District of Columbia Court Systems

Information Technology Division (IT)

CABLE & MANAGEMENT PROCEDURES MANUAL

Version 3

03/05/2019

Document Revision History			
Version	**Document Changes**	**Changes Made By:**	**Date**
Version 0.1	Initial Draft prepared for review by the District of Columbia Courts Information Technology Division.	E. Anderson	3/24/2017
Version 2	Utilizing current standards	E. Anderson	5/2/2018
Version 3	Utilizing current standards	E. Anderson	3/5/2019

All contractors must comply:

DC Courts/IT personnel will have final review, approval and be the acceptance authority for all telecommunications infrastructure, designs, installations, materials and methods, in all phases of the design and installation process. DC Courts/IT personnel intend to work in a "team" atmosphere with all parties. Our goal is to build a quality Telecommunications Infrastructure, by partnering with the design team, consultants and contractors. It is encouraged for all parties to ask questions and/or resolve conflicts in a professional, reasonable and timely matter.

CAT6A Installations:

Installers shall be certified by the manufacture of the system(s) they are installing and be able to certify the installation for the manufacturer's warranty. The DC Courts BPG and C&MPM will be the benchmarked used for equal or equivalent for material, methods and warranties for all cabling solutions. DC COURTS/IT PERSONNEL will be the evaluator of authority in determining any possible substitutions.

Fiber Optic, Coax, Audio Video and other low voltage installations:

Installers must install the system(s) per Manufacturer's specifications, this Policy's methods, and Industry standards. Test per BICSI's recommendations and methods. See Commissioning and Warranties for details on testing.

Installers must have:

- The necessary tools and calibrated test equipment
- Trained technicians to operate the equipment
- Have the ability to test, record and produce drawings
- Provide material that is new and free of defects, delivered to the job site in the original packing.
- It is recommended that a Project Manager be assigned.

Installers to be professional:

- In their interactions with Faculty, Staff and each other.
- In their appearance. No objectionable graphics or language on clothing.
- Follow the courts rules as in the No Tobacco and Parking Policies.

This standard / policy will change to meet industry recognized standards. The designer, consultants and installers are responsible for inquiring about updates.

Signature Date _____

Signature Date_____

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OPERATION AND MAINTENANCE OF COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

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 is inclusive to all Division 27 sections.

1.2 **DRAWINGS**

A. The drawings show the general arrangement and extent of the work only. Determine the exact location and arrangement of all parts as the work progresses.

B. All work shall be subject to the Owner's direction and approval.

1.3 **SUMMARY**

A. This project consists of providing a complete structured cabling system. The structured cabling system includes voice, data, and CATV cabling locations as shown on the drawings for this building.

B. The scope of work includes:

1. Provide all voice, data, and CATV cabling throughout the building as a total end-to-end solution as described within the division 27 documents and as shown on the "T" series drawing sheets.

a. Provide the necessary parts and supplies whether specifically mentioned or not to turn over to the owner a complete system.

1.4 **QUALITY ASSURANCE**

A. In addition to procedures stated in Division 1:

1. Cutting and Patching

a. Perform required cutting, drilling and chasing to receive new equipment. In general, perform all patching and repairing necessary to restore to original condition, all surfaces that may become damaged during the installation. All work shall be executed by persons normally employed in the type of work to which they are assigned.

b. Paint all structural steel and all steel parts used for hangers and for supporting conduits, junction boxes and technology equipment with one (1) coat of "red" oxide primer before erection. After

steel is in place, paint again with a minimum of one (1) coat of paint, color as directed by the Architect.

c. The contractor is responsible for all cutting, patching, plastering and painting associated with the new installation.

2. Clean Up

a. The job-site shall be cleaned at the end of each day.

b. Upon completion of the contract, remove all workmen's appurtenances from the premises. Clean the premises of all debris caused by the work and leave the installation clean and in first-class operating condition.

3. Storage of Material and Equipment

a. Store materials and equipment in a location approved by the Owner.

b. Be responsible for securing all equipment and materials employed in the installation until final acceptance by the Owner. The Owner will not be responsible for loss reimbursement to the Contractor.

c. Be responsible for the replacement of all damaged or defective work, materials or equipment. Do not install sensitive or delicate equipment until major construction work is completed. Ensure that equipment is protected from all construction site activities.

d. Observe and conform to all applicable safety regulations required by the Owner and O.S.H.A.

1.5 **INTERPRETATION AND CONFLICTS**

A. Bring any discrepancies determined or omissions found lacking in the Contract Documents to the Technology Consultant's attention before submitting the bid. After award of Contract, the Owner or Technology Consultant will make the interpretation of any conflict.

B. The failure to question any controversial item will constitute acceptance by the Bidder who shall execute it to the satisfaction of the Owner after being awarded the Contract.

C. If mention has been omitted pertaining to details, items or related accessories required for the completion of any system, it is understood such item and accessories are included in the Contract. After the Contract is awarded, claims based on insufficient data or incorrectly assumed conditions, or claims based on misunderstanding the nature of the work, will not be recognized.

C. The General Conditions, Requirements, and Special Provisions, of any larger body of specifications, of which this Specification may be a part, are hereby made a part of this Specification. In the event that any clauses or provisions of the larger body of specification conflict with the letter or intent of this

Specification, the Contractor shall immediately notify the Architect and the Technology Consultant for clarification and direction.

D. All work shown shall be new work provided under this Contract except that work labeled "present to remain" and that equipment labeled "to be furnished by others, but installed by the Contractor".

1.6 **LABELING AND IDENTIFICATION**

A. Clearly Label all new equipment, devices and miscellaneous apparatus for easy identification and for safety.
B. Owner will identify and provide labeling schemes for all patch panels, wall plate end point locations, 110 blocks, fiber termination cabinets, and backbone cables according to Owners standards.

1.7 **LOCATION OF EQUIPMENT AND RACEWAY**

A. The drawings are diagrammatic and indicate the general arrangement of equipment to be installed.

B. Coordinate the structural, electrical/electronic and finished conditions of work accordingly.

C. Coordinated locations of all equipment, raceways, junction boxes, cable runs, conduit runs, etc., shall be determined at the site. Install all items to accommodate the various conditions in the building and make deviations necessary without additional cost.

1.8 **WIRING METHODS**

A. Install all wire and cable located in finished areas in new or existing raceways as indicated on Drawings.

B. Install new raceways in the locations shown on the drawings and as specified.

1.9 **ORDINANCES AND CODES**

A. Nothing contained in the Specifications or shown on the drawings shall be construed as to conflict with any local, municipal or state laws and regulations, governing the installation or other contract work, and all such ordinances and regulations, including the latest: National Electric Code, ANSI/EIA/TIA standards and the National Electric Safety Code, are hereby incorporated and made a part of these Specifications, and shall be satisfied by the contractor at no additional expense to the Owner.

B. Secure all permits and inspection certificates for submission to the owner.

1.10 **SYSTEM CONTINUITY**

A. Reconnect all existing items that remain in use. Provide all materials and labor required to retain continuity of existing circuits or systems that are disrupted by these alterations even though not indicated on the drawings.

1.11 **SUBMITTALS**

A. Shop drawings shall be checked, corrected and approved by the contractor before being submitted to the Owner/Technology Consultant for approval. Before submitting shop drawings, the Contractor shall carefully examine them and shall certify by his stamp/signature that, to the best of his knowledge, they comply with the Contract Documents. The Contractor must receive written approval from the Owner or an authorized representative of the Owner, in writing, prior to fabricating or installing any materials. Approval will be given based upon shop drawings. The shop drawings shall indicate complete details of work to be performed. Drawings shall include a title block naming the Project, Architect, Technology Consultant, Contractor, drawing title, drawing number, revision number if applicable and date. Submit all Shop Drawings complete as a single submission. Isolated items will not be accepted, except with prior approval.

B. Where the shop drawings deviate from the requirements of the Contract documents, the Contractor shall (1) correct the shop drawings as required, or (2) where the deviations do not necessarily require correction, notify the Owner/Technology Consultant of the deviations.

C. Submit to the Architect four (4) sets of shop drawings or otherwise documents/equipment for the following equipment and obtain written approval before ordering materials. See the drawings and scope information for applicability of product to phase and project.

D. The contractor shall provide product submittals for all system components as defined in Part 2 of all associated communication specification sections related to this project. These components shall include:

1. Patch Panels (UTP and Fiber)
2. Cables (UTP and Fiber)
3. Patch Cables (UTP and Fiber)
4. Faceplates and Jacks
5. Proposed Labeling Scheme
6. Cable Management Devices
7. Punch Down Blocks
8. Protection Devices
9. Grounding and Bonding Equipment
10. Nameplates and Identification Devices
11. Basket Style Cable Tray
12. Ladder Style Cable Tray
13. Hangers and Supports
14. Strain Relief Products
15. All other equipment identified or inferred as may be required by the Architect, Technology Consultant or Owner.

E. Submit complete submittal list for Architect/Technology Consultant approval prior to purchasing any equipment. The selected contractor will allow sufficient time in project scheduling for review by the client

and the Architect's Technology Consultant.

F. In some cases, manufacturer warranty may call for the review of system documentation to assure that the system design meets manufacturer warranty requirements. In such instance, with prior approval of the Owner, the contractor shall provide a complete set of Project Documents and product data to the system manufacturer for review. The system manufacturer shall review the complete system package and provide documentation attesting to the system compliance with manufacturer warranty requirements. This documentation shall be included with the Contractor Shop Drawings submittal. The Technology Consultant will not review the Contractor Shop Drawings submittal, which does not include the manufacturer warranty compliance review documentation.

G. Isolated items will not be accepted, except with prior approval.

H. Each shop drawing shall contain reference to the applicable drawing and specification section and verification of compatibility with the systems involved.

I. All nameplate data shall be submitted with equipment submittals – refer to other sections for complete identification requirements.

J. Shop drawings shall show conformance with specified performance characteristics, or the Contractor shall assume responsibility for all deviations including all additional costs as a result of the deviations.

1.12 **STANDARDS OF MATERIAL AND WORKMANSHIP**

A. All work shall be executed by persons skilled in the work to which they are assigned. This shall include all copper and fiber connections including testing, and all plastering and painting.

B. All materials and equipment in the work shall be new and of first quality, produced by manufacturers of recognized reputation for each line of material and equipment. The fact that materials or equipment offered have been recently developed or are untried may be sufficient justification for their rejection.

1.13 **PROTECTION OF WORK AND EQUIPMENT**

A. This Contractor shall use the required safety precautions, methods and skills to prevent possible unsafe conditions or conditions unduly susceptible to fire.

B. When this Contractor is working in areas in which the building occupants have access, contractor shall provide suitable barriers around his operation.

C. This contractor is responsible for containing the undue spread of vapors or odors from his work area.

1.14 **TESTS AND INSTRUCTIONS**

A. Upon completion of the work, and upon the request of the Architect, the Contractor shall be prepared to test all systems in the presence of the Owner, Architect, or Technology Consultant. Such testing shall

occur at a time that is mutually acceptable to all parties. The Contractor's representatives assisting in the performance of these tests shall be thoroughly familiar with the details of the system and shall include the field supervisor responsible for installing the system.

B. The contractor will provide the owner with all manufacturers' systems certifications within 60 days of completion of work. Contractor's final retention payment will not be released until all manufacturers' system certifications have been received, reviewed and approved by the Architects Technology Consultant.

C. Correct all failures or improper conditions.

D. Demonstrate to the Owner the proper care and maintenance of all new items.

1.15 **GUARANTEE**

A. Unless stated otherwise in Division 1:

1. The contractor and his surety shall guarantee in writing for a minimum period of one (1) year from the date of final acceptance that all materials, equipment and labor furnished by contractor are free from defects.

a. Refer to cable system warranty for additional requirements.

2. The Contractor shall further guarantee that if any piece of material or equipment is found to be defective within the guarantee period because of faulty manufacture or faulty installation, in the opinion of the Owner, contractor will replace and install and test such material or equipment without any further expense to the Owner.

PART 2 - – PRODUCTS – NOT USED
PART 3 - – EXECUTION – NOT USED

END OF SECTION

COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section and the other sections of Division 27.

B. This section is inclusive to all Division 27 sections.

1.2 **SUMMARY**

A. This Section includes general administrative and procedural requirements for the structured cabling system and campus inter-building distribution systems. It includes contractor qualifications, terminations and testing parameters. Reference individual sections for further expansion of these requirements.

B. Permits, Inspections, Codes and Regulatory References

1. General: Contractor shall obtain and pay for all permits and inspections required by laws, ordinances, rules, and regulations having jurisdiction for work included under this Contract, and shall submit approval certificates to the Technology Consultant.

2. Codes: The cabling system installation shall comply fully with all local, county and state laws, ordinances and regulations applicable to electronic and electrical installations.

3. The following industry standards are the basis for the structured cabling system described in this document:

   a. TIA/EIA-568-D Commercial Building Telecommunications Cabling Standard
   b. TIA/EIA-568-D.1 General Requirements
   c. TIA/EIA-568-D.2 Balanced Twisted Pair Cabling Components Standard
   d. TIA/EIA-568-D.3 Optical Fiber Cabling Components Standard
   e. TIA/EIA-569-D Commercial Building Standard for Telecommunications Pathways
   f. TIA/EIA-606-B Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
   g. TIA/EIA-607-C Commercial Building Grounding/Bonding Requirements
   h. NFPA National Fire Protection Association
   i. NFPA 70 National Electric Code (NEC)
   j. ISO/IEC International Organization of Standards/International Electrotechnical Commission

k. ISO 11801 Generic Cabling for Customer Premises

C. If there is a conflict between applicable documents, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.

E. This document does not replace any code, either partially or wholly. The contractor must be aware of local codes that may impact this project.

1.3 **ABBREVIATIONS AND DEFINITIONS**

A. General: In addition to abbreviations defined in Division 1, utilize the following abbreviations and definitions for discernment with the Drawings and Specifications.

B. Abbreviations:

1. ANSI American National Standards Institute
2. ASA American Standards Association
3. ASTM American Society of Testing Materials
4. AVC Audiovisual Contractor
5. EC Electrical Contractor
6. EIA Electronic Industry Association
7. ETL Electrical Testing Laboratories, Inc.
8. GC General Contractor
9. ICEA International Cable Engineers Association
10. ICIA International Communications Industries Association
11. IEEE Institute of Electrical and Electronics Engineers
12. NEC National Electric Code
13. NEMA National Electrical Manufacturers Association
14. NFPA National Fire Protection Association
15. NIC Not In Contract
16. NRTL Nationally Recognized Testing Laboratory

17. O Owner

18. OEM Original Equipment Manufacturers

19. OSHA Occupational Safety and Health Administration

20. OSP Outside Plant

21. SCC Structured Cable Contractor

22. TC Technology Consultant

23. TIA Telecommunications Industry Association

24. UL Underwriter's Laboratories, Inc.

C. Definitions:

1. ACCEPTED means as accepted by the Technology Consultant or his representative.

2. APPROVED means as approved by the Technology Consultant or his representative.

3. ARCHITECT means Beyer Blinder Belle Architects & Planners LLP or their designated representative.

4. AS DIRECTED means as directed by the Technology Consultant or his representative.

5. AS REQUIRED means as required by some other part of the contract documents which may include reference specifications or manufacturer's recommended practice.

6. AS SHOWN means as shown on the drawings, shop drawings or other graphical elements of the contract documents.

7. BIDDER is used to indicate that entity generating the bid response.

8. CONCEALED means embedded in masonry or other construction, installed behind wall furring or within double partitions or installed within hung ceilings.

9. CONDUIT means the inclusion of all fittings, hangers, supports, sleeves, etc.

10. CONTRACTOR is used to indicate the successful Bidder to whom the Owner has awarded the contract.

11. EQUAL means equivalent as approved by the Technology Consultant or his representative.

12. FURNISH means to indicate the responsibility to ship or deliver the item to the job site, freight prepaid, for receipt, staging and installation by others.

13. INSTALL means to join, unite, fasten, link, attach, setup or otherwise connect together before testing and turning over to Owner, complete and ready for regular operation, the particular work referred to. It is also used

to indicate the responsibility of receiving the item at the job site, providing adequate storage, unpacking or uncrating the item, physically securing the item or otherwise making ready the item for its intended use by following the instructions and approved methods of the manufacturer and those contained herein.

14. OWNER or CLIENT means District of Columbia Courts or their designated representative.

15. OWNER FURNISHED CONTRACTOR INSTALLED (OFCI) shall refer to equipment that will be furnished by the Owner for installation by the Contractor. The Contractor shall be responsible for installing and integrating this equipment as detailed herein.

16. PROVIDE means to furnish, install, place, erect, connect, test and turn over to Owner complete and ready for the regular operation, the particular work referred to.

17. PROVIDED BY OTHERS shall refer to material and work, which is related to this contract, but has been provided by parties other than the Contractor.

18. SPECIFICATION is defined as the body of documentation provided to the Contractor with the Request for Quotation, as well as all addenda to said documentation. Throughout this document, words such as "herein" refer to the entire Specification, and not just this written document. The Specification includes, but is not limited to, this written specification document, all drawings, as listed in the List of Drawings, cable terminations and labeling schedule, additions and/or modifications as detailed in written addenda, additions and/or modifications as detailed in drawing additions or reissues.

19. TECHNOLOGY CONSULTANT refers to The Sextant Group, Inc., 1069 West Broad Street, Suite 216, Falls Church VA 22046.

20. The term SHALL is mandatory; the term WILL is informative; and the term SHOULD is advisory.

21. WIRING means the inclusion of all raceways, fittings, conductors, connectors, patch panels, labeling, junction and outlet boxes, connections, testing and all other items necessary and/or required in connection with such work.

D. For the purpose of Division 27, in the event of conflict with an abbreviation or definition in Division 1 and in Division 27, the Division 27 abbreviation or definition shall prevail.

1.4 **PERMITS, CODES, STANDARDS, AND INSPECTIONS**

A. Contractor shall obtain and pay for all permits and inspections required by laws, ordinances, rules and regulations having jurisdiction for work included under this Contract, and shall submit approval certificates to the Technology Consultant.

B. The installation shall comply fully with all local, county and state laws, ordinances and regulations applicable to electronic and electrical installations.

C. Unless stated in Division 1, the installation shall be in compliance with the requirements of the latest revisions of:

1. All approved published instructions set forth by equipment manufacturers.
2. All local codes and ordinances in effect and having jurisdiction.
3. Americans with Disabilities Act (ADA)
4. All requirements of electric and telephone utility companies
5. BICSI Telecommunications Distribution Methods Manual (latest edition)
6. Building Officials and Code Administrators (BOCA)

7. Electronic Industry Association (EIA)
8. Institute of Electrical and Electronic Engineers (IEEE)
9. Legislative Act 235 (1965)-Handicapped
10. Legislative Act 287 (1974)-Excavation
11. National Board of Fire Underwriter's (NBFU)
12. National Electric Code (NEC)
13. National Electrical Manufacturer's Association (NEMA)
14. National Electric Safety Code (NESC)

15. Occupational Safety and Health Act (OSHA)
16. Telecommunications Industry Association (TIA)

D. Submit certificates issued by approved authorized agencies to indicate conformance of all work with the above requirements, as well as any additional certificates as may be required for the performance of this contract work.

E. Should any change in drawings or Specifications be required to comply with governmental regulations, the Contractor shall notify the Technology Consultant prior to execution of the work. The work shall be carried out according to the requirements of such code in accordance with the instructions of the Architect and the Technology Consultant at no additional cost to the Owner.

1.5 **CONTRACTOR QUALIFICATIONS**

A. All bidders shall demonstrate their qualifications by providing the following documents:

1. A list of the LAST five (5) Structured Cabling systems that were installed by the bidder:

2. The listing shall include only systems that included the installation of fiber optic cable and Category 6A twisted pair.

3. The listings shall be for the last five (5) projects that are completed and have been turned over to the owner.

4. The listing shall include a brief description of the project, size of the system, products used, Owner's name, phone number, address, and representative, date started, and date of completion

B. The bidder shall furnish a list of all test equipment that will be used in the installation and testing of the fiber optics, multi pair copper distribution and UTP cable.

C. Performance testing of Category 6A UTP cable will be completed using a Fluke DTX-5000 Cable Analyzer. Performance testing of fiber optic cable will be completed using an OTDR. Proof of valid and current test equipment calibration and firmware must be provided to owner 30 days prior to testing.

D. The bidder shall furnish a listing of the names of full-time employees that will work on the project and list their training and certification in the installations and testing of structured cabling. At all times through the duration of the project a minimum of 50% of the on-site cabling personnel including the project lead will be BICSI Certified Installers (ITS Installer 1). Submit the BICSI Installer Certificates with bid.

