port.
3. CAT-5 Patch Cord furnished by CCTV Contractor (Same manufacturer as Structured Cabling System).
4. Camera Fixture Back Box.
5. CCTV Camera mounted and secured per NEC and in accordance with manufacturer’s recommendations.
7. 3/4" Rigid Conduit (CMT) to nearest accessible location or cable tray flush to ceiling.
8. 5/8" Information Outlet Backbox with 1-1/4" Ring Reducer and Single Gang Blank Faceplate.
9. CAT-5 Station Cable Coiled, labeled and terminated with strain relieved, 8-positions CAT-5, RJ-45 type female (Jack) connector.
10. Free floating Information Outlet with strain relief.
11. CU-IT Test Point.
12. Information Outlet can be mounted above or to left or right of camera location.
8.2 Typical Ceiling-Mount Camera Conduit Design (Accessible)

1. 3/4" PLenum RATED FLEXIBLE CONDUIT (LENGTH NOT TO EXCEED 38") TO BE SECURED EVERY 18" USING CLIPS OR PLenum RATED TY-WRAPS
2. SECURITY CONTRACTOR TO USE 3/4" FLEXIBLE CONDUIT TO ROUTE CAT-6 PATCH CORD FROM INFORMATION OUTLET TO CAMERA PORT.
3. CAMERA FIXTURE BACKBOX
4. CAT-6 PATCH CORD FURNISHED BY CCTV CONTRACTOR (SAME MANUFACTURE AS STRUCTURED CABLEING SYSTEM)
5. CCTV CAMERA MOUNTED PER NEC AND MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS
6. CAT-6 STATION CABLE COILED, LABELED AND TERMINATED WITH STRAIN RELIEFED 8-POSITION, CAT-6 RJ-45 TYP. CONNECTOR.
7. FREE FLOATING INFORMATION OUTLET WITH STRAIN RELIEF
8. 5"X5" INFORMATION OUTLET BACK BOX WITH BLANK COVER SECURED ABOVE SUSPENDED ACCESSIBLE CEILING. BACKBOX INDEPENDENTLY SUPPORT (NO BLACK IRON OR CEILING GRID TO BE USED)
9. CONDUIT TO NEAREST ACCESSIBLE LOCATION OR CABLE TRAY
10. CU-IT TEST POINT
8.3 Typical Ceiling-Mount Camera Conduit Design (Inaccessible)

1. 3/4" Plenum rated flexible conduit (length not to exceed 3 ft.) to be secured every 18" using clips or plenum rated ty-wraps.
2. Security contractor to use 3/4" flexible conduit to route Cat-6 patch cord from information outlet to camera port.
3. Cat-6 patch cord furnished by CCTV contractor (same manufacturer as structured cabling system).
4. Camera fixture back box.
5. CCTV camera mounted and secured per NEC and in accordance with manufacturer's recommendations.
7. 3/4" fixed conduit (EMT) to nearest accessible location or cable tray flush to ceiling.
8. 5"x5" information outlet backbox with mud ring reducer and single gang blank faceplate.
9. Cat-6 Station cable coiled, labeled and terminated with strain relieved, 8-positions Cat-6, RJ-45 type female (JACK) connector.
10. Free floating information outlet with strain relief.
11. CU-1T test point.
Section 9.0 Electronic Classrooms

Electronic Classroom A/V Components

- Speakers
- Room control system
- Projection screen
- Podium
- Computer

These components are typically installed by CUIT.

E-Room
A classroom designed with A/V components built into the room.

E-Room Ready
A classroom that is designed ready for A/V components but without the components installed.

At a minimum, all newly-constructed or renovated Columbia University Registrar classrooms must be configured as “E-Room Ready” classrooms. A classroom is deemed “E-Room Ready” when it has the following power outlets, data work area outlets and empty conduits in place for future e-podium, projector and control cabling installation:

Podium Location: Either in the floor under the proposed podium location (preferred, usually in new construction or gut renovation projects) or on the wall adjacent to the podium (existing classroom upgrade):

(1) 20A quad receptacle
(1) box and 1-1/4” conduit stubbed to nearest accessible ceiling with 4-port voice/data outlet
(1) box with two empty 1” conduits to speaker locations on each side of projection screen and one empty 1-1/2” conduit to ceiling projector location
Network Infrastructure Specifications

**Speaker Locations:** Speaker locations on either side of the proposed projector screen location (exact dimensions and spacing TBD by CUIT for each installation)

(2) boxes with empty 1” conduits back to podium (Location A)

**Projector Location:** Ceiling projector location (exact location TBD by CUIT for each installation)

(1) 20A duplex receptacle **installed above ceiling** (requiring a 12” x 12” access panel in gyp. board ceilings)
(1) box and empty 1-1/2” conduit back to podium (Location A) **installed above ceiling** (requiring a 12” x 12” access panel in gyp. board ceilings)

Further consultation with CUIT will be required when upgrading “E-Room Ready” classrooms to fully-equipped electronic classrooms.

Lecture Capture or Assisted Listening functionality will require additional cable, conduit pathways and components.
9.1 Typical Electronic Classroom Design

* Note: When physically possible, it is preferred to have the grommet, network plates, power and all home runs landed at a floor box concealed underneath the planned podium location. Wall plated options are OK, but only if floor boxes aren’t possible.
Section 10.0 CUIT Project Management

• Only CUIT Network Engineering and Project Management shall issue final approval of any data and voice infrastructure designs or design changes. CUF Capital Project managers shall pass all information regarding all data and voice connectivity to CUIT Network Engineering and Project Management via netproject@columbia.edu.

• CUIT Network Engineering and Project Management must approve any changes to the project scope that might occur throughout the course of the project.

• Please reference the CU Network Communications and Equipment Policy on page 4 of this document.

• CUIT Network Engineering and Project Management shall review any changes to the construction documents that might occur throughout the course of the construction.

• CUIT shall provide an order of magnitude estimate at the schematic design phase.