E. The bidder shall have a Registered Communication Distribution Designer (RCDD) with five (5) years experience, on staff. Submit the RCDD Certificate and project information with bid.

F. All of the above documents shall be submitted along with the Bid Form, by the Bid due date.

G. The Contractor shall be fully conversant and capable in the cabling of low voltage applications such as, but not limited to data and voice network systems. The Contractor shall at a minimum possess the following qualifications:

1. Those licenses/permits required to perform telecommunications installations in the specified jurisdiction.

2. Personnel trained and certified in the design of the selected Structured Cabling System.

3. Personnel trained and certified to install the selected Structured Cabling System.

H. Personnel must be knowledgeable in local, state, and national codes, and regulations. All work shall comply with the latest revision of the codes or regulations. When conflict exists between local or national codes or regulations, the most stringent codes or regulations shall apply.

I. The Contractor shall have been in the business of installing structured cabling systems for a minimum of five (5) years.

J. The Contractor must possess and maintain current liability insurance certificates.

1.6 **WARRANTIES**

A. Provide complete written warranty information for each item to include date of beginning of warranty or bond; and names, addresses, telephone numbers and procedures for filing a claim and obtaining warranty services.

B. Warranty and Certification of the Cabling systems and connectors:

C. The Contractor shall provide a minimum 25-year performance and product warranty that installation, cable, connectors and connecting hardware shall be free from defects in material, workmanship and fabrication. Submit detailed warranty documentation with close out documentation.

D. The system shall be certified by the cable/connector manufacturer and warranted for the specified performance for minimum of 25-years. The Contractor shall conform to the manufacturer's certification including submittals of all required documentation to the manufacturer.

E. The Contractor shall obtain, from the manufacturer, a Registration Document and Certificate for the specific installation. Upon receipt of the Registration Document and Certificate, the Contractor shall forward a copy to the Technology Consultant and deliver the original to the Owner.

F. Any material, equipment or appurtenance whose operation or performance does not comply with the requirements of the Contract or any equipment which is damaged prior to acceptance will be held as defective and shall be removed and properly replaced at no additional cost to the Owner.

1.7 **SUBMITTALS**

A. The contractor shall provide product submittals for all system components. These components shall

include all cable, termination devices; splice connectors, patch panels, associated racks and enclosures, patch cords and labeling devices. The selected contractor will allow sufficient time in project scheduling for client and review by the Architect's Technology Consultant.

1.8 **PROJECT DRAWINGS AND SPECIFICATIONS**

A. The Contractor shall carefully examine the Drawings and Specifications of all trades and report discrepancies to the Technology Consultant in writing to obtain corrective action. No departures from the Contract Documents will be made without prior written approval from the Technology Consultant.

B. Questions or disputes regarding the intent or meaning of Contract Documents shall be resolved by the interpretation of the Technology Consultant. The Architects' interpretation is final and binding.

C. The Drawings and Specifications are not intended to define all details, finish materials, and special construction, which may be required or necessary. The Contractor shall provide all installations complete and adequate as implied by the project documents.

D. Drawings are diagrammatic only and do not show exact routes and locations of equipment and associated wiring. The Contractor shall verify the work of all other trades and shall arrange his work to avoid conflicts. In the event of a conflict, the Contractor shall obtain corrective action from the Technology Consultant.

E. If there is a conflict between contract documents, the document highest in precedence shall control. The precedence shall be: first; permits from agencies as required by law, second; special provisions, third; specifications, forth; drawings, fifth; reference specifications and sixth; vendor submittals.

1.9 **COOPERATION AND COORDINATION WITH OTHER TRADES**

A. The Structured Cabling Contractor shall be responsible for all cross connecting and coordination with vendors and other trades to provide a complete operational system.

1.10 **PRODUCT LISTING**

A. When two or more items of the same material or equipment are required, they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, conduit, fittings, sheet metal, solder, fasteners, and similar items, except as otherwise indicated.

B. Provide products that are compatible within systems and other connected items.

C. All powered equipment shall be UL listed and follow approval criteria defined by the local authority having jurisdiction.

1.11 **RECORD DOCUMENTS**

A. When all work has been completed and before final acceptance, the Contractor shall furnish to the Technology Consultant and Owner a complete set of documents that clearly represent all contract work "as-built". This shall be inclusive of all test results and drawings. The Contractor is responsible for assuring the accuracy of the As-Built documentation.

B. As part of the completed "As-Built" document package the Contractor will deliver a final cable plant matrix (in spreadsheet format) of Category 6A outlets and floor plan with reference numbers. Final "As-Built" drawings will be delivered in AutoCAD, PDF, and Visio format. Confirm electronic format and edition of Visio desired by owner prior to production and transmission.

1.12 **MAINTENANCE MANUALS**

A. Prepare maintenance manuals (Record Document) in accordance with the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.

2. Manufacturer's data of each piece of equipment.

1.13 **GENERAL WARRANTIES**

A. Provide complete warranty information for each item to include date of beginning of warranty or bond; and names, addresses, telephone numbers and procedures for filing a claim and obtaining warranty services.

B. Any material, equipment or appurtenance whose operation or performance does not comply with the requirements of the Contract Documents or which are damaged prior to acceptance will be held as defective and shall be removed and properly replaced at no additional cost to the Owner.

PRODUCTS

PART 2

2.1 GENERAL

A. Major items of equipment shall have manufacturer's name, address and catalog number on a plate securely attached. All equipment or apparatus of any one system must be the product of one manufacturer, or approved equivalent products of a number of manufacturer's that are suitable for use in a unified system.

B. All materials and equipment for which Underwriter's Laboratories have established standards shall bear a UL label of approval.

C. Where proprietary names are used, whether or not followed by the words “or as approved”, they shall be subject to substitution only as approved by the Architect, Technology Consultant, and Owner.

D. Where the Contractor proposes substitute equipment, contractor shall submit acceptable evidence to indicate compliance with all requirements of the documents, including performance rating, size and resistance to wear and deterioration equivalent to the specified item. In instances where substituted equipment requires additional material or work beyond that shown or required by the specified item, said additional material or work, shall be the responsibility of this Contractor, regardless of the trade involved.

PART 3 - EXECUTION

3.1 **DELIVERY, STORAGE, AND HANDLING**

A. Deliver products to the project identified with names, model numbers, types, grades, compliance labels, and other information needed for distinct identification; adequately packaged and protected to prevent damage during shipment, storage and handling.

3.2 **INSTALLATIONS**

A. General: Sequence, coordinate, and integrate the various elements of systems, materials, and equipment.

B. Coordinate systems, equipment, and materials installation with other building components.

C. Verify all dimensions by field measurements.

D. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for cabling installations.

E. Sequence, coordinate, and integrate installations of cabling materials and equipment for efficient flow of the Work.

F. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components.

G. Coordinate the cutting and patching of building components to accommodate installation of cabling equipment and materials.

H. Coordinate the installation of all materials and equipment above ceilings with suspension system, mechanical equipment and systems, and structural components.

I. Install equipment to facilitate servicing, maintenance, and repair or replacement of equipment

components. Connect equipment for ease of disconnecting, with minimum of interference with other installations.

J. Plywood on MDF/IDF walls shall be void-free fire resistant grade AC grade or better with a minimum thickness of 0.75 inches with two coats of fire-resistant paint on all useable walls. Use flush hardware and supports to mount plywood. Ensure that the strength and placement of the hardware are sufficient to handle the total anticipated load and mounting of cabling components.

K. Ensure that the fire rating of all walls and floors is maintained. Plywood backboard sheets will have the fire-rated stamp left visible for inspection.

3.3 **CONDUIT AND RACEWAY**

A. Actual locations of all equipment, raceways, junction boxes, cable runs, conduit runs, etc., shall be determined at the site.

B. Provide a pull box or pull point immediately before and after any conduit or raceway section containing three ninety-degree bends, or any single run exceeding fifty feet in length. Pull box openings must face in the direction from which personnel will approach and must have a minimum eight inches in front of and to all sides of the opening. Pull boxes shall not be used in place of a bend. Conduits must always exit the pull box from the opposite side it entered (no change of direction inside the pull box will be accepted).

C. Carefully investigate the structural, electrical/electronic and finished conditions of work accordingly.

3.4 **FIRESTOPPING**

A. General

1. Provide through penetration fire stop systems to prevent the spread of fire through openings made in fire-rated walls or floors to accommodate penetrating items such as conduit, cables and cable tray. Fire stop shall restore floor and wall to the original fire rated integrity and shall be waterproof. The fire stop systems and products shall have been tested in accordance with the procedures of U.L. and material shall be U.L. classified as materials for use in through-penetration fire stops.

2. The fire stop system shall comply with the NEC and with NFPA 101-Life Safety Code (latest edition) and shall be made available for inspection by the local inspection authorities prior to cable system acceptance. The contractor shall be responsible for verifying the fire rating of all walls and floors having cabling penetrations. Coordinate sealant installation with work of other trades and with the general contractor on site.

3. Fire stop systems shall be UL Classified to ASTM E814 (UL 1479) or shall be approved by a qualified Professional Engineer (PE), licensed in the District of Columbia.

4. A drawing showing the proposed fire stop system shall be provided to the Owner and Technology Consultant prior to installing the fire stop system(s).

3.5 **GROUNDING AND BONDING**

A. Ground communications systems and equipment in accordance with the ANSI/TIA/EIA-607-C Grounding Standard and NEC requirements except where the Drawings or Specifications exceed NEC requirements. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases,

cable trays, paging equipment, CATV equipment etc. entering or residing in technology spaces shall be grounded to the respective ground system using a minimum #6 AWG solid copper bonding conductor and compression connectors. All wires used for technology grounding purposes shall be identified with green insulated wires. All cables and bus bars shall be identified and labeled in accordance with the Technology Identification requirements.

3.6 **TESTING**

A. Contractor, at his own expense, shall make any tests directed by an inspection authority or by the Technology Consultant and shall provide all equipment, instruments and materials to make such tests.
B. Upon completion of work, all component parts, both singularly and as a whole, shall be set, calibrated, adjusted and left in satisfactory operation condition to suit load conditions, by means of instruments furnished by the Contractor.

C. Notify the Owner and Technology Consultant seven (7) days prior to the testing dates. Upon completion of a test, a statement of certification shall be forwarded to the Technology Consultant for his approval.

END OF SECTION

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section and the other sections of Division 27.

B. Drawings and general provisions including Division 1, apply to this Section.

1.2 **SUMMARY**

A. This Section includes:

1. Commercial building grounding and bonding requirements for telecommunication infrastructure.

2. Requirements for bonding and communications cabling, equipment, pathways, spaces, and mounting equipment.

3. Basic requirements for grounding for protection of life, equipment circuits and systems. Grounding requirements specified in this Section may be supplemented in other sections of these Specifications.

B. Comply with the ANSI/TIA/EIA Standard 607-C, "Grounding and Bonding Requirements" and the NEC.

1.3 **RELATED SECTIONS**:

A. Section 013300 – Submittal Procedures.
B. Section 260526 – Grounding and Bonding for Electrical System.
C. Section 270100 – Operation and Maintenance of Communications Systems
D. Section 270528 – Pathways for Communications Systems

1.4 **REFERENCES**

A. ANSI/NFPA-70, 2011 National Electrical Code (NEC)

B. ANSI/IEEE Std. 1100-2005, Recommended Practice for Powering and Grounding Electronic Equipment

C. ANSI/IEEE Std. C2, 2007 National Electrical Safety Code (NESC)

D. TIA-607-C Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises

E. ANSI/TIA-606-B Administration Standard for Telecommunications Infrastructure

F. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings

G. OSHA Standards and Regulations - all applicable

H. Local Codes and Standards - all applicable

I. Anywhere low-voltage cabling Standards conflict with electrical or safety Codes, Contractor shall defer to NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either. Knowledge and execution of applicable codes is the sole responsibility of the Contractor. Any code violations committed at the time of installation shall be remedied at the Contractor's expense. Contractor is responsible to bring any perceived conflicts between project documents and referenced Standards or Codes to the attention of the Architect and Technology Consultant for resolution.

1.5 **SYSTEM DESCRIPTION**

A. Provide a communications bonding and grounding system as described in this document and project drawings and in compliance with the above cited Codes, Standards and Agencies.

B. Comply with the requirement of Code of Practice for Info-Communications Facilities in Buildings.

C. Comply with the requirement for Section 26 05 26 - Grounding and Bonding for Electrical System.

D. Bond the following items within the telecommunications grounding system.

1. All communications system active equipment.
2. All PDU and surge protection equipment.
3. Raised floor systems.
4. Underfloor grounding grids (a.k.a. "supplemental bonding grids" or SBGs) for computer or telecommunications rooms.
5. Metallic raceway systems, including metallic cable trays.
6. Communications equipment enclosures (cabinets) or cross-connect frames.
7. Broadband passive devices.
8. Metallic splice cases.
9. Metallic cable screens, armor or shields.
10. All metal cable conduit.
11. Electrical service panels in entrance facilities, telecommunications and equipment rooms.
12. Wall and rack mounted grounding busbars.
13. Exposed building steel that is within 6 feet of equipment racking systems.
14. Building steel extending to earth in outside-plant.
15. All related bonding accessories.

1.6 **SUBMITTALS**

A. Submit the following:

1. The contractor shall provide product submittals for all system components as defined in Part 2 of this specification section and all associated project specifications. These components shall include all grounding and bonding products required for a complete grounding and bonding system.

2. Shop drawings showing construction details and locations of components, and description and routing of interconnecting cabling.

3. Field-testing organization certificates, signed by the contractor, certifying that the organization performing the tests complies with the requirements specified in Quality Assurance below.

B. The selected contractor will allow sufficient time in project scheduling for client and review by the Architect and Technology Consultant.

1.7 **QUALITY ASSURANCE**

A. Manufacturers: Firms regularly engaged in manufacture of electrical connectors, terminals and fittings of types and rating required, and ancillary grounding materials, including stranded cable, copper braid and bus, ground rods and plate electrodes, whose products have been in satisfactory use in similar service for not less than 3-years.

B. Installer: Qualified with at least 3-years of successful installation experience on projects with technology ground work similar to that required for this project.

C. Listing and labeling: Provide products specified in this Section that are listed and labeled. The terms "listed" and "labeled" shall be defined as they are in the National Electric Code, Article 100.

D. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

E. Field-testing Organization Qualifications: To qualify for acceptance, the independent testing organization must demonstrate, based on evaluation of organization-submitted criteria conforming to ASTM699, that it has the experience and capability to satisfactorily conduct the testing indicated.

F. Component Standard: Components and installation shall comply with NFPA 70, "National Electric Code" (NEC).

G. UL Compliance: Comply with applicable requirements of UL Standards Nos. 467 and 869 pertaining to electrical and electronic grounding.

H. IEEE Compliance: Comply with applicable requirements of IEEE Standard 142 and 241 pertaining to electrical and electronic grounding.

PART 2 - PRODUCTS

2.1 **GROUNDING AND BONDING PRODUCTS**

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

1. B-Line Systems, Inc.
2. Burndy Corp.
3. Crouse-Hinds Co.
4. Electrical Components Division; Gould Inc.
5. General Electric Supply Co.
6. Ideal Industries, Inc.
7. Panduit Corp.
8. Thomas & Betts Corp.

2.2 **PRODUCTS**

A. Supply types indicated and of sizes and rating to comply with NEC. Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

2.3 **CONDUCTOR MATERIALS**

A. Copper with minimum 98% conductivity.

2.4 **WIRE AND CABLE CONDUCTORS**

A. Coordinate with Division 26 Sections.

B. Equipment Grounding Conductor: Green insulated.

C. Grounding Electrode Conductor: Stranded cable.

D. Bare Copper Conductors:

1. Conform to the following:
   a. Solid Conductors: ASTM B-3.
   b. Assembly of Stranded Conductors: ASTM B-8.
   c. Tinned Conductors: ASTM B-33.

2.5 **MISCELLANEOUS CONDUCTORS**

A. Ground Bus: Bare annealed copper bars of rectangular cross section. All bus bars shall be two-hole lug type.

B. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

C. Flexible Jumper Strap: Flexible flat conductor, 480 strands of 30-gauge bare copper wire, 3/4" wide, 9-1/2" long; 48.250cm. Protect braid with copper bolt-hole ends with holes sized for 3/8" diameter bolts.

2.6 **CONNECTOR PRODUCTS**

A. Listed and labeled as grounding connectors for materials used and approved by a nationally recognized testing laboratory.

B. Pressure Connectors:

C. High-conductivity-plated units.

1. All lugs shall be two-hole type.

D. Bolted Clamps: Heavy-duty units listed for the application.

2.7 **GROUNDING ELECTRODES**

A. For technology systems, provide a #2 AWG minimum insulated stranded copper conductor from the grounding electrode system to each telecommunication room, terminal cabinet and central location.

B. Bonding Plates, Connectors, Terminals and Clamps: Provide electrical bonding plates, connectors, terminals, lugs and clamps as recommended by manufacturers for indicated applications.

C. Connectors, Terminals and Clamps will be compression type.

D. Grounding Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials and bonding straps, as recommended accessories by manufacturers.

2.8 **PIPE CLAMPS**

A. Used to ground copper code conductor to water pipe or copper tubing.

B. Cast from high strength, electrolytic bronze to provide reliable grounding connections.

C. Plated steel screws provide high strength and inhibit corrosion.

D. Accommodates a wide range of pipe, tube, rod and conductor sizes - minimizes inventory.

E. cULus 467 Listed for grounding and bonding with AWG conductor.

F. Approved bronze grounding pipe clamps are as follows:

Part Number	Description
GPC2-1-Q	For pipe range 1/2 – 1" and conductor size range #10 SOL - #2 STR
GPC2-2-L	For pipe range 1 1/4 – 2 and conductor size range #10 SOL - #2 STR
GPC2-4-X	For pipe range 2 1/2 – 4 and conductor size range #10 SOL - #2 STR
GPC2-6-X	For pipe range 4 1/2 – 6 and conductor size range #10 SOL - #2 STR

2.9 **BRONZE GROUNDING CLAMPS FOR CONDUIT**

A. Used to ground copper conductor parallel to, or at a right angle to a rod, tube, or pipe.

B. Made from high strength, electrolytic cast bronze.

C. High strength silicon bronze hardware provides long term reliable assembly.

D. Accommodates a wide range of pipe, tube, rod and conductor sizes - minimizes inventory.

E. cULus 467 Listed for grounding and bonding with AWG conductor and suitable for direct burial in earth or concrete.

F. Approved bronze grounding conduit clamps are as follows:

Part Number	Description
GPL-8-Q	For pipe size inches 1/2 or 3/4 and conductor size range AWG #8 SOL - #4 STRL
GPL-14-X	For pipe size inches 1 and conductor size range AWG #8 SOL - #4 STR
GPL-22-X	For pipe size inches 1 1/4 and conductor size range AWG 2/0 SOL – 250 kcmil
GPL-28-X	For pipe size inches 1 1/2 and conductor size range AWG 2/0 SOL – 250 kcmil
GPL-34-3	For pipe size inches 2 and conductor size range AWG 2/0 SOL – 250 kcmil

2.10 **BRONZE GROUNDING CLAMPS FOR LAY-IN FEATURE**

A. Bonds water pipe to continuous copper grounding conductors.

B. High strength, electrolytic cast bronze.

C. Phos bronze hardware provides long term reliable assembly.

D. cULus 467 Listed for grounding and bonding and suitable for direct burial in earth or concrete.

Part Number	Description
GPLAC2-1-C	For conductor run parallel to pipe. Pipe size inches 1/2 or 3/4 and conductor size range AWG #10 SOL - #2 STR
GPLBC2-1-C	For conductor run perpendicular to pipe. Pipe size inches 1/2 or 3/4 and conductor size range AWG #10 SOL - #2 STR

2.11 **ZINC GROUND CLAMP**

A. Bonds steel and aluminum pipe to aluminum conductors

B. Made from die cast zinc
C. Zinc plated steel hardware

D. cULus 467 Listed for grounding and bonding

Part Number	Description
GPCZ2-1-C	Pipe size inches 1/2 or 3/4 and conductor size range AWG #10 SOL - #2 STR

2.12 **COMPRESSION-TYPE ALUMINUM-TO-COPPER REDUCING SPLICE**

A. Dual rated for use with aluminum or copper conductors.

B. Factory pre-filled with joint compound and sealed with easy pull-out end plug to inhibit corrosion.
C. Color-coded end plug and Panduit die index numbers marked on barrel for proper crimp die selection
D. Tin-plated to inhibit corrosion

E. For use up to 35 KV and temperature rated 90°C when crimped with Panduit crimping tools and dies

Part Number	Description
SAR2-4-X	Bonds aluminum conductor size #2 AWG to Aluminum or copper conductor size #4 AWG

2.13 **COPPER AND ALUMINUM ONE-HOLE GROUNDING LAY-IN LUG FOR BONDING LADDER RACK**

A. Used for quick installation of a continuous grounding conductor

B. cULus 467 Listed for grounding and bonding, copper lugs. UL Listed for direct burial in earth or concrete

C. cULus Listed for use up to 600 V and temperature rated 90°C

Part Number	Description
LICC4-22-C	Copper body, 0.22 inch stud hole, conductor size range AWG #14 SOL - #4 STR
LICC4-22TP-C	Tin plated copper body, 0.22 inch stud hole, conductor size range AWG #14 SOL - #4 STR
LIAC4-22-C	Tin plated aluminum body, 0.22 inch stud hole, conductor size range AWG #14 SOL - #4 STR
LIAS1/0-14-L	Tin plated aluminum body, 0.27 inch stud hole, conductor size range AWG #14 SOL - #1/0 STR
LIAS250-56-Q	Tin plated aluminum body, 0.33 inch stud hole, conductor size range AWG #6 SOL – 250 kcmil STR

2.14 **COMMUNICATIONS GROUNDING RODS**

A. Material: Copper-clad steel.

B. Size: 3/4-inch by 8 feet long.

C. Standards: Meet requirements of ANSI®/UL 467-1984, CSA, and ANSI/NEMA GR-1.

D. Approved manufacturers:
1. Erico

2.15 **ELECTROLYTIC GROUND RODS**

A. Where standard ground rods do not have acceptable levels of conductivity (typically greater than 5 ohms resistance) to earth due to local soil conditions, electrolytic systems may be considered.
B. Such systems shall meet the following:

1. Be comprised of a hollow stainless steel or copper tube 10 feet or longer and filled with a mixture of hygroscopic electrolytic salts.
2. Function as an active grounding system by absorbing moisture out of the air and constantly leaching and electrolytic solution into the surrounding soil to maintain high conductivity.
3. Rod shall be encased in a conductive, non-corrosive carbon based back fill material.
4. Provide low resistance to ground.
5. Provide season to season stability.
6. Be maintenance-free for 30 years.
7. Contain no hazardous materials or chemicals.

2.16 **TELECOMMUNICATIONS BONDING BACKBONE (TBB) GROUNDING CONDUCTORS**

A. To be bare or insulated copper, of minimum conductor size #6 AWG and sized at 2 kcmil per linear foot up to a maximum size of 750 kcmil.
B. Where un-insulated, to be identified with green tape at termination location.

C. Labeled in accordance with recommendations set forth in ANSI/TIA-606-B Administration Standard for Telecommunications Infrastructure.
D. Approved manufacturers:

1. General Cable

2. Southwire

2.17 **TWO-HOLE, LONG-BARREL COPPER COMPRESSION LUGS FOR GROUNDING CONDUCTORS**

A. Meets TIA-607-C requirements for network systems grounding applications.

B. Tested by Telcordia - meets NEBS Level 3 with AWG conductor.

C. UL Listed and CSA Certified with AWG conductor for use up to 35 KV** and temperature rated 90°C when crimped with Panduit crimping tools and dies.
D. Color-coded barrels marked with Panduit die index numbers for proper crimp die selection.

E. Have long barrel to maximize number of crimps and provides premium wire pull-out strength and electrical performance.
F. Have "inspection window" over tongue to visually assure full conductor insertion.

G. Be tin-plated to inhibit corrosion.

H. Available with NEMA and BICSI hole-sizes and spacing.

I. Approved Manufacturers for lugs:

1. Panduit

Part Number	Description
LCC-W series	Panduit two-hole compressing lugs for code conductors in BICSI hole spacing

2.18 **CODE/FLEX CONDUCTOR H-TAPS**

A. Used as a splice, or to tap smaller (pigtail) conductors into larger continuous conductors.

B. Each HTAP terminates a wide range of conductor sizes and combinations of code and flex conductors Class G, H, I and Locomotive to suit a variety of applications.
C. Slotted design allows quick and easy assembly of conductor to HTAP using three Panduit 94V-0 cable

ties.

D. Tap grooves are separated from one another, allowing them to function independently so HTAP can be used with single or multiple conductors, providing maximum design and installation flexibility.

E. Color coded and marked with Panduit die index numbers for proper crimp die selection.

F. UL Listed and CSA Certified, with wide size range of conductor sizes and rated for applications up to 600 V when crimped with Panduit tools and dies.

G. Tin plated to inhibit corrosion.

H. Available with an assortment of clear covers with integrated label fields.

I. Approved Manufacturers for HTAPs and clear covers:

1. Panduit

J. Approved parts for HTAPs are as follows

Part Number	Description
HTCT series	Panduit HTAPs. Must be selected according AWG size of run and tap conductors.
CLRCVR series	Panduit clear covers for HTAPs. Must be selected according to HTAP being covered.

2.19 CODE **CONDUCTOR, THIN WALL, TIN-PLATED C-TAP (SPLICE)**

A. For copper-to-copper splicing or pigtail tap splicing.

B. Wide wire range-taking capability minimizes inventory requirements.

C. Color-coded for proper crimp die selection.

D. Ribbed design provides high strength.

E. Made from high conductivity wrought copper.

F. Tin-plated to inhibit corrosion and oxidation.

G. UL Listed and CSA Certified with AWG conductor to 600 V and temperature rated to 90°C when crimped with Panduit crimping tools and dies.

H. Approved Manufacturers for C-TAPs:

1. Panduit

I. Approved parts for C-TAPs are as follows:

Part Number	Description

CTAPF series Panduit C-TAPs. Must be selected according AWG size of conductors being spliced.

2.20 **IEEE UNIVERSAL BEAM GROUNDING CLAMP**

A. For bonding structural steel (ex: I-beams) into bonding network.

B. Universal, fits on a wide range of standard (angled) and wide flange (parallel) structural steel beams.
C. Provide a mounting pad suitable for a two-hole compression lug.

D. Installs quickly and easily with standard 1/4" key hex wrench tooling.

E. UL 467 Listed and CSA 22.2 Certified for grounding and bonding suitable for direct burial in earth or concrete.
F. Comply with vibration tests per MIL-STD-202G (METHOD 201A).

G. Approved Manufacturers for beam grounding clamps:

1. Panduit

H. Approved parts for beam grounding clamps are as follows:

Part Number	Description
GUBC500-6	Panduit Universal Beam Grounding Clamp for copper conductor sizes ranging from #6 AWG to 500 kcmil and flange thickness from .25" to .675". Stud size is 1/2" with hole spacing for two hole lug being 1.75" and thread size from 1/2 to 13.

2.21 **SPLIT BOLT FOR BONDING CABLE TRAYS**

A. Made from high strength copper alloy to resist corrosion and provide premium electrical and mechanical performance.
B. Wire range-taking capability minimizes inventory requirements.

C. Nut hex provides correct fit with socket, box, or open end wrenches resulting in proper torqueing of electrical connection.
D. Pressure bar provides secure connection on a full range of conductor combinations used with each connector assuring premium wire pull-out strength.
E. UL Listed and CSA Certified with AWG conductor for use up to 600 V and temperature rated 90°C.
F. Available in tin-plated version for bonding to galvanized wire baskets and Flex Tray.

G. Approved Manufacturers:

1. Panduit

H. Approved parts for split lugs to bond wire basket tray

Part Number	Description
SBC3-C	Panduit split lug for #8 AWG to #4 AWG code conductors
SBCT3-C	Panduit split lug for #8 AWG to #4 AWG code conductors - tinned for use with galvanized basket tray delivery systems

2.22 **AUXILIARY CABLE BRACKETS (CONDUCTOR PATHWAY)**

A. Used for mounting telecommunications bonding conductors outside of cable tray.
B. Maintain minimum 2" separation between bonding conductors and all other types of cabling per TIA 607-C.
C. Bonds ladder rack, wire basket sections together without drilling holes or applying other split-bolt clamps.
D. Supports grounding conductors in the telecommunications room, allows separation of grounding conductors from other cables.
E. Holds up to four conductors in sizes up to 750 kcmil.
F. Bonds to all 1" and 2" ladder rack rails.
G. Paint piercing teeth provide electrical continuity between cable pathway sections while minimizing debris.
H. Front and back mounting screw options allow easy installation and visual inspection.
I. Can be mounted above or below the cable pathway system for flexibility.
J. Meet requirements TIA-607-C.
K. Have available bonding jumper kits to bond sections of basket tray or ladder rack.
L. Approved Manufacturers:
1. Panduit
M. Approved brackets for running bonding backbones parallel to ladder rack or Flex Tray:

Part Number	Description
GACB-2	Auxiliary cable bracket; 1.63" (41.4mm) width, 3.95" (100.3mm) height, 5.22" (132.6mm) depth; provided with one mounting screw.
GACBJ612U	Auxiliary cable bracket jumper for bonding pathway sections; #6 AWG (16mm²); 12.0" (305mm) length; factory terminated on both ends with straight, two-hole, long barrel compression lugs; provided with .16 oz. (5cc) of antioxidant and four mounting screws.

2.23 **WALL-MOUNT BUSBARS (TGB AND TMGB AND LABELING)**

A. Meet BICSI and TIA-607-C requirements for network systems grounding applications.
B. Employ BICSI hole spacing to fit LCC-W series 2-hole lugs.
C. Be made of high conductivity copper and tin-plated to inhibit corrosion.
D. Come pre-assembled with brackets and insulators attached for quick installation.
E. Use Panduit component labels, sold separately, to identify busbars to meet TIA/EIA-606-B.
F. Approved Manufacturers:
1. Panduit

G. Approved wall-mount grounding busbars are as follows:

Part Number	Description
GB2B0306TPI-1	Telecommunications grounding busbar (TGB) with 6 number of mounting positions with 1/4" stud hole and with 5/8" hole spacing, and 3 number of positions with 3/8" stud hole with 1" hole spacing
GB2B0312TPI-1	Telecommunications grounding busbar (TGB) with12 number of mounting positions with 1/4" stud hole with 5/8" hole spacing, and 3 number of positions with 3/8" stud hole with 1" hole spacing
GB4B0624TPI-1	Telecommunications main grounding busbar (TMGB) with 24 number of mounting positions with 1/4" stud hole with 5/8" hole spacing, and 6 number of positions with 3/8" stud hole with 1" hole spacing
GB4B1028TPI-1	Telecommunications main grounding busbar (TMGB) with 28 number of mounting positions with 1/4" stud hole with 5/8" hole spacing, and 10 number of positions with 3/8" stud hole with 1" hole spacing
LTYK	Busbar label kit includes one printed tag and on flame retardant cable tie.

2.24 **VERTICAL GROUNDING STRIP BUSBARS FOR NEW INSTALL RACKS AND CABINETS**

A. Provides clean bond to any rack mounted equipment regardless of whether or not equipment has an integrated grounding terminal.
B. Bonds up to 45 RU per rack.
C. Comes in EIA Universal mounting hole pattern.
D. Complies with US and International grounding requirements.
E. Comes in threaded rail and cage nut versions.
F. Approved Manufacturers:
1. Panduit
G. Approved rack and cabinet mount vertical busbars for new installs:

Part Number	Description
RGS134-1Y	Grounding strip for use with threaded rails; 78.65" (2m) length; .67" (17mm) width; .05" (1.27mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker and three each #12-24 x 1/2" and M6 x 12mm thread-forming screws.
RGS134B-1	Grounding strip for use with cage nut rails; 78.70" (2m) length; .67" (17mm) width; .05" (1.27mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker, three cage nut bonding studs, eight #12-24 bonding nuts and three strip clips
RGS13442-1	Grounding strip for use with threaded rails ; 73.70" (1.9m) length; .67" (17mm) width; .05" (1.27mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker, three each, #12-24 x1/2” and M6 x12mm thread-forming screws.

RGS13448-1 Grounding strip for use with threaded rails; 83.90" (2.1m) length; .67" (17mm) width; .05" (1.27mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker and three each #12-24 x 1/2" and M6 x 12mm thread-forming screws.

RGS13451-1 Grounding strip for use with threaded rails; 89.15" (2.3m) length; .67" (17mm) width; .05" (1.27mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker and three each #12-24 x 1/2" and M6 x 12mm thread-forming screws.

RGS13452-1 Grounding strip for use with threaded rails; 90.90" (2.3m) length; .67" (17mm) width; .05" (1.27mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker and three each #12-24 x 1/2" and M6 x 12mm thread-forming screws.

RGS134B42-1 Grounding strip for use with cage nut rails; 73.40" (1.9m) length; .67" (17mm) width; .03" (.76mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker, three cage nut bonding studs, eight #12-24 bonding nuts and three strip clips.

RGS134B48-1 Grounding strip for use with cage nut rails; 83.90" (2.1m) length; .67" (17mm) width; .03" (.76mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker, three cage nut bonding studs, eight #12-24 bonding nuts and three strip clips.

RGS134B51-1 Grounding strip for use with cage nut rails; 89.15" (2.3m) length; .67" (17mm) width; .03" (.76mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker, three cage nut bonding

studs, eight #12-24 bonding nuts and three strip clips.

RGS134B52-1 Grounding strip for use with cage nut rails; 90.90" (2.3m) length; .67" (17mm) width; .03" (.76mm) thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker, three cage nut bonding studs, eight #12-24 bonding nuts and three strip clips.

2.25 RETROFIT CABINET AND RACK GROUNDING KITS FOR REMEDIATION OF UN-GROUNDED LEGACY RACKS AND CABINETS:

A. Provide a dedicated ground system to maintain system performance and protect network equipment when equipment is already installed.
B. Hardware that incorporates paint piercing serrations to create a bond point between the cabinet rail, grounding busbar and lug.
C. Hardware installable without removal of existing installed equipment.
D. Cabinet kits optimized for installation on 19" cabinets that meet EIA-310, with functioning equipment are already mounted.
E. A complete system of integrated and matched components
F. Engineered to comply with US and International grounding requirements.

G. Rack kits optimized for installation on 19" racks that meet EIA-310, with functioning equipment, and are deployed in the field
H. Incorporates thread-forming screws to eliminate the need to manually remove paint from the rack.
I. Approved Manufacturers:
1. Panduit
J. Approved rack and cabinet mount grounding retrofit kits:

Part Number	Description
CGR630U	Retrofit grounding kit for installation on ungrounded existing cabinets with threaded #12-24 or M6 rail fasteners and rail depth up to 30" (.75m); includes one RGRB19U grounding busbar kit and one CGJ630U front to back rail jumper kit
CGR630UB	Retrofit grounding kit for installation on ungrounded existing cabinets with cage nut rail fasteners and rail depth up to 30" (.75m); includes one RGRB19U grounding busbar kit and one CGJ630UB front to back rail jumper kit
RGRKCBNJY	Rack grounding kit to ground an existing rack with equipment already mounted; includes one RGRB19U busbar, one HTCT250-2-

1 HTAP, and one RGREJ696Y grounding jumper

2.26 **RACK BONDING CONDUCTOR KITS (RBC)**

A. Bonds the rack or cabinet to the telecommunications grounding busbar (TGB or TMGB).
B. Jumper kits available with both ends factory terminated to provide a bolt-on solution.
C. Jumper kits available with one end factory terminated to attach to the rack or cabinet; free end accommodates unique length requirements.
D. Engineered to comply with US and international grounding requirements.
E. Approved Manufacturers:
1. Panduit
F. Approved rack jumper (RBC) kits:

Part Number	Description
GJ672UH	Terminated on both ends for smaller telecommunications rooms where racks have individual connections directly to the TMB. One 72" length #6 AWG green wire with yellow horizontal stripe. Jumper is pre-terminated on one end with LCC6-14JAWH-L and the other end with LCC6-14JAW-L. Comes in lengths 72", 96", 120", 144", 168", 192:", 216", 240", 264", and 288". For other lengths substitute "72" in part number with desired length
GJS6120U	Terminated on one end for larger telecommunications rooms where racks are individually bonded to underfloor or overhead bonding backbone with an HTAP connection. One 120" length #6 AWG green wire with yellow horizontal stripe. Jumper is pre-terminated on one end with LCC6-14JAW-L. For 180" length substitute "120" in part number with "180"

ASSOCIATED HARDWARE FOR RBC KITS

HDW1/4-KT	Stainless steel mounting hardware for busbar; two 1/4-20 hex bolts, two 1/4-20 hex nuts, four 1/4 flat washers and two 1/4 Belleville compression washers. Mounting hardware for rack or cabinet; two #12-24 thread-forming screws and two M6 thread-forming screws.
HDW3/8-KT	Stainless steel mounting hardware for busbar; two 3/8-16 hex bolts, two 3/8-16 hex nuts, four 3/8 flat washers and two 3/8 Belleville compression washers. Mounting hardware for rack or cabinet; two #12-24 thread-forming screws and two M6 thread-forming screws
HDW1/4-A-KT	Stainless steel mounting hardware for busbar; two 1/4-20 hex bolts, two 1/4-20 hex nuts, four 1/4 flat washers and two 1/4 Belleville compression washers. Mounting hardware for rack or cabinet; two #10-32 thread-forming screws and two M5 thread-forming screws
HDW3/8-A-KT	Stainless steel mounting hardware for busbar; two 3/8-16 hex bolts, two 3/8-16 hex nuts, four 3/8 flat washers and two 3/8 Belleville compression washers. Mounting hardware for rack or cabinet; two #10-32 thread-forming screws and two M5 thread-forming screws.

2.27 **ELECTROSTATIC DISCHARGE (ESD) PORT KITS AND WRIST STRAP**

A. For dissipating electro-static buildup prior to maintenance work on network equipment.
B. Accommodate standard ESD wrist strap 4mm plug.
C. Wrist strap provides rapid and continuous drain of electrostatic charge between a person and the surface to which the wrist strap is bonded, thus preventing damaging static discharge into equipment.
D. Can be mounted to front or back of rack or cabinet for convenient access.
E. Bent 45° to act as a hook to hold wrist strap when not in use.
F. Two-hole configuration provides anti-rotation and prevents loss of bond.
G. Barrel permanently marked with the protective earth (ground) symbol.
H. Engineered to comply with US and International grounding requirements.
I. Versions for threaded racks rails or cabinet cage nuts.
J. Approved Manufacturers:
1. Panduit
K. Approved ESD port kits:

Part Number	Description
RGESD2-1	For #12-24 or M6 rail fasteners: Two-hole ESD port with 5/8" hole spacing; provided with an ESD protection sticker, .16 oz. (5cc) of antioxidant, and two each #12-24 x 1/2" and M6 x 12mm thread-forming screws
RGESD2B-1	For cage nut rail fasteners: Two-hole ESD port with 5/8" hole spacing; provided with an ESD protection sticker, .16 oz. (5cc) of antioxidant, two cage nut bonding studs and two #12-24 bonding nuts

RGESDWS	Adjustable fabric ESD wrist strap with 6' coil cord, banana plug, 1 megaohm resistor and 4mm snap.

2.28 **EQUIPMENT JUMPER KITS (UNIT BONDING CONDUCTOR OR "UBC")**

A. Used to ground large, chassis-style rack mounted equipment that have built-in grounding pads or terminals.
B. Bond network equipment to grounding strip or grounding busbar.
C. Jumper kit available with both ends factory terminated to provide a bolt-on solution.
D. Jumper kit available with one end factory terminated to attach to the grounding strip or grounding busbar; free end accommodates unique equipment terminations.
E. Use jumpers with 90° bent lug, on grounding strip side, for high density grounding requirements up to one ground point per RU.
F. Use jumpers with 45° bent lugs on grounding strip side, for improved cable management.
G. Engineered to comply with US and International grounding requirements.
H. Approved Manufacturers:
1. Panduit
I. Approved equipment jumper (UBC) kits:

Part Number	Description
GJS6 series	#6 equipment jumper factory terminated on one end for switches, cabinets and 4 post racks. Exact part number depends on length
RGE series	Factory terminated jumpers that are terminated on both ends . Exact part number depends on AWG size, length and angle of two hole lugs

2.29 **SURGE SUPPRESSOR JUMPER KIT**

A. Bonds power or data line surge suppressor to grounding strip or grounding busbar.
B. Both ends factory terminated to provide a bolt-on solution.
C. Engineered to comply with US and International grounding requirements.
D. Approved Manufacturers:
1. Panduit
E. Approved surge suppressor jumper kits:

Part Number	Description
SSGK-1	#10 AWG (6mm²) jumper; 24" (.61m) length; factory terminated on both ends; one-hole lug on surge suppressor to two-hole lug on grounding strip/busbar side; provided with .16 oz. (5cc) of antioxidant and two each #12-24 x 1/2", M6 x 12mm, #10-32 x 1/2" and M5 x 12mm thread-forming screws

2.30 **ARMORED CABLE GROUNDING KIT**

A. Provides a secure bond to the armor sheath on indoor and indoor/outdoor fiber optic cables at both cassette and enclosure ends.
B. Worm-gear design evenly distributes forces across the armor.
C. Made from steel and aluminum material is compatible with common armor for long term reliability.
D. Black insulating cover protects and hides the connection for an aesthetically pleasing work area.
E. Complies with industry requirements ensuring a high level of reliability and safety.
F. Approved Manufacturers:
1. Panduit
G. Approved armored cable grounding kits:

Part Number	Description
ACG24K	#6 AWG (16mm2) jumper for armored cable diameter up to 0.84" (21.3mm); 24" (609.6mm) length; factory terminated on one end with LCC6 two-hole copper compression lug and the other end with grounding terminal; provided with two each #12-24 and M6 thread-forming screws and a black polypropylene terminal cover
ACG24K-500	#6 AWG (16mm2) jumper for armored cable diameter 0.85" (21.3mm) to 1.03" (26.2mm); 24" (609.6mm) length; factory terminated on one end with LCC6 two-hole copper compression lug and the other end with grounding terminal; provided with two each #12-24 and M6 thread-forming screws and a black polypropylene terminal cover
ACGK	Armored cable grounding kit. Contains one grounding terminal for #6 AWG grounding conductor, and one #10 mechanical clamp for cable diameters in 9/16" – 1 1/16" diameter range.

2.31 MISCELLANEOUS BONDING ACCESSORIES:

A. Anti-oxidation Paste (contact aid) For Copper to Copper and Copper to Steel Connections.
B. Anti-oxidation Paste (contact aid) For Aluminum Pad-to-Pad or Thread-to-Thread Aluminum Connections.
C. Green thread-forming bonding screws for bonding smaller equipment on threaded rack rails through the equipment mounting flange.

D. Green bonding cage nuts from bonding smaller equipment on cage nut rails through the equipment mounting flange.
E. Thread forming screws for bonding two hole lugs to vertical busbars on threaded rack rails.
F. Green paint piercing grounding washers for assuring electrical continuity between painted parts of equipment racks as described in TIA 607-B Standard.
G. Bonding hardware kits (studs) for forming low-resistance bond between the rack or cabinet and painted rack mounted appliances and equipment.
H. Approved Manufacturers:

1. Panduit

I. Approved miscellaneous bonding/grounding components and accessories:

Part Number	Description
CMP-300-1	Contact aid (anti-oxidant paste) for copper-to-copper and copper-to-steel connections in 8 oz container. Operating temperature range -40°F (-40°C) to 350°F (177°C). Good for all voltages and suitable for grounding. Also may be used for anti-seizing thread lubricant
CMP-100-1	Contact aid (anti-oxidant paste) for pad-to-pad or thread-to-thread aluminum connections made on aluminum conductor in 8 oz container. Operating temperature range -40°F (-40°C) to 400°F (204°C).
RGTBSG-C	Green thread-forming bonding screw, #12-24 x 1/2" for mounting smaller equipment and bonding to rack/cabinet racks through equipment mounting flange
RGTBS1032G-C	Green thread-forming bonding screw, #10-32 x 1/2" for mounting smaller equipment and bonding to rack/cabinet racks through equipment mounting flange
CNB4K	Green bonding cage nut, includes 4 #12-24 bonding cage nuts (.06 – .11 thick panel) and 4 #12-24 x 1/2" bonding screws with #2 Phillips/slotted combo hex head (use 5/16" or 8mm socket). Ideal for patch panel applications
CNBK	Green bonding cage nut, includes 50 #12-24 bonding cage nuts (.06 – .11 thick panel) and 50 #12-24 x 1/2" bonding screws with #2 Phillips/slotted combo hex head (use 5/16" or 8mm socket)
RGTS-CY	Thread-forming grounding screw, #12-24 x 1/2" for bonding two-hole grounding lugs to rack/cabinet vertical busbars
RGTS1032-C	Thread-forming grounding screw, #10-32 x 1/2" for bonding two-hole grounding lugs to rack/cabinet vertical busbars
RGW-100-1Y	100 paint piercing bonding washers for 3/8" (M8) stud size; .875" (22.2mm) O.D.; provided with .16 oz. (5cc) of antioxidant.
TRBSK	Bonding stud kit for threaded #12-24 rail fasteners; includes 25 bonding studs and 50 bonding nuts for bonding painted equipment and appliances to rack/cabinet rails and vertical busbars
CGNBSK	Bonding stud kit for cage nut rail fasteners; includes 25 bonding studs and 50 bonding nuts for bonding painted equipment and appliances to rack/cabinet rails and vertical busbars

PART 3 - EXECUTION

3.1 **INSTALLATION**

A. General:

1. This Specification document describes a generic enterprise communications bonding and grounding system for the construction of a complete and functioning grounding system. It is the responsibility of the installing contractor to adapt these general guidelines and principles to the requirements of the actual environments where the systems are to be implemented.
2. System shall provide equipment ground connections (bonds) from the premises entrance facility and outside-plant earthing system to each telecommunication room telecommunication ground busbar, through the racking systems to bond the network equipment.
3. Entire grounding link from equipment to earth should be visually verifiable except where hidden by walls, conduit or pathways.
4. Installing contractor shall label all elements of the communications bonding network according to guidelines defined in TIA-607-C and ANSI/TIA 606-B.
5. It is the responsibility of the installer to be knowledgeable of all previously cited Standards and Codes and to bring to the attention of Architect and Technology Consultant any conflicts or discrepancies to achieve a fully functioning, standards-compliant earthing system.
6. Contractors working around, or adding to existing legacy systems shall bring to the attention of Architect and Technology Consultant previously installed network elements that may not comply with modern grounding requirements for possible remediation.

B. Telecommunications Bonding Backbone (TBB):

1. Bonding and grounding conductors may be insulated or un-insulated and shall not decrease in size as the grounding path moves closer to earth.
2. Connections (bonds) between the telecommunications grounding network and associated electrical panels shall be done by a qualified electrician in accordance with guidelines in TIA 607-C and applicable electrical codes.
3. Bonding Conductors should be continuous and routed in the shortest possible straight line path, avoiding changes in elevation and sharp bends.
4. TBB conductors shall be protected from mechanical damage and built so as to minimize splicing. Where splicing is unavoidable they shall be done using irreversible compression splices (C-TAPS) built to that purpose. See the "Materials" section of this document for appropriate compression splices.
5. TBB in multi-story buildings with multiple risers (multiple TBBs) shall employ a grounding equalizer (GE) between vertical grounding backbones at the top floor of the building and minimally at every third floor in between to the lowest floor level. The GE shall be no smaller than the largest sized TBB.
6. Routing grounding conductors through ferrous metal conduit should be avoided, but if it is necessary due to building constraints, any grounding conductor running through ferrous conduit longer than 3 feet shall be bonded at the end using appropriately sized HTAP and Conduit grounding clamps as described TIA 607-C using appliances described for that purpose in the "Materials" section of this document.
7. Conductors used to bond TBB to conduit ends shall be of #6 AWG size or larger.
8. Conductor sizing shall be based upon project specification (drawings and notes) for that installation. These sizes are based on TBB length per TIA 607-C recommendations. Contractor shall bring to the attention of Architect and Technology Consultant anywhere TBB project specified sizing appears insufficient per the Table below:

Sizing of the TBB

TBB Length in Linear meters (feet)	TBB Size (AWG)
Less than 4 (13)	6
4-6 (14-20)	4
6-8 (21-26)	3
8-10 (27-33)	2
10-13 (34-41)	1
13-16 (42-52)	1/0
16-20 (53-66)	2/0
20-26 (67-84)	3/0
26-32 (85-105)	4/0
32-38 (106-125)	250 kcmil
38-46 (126-150)	300 kcmil
46-53 (151-175)	350 kcmil
53-76 (176-250)	500 kcmil
76-91 (251-300)	600 kcmil
Greater than 91 (301)	750 kcmil

C. Entrance Facilities and Telecommunications Main Grounding Busbar (TMGB):

1. TMGB shall be located in the entrance facility, near the electrical panel to which it will be bonded but installed to maintain clearances required by applicable electrical codes.
2. TMGB shall be sized according to the anticipated number of bonded connections needed.
3. TMGB shall have tinned surface to restrain oxidation and be cleaned and antioxidant paste applied prior to fastening conductors.
4. Connectors on TBB which attach to TMGB shall be of two-hole, long-barrel compression lugs of the LCC series as specified in the "Materials" section of this document.
5. Building steel within six feet of the communications grounding system should be bonded into the system with appropriate hardware listed in "Materials" section of this document.
6. All cables containing a metallic shield or armor shall have that shield properly bonded into the communications grounding system using the appropriately sized Armored Cable Grounding Kit listed in the "Materials" section of this document.

D. Telecommunications Rooms and Telecommunications Grounding Busbar (TGB):

1. Each telecommunications room shall have its own TGB to which equipment and dead steel (building steel and support structures) in that room are bonded.
2. The TGBs shall have a tinned surface to inhibit oxidation and be sized according to the anticipated number of bonded connections that will be needed.
3. TGBs shall be sized according to the anticipated number of bonded connections needed.
4. TMGs shall have tinned surfaces to restrain oxidation and shall be cleaned and have an antioxidant paste applied to both bonding surfaces prior to fastening conductors.
5. Connectors on backbone and rack/cabinet bonding conductors which attach to TGB shall be of two-hole, long-barrel compression lugs of the LCC series as specified in the "Materials" section of this document.
6. Building steel within six feet of the communications grounding system should be bonded into

the system with beam clamps and other hardware appropriate to that purpose listed in "Materials" section of this document.

7. Racks and cabinets shall have individual Rack Bonding Conductors (RBC) bonding to the Telecommunications Equipment Bonding Conductor (TEBC) or underfloor "Supplemental Bonding Grid - DAISY CHAINING OR SERIAL CONNECTIONS OF ONE RACK OR CABINET TO ANOTHER WILL NOT BE ACCEPTED.
8. Rack Bonding Conductors (RBC) or above rack row grounds (TEBC) shall be installed to maintain a minimum of 2" separation from all other types of cable - power or communications.
9. To maintain this segregation of cables some telecommunications rooms may lend themselves to the installation of Auxiliary Conductor Brackets for routing bonding conductors outside of, yet parallel to ladder rack or basket tray. See "Auxiliary Brackets" in "Materials" section of this document.
10. Bonding conductor support systems like auxiliary brackets shall be spaced no further apart than three foot intervals.
11. All cables containing metallic shielding or armor shall be properly bonded into the communications grounding system using the appropriately sized Armored Cable Grounding Kit listed in the "Materials" section of this document.

E. Bonding within Racks and Cabinets:

1. Racks and Cabinets shall be bonded into the communications bonding network with conductors of #6 AWG or larger.
2. Racks, cabinets and similar enclosures shall not be attached serially (daisy-chained) but must have individual RBC into the grounding system.
3. Newly installed racks and cabinets shall have vertical grounding busbars installed along one rail to provide clean bonding landing point for all rack mount equipment. For part numbers vertical busbars see "Materials" section of this document. Grounding busbars shall not be isolated from the rack or cabinet.
4. All painted components of racks/cabinets shall be assembled using serrated grounding washers and thread-forming screws to ensure electrical continuity between the different structural components of the rack/cabinet.
5. Larger equipment (chassis switches) with integral grounding terminals or pads shall be bonded to the vertical busbar with equipment grounding kits attached to those terminals and bonding them to the rack-mounted busbars. For kit part numbers see the "Materials" section of this document.
6. Anywhere two metallic surfaces are to be bonded, contractor shall clean the contact areas of paint or oxidation using abrasive pads, and apply film of anti-oxidation compound between surfaces prior to bonding.
7. All cable fittings shall be of two-hole (LCC series) compression-type. Mechanical screw-lugs on racking systems will not be accepted and must be removed and replaced at contractor's expense.

8. All screws used to affix compression lugs to rack-mounted vertical busbars shall be of the thread forming type made specifically for electrical bonding.
9. Smaller equipment (servers, TOR switches) not having integral grounding pads must be bonded to the rack through the equipment mounting flanges using green thread-forming grounding screws with serrations under the head to cut through paint, coatings and oxidation that may be present on the equipment flange. Such equipment shall have minimally one

grounding screw per piece of equipment.

10. Existing (installed) racking systems containing live active equipment may be retrofitted for Standards-compliant bonding using rack retrofitting kits listed in the "Materials" section of this document.
11. ESD (electro-static discharge) ports and wrist straps shall be provided minimally every other rack or bay to be within reach of any active equipment. On larger 4-post racks or cabinets - ESD ports and wrist straps shall be installed on the front and back to be accessible when servicing any active equipment.
12. As a condition of employment, any internal or contracting technicians servicing active equipment must be wearing a properly grounded wrist strap to dissipate ESD charges prior to touching any active equipment.

F. FIELD QUALITY CONTROL

1. Contractor shall verify the use of all appropriate bonding accessories in the racking systems such as grounding washers, thread-forming grounding screws and the presence of electro-static discharge ports and wrist straps within reach of all equipment to be maintained.
2. Contractor is responsible for visually verifying sizing and sound installation of the telecommunications bonding backbone including presence of properly sized and installed grounding equalizer conductors between backbones contained in separate risers.
3. Inspecting Contractor shall verify that any conduit longer than 3 feet through which a grounding conductor passes is properly bonded to the grounding conductor as described in this document.
4. During inspections contractor shall verify compliance with all stipulations specified in this document and compliance with all regulatory references (Standards and Codes) cited.
5. All opens or gaps in the bonding system during final inspections will be recorded in the inspection report and remedied.
6. During inspections, contractor shall check all grounding and bonding system conductors and connections for tightness and proper installation, including

checking proper dies were used on compression taps and fittings by checking embossed die numbers on those connections.

7. Architect and Technology Consultant may request a test of 10% of bonded connections within the grounding system with a volt-ohm meter. Resistance tests taken on either side of a compression or exothermic bond shall be less than .2 (2/10) of one ohm in resistance.
8. Bonded joints to be tested may be random or individually tagged by a representative of Architect or Technology Consultant.
9. Contractor shall Test system at bonded points indicated and provide results in report form.
10. Based upon test results, Architect and Technology Consultant reserves the right to request testing on 100% of exothermic and compression bonds within the installed grounding system.
11. All bonded connections failing the test described above shall be remedied and retested by the installation contractor at contractor's expense.

END OF SECTION

HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

A. Drawings and general provisions of Contract, including General Provisions and Supplementary Conditions, Specification Sections, apply to this and the other sections of Division 27.
B. This section is a Division 27 BASIC section and is a part of each Division 27 section.

1.2 **SUMMARY**

A. This Section includes secure support from the building structure for technology items by means of hangers, supports, anchors, sleeves, inserts, seals and associated fastenings.
B. All support shall utilize threaded fasteners for all technology/attachments

1. Exception:
a. Spring steel fasteners may be used in lieu of threaded fasteners only for ¾" raceways above suspended ceilings.

C. Types of supports, anchors, sleeves and seals specified in this section include the following:

1. C-clamps
2. Clevis hangers
3. Conduit straps
4. I-beam clamps
5. Lead expansion anchors
6. Riser clamps
7. Round steel rods
8. Toggle bolts
9. Wall and floor seals

D. Supports, anchors, sleeves and seals furnished as part of factory-fabricated equipment, are specified as part of that equipment assembly or as specified in Division 16.

1.3 **SUBMITTALS**

A. Submit the following in accordance with Conditions of Contract and Supplementary Conditions Specifications Sections.
1. Product Data: Submit manufacturer's data on supporting devices including catalog cuts, specifications, and installation instructions, for each type of support, anchor, sleeve and seal.
2. Where multiple products are shown on one cut sheet, circle product to be used.
3. Shop Drawings: Submit dimensioned drawings of fabricated products, indicating details of fabrication and materials.

1.4 **QUALITY ASSURANCE**

A. Manufacturers: Firms regularly engaged in manufacture of supporting devices, of types, sizes, and ratings requires, whose products have been in satisfactory use in similar service for not less than 3 years.
B. Contractor Qualifications: Firm shall have at least 3 years of successful installation experience with projects utilizing electronic/electrical supporting device work similar to that required for this project.
C. NEC Compliance: Comply with NEC requirements as applicable to construction and installation of supporting devices.
D. MSS Compliance: Comply with applicable MSS standard requirements pertaining to fabrication and installation practices for pipe hangers and supports.
E. UL Compliance: Provide components that are UL listed and labeled.
F. FS Compliance: Comply with Federal Specification FF-S-760 pertaining to retaining straps for conduit, pipe and cable.
G. Components shall be listed and labeled by ETL, CSA, or other approved, nationally recognized testing and listing agency that provides third-party certification follow-up services.

PART 2 - PRODUCTS

2.1 **MANUFACTURERS**

A. Major items of equipment shall have manufacturer's name, address and catalog number on a plate securely attached. All equipment or apparatus of any one system must be the product of one manufacturer, or approved equivalent products of a number of manufacturer's that are suitable for use in a unified system.

B. All materials and equipment for which Underwriter's Laboratories have established standards shall bear a UL label of approval.
C. Where proprietary names are used, whether or not followed by the words "or as approved", they shall be subject to substitution only as approved by the Architect, Technology Consultant, and Owner.
D. Where the Contractor proposes substitute equipment, contractor shall submit acceptable evidence to indicate compliance with all requirements of the documents, including performance rating, size and resistance to wear and deterioration equivalent to the specified item. In instances where substituted equipment requires additional material or work beyond that shown or required by the specified item, said additional material or work, shall be the responsibility of this Contractor, regardless of the trade involved.

PART 3 - EXECUTION

3.1 **DELIVERY, STORAGE, AND HANDLING**

A. Provide supporting devices that comply with manufacturer's standard materials. Install in accordance with published product information, and as required for a complete installation; and as

herein specified. Where more than one type of supporting device meets indicated requirements, selection is Contractor's option.

B. Install hangers, anchors, sleeves and seals as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to insure supporting devices comply with requirements. Comply with requirements of NEC for installations of supporting devices.

1. Support all technology cables a minimum of every 5ft. with J-hooks, unless other supports are available.

2. Cables shall be bundled in groups of 24 cables maximum.

C. Coordinate with the building structural system and electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.

D. Do not fasten supports to pipes, ducts, mechanical equipment and conduit.

E. Obtain approval from the Architect before drilling or cutting structural members.

F. Install surface-mounted cabinets and panels with minimum of four anchors.

3.2 **MISCELLANEOUS SUPPORTS**

A. Support miscellaneous technology components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panels, control enclosures, pull boxes, junction boxes and other devices.

3.3 **FASTENING**

A. Unless otherwise indicated, fasten technology items and their supporting hardware securely to the building structure, including but not limited to conduits, raceways, cables, cable trays, cabinets, panels, boxes and control components in accordance with the following:
B. Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, and machine screws, welded threaded studs, or spring-tension clamps on steel. Threaded studs driven by a powder charge and provided with lock washers and nuts may be used instead of expansion bolts and machine or wood screws. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures. In partitions of light steel construction, use sheet metal screws.
C. Holes cut into reinforced concrete beams or in concrete shall not cut reinforcing bars. If the Contractor cuts into any reinforcing bars, stop work and notify the Technology Consultant immediately. Fill all holes that are not used.
D. Ensure that the load applied to any fastener does not exceed 25% of the proof test load. Use vibration-and shock-resistant fasteners for attachments to concrete slabs.

3.4 **TESTS**

A. Test pull-out resistance of one of each type, size and anchorage material for the following fastener types:

B. Expansion anchors.
   1. Toggle bolts.
   2. Powder-driven threaded studs.

C. Provide all jacks, jigs, fixtures, and calibrated indicating scales required for reliable testing. Obtain and submit the Structural Engineer's signed approval before transmitting loads to the structure. Test to 90% of rated proof load for fastener. If fastening fails test, revise all similar fastener installations and retest until satisfactory results are achieved.

END OF SECTION

IDENTIFICATION FOR COMMUNICATION SYSTEMS

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section and the other sections of Division 27.

1.2 **SUMMARY**

A. This section relates to the Structured Cabling Sections of this specification.

B. This Section includes requirements for identification of components including but not limited to the following:
   1. Identification labeling for cables and conductors
   2. Operational or instructional signs
   3. Equipment labels

C. Refer to project drawings and other Division 27 sections for additional specific identification associated with the specific items.

D. Labeling shall be consistent. Please ensure labeling corresponds to the final room number which may be different then the Architect's number scheme on the construction documents.

E. Comply with the EIA/TIA Standard 606-B, "The Administration Standard for the Telecommunications Infrastructure".

F. The Contractor shall submit, for approval by the Technology Consultant and Owner, a labeling system for the cable installation. The Owner will coordinate the exact verbiage of the labeling scheme with the successful contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cabinets, ground bars, cables, panels and outlets. The labeling system shall designate the cable origin and destination and a unique identifier for the cable within the system.

Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.

G. All label printing shall be machine generated using indelible ink ribbons or cartridges. Self-laminating labels shall be used on cable jackets, appropriately sized to the OD of the cable, and placed within the view at the termination point on each end. Outlet, patch panel and writing block labels shall be installed on, or in the space provided on the device.

1.3 **SUBMITTALS**

A. Submit the following in accordance with Section 270100 Operations and Maintenance of Structured Cabling Enclosures:

1. Manufacturer's data for each type of product specified.
2. Schedule of identification and nomenclature to be used for identification labels.
3. Samples of each color, lettering style and other graphic representation required for identification materials.

B. Labeling conventions for copper and fiber optical cable and terminations shall be approved by the Owner's IT department prior to installation.

1.4 **QUALITY ASSURANCE**

A. All work shall be in accordance with the general principles outlined in the BICSI TDMM manual latest edition and with the TIA-526, TIA-568-D.2-1 and TIA-606-B Standards.

B. UL Compliance: Comply with the applicable requirements of the UL Standard 969. "Marking Systems", with regards to type and size of lettering for raceways and cable labels.

C. NEMA Compliance: Comply with applicable requirements of NEMA Standards WC-1 and WC-2 pertaining to identification of power and control conductors.

D. Major items of equipment shall have manufacturer's name, address and catalog number on the plate securely attached in a convenient place.

1.5 **SUGGESTED NUMBERING AND LABELING SCHEME**

A. All labeling/color schemes for the structured cabling shall conform to the standards as set forth and confirmed by the District of Columbia Courts IT department.

B. Workstation Cable Numbering:

1. Faceplate labeling shall be consistent with that of the other buildings on the campus. Provide labeling per owner's directions.
2. There shall not be any open places on the patch panel.
3. Terminate all outlets from the same room sequentially on the same patch panel.
4. If an outlet is added, it gets a new number that is next on the sequence even if it is on an existing

faceplate.

5. Labeling techniques: The label shall be black letters on white background. Labels must be produced by label-making equipment. The blank white label tags that are included in the faceplate hardware are to be installed with clear plastic shields in all positions on the faceplate.

C. Workstation Cable Numbering Standard: AA-BB-CC-A/B/C/D

1. AA= Floor that the Telecommunications Room resides
2. BB= Telecommunications Room Name or Number
3. CC= Patch panel port position
4. A/B/C/D= Faceplate position

D. Example: All wall jacks shall be labeled in such a way to reflect floor, closet and jack number. Such as with buildings A and B 3N106D, 3rd floor, North closet, Jack 106 Data, or Moultrie building 3G106D, 3rd floor, Communications closet G, 106 Data. Patch panels will be labeled in such a way as to reflect the room and or division the port represents. For example 3G106D is labeled on the drop. The closet's patch panel would reflect rm3112-106.

1.6 **RISER CABLES**

A. Number scheme: Riser cables must be assigned specific numbers. Each shall be tagged with the building abbreviation and room number of the BET/IDF at both ends of the cable clearly shown.

B. Labeling techniques: Each cable is to be labeled on each end within 6" of where it terminates on the cross-connect panel. Cable tags must be securely fastened to the cable sheath. Wrap around tags protected by clear polyurethane tape may be used as well. Tags must be typed and be permanent. Cable tags that appear less than permanent will not be accepted. Directly writing on the cable sheath will not suffice as proper labeling of the riser cables.

1.7 **UTP CABLING CROSS-CONNECT BLOCKS**

A. Numbering scheme: 25 pair cables from the Utility RJ21X blocks are terminated on blocks. Cable pairs are numbered in 25 pair increments. The first cable is numbered 1-25, the second 26-50, etc. Pair #1 is terminated on the left position of the top block. Subsequent cable pairs are terminated from left to right and from top to bottom.

B. Labeling technique: The first label block shall read, "Cables to RJ21X blocks, 1-25". Subsequent label blocks shall denote the same for pairs 26-50, etc. The label shall be black letters on white background. Labels must be produced by label-making equipment. Handwritten labels are not allowed.

1.8 **FIBER OPTIC PANELS**

A. Numbering scheme: Fiber optic cables and terminations shall be numbered and labeled per current EIA/TIA Standards. The numbering scheme denotes the cable function (campus backbone, building entrance, or intrabuilding), sheath number, and buffer tube number.

B. Labeling techniques: A label shall be installed onto the outside of the front face of the connector

housing to read, “Horizontal fiber optic cables to outlets” or “Entrance/riser fiber optic cables” as appropriate. Labels must be produced by label making equipment. Handwritten labels are not permitted. Horizontal fiber optic cables shall be labeled on the label tags on the closet connector housing. Each cable terminated shall be labeled with the following information: type of fiber optic cable and outlet number. For example, a label block for a multimode horizontal fiber optic cable termination might read “MM-17”. Terminations are numbered by the outlet number, not the housing or connector panel position number. Only adapter positions that are terminated are labeled.

1.9 **OSP FIBER OPTIC CABLES**

A. Numbering scheme: The numbering scheme denotes the cable function (campus backbone or building entrance). Each fiber optic cable sheath shall be tagged in each BET and IDF with the number and type of strands in the sheath (i.e. 12SM/12MM) and the building name of the far end of the cable clearly shown. In each intermediate maintenance hole or hand hole each cable sheath shall be tagged with the number and type of strands in the sheath and the building name of each of the cable endpoints clearly shown.

B. Labeling technique: Each cable is to be labeled within 36” of where it enters each BET or IDF. Cable tags may be cloth or plastic tape securely fastened to the cable sheath. Wrap around tags protected by clear polyurethane tape may be used as well. Tags must be typed or permanent. Cable tags that appear less than permanent will not be accepted. Directly writing on the cable sheath will not suffice as proper labeling. In intermediate maintenance holes and hand holes, one wrap-around cable marker shall be installed on each cable sheath. Markers shall have a clear Mylar covering reading “Fiber Optic Cable-Caution” with space for cable designation. Cable markers shall be orange in color. Other types of tags, tapes or sheath marking are not acceptable.

1.10 **EQUIPMENT RACKS**

A. Numbering scheme: Each rack is numbered sequentially denoting the following information: BET/IDF room number, and rack number. There is no correspondence between the rack equipment and configuration (type) and the rack number. Unique rack number example:

1. 1.1 = Row 1, Rack 1
2. 1.2 = Row 2, Rack 2
3. 2.1 = Row 2, Rack 1
4. 2.2 = Row 2, Rack 2

B. Labeling techniques:

1. Two labels shall be installed onto the front face of each equipment rack, one at the bottom of the rack, and one at the top.
2. All labels shall be black letters on white background.
3. Provide engraved stock melamine plastic laminate, complying with FS L-P-387, in sizes and thicknesses indicated, engraved with engraver’s standard letter style of the sizes and wording indicated, black face and white core plies (letter color) except as otherwise indicated, punched for mechanical fastening

1.11 **TELECOM ROOM ELECTRICAL RECEPTICLES**

A. Each electrical receptacle in IDFs shall be labeled with the following information: room number where electrical panel is located, panel number, and circuit number. Each receptacle is to be labeled on top or front of the faceplate or outlet box. Preprinted adhesive labels or tags shall be used.

PART 2 - PRODUCTS

2.1 **TECHNOLOGY IDENTIFICATION PRODUCTS**

A. Cable/Conductor Identification Bands:
1. Provide Manufacturer's standard wrap-around cable/conductor markers, of size required for proper application, and numbered to show circuit identification.
B. Equipment Labels
1. General: Provide engraved stock melamine plastic laminate, complying with FS L-P-387, in sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black face and white core plies (letter color) except as otherwise indicated, punched for mechanical fastening.
2. Thickness: 1/16", for units up to 20 sq. in. or 8" length; 1/8" for larger units.
C. Lettering and Graphics
1. Coordinate names, abbreviations and other designations used in technology identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of the technology systems and equipment.
2. Fasteners for Plastic-Laminated Signs shall be self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and lock washers.
3. Exception: Where specifically approved contact type permanent adhesive may be used where screws cannot or should not penetrate substrate.

PART 3 - EXECUTION

3.1 **GENERAL**

A. Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application.
B. The contractor shall be responsible to adapt their labeling and identification system to match the existing standards of District of Columbia Courts and meet those standards to the Owner's satisfaction.
1. The contractor shall procure a copy of the owner's detailed labeling & identification standards and shall follow those standards as directed.
C. Lettering and Graphics
1. Coordinate names, abbreviations, colors and other designations used in technology identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as

approved in submittals and as required by standards.

D. Install identification devices as indicated, in accordance with manufacturers written instructions.

E. Sequence of work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

3.2 **CABLE/CONDUCTOR IDENTIFICATION**

A. Apply cable/cable conductor identification on each cable/conductor in each box/enclosure/cabinet where wires of more than one circuit or communication/signal system are present. Match identification with the marking system used on shop drawings, contract documents, and similar previously established identification for project's technology work.

3.3 **OPERATIONAL SIGNS**

A. Provide instructional signs with approved legend where instructions or explanations are needed for system or equipment operation.

3.4 **OUTLET IDENTIFICATION**

A. Label each voice and data outlet with the proper designation and provide appropriate icon. All quad locations should be designated with (3) data icons and (1) voice icons. Attic stock of an additional 50% of total installed cables for voice icons shall be provided to DCSC for future use as functionality changes.

B. The RJ45 jacks shall have the following basic color coding:

1. Voice and Data = White
2. Security = Purple

3.5 INSTALLATION

A. Provide equipment identification labels of engraved plastic-laminate on all equipment racks and on major units of technology equipment in buildings. Except as otherwise indicated, provide single line of text, with ½-inch high lettering on 1-½-inch high label (2-inch high where two lines are required), white lettering in black filed. Text shall match terminology and numbering of the Contract Documents and shop drawings.

B. Provide labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment

C. Contractor shall also be responsible for final labeling of all OFCI Wireless Access Points. Labeling shall be viewed from standing height and exact method and labeling scheme coordinated with owner.

END OF SECTION

COMMISSIONING COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General Provisions and Specification Sections, apply to this and the other sections of Division 27.
B. This section relates to the Structured Cabling Sections of this specification.

1.2 SUMMARY

A. This Section includes general administrative and procedural requirements for the structured cabling system and campus inter-building distribution systems. It includes terminations and testing parameters. Reference individual sections for further expansion of these requirements.
B. Codes: The cabling system installation shall comply fully with all local, county and state laws, ordinances and regulations applicable to electronic and electrical installations.
C. The following industry standards are the basis for the structured cabling system described in this document.

1. TIA/EIA-568-D Commercial Building Telecommunications Cabling Standard and Relevant addenda
2. TIA/EIA-568-D.1 General Requirements
3. TIA/EIA-568-D.2 Balanced Twisted Pair Cabling Components Standard
4. TIA/EIA-568-D.3 Optical Fiber Cabling Components Standard
5. TIA/EIA-569-D Commercial Building Standard for Telecom Pathways and Spaces
6. TIA/EIA-606-B Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
7. TIA/EIA-607-C Commercial Building Grounding/Bonding Requirements
8. NEC National Electrical Code
9. NFPA 70 National Fire Protection Association (NEC)
10. ISO 11801 Generic Cabling for Customer Premises
11. ISO/IEC International Organization for Standards / International Electrotechnical Commission

D. If there is a conflict between applicable documents, then the more stringent requirement shall apply.

All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.

E. This document does not replace any code, either partially or wholly. The contractor must be aware of local codes that may impact this project.

PART 2 - PRODUCTS

2.1 **QUALITY ASSURANCE PARAMETERS**

A. All work shall be performed in accordance with these guidelines, current industry testing standards, and with the test equipment manufacturer recommendations. All work shall be in accordance with the general principles outlined in the BICSI TDMM manual, latest edition. The system shall be certified and manufacturer's warranted solution.

B. All equipment or apparatus of any one system must be the product of one manufacturer, or approved equivalent products of a number of manufacturer's that are suitable for use in a unified system.

C. All materials and equipment for which Underwriter's Laboratories have established standards shall bear a UL label of approval.

D. Where proprietary names are used, whether or not followed by the words "or as approved", they shall be subject to substitution only as approved by the Owner and Technology Consultant.

E. Where the Contractor proposes substitute equipment, contractor shall submit acceptable evidence to indicate compliance with all requirements of the documents, including performance rating, size and resistance to wear and deterioration equivalent to the specified item. In instances where substituted equipment requires additional material or work beyond that shown or required by the specified item, said additional material or work shall be the responsibility of this Contractor, regardless of the trade involved.

F. Furnish (1) new Fluke DTX-5000 Cable Analyzer, including DTX-5000 Main and Smart Remote, LinkWare PC Software, 128MB MMC Card, CAT 6/Class E Permanent Link Adaptors (2), CAT 6/Class E Channel Adapters (2), Headset for Talk (2), AC Chargers (2), carrying case, USB interface cable (Mini-B), Serial RS-232 cable (DB9to IEEE 1394), and user manuals. Also include (1) new DTX-10GKIT Alien Crosstalk Analyzer Kit for DTX-5000, including (2) DTX-AXTLK1 Communications Modules, Windows based DTX AxTalk Analyzer Software, (2) CAT6A/Class EA Permanent Link Adaptors (DTX-PLA002S), (2) Channel Adaptors optimized for Alien Crosstalk measurements (DTX-CHA001AS). This tester shall be used during testing of this project. Included features shall include the ability to integrate with labeling and cable management software, which yields downloadable 606-B cable IDs, ensuring data accuracy. This tester shall be turned over to Owner at project completion along with all tester product documentation and testing accessories. All modules are to be replaced after 5,000 insertions. Provide usage numbers for all modules being turned-over to the Owner. Items being turned-over to the Owner shall have utilization numbers of 3,500 or less; any items exceeding this amount must be replaced with new modules.

PART 3 - EXECUTION

3.1 **UTP CABLE TESTING**

A. Riser and campus distribution cable testing: Each cable pair within all UTP riser cables shall be tested for continuity to ensure conductors are terminated in proper sequence, with correct polarity (tip and ring), and without conductor-to-conductor shorts, conductor-to-ground shorts, or opens.

B. Horizontal cable testing: All UTP station cables shall be tested to prove compliance with the current industry standard, TIA-568-D.2-1 Part 2: Balanced Twisted Pair Cabling Components, Addendum – Transmission Performance Specifications for 4-pair 100 Ω Category 6A Cabling and any subsequent addenda. Permanent Link tests are the only acceptable test format for testing Category 6A cabling.

C. Horizontal cable testing equipment: The testing of UTP station cables shall be performed using the recommended test equipment specifically designed to test cables for all parameters from 0 – 500 MHz. Testers shall be loaded with the most recent test values per the above referenced standard. The contractor will be required to provide current calibration and firmware release for the test equipment to be used.

D. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-D including applicable Technical Service Bulletins and amendments. The appropriate level III tester shall be used to verify Category 6A cabling systems.

3.2 **FIBER OPTIC CABLE TESTING**

A. Inter-building cable testing requirements:

1. Bi-directional direction.
    a. Test multi-mode strands at 850 nm and 1300 nm.
    b. Test single-mode strands at 1310 nm and 1550 nm.
    c. Use optical time domain reflectometer (OTDR) and power meter for tests.
    d. Record the following at the above frequencies:
    e. Signature trace
    f. Length
    g. Polarity
    h. End to end attenuation
2. Fiber optic cables: Test results for fiber optic cables shall consist of the measured attenuation, the maximum attenuation allowed per these guidelines, and whether the test passed or failed for each fiber optic cable link.
3. Provide test report and include as a minimum the following information for all cables:
    a. Fiber cable number
    b. Fiber length.
    c. Attenuation (loss in dB)
    d. Test date
    e. Tester make and model number
    f. Tester calibration date
4. The maximum optical attenuation per connector pair for multimode fiber connectors shall be 0.3 dB or less when measured at 850/1300 nm in accordance with ANSI/EIA/TIA-526-14A, Method A-1. Maximum optical attenuation per connector pair for singlemode fiber connectors shall be .05 dB or less when measured at 1310/1550 nm in accordance with ANSI/EIA/TIA-526-7, Method B. Reflection shall be ≥ 45dB.
5. Fluke Linkware format on CD or approved format.

3.3 **TEST RESULTS**

A. Prior to acceptance, the contractor shall submit a copy of all applicable test results to the Owner/Technology Consultant in both electronic (file) and paper form.

B. Category 6A UTP cables: The test results submitted for Category 6A UTP cables shall be recorded by Fluke Linkware or approved format on CD and include the following:

1. Graphical/numerical data. Both graphical data plots and numerical data are required for the following test parameters:

a. NEXT
b. PS NEXT
c. ELFEXT

d. PS ELFEXT
e. Attenuation
f. Return loss

2. Numerical data. Numerical data only is required for the following test parameters:

a. Propagation delay
b. Delay skew
c. Resistance

3. The Category 6A Horizontal Cable Certification reports shall have complete testing of Permanent Link at frequency increments up to 500 MHz as indicated in TIA/EIA-568-D and shall include the following:

a. Cable/Faceplate Number - matching faceplate numbers on patch panels
b. Test Date
c. Cable Length
d. Wire-Map
e. Network Tests for 100BASE-TX and 1000BASE-T
f. Attenuation
g. Near End Crosstalk (NEXT)
h. Power-sum NEXT (PS-NEXT)
i. Attenuation to Cross Talk Ratio (ACR)
j. Power-sum Attenuation to Crosstalk Ratio (PS-ACR)
k. Equal Level Far End Crosstalk (ELFEXT)
l. Power-sum Equal Level Far End Crosstalk (PS-ELFEXT)
m. Return Loss
n. Propagation Delay
o. Delay Skew
p. Signal to Noise Ratio

4. Testing of horizontal cabling shall not be performed on test equipment with marginal pass/fail notification disabled. If the tester is capable of indicating tests that pass with a measured value closer to the limit than the guaranteed accuracy of the tester, the test result shall be marked (typically as Pass* or Fail*).

5. Marginal pass results will not be accepted. Contractor shall correct issue and retest at no expense to the owner.

C. UTP riser cables: Continuity and Wire Mapping tests shall be performed on each pair. The contractor shall submit a document detailing termination errors, open, short, split pairs, and confirming that

these trouble cable pairs were corrected and tested satisfactorily per these guidelines.

3.4 SYSTEM DOCUMENTATION

A. When all work has been completed and before final acceptance, the Contractor shall furnish to the Technology Consultant a complete set of documents that clearly represent all contract work "as-built". This shall be inclusive of all test results and drawings. The Contractor is responsible for assuring the accuracy of the As-Built documentation.

B. The contractor shall submit, within forty (40) working days of the completion of each phase, three (3) full sets of As-Built documentation to the Technology Consultant for approval. Prior to delivery, each document section and each drawing shall be signed and dated by the Contractor's project manager attesting to the accuracy of the as-built documents.

C. Electronic drawing files must conform to project drawing standards and be nominally in the AutoCAD 2000 format with 2006 preferred as well as the latest version of Visio. The As-Built drawings shall include at minimum, equipment locations, cable routes and outlet locations, and clearly show any deviations from the Contract Documents. Confirm electronic format and edition of Visio desired by owner prior to production and transmission

D. The contractor shall provide, in the BDF, a full-size laminated or similarly framed copy of the drawing which clearly provides an "in-room" roadmap of the voice/data drops that are served from within that space respectively. The final product shall be coordinated with the IT department staff so as to follow Owner standards.

E. Note -The Technology Consultant is under no obligation to provide the Contractor with digital drawing files. However, digital drawing files may be provided to the Contractor for use in the development of Shop Drawings or As-Built drawings under a separate agreement between the Contractor and the Architect.

F. Test printouts and electronic documentation (CD's) generated for each cable by the wire (or fiber) shall be submitted as part of the documentation package. The CD's shall contain the electronic equivalent of the test results and be in and be of a format readable from Microsoft Word or Excel.

G. The As-Built drawings shall include outlet locations. Their sequential number, as defined elsewhere in this document, shall identify outlet locations. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. These documents shall be modified accordingly by the contractor to denote as-built information as defined above and returned to the Technology Consultant.

H. The Technology Consultant may request that a 5% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Architect or Technology Consultant, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

I. Test Results documentation shall be clearly marked on the outside front cover with the words "Project Test Documentation", "H Carl Moultrie Courthouse – C St. Expansion Project" and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, and reference setup. The test equipment name, manufacturer, model number, serial number, software version and calibration date shall also be provided at the end of the document. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

J. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

END OF SECTION

COMMUNICATIONS ROOMS EQUIPMENT FITTINGS

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section and the other sections of Division 27.

1.2 **SUMMARY**

A. This Section includes the following:
1. Cable Management
2. Mounting of owner-furnished equipment in equipment racks
3. Rack mounted power protection and power strips
4. Terminal blocks and patch panels

B. Refer to following Specification Sections:
1. Division 6 Section "Rough Carpentry" for wood framing and blocking for installation of wall-mounted equipment racks.
2. Division 7 Sections for fire-stopping materials and installation at penetrations through walls, ceilings, and other fire-rated elements.
3. Division 26 Sections for supports, anchors, identification products, electrical service and connections.

C. Provide cabinets and racks in accordance with the Contract Documents. Where conflicting data is indicated, verify mounting and equipment requirements prior to ordering.

D. This section contains specific parts selected by Owner and Technology Consultant. In the event that the parts specified are not available, Owner and Technology Consultant shall be contacted to specify replacements.

1.3 **COORDINATION**

A. This contractor shall be responsible for all coordination with the general and electrical contractor and data and voice vendors to provide a complete operational system.

B. Coordinate layout and installation of equipment racks with adjacent construction.

1.4 **SUBMITTALS**

A. Product Data: For copper protection devices, cabinets and equipment racks, termination blocks and patch panels, cable management devices, and power strips.

B. Shop Drawings: Show fabrication and installation details of components for cabinets, equipment

racks, and their associated parts and pieces to make a complete system.

C. Show rack elevations for review and approval by the Owner and Technology Consultant.
D. Allow sufficient time in project scheduling for Owner and Technology Consultant review.
E. Submittals shall be checked by the supplier and made as complete systems including all required accessories and any special tools.
F. Manufacturer's installation and maintenance instructions.

1.5 **QUALITY ASSURANCE**

A. Source Limitations: Obtain each type of enclosure through one source from a single manufacturer.
B. All work shall be in accordance with the latest edition of all applicable State, and Federal regulations and codes. Further, all work shall also be in accordance with EIA/TIA Standards, the BICSI TDMM manual, latest edition and with the manufacturer's recommendations.

1.6 **SEQUENCING AND SCHEDULING**

A. Sequence all work to support the installation of the structured cabling system, electrical work and all cable tray systems installation.

PART 2 - PRODUCTS

2.1 **MANUFACTURERS**

A. Available manufacturers are listed in subparagraphs for each Part 2 article below.
B. Proposed substitutions shall be submitted WITH THE BID and must be approved by the Owner and Technology Consultant.
C. Requests for substitution are only permitted for materials specified with an "or approved equivalent" clause or other language of same effect in the Contract Documents.

2.2 **HORIZONTAL CABLE MANAGER**

A. Provide horizontal cable managers, 2 RU in height. Provide angled horizontal cable managers as required per drawings. Mount as directed by the owner or technology consultant. Refer to rack elevations for typical requirements.
B. Manufacturers:
1. CPI/Chatsworth Product Inc.
2. Great Lakes Case and Cabinet
3. Ortronics

2.3 **RACK MOUNT POWER STRIP**

A. Provide rack-mounted power strips 1 RU in height with 8 outlets and 10' cord. Provide one per rack
1. CPI/Chatsworth Product Inc.
a. Part #13239-753.
2. Great Lakes Case and Cabinet
a. 7219-SR14, 14 position (6 front/8 back) Power Strip with surge suppressor for 19" mounting
3. Ortronics

PART 3 - EXECUTION

3.1 **HORIZONTAL CABLE MANAGERS**

A. Installation
1. Rack mount screws not used for installing patch panels, keys and other hardware shall be bagged and left with the rack upon completion of the installation.
2. Horizontal wire managers shall be installed as indicated on the drawings.
3. Horizontal cable jumper tray shall be in the uppermost position and have the radius section adjusted to transition optical fiber to the vertical cable channel.

3.2 **OWNER FURNISHED, CONTRACTOR INSTALLED EQUIPMENT**

A. Owner furnished, contractor installed equipment includes the following. Contractor shall coordinate the delivery, storage, and installation of all of the devices with the owner.

1. Network Switches
2. UPS and batteries
3. Wireless Access Points, including final labeling

END OF SECTION

COMMUNICATIONS BACKBONE CABLING

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS:**

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section and the other sections of Division 27.
B. This section is inclusive to all Division 27 sections.
C. Division 7 Sections for firestopping materials and installation at penetrations through walls, ceilings, and other fire-rated elements.

1.2 **DRAWINGS**

A. The drawings show the general arrangement and extent of the work only. Determine the exact location and arrangement of all parts as the work progresses.
B. In all details, the work shall be subject to the Owner's direction and approval. All work shall conform to its surroundings in best possible manner.

1.3 **SCOPE OF WORK**

A. General
1. This project includes the installation of fiber and copper cables.
2. All UTP terminations must follow 568B wiring schematic.
3. All copper cabling shall be manufactured by:
a. Belden
b. Berk-Tek/Leviton
c. Commscope Uniprise
d. Other approved equal
4. All fiber optic cabling shall be manufactured by:
a. Belden
b. Berk-Tek/Leviton
c. Commscope
d. Other approved equal.

B. The Contractor shall provide a complete structured cabling system that will accommodate voice, and data for all rooms defined in scope.

C. Intra-Building Backbone Cabling
1. CourtSmart Central Recording System:
a. Cabling shall be a new (12) pair plenum rated cable (typical of CSC 111421-09-1RL). Each cable shall be installed from the Central Recording CourtSmart server room located in Moultrie Courthouse Suite 2300 to each hearing room, courtroom, and rack location as indicated on the drawings.
b. Contractor shall rough-in each cable with a 15' service loop at each end. No splices shall be allowed. The DC Court's CourtSmart Contractor shall be responsible for all terminations, connections, and DSP programming.
c. Contractor shall confirm exact location in 2300 and each endpoint with DC Courts prior to installation.
2. Fiber Optic Cabling:
a. Install (1) new 12-strand single-mode cable (OS2) and (1) new 24-strand multimode cable (OM4) from the existing data center (Room #C301-A) to each IDF as indicated on the drawings. At each end, terminate fiber in new rack mounted fiber distribution unit with LC panels and connectors as indicated on the drawings. Coordinate exact location in the existing data center (Room #C301-A)

with owner.

b. Install (1) new 6-strand multimode cable (OM4) from the Family/Juvenile Court Systems network headend (Room #JM-G) to each IDF as indicated on the drawings. At each end, terminate fiber in new rack mounted fiber distribution unit with LC panels and connectors as indicated on the drawings. Coordinate exact location in the existing JM-G room with owner.

c. Be plenum rated.

3. Copper Cabling:

a. Install (1) new 100-pair copper cable from the voice demarcation room (Room # COM P1) to each IDF as indicated on the drawings.

b. Terminate copper on new wall mounted 110-type termination blocks in the voice demarcation room (Room # COM P1). Coordinate exact location in the voice demarcation room with owner. In each IDF, terminate on rack-mounted Category 6A flat patch panels; 1-pair per port as indicated on the drawings.

c. Be plenum rated.

4. Coaxial Cabling:

a. Install (1) new RG-11 cable from the voice demarcation room (Room # COM P1) to each IDF as indicated on the drawings.

b. Terminate coaxial cable on F-type connectors with a 20’ service loop on each end. Coordinate exact location within the voice demarcation room with owner.

c. Be plenum rated.

PART 2 - PRODUCTS

2.1 **GENERAL**

A. Available manufactures are listed in subparagraphs for each Part article below.

B. Proposed substitutions shall be submitted WITH THE BID and must be approved by the Owner and Technology Consultant.

C. Request for substitutions are only permitted for materials with an “or approved equivalent” clause or other language of the same effect in the Contract Documents.

2.2 **BACKBONE CABLING**

A. Cables allowed for use in the inter-building backbone include fiber optic and 100Ω UTP multi-pair copper cables. The cable shall support voice, data, and imaging applications. The bending radius and pulling strength requirements of all backbone cables shall be observed during handling and installation.

B. All UTP cables shall conform to ANSI/TIA/EIA-568-D Commercial Building Telecommunications Cabling Standard and ISO/IEC 11801 (International) Generic Cabling for Customer Premises standard.
C. CourtSmart Central Recording System:
1. 12-pair plenum rated cable, CSC 111421-09-1RL.

D. Multimode (OM4) 24-strand fiber shall be:
1. Belden
a. FiberExpress Armored Distribution, Indoor Plenum rated, 24-strand OM4 Part # FI4D024AJ
2. Berk-Tek/Leviton

a. Part #PDPK12B048-024XB3010/X5-012AB0403;Indoor/Plenum/Armored 24-strand OM4+ MMF, 12-strand OS2 SMF; Hybrid Cable.
b. Part #PDPK12B024XB3010; Indoor/Plenum/Armored 24-strand OM4+ MMF.
3. Commscope
a. Uniprise, OM4, Armored, Indoor Plenum rated, 24-strand Part # P-024-DZ-5K-FSUAQ, 760127910
4. Other approved equal

E. Single-Mode (OS2) 12-strand fiber shall be:
1. Belden
a. FiberExpress Armored Distribution, Indoor Plenum rated, 12-strand OS2 Part # FISD012A9
2. Berk-Tek/Leviton
a. Part #PDPK12B048-024XB3010/X5-012AB0403;Indoor/Plenum/Armored 24-strand OM4+ MMF, 12-strand OS2 SMF; Hybrid Cable.
b. Part #PDPK12B012AB0403; Indoor/Plenum/Armored 12-strand OS2 SMF.
3. Commscope
a. Uniprise, OS2, Armored, Indoor Plenum rated, 12-strand Part # P-012-DZ-8W-FSUYL, 760127803
4. Other approved equal

F. Multimode (OM4) 6-strand fiber shall be:
1. Belden,
a. FiberExpress Armored Distribution, Indoor Plenum rated, 6-strand OM4 Part # FI4D006A9
2. Berk-Tek/Leviton
a. Part # PDPK006XB3010/X5; Indoor/Plenum/Armored 6-strand OM4+ MMF.
3. Commscope
a. Uniprise, OM4, Armored, Indoor Plenum rated, 6-strand Part # P-006-DS-5K-FSUAQ, 760012138
4. Other approved equal

G. Fiber terminations shall be:
1. Belden
a. Fiber Termination Unit, Part #AX105564
b. Duplex Multimode Adapter Panels, Part #FC4H12LDFS
c. Duplex Single-Mode Adapter Panels, Part #FCSH12LAFS
d. LC-Type Multimode Connectors, Fusion Splice Pigtails
e. LC-Type Single-Mode Connectors, Fusion Splice Pigtails
2. Berk-Tek/Leviton
a. Fiber Termination Unit, Part #5R2UH-S06
b. Duplex Multimode Adapter Panels, Part # 5F100-4PL

c. Duplex Single-Mode Adapter Panels, Part # 5F100-4LL
d. LC-Type Multimode Connectors, Fusion Splice Pigtails
e. LC-Type Single-Mode Connectors, Fusion Splice Pigtails
3. Commscope Uniprise
a. Fiber Termination Unit, Part # 760147447, RFE-SLC-IS-EMT-BK/2U-PNL
b. Duplex Multimode Adapter Panels, Part # PNL-BK-024-MFA-LC02-AQ-NS 760148171
c. Duplex Single-Mode Adapter Panels, Part # PNL-BK-024-SFA-LC02-BL-NS, 760148361
d. LC-Type Multimode Connectors, Fusion Splice Pigtails
e. LC-Type Single-Mode Connectors, Fusion Splice Pigtails
4. Other approved equal

H. Multi-Pair Copper Cable shall be:
1. 100-pair 100Ω cable
2. Manufacturers:
a. Belden, Part #IBDN25P, Category 5e 25-pair UTP Plenum
b. Berk-Tek/Leviton, Part #10089521, Power Sum Category 5e 25-pair UTP Plenum
c. Commscope Uniprise, Part #4172306/10 | 5E25, Category 5e 25-pair UTP Plenum

I. Coaxial Cable shall be:
1. Manufacturers:
a. Belden, Part #1153A, Quad Shielded, 14 AWG Solid, FEP Jacket, Plenum rated, RG-11 Coaxial Cable
b. Berk-Tek/Leviton, Part # 10061910, Quad Shiedled, 14 AWG, Plenum rated, RG-11 Coaxial Cable
c. Commscope Uniprise, Part # 2287V, 4101204/10, Quad Shielded 14 AWG Solid Foam FEP, Plenum Rated, RG-11 Coaxial cable

PART 3 - EXECUTION

3.1 **SITE SURVEY**

A. Prior to placing any cable pathways or cable, the Contractor shall survey the site to determine job conditions will not impose any obstructions that would interfere with the safe and satisfactory placement of the cables. The arrangements to remove any obstructions with the Project Manager need to be determined at that time.

3.2 **PHYSICAL INSTALLATION**

A. Industry requirements; The following installation, documentation, component and system industry specifications shall be met or exceeded:
1. ANSI/TIA/EIA-526-7 “Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant”.
2. ANSI/TIA/EIA-526-14A “Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant”.
3. ANSI/TIA/EIA-568-D.1 and addenda “Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements”.
4. ANSI/TIA/EIA-568-D.2 and addenda “Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted-Pair”.
5. ANSI/TIA/EIA-568-D.3 and addenda “Commercial Building Telecommunications Cabling Standard - Part 3: Optical Fiber Cabling and Components Standard”.

6. ANSI/TIA/EIA-569-D and addenda "Commercial Building Standard for Telecommunications Pathways and Spaces".
7. ANSI/TIA/EIA-606-B and addenda "Administration Standard for the Telecommunications Infrastructure of Commercial Buildings".
8. ANSI/TIA/EIA-607-C and addenda "Commercial Building Grounding and Bonding Requirements for Telecommunications".
9. IEC/TR3 61000-5-2 - Ed. 1.0 and amendments "Electromagnetic compatibility (EMC) - Part 5: Installation and mitigation guidelines - Section 2: Earthing and cabling".
10. ISO/IEC 11801:2000 Ed1.2 and amendments "Information technology - Generic cabling for customer premises".
11. CENELEC EN 50173:2000 and amendments "Information Technology - Generic cabling systems".

B. Cable Pathways

1. Pathways shall be designed and installed to meet applicable local and national building and electrical codes or regulations.
2. Grounding and bonding of pathways shall comply with applicable codes and regulations.
3. Pathways shall not have exposed sharp edges that may come into contact with telecommunications cables.
4. The number of cables placed in a pathway shall not exceed manufacture specifications, nor, will the geometric shape of a cable be affected.

C. Cable Routing

1. In open ceiling cabling, cable supports shall be provided by means that is structurally independent of the suspended ceiling, its framework, or supports. These supports shall be spaced no more than 1.5m (5ft) apart.
2. Telecommunications pathways, spaces and metallic cables, which run parallel with electric power or lighting, which is less than or equal to 480 Vrms, shall be installed with a minimum clearance of 50mm (2in).
3. The installation of telecommunications cabling shall maintain a minimum clearance of 3m (10ft) from power cables in excess of 480 Vrms.

4. No telecommunications cross-connects shall be physically located within 6m (20ft) of electrical distribution panels, step down devices, or transformers, which carry voltages in excess of 480 Vrms.
5. In the telecommunications rooms where cable trays or cable racking are used, the Contractor shall provide appropriate means of cable management such as reusable color-coded hook and loop cable managers (ties) to create a neat appearance and practical installation.
6. In a false ceiling environment, a minimum of 9-inches shall be observed between the cable supports and the false ceiling.
7. Continuous conduit runs installed by the Contractor should not exceed 30.5m (100ft) or contain more than two (2) 90-degree bends without utilizing appropriately sized pull boxes.
8. Maximum conduit pathway capacity shall not exceed a 40% fill. However, perimeter fill is limited to 60% fill for move and changes.

D. Backbone pathways shall:

1. Be installed or selected such that the minimum bend radius of backbone cables is kept within manufacturer specifications both during and after installation.
2. Have adequate riser sleeve/slot space available with the ability to ingress the area at a later date in all Telecommunications Rooms, such that no drilling of additional sleeves/slots is necessary.

E. Pulling Tension

1. The maximum cable pulling tensions shall not exceed manufacturer's specifications.

F. Bend Radius

1. The maximum cable bend radii shall not exceed manufacturer's specifications.
2. In spaces with UTP cable terminations, the maximum bend radius for 4-pair cable shall not exceed four times the outside diameter of the cable and ten times for multi-pair cable. This shall be done unless this violates manufacturer specifications.
3. During the actual installation, bend radius on 4-pair cable shall not exceed eight times the outside diameter of the cable and ten times for multi-pair cable. This shall be done unless this violates manufacturer specifications.

G. Slack/Service Loop

1. In telecommunications rooms a minimum of 6m (20ft) of slack should be left for all cable types. This slack must be neatly managed on plywood walls fields in locations as shown on drawings.

H. Cable Wraps

1. Hook and loop cable managers should be used in the telecommunications rooms where reconfiguration of cables and terminations may be frequent.

I. Grounding

1. Grounding and bonding shall be done per applicable codes and standards.

J. Fire Protection

1. Properly installed firestop systems shall be installed to prevent or retard the spread of fire, smoke, water, and gases through the building. This requirement applies to openings designed for telecommunications use that may or may not be penetrated by cables, wires, or raceways.
2. Fire stops shall comply with all applicable codes.

K. Workmanship

1. All work shall be done in a workman like fashion of the highest standards in the telecommunications industry. All equipment and materials are to be installed in a neat and secure manner, while cables are to be properly dressed. Workers must clean any debris and trash at the close of each workday.

END OF SECTION

COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

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 is inclusive to all Division 27 sections.

1.2 **DRAWINGS**

A. The drawings show the general arrangement and extent of the work only. Determine the exact location and arrangement of all parts as the work progresses.

B. All work shall be subject to the Owner's direction and approval.

1.3 **SUBMITTALS**

A. The contractor shall provide product submittals for all system components as defined in Part 2 of this specification section. These components shall include all structured cabling and associated structured cabling

components. The selected contractor will allow sufficient time in project scheduling for client and review by the Architect's Technology Consultant.

1.4 **SCOPE OF WORK**

A. The campus network cabling solution shall be based upon structured cabling system components manufactured by Belden, Berk-Tek/Leviton, or Commscope Uniprise. This may include but not be limited to cable management, faceplates, copper and fiber modules, patch panels, racks, 110-type blocks, patchcords, labels and grounding hardware.
B. All UTP terminations shall follow 568B wiring schematic
C. All copper cabling shall be manufactured by Belden, Berk-Tek/Leviton, or Commscope Uniprise.
D. The installed system shall meet all the requirements necessary to achieve certification for the manufacturer's certified warranty program.
E. The Contractor shall provide a complete structured cabling system that will support voice, data, security and video applications for the building.
F. Contractor shall provide outlets as identified in this specification or indicated on the drawings.

PART 2 - PRODUCTS

2.1 **CATEGORY 6A HORIZONTAL CABLING**

A. General

1. Available manufactures are listed in subparagraphs for each PART 2 article below.
2. Proposed substitutions shall be submitted WITH THE BID and must be approved by the Owner and Technology Consultant.
3. Requests for substitutions are only permitted for materials specified with an "or approved equivalent" clause or other language of the same effect in the Contract Documents.

B. The Horizontal Subsystem is the portion of the telecommunications cabling system that extends from the work area telecommunications outlet/connector to the horizontal cross-connect in the telecommunications room. It consists of the telecommunications outlet/connector, the horizontal cable and the patch panel or termination block in the telecommunications room.

C. Cable Types
1. All telecommunications cables shall conform to ANSI/TIA/EIA 568-D Commercial Building Telecommunications Cabling Standard (latest amendment including all applicable addenda) and ISO/IEC 11801 (International) Generic Cabling for Customer Premises standard.
2. Be appropriate for the environment in which it is installed.
3. The copper 4-pair UTP Category 6A cables shall meet the ANSI/TIA/EIA 568-D and manufacturers specifications for following items:
a. Attenuation
b. Near End Crosstalk (NEXT)
c. Power Sum Near Crosstalk (PSNEXT)

d. Equal Level Far-End Crosstalk (ELFEXT)
e. Power Sum Equal Level Far-End Crosstalk (PSELFEXT)
f. Return Loss
g. Propagation Delay (ANSI/TIA/EIA-568-DC1)
h. Delay Skew (ANSI/TIA/EIA-568-D1)

i. Attenuation to Crosstalk Ratio (ACR)
j. Power Sum Attenuation to Crosstalk Ratio (PSACR)
k. Near End Crosstalk (NEXT) Loss
l. Near End Crosstalk (NEXT) Loss
4. Cable shall be:
a. Manufacturers:
(1) Belden, Part # 10GX13 CMP, Category 6A UTP System, Blue Jacket, Plenum Rated.
(2) Berk-Tek/Leviton, Part # 11082062, LANmark-XTP CMP; CX6850 Category 6A Premium+ UTP System, Blue Jacket, Plenum Rated.
(3) Commscope Uniprise, Part # 8765404/10; 10G4 CMP Category 6A UTP Cable, Blue Jacket, Plenum Rated.
(4) Other approved equal.
5. Equivalents shall:
a. Meet or exceed parameters of the specified cable.
b. Maintain warranty as stated herein.
2.2 COAXIAL HORIZONTAL CABLING
1. Cable shall be:
a. Manufacturers:
(1) Belden, Part # 1829P; Plenum
(2) Berk-Tek/Leviton, Part # 10057997; Plenum
(3) Commscope Uniprise, Part# 4112704/10; Plenum
(4) Other approved equal.
2. Equivalents shall:
a. Meet or exceed parameters of the specified cable.
b. Maintain warranty as stated herein.

2.3 **PATCH PANELS**

A. Patch panels shall:
1. Support Category 6A performance levels.
2. Be angled to minimize or eliminate the use of horizontal cable managers to feed the patch panels.
3. Be 48-port capacity and 2RU in height.
4. Be 8-position /8-conductor with coherent pairing of IDC pins
5. Be backwards compatible to allow lowering the performing categories of cables or connecting hardware to operate to their full capacity.
6. Support industry standards for T568A or T568B wiring options on each individual outlet.
7. Be made by an ISO 9001 and 14001 Certified Manufacturer.
8. Manufacturers:
a. Belden, Part # AX105364 10GX Angled Patch Panel, Modular, 48-port, 2RU
b. Berk-Tek/Leviton, Part #49256-H48, Angled Quick Port Patch Panel+, Modular, 2RU 48-Port
c. Commscope Uniprise, Part # M2000A-48-2U, 760207308, Angled Patch Panel, Modular, 48-port, 2RU

2.4 **INFORMATION OUTLET**

A. All Category 6A high density information outlets for 100Ω 22-24AWG copper cable shall:
1. Be available in white, blue and purple.
2. Be 8-position /8-conductor with coherent pairing of IDC pins
3. Have available a 45-degree angled low profile as well as flush mount design.
4. Provide universal application/multi –vendor support
5. Utilize center tuned technology with optimized pair balance design and linear crosstalk response to address applications up to 500 MHz.
6. Support industry standards for T568A or T568B wiring options on each individual outlet.
7. Allow installation from the front or the rear of the faceplate, and allow for the jack to pass through the faceplate without re-termination.
8. Be side-stackable for high density solutions.
9. Provide color-coded, slide-in icons available for circuit identification.
10. Be constructed of high impact, flame-retardant thermoplastic.
11. Be made by an ISO 9001 and 14001 Certified Manufacturer.
12. Be ANSI/TIA/EIA 568-D.2-1 and ISO/IEC 11801 Category 6A compliant
13. Be UL VERIFIED (or equivalent) for TIA/EIA Category 6A electrical performance.
14. Be UL LISTED 1863 and CUL approved.
15. Manufacturers:

a. Belden, Part # RVAMJKUXX-S1, 6A REVConnect Jack 10GX UTP
b. Berk-Tek/Leviton, Part #6AUJK-R*6, Atlas-X1, Cat 6A QuickPort Connector
c. Commscope Uniprise, Part # UNJ10G-**, 760149989

2.5 **FACEPLATES**

A. Face plates shall be:
1. Manufacturers:

a. Belden, Part #
(1) 1-port, AX102660
(2) 2-port, AX102655
(3) 4-port, AX102249
(4) 6-port, AX102251
(5) Wall Phone, AX104126
b. Berk-Tek/Leviton, Part #
(1) 1-port, 42080-1WS
(2) 2-port, 42080-2WS
(3) 4-port, 42080-4WS
(4) 6-port, 42080-6WS
(5) Wall Phone, 4108W-1SP
c. Commscope Uniprise, Part #
(1) 1-port, M10L-262, 108258427
(2) 2-port, M12L-262, 108168469
(3) 4-port, M14L-262, 108168543
(4) 6-port, M16L-262, 108168584

(5) Wall Phone, M10LWSP, 760117572

B. Blank inserts shall be used in unused faceplate openings.

1. Manufacturers:
   a. Belden, Part # AX102262, KeyConnect Blank Insert
   b. Berk-Tek/Leviton, Part # 41084-BW
   c. Commscope Uniprise, Part # M20AP-262, 107067928

PART 3 - EXECUTION

3.1 **SITE SURVEY**

A. Prior to placing any cable pathways or cable, the Contractor shall survey the site to determine job conditions will not impose any obstructions that would interfere with the safe and satisfactory placement of the cables. The arrangements to remove any obstructions with the Project Manager need to be determined at that time.

3.2 **PHYSICAL INSTALLATION**

A. Industry requirements; The following installation, documentation, component and system industry specifications shall be met or exceeded:

1. ANSI/TIA/EIA-526-7 “Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant”.
2. ANSI/TIA/EIA-526-14A “Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant”.
3. ANSI/TIA/EIA-568-D.1 and addenda “Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements”.
4. ANSI/TIA/EIA-568-D.2 and addenda “Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted-Pair”.
5. ANSI/TIA/EIA-568-D.3 and addenda “Commercial Building Telecommunications Cabling Standard - Part 3: Optical Fiber Cabling and Components Standard”.
6. ANSI/TIA/EIA-569-D and addenda “Commercial Building Standard for Telecommunications Pathways and Spaces”.
7. ANSI/TIA/EIA-606-B and addenda “Administration Standard for the Telecommunications Infrastructure of Commercial Buildings”.
8. ANSI/TIA/EIA-607-C and addenda “Commercial Building Grounding and Bonding Requirements for Telecommunications”.
9. IEC/TR3 61000-5-2 - Ed. 1.0 and amendments “Electromagnetic compatibility (EMC) - Part 5: Installation and mitigation guidelines - Section 2: Earthing and cabling”.
10. ISO/IEC 11801:2000 Ed1.2 and amendments “Information technology - Generic cabling for customer premises”.
11. CENELEC EN 50173:2000 and amendments “Information Technology - Generic cabling systems”.

B. Cable Pathways

1. Pathways shall be designed and installed to meet applicable local and national building and electrical codes or regulations.
2. Grounding and bonding of pathways shall comply with applicable codes and regulations.
3. Pathways shall not have exposed sharp edges that may come into contact with telecommunications cables.
4. The number of cables placed in a pathway shall not exceed manufacture specifications, nor, will the geometric shape of a cable be affected.

C. Cable Routing

1. All horizontal cables, regardless of media type, shall not exceed 90 meters (295 ft.0from the telecommunications outlets in the work area to the horizontal cross-connect.

2. The combined length of jumpers or patchcords and equipment cables in the telecommunications room/closet and the work area shall not exceed 10 meters (33 ft.) unless used in conjunction with a multi-user telecommunications outlet.
3. Two horizontal cables shall be routed to each work area. At least one cable connected to an information outlet shall be 4-pair, 100Ω unshielded twisted-pair (UTP).
4. Horizontal pathways shall be installed or selected such that minimum bend radius of horizontal cables is kept within the manufacturers specification both during and after the installation.
5. In open ceiling cabling, cable supports shall be provided by means that is structurally independent of the suspended ceiling, its framework, or supports. These supports shall be spaced no more than 1.5m (5ft) apart.
6. Telecommunications pathways, spaces and metallic cables, which run parallel with electric power or lighting, which is less than or equal to 480 Vrms, shall be installed with a minimum clearance of 50mm (2in).
7. The installation of telecommunications cabling shall maintain a minimum clearance of 3m (10ft) from power cables in excess of 480 Vrms.
8. No telecommunications cross-connects shall be physically located within 6m (20ft) of electrical distribution panels, step down devices, or transformers, which carry voltages in excess of 480 Vrms.
9. For voice or data applications, 4-pair UTP or fiber optic cables shall be run using a star topology from the telecommunications room serving that floor, to every individual information outlet.
10. The Contractor shall observe the bending radius and pulling strength requirements of the 4-pair UTP and fiber optic cable during handling and installation.
11. In the telecommunication room where cable trays or cable racking are used, the Contractor shall provide appropriate means of cable management such as reusable color-coded hook and loop.
12. In a false ceiling environment, a minimum of 9-inches shall be observed between the cable supports and the false ceiling.
13. Continuous conduit runs installed by the Contractor should not exceed 30.5m (100ft) or contain more than two (2) 90-degree bends without utilizing appropriately sized pull boxes.
14. Maximum conduit pathway capacity shall not exceed a 40% fill. However, perimeter fill is limited to 60% fill for move and changes.

D. Work Area terminations:

1. All UTP cables wired to the telecommunications outlet/connector shall have 4-pairs terminated in eight-position modular outlets in the work area. All pairs shall be terminated.
2. The telecommunications outlet/connector shall be securely mounted at planned locations.
3. The height of the telecommunications faceplates shall be applicable to codes and regulations.

E. Pulling Tension

1. The maximum cable pulling tensions shall not exceed manufacturer’s specifications.

F. Bend Radius
1. The maximum cable bend radii shall not exceed manufacturer's specifications.
2. In spaces with UTP cable terminations, the maximum bend radius for 4-pair cable shall not exceed four times the outside diameter of the cable and ten times for multi-pair cable. This shall be done unless this violates manufacturer specifications.
3. During the actual installation, bend radius on 4-pair cable shall not exceed eight times the outside diameter of the cable and ten times for multi-pair cable. This shall be done unless this violates manufacturer specifications.

G. Slack/Service Loop
1. In telecommunications rooms a minimum of 10ft of slack should be left for all cable types. This slack must be neatly managed on plywood walls fields in locations as shown on drawings.

H. Cable Wraps
1. Hook and loop cable managers should be used in the telecommunications rooms where reconfiguration of cables and terminations may be frequent.

I. Grounding
1. Grounding and bonding shall be done per applicable codes and standards.

J. Fire Protection
1. Properly installed firestop systems shall be installed to prevent or retard the spread of fire, smoke, water, and gases through the building. This requirement

applies to openings designed for telecommunications use that may or may not be penetrated by cables, wires, or raceways.
2. Fire stops shall comply with all applicable codes.

K. Workmanship
1. All work shall be done in a workman like fashion of the highest standards in the telecommunications industry. All equipment and materials are to be installed in a neat and secure manner, while cables are to be properly dressed. Workers must clean any debris and trash at the close of each workday.

END OF SECTION

COMMUNICATIONS CONNECTING CORDS, DEVICES, AND ADAPTERS

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section and the other sections of Division 27.
B. This section is inclusive to all Division 27 sections.
C. Division 7 Sections for fire-stopping materials and installation at penetrations through walls, ceilings, and other fire-rated elements.

1.2 **DRAWINGS**

A. The drawings show the general arrangement and extent of the work only. Determine the exact location and arrangement of all parts as the work progresses.
B. In all details, the work shall be subject to the Owner's direction and approval. All work shall conform to its surroundings in best possible manner.

1.3 **SCOPE OF WORK**

A. General

1. This project includes the supply of patch cords, adaptors and devices.
2. All UTP terminations must follow 568B wiring schematic.
3. Contractor shall install patch cords between switches and patch panels per owner direction.

1.4 **SUBMITTALS**

A. The contractor shall provide product submittals for all system components as defined in Part 2 of this specification section. These components shall include all communications connection cords, devices and associated components. The selected contractor will allow sufficient time in project scheduling for client and review by the Architect's Technology Consultant

PART 2 - PRODUCTS

2.1 **CORDS, DEVICES, AND ADAPTORS**

A. This portion of the communications system includes termination of copper and fiber cables using modules and adaptors, faceplates, and patch cords.

2.2 **WORK AREA**

A. This section outlines specifications for the work area equipment cords, and telecommunications outlets at the users work area. The connection between the information outlet and the device (computer/telephone) is achieved by means of this subsystem.

2.3 **PATCHCORDS**

A. Work Area patchcords shall meet or exceed the following criteria:
1. Category 6A, modular equipment cords shall:
2. Be round, and consist of eight insulated 24 AWG, stranded copper conductors, arranged in four color-coded twisted-pairs within a flame-retardant jacket.
3. Be equipped with modular 8-position (RJ45 style) plugs on both ends, wired straight through with standards compliant wiring.
4. Be backwards compatible with lower performing categories.
5. Use modular plugs which exceed FCC CFR 47 part 68 subpart F and IEC 60603-7 specifications, and have 50 micro inches minimum of gold plating over nickel contacts.
6. Be resistant to corrosion from humidity, extreme temperatures, and airborne contaminants.
7. Be available in any custom length and standard lengths of 0.9, 1.5, 2.1, 3.1, 4.6, 6.1, 7.6 meters (3, 5, 7, 10, 14, 20, and 25 feet).
8. Be made by an ISO 9001 and 14001 Certified Manufacturer.
9. Electrical Specifications:
10. Have a DC resistance per lead: 9.38 Ω / 100 m maximum.
11. Have input impedance without averaging: 100 Ω + 15% from 1 to 100 MHz, + 22% from 100 to 200 MHz and + 32% from 200 to 500 MHz.

12. Be 100% transmission tested with laboratory grade network analyzers for proper performance up to 500 MHz. Vendor shall guarantee cords are compatible with Category 6A Permanent Link.
13. Be UL VERIFIED (or equivalent) for TIA/EIA Category 6A electrical performance.
14. Be UL LISTED 1863 and CUL C22.2 approved.
15. One plug end shall be of the Paralign type, and the other shall be low profile type to address bend radius requirements to plug into IP phones sets.
16. Be patchcords
a. Manufacturers:
(1) Belden, Part #
a) 6A Patch Cord Part #CA22106003
b) 6A Patch Cord Part #CA22106005
c) 6A Patch Cord Part #CA22106010
(2) Berk-Tek/Leviton, Part #
a) Atlas X-1 Cat 6A SlimLine Patch Cord Part #6AS10-L03
b) Atlas X-1 Cat 6A SlimLine Patch Cord Part #6AS10-L05
c) Atlas X-1 Cat 6A SlimLine Patch Cord Part #6AS10-L10
(3) Commscope Uniprise,
a) UNC10G-BL, UC1AAA2-0ZF003
b) UNC10G-BL, UC1AAA2-0ZF005
c) UNC10G-BL, UC1AAA2-0ZF010
17. Supply one (1) per outlet of each faceplate.
(1) Supply 30% of the cords, 3 foot in length.
(2) Supply 30% of the cords, 5 foot in length.
(3) Supply 40% of the cords, 10 foot in length.
B. Telecommunication Room patchcords shall meet or exceed the following criteria:
1. Category 6A, modular equipment cords shall:

2. Be round, and consist of eight insulated 24 AWG, stranded copper conductors, arranged in four color-coded twisted-pairs within a flame-retardant jacket.
3. Be equipped with modular 8-position (RJ45 style) plugs on both ends, wired straight through with

standards compliant wiring.

4. Be backwards compatible with lower performing categories.
5. Use modular plugs which exceed FCC CFR 47 part 68 subpart F and IEC 60603-7 specifications, and have 50 micro inches minimum of gold plating over nickel contacts.
6. Be resistant to corrosion from humidity, extreme temperatures, and airborne contaminants.
7. Be available in any custom length and standard lengths of 0.9, 1.5, 2.1, 3.1, 4.6, 6.1, 7.6 meters (3, 5, 7, 10, 14, 20, and 25 feet).
8. Be made by an ISO 9001 and 14001 Certified Manufacturer.
9. Electrical Specifications:
10. Have a DC resistance per lead: 9.38 Ω / 100 m maximum.
11. Have input impedance without averaging: 100 Ω + 15% from 1 to 100 MHz, + 22% from 100 to 200 MHz and + 32% from 200 to 500 MHz.
12. Be 100% transmission tested with laboratory grade network analyzers for proper performance up to 500 MHz. Vendor shall guarantee cords are compatible with Category 6A Permanent Link.
13. Be UL VERIFIED (or equivalent) for TIA/EIA Category 6A electrical performance.
14. Be UL LISTED 1863 and CUL C22.2 approved.
15. Both plug end shall be of the Paralign type, and have a protective mechanism to prevent connector from catching or obstructions
16. Quantities shall be based on the total number of switch ports provided by the owner both active and inactive.
17. Manufacturers:

a. Belden
(1) Supply 25% of the cords, 6A Patch Cord Part #CA22106003
(2) Supply 25% of the cords, 6A Patch Cord Part #CA22106005

(3) Supply 25% of the cords, 6A Patch Cord Part #CA22106007
(4) Supply 25% of the cords, 6A Patch Cord Part #CA22106010

b. Berk-Tek/Leviton
(1) Supply 25% of the cords, Atlas X-1 Cat 6A SlimLine Patch Cord Part #6AS10-L03
(2) Supply 25% of the cords, Atlas X-1 Cat 6A SlimLine Patch Cord Part #6AS10-L05
(3) Supply 25% of the cords, Atlas X-1 Cat 6A SlimLine Patch Cord Part #6AS10-L07
(4) Supply 25% of the cords, Atlas X-1 Cat 6A SlimLine Patch Cord Part #6AS10-L10

c. Commscope Uniprise
(1) Supply 25% of the cords, Cat 6A Patch Cord Part # UNC10G-BL, UC1AAA2-0ZF003
(2) Supply 25% of the cords, Cat 6A Patch Cord Part # UNC10G-BL, UC1AAA2-0ZF005
(3) Supply 25% of the cords, Cat 6A Patch Cord Part # UNC10G-BL, UC1AAA2-0ZF007
(4) Supply 25% of the cords, Cat 6A Patch Cord Part # UNC10G-BL, UC1AAA2-0ZF010

18. Exact quantities of each length shall be confirmed with owner prior to ordering to ensure the racks are neatly dressed per rack elevations.

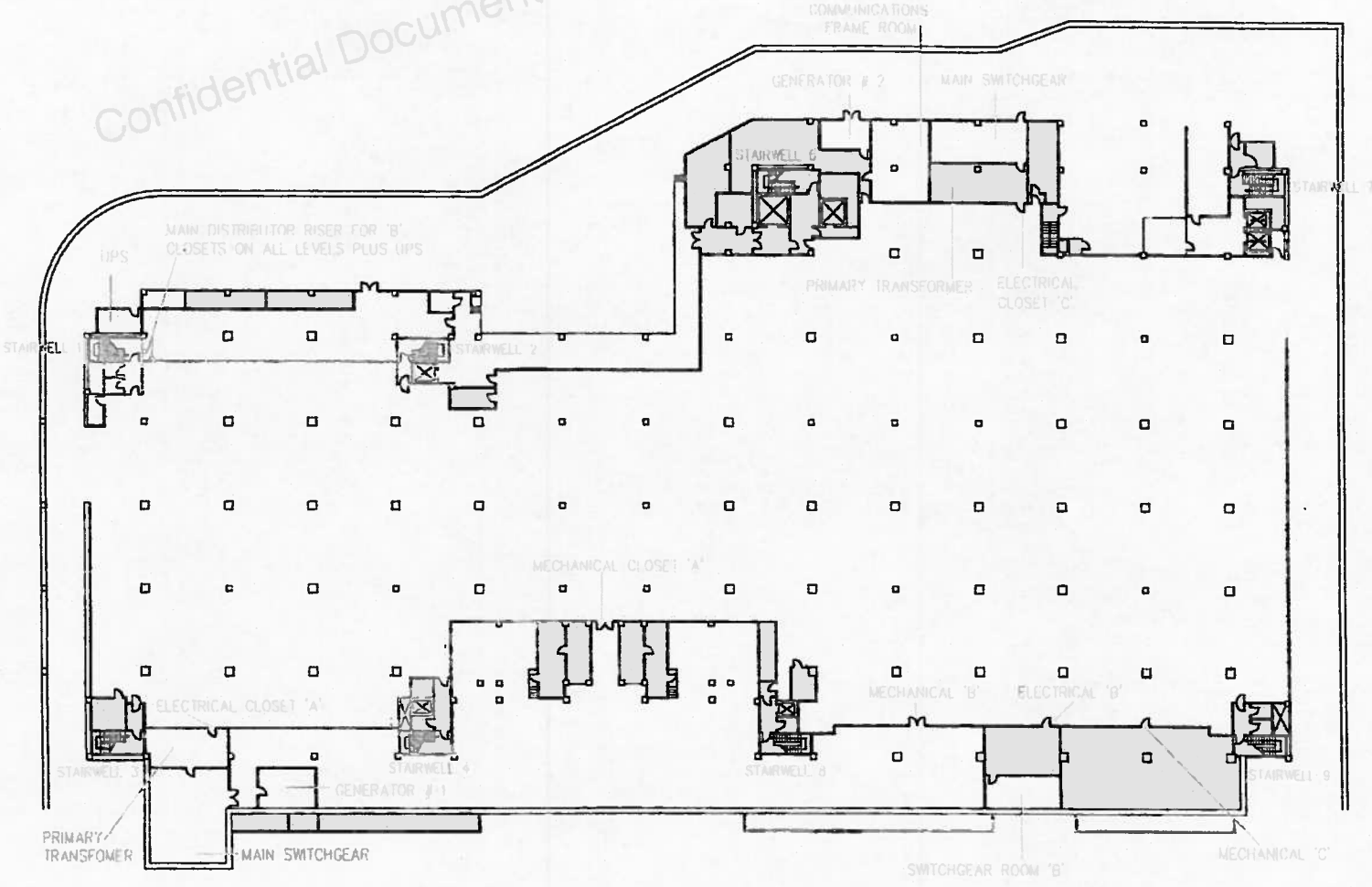
PART 3 - EXECUTION (Not Used)

End of Section

Attachment A

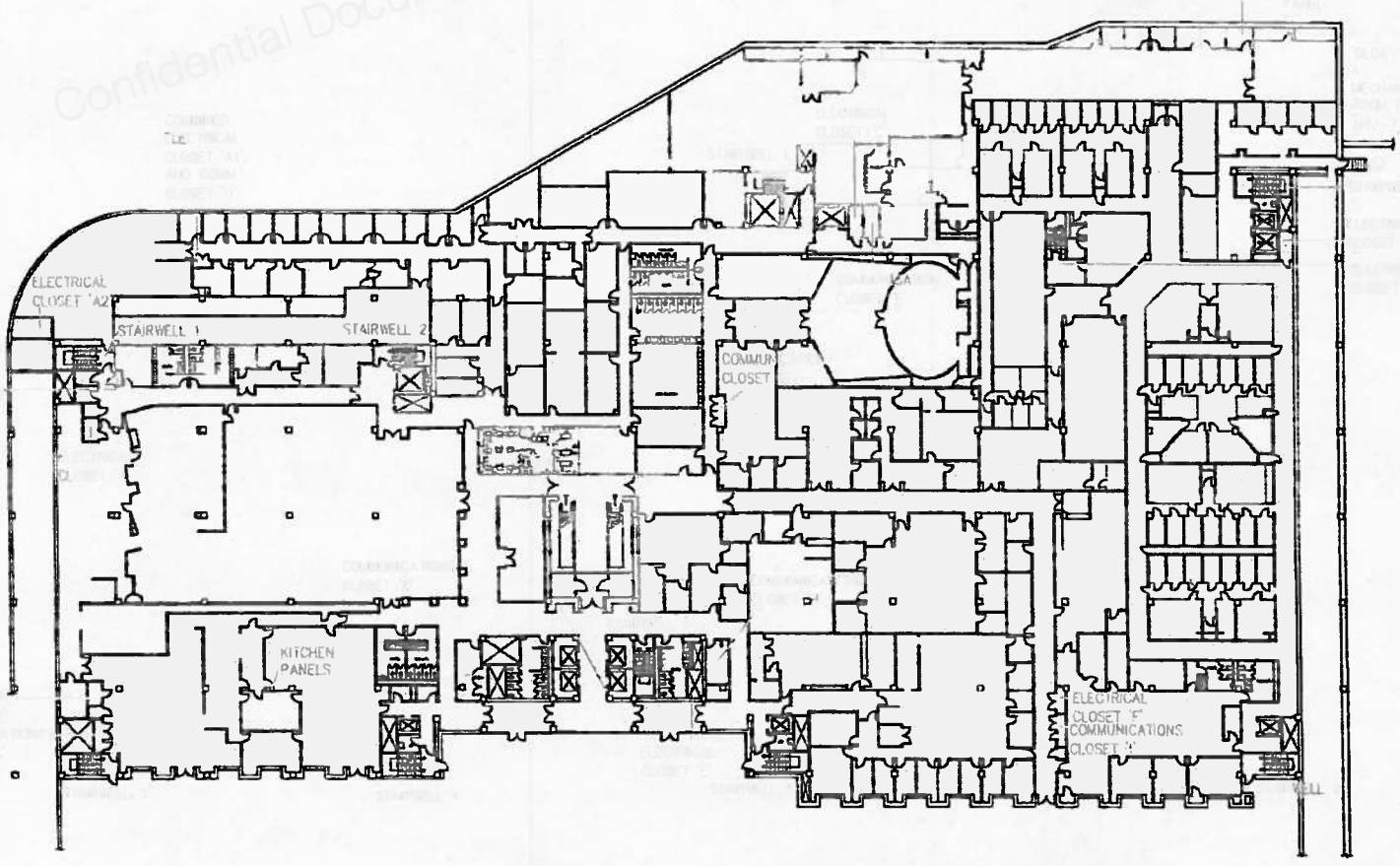
Floor Plans with Closet Locations

Confidential Document



Moultrie Courthouse–Parking Level

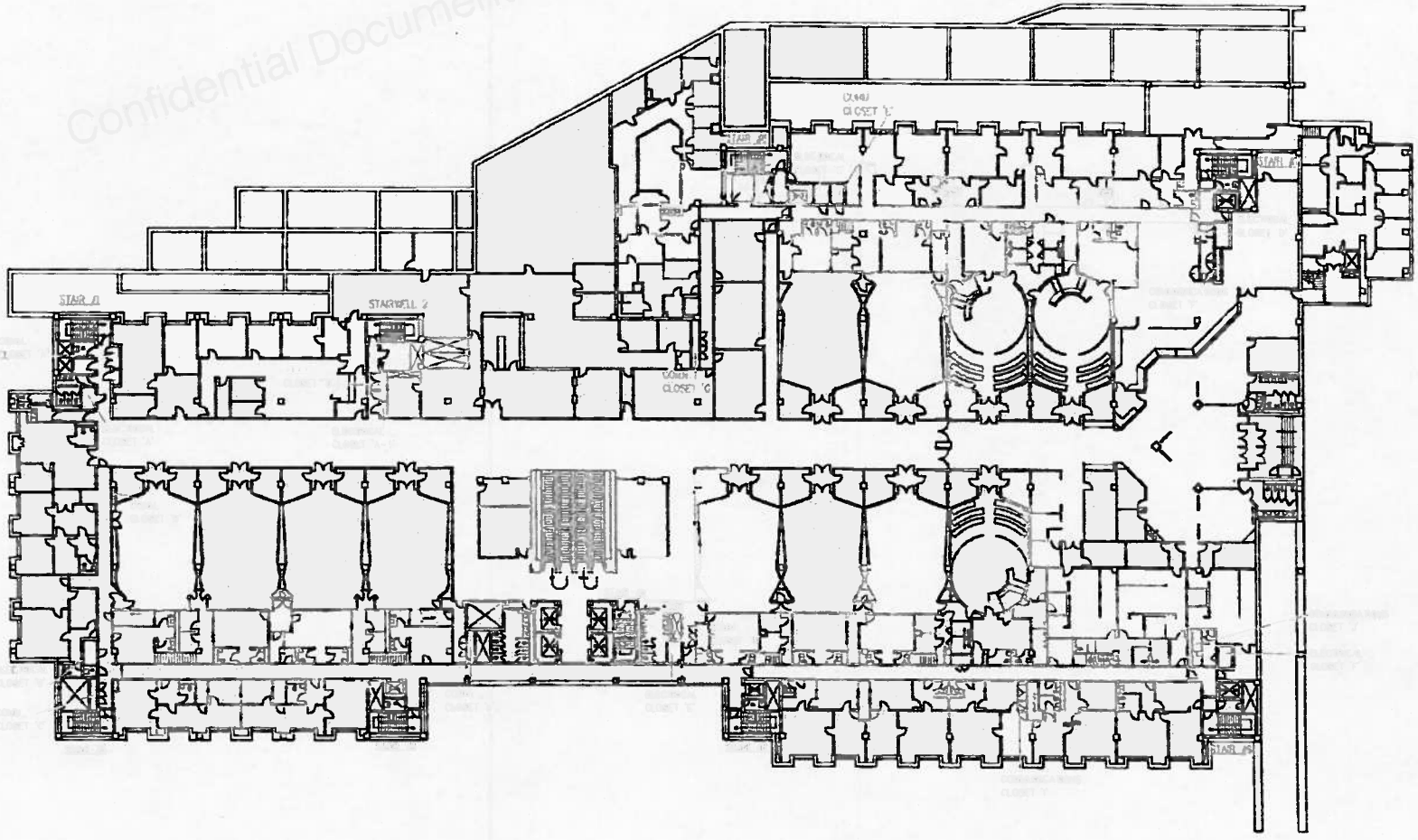
Electrical/Telecom Closet Plan



Moultrie Courthouse – Street Level

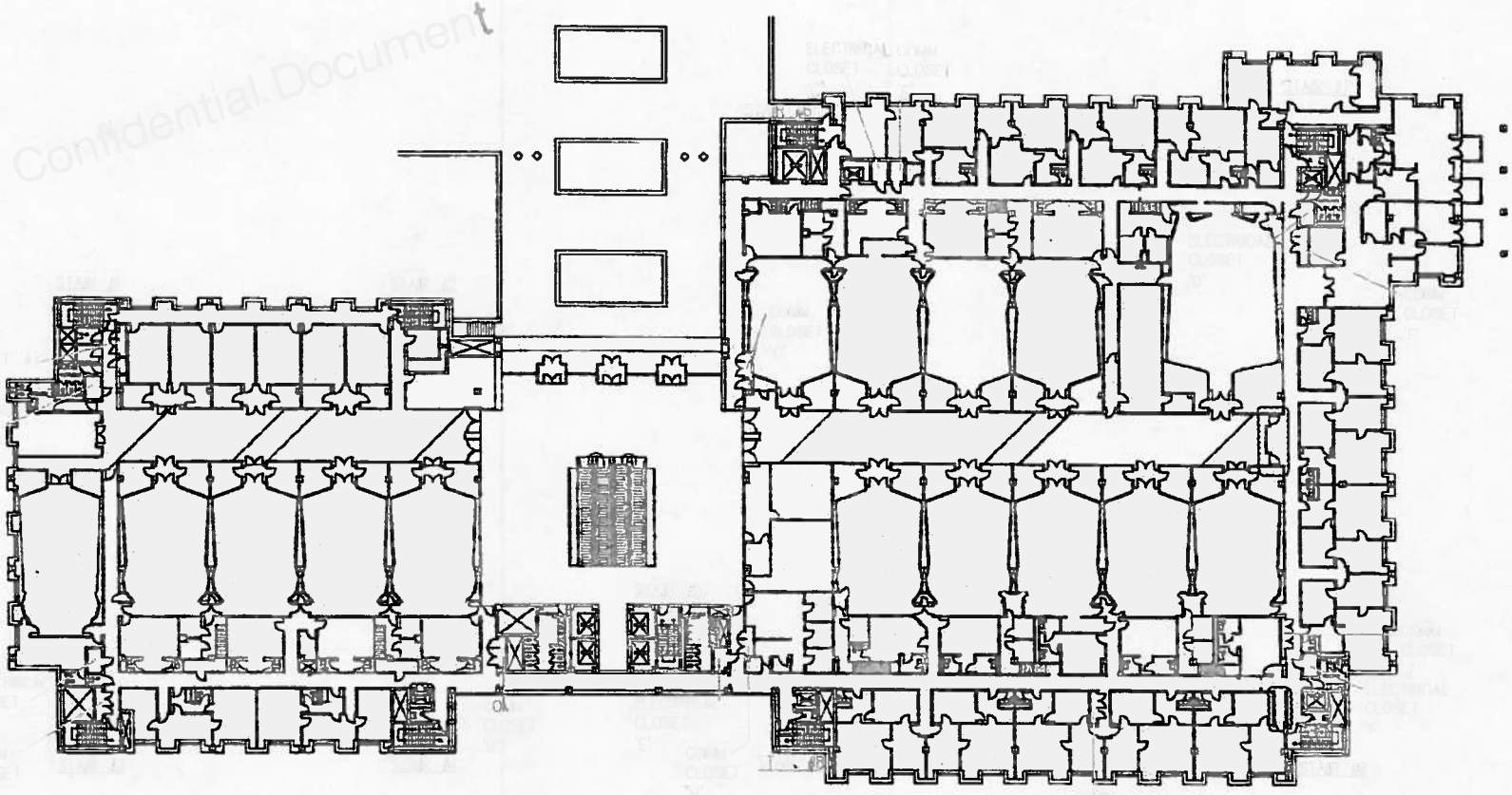
Confidential Document

Confidential Document



Moultrie Courthouse – John Marshall Level

Deckhook/Telecom Closet Plan

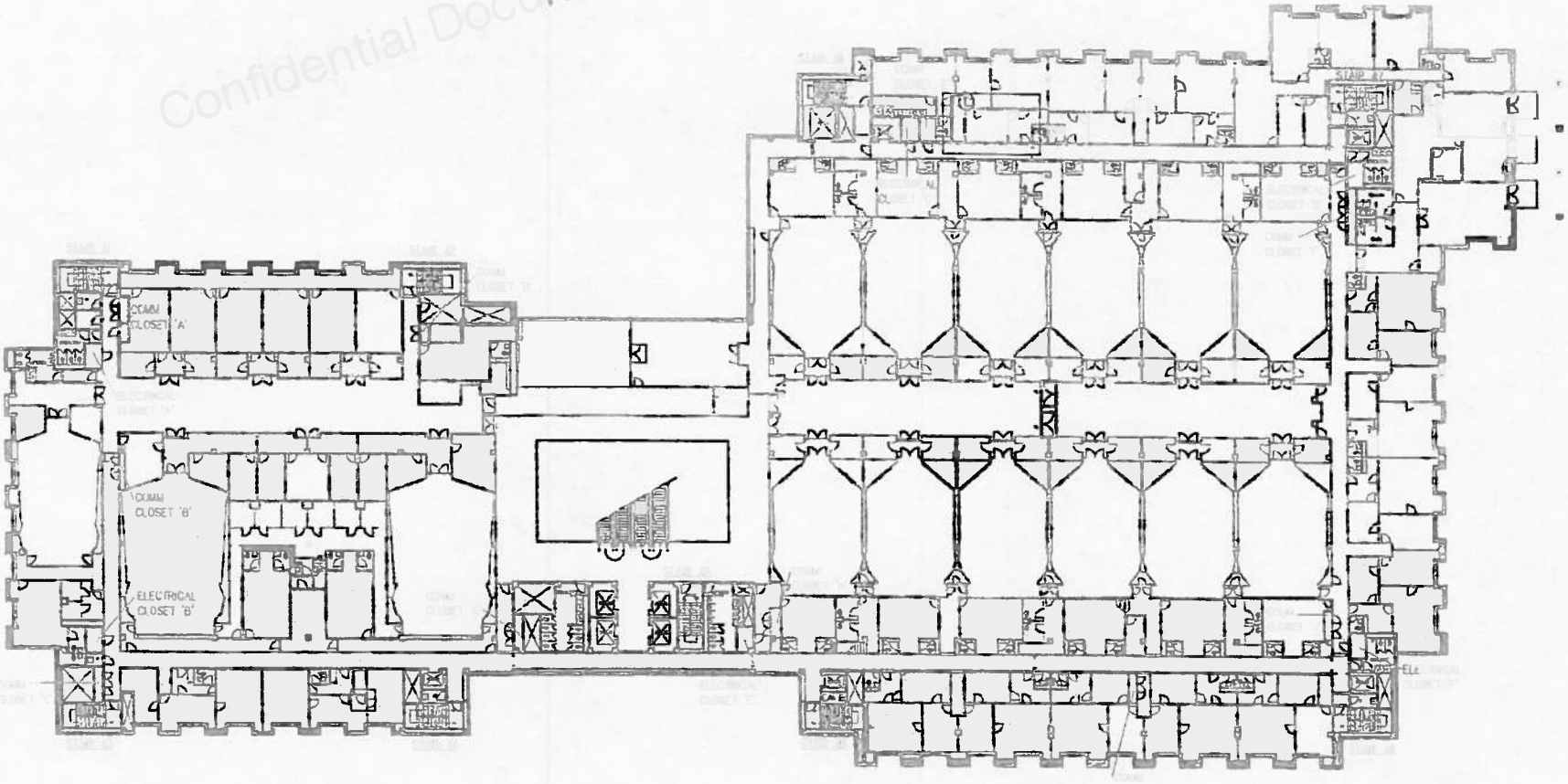


Confidential Document

Moultrie Courthouse-Indiana Level

Electrical/Telecom. Closet Plan

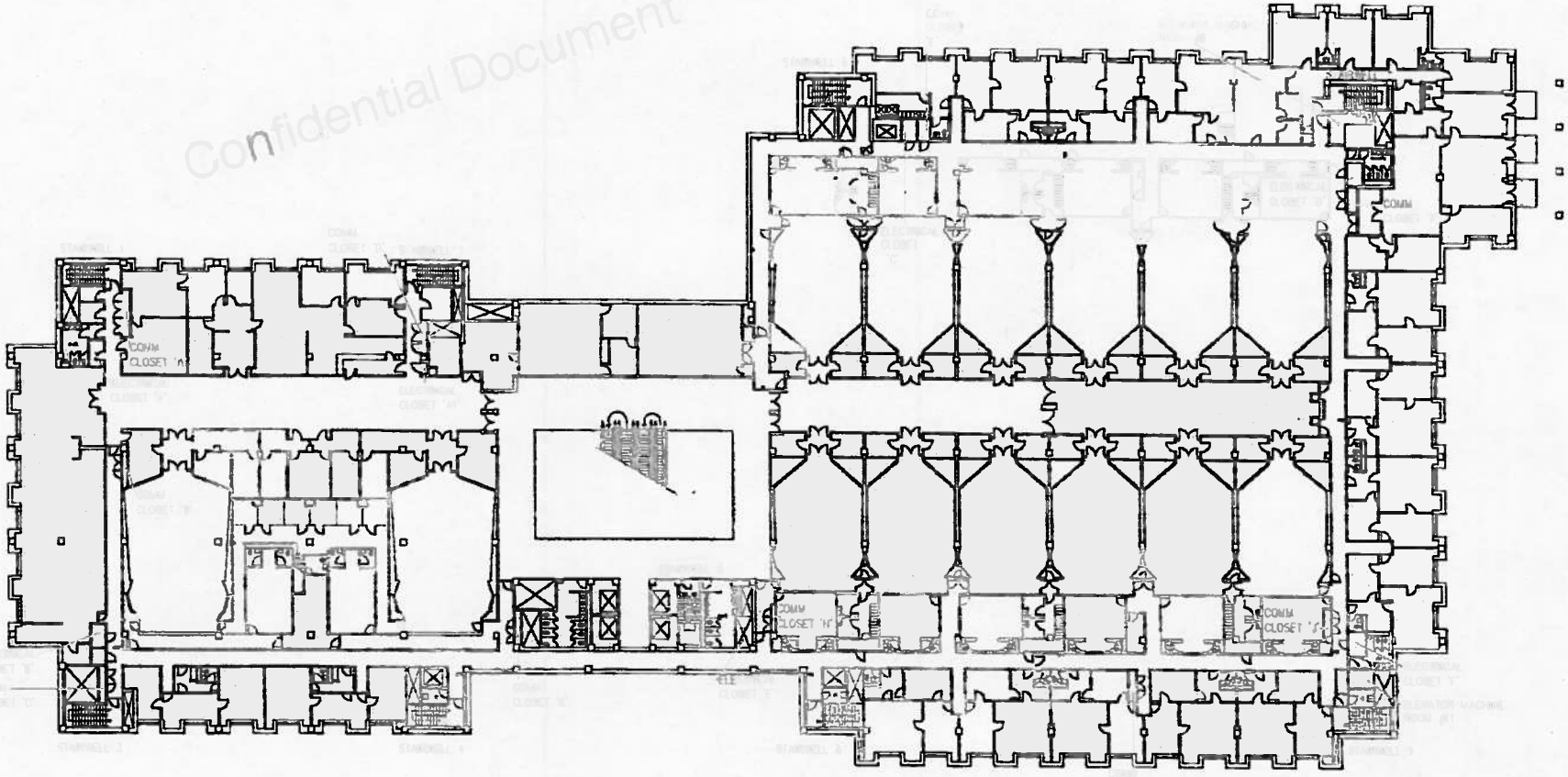
Confidential Document



Moultrie Courthouse – Second Level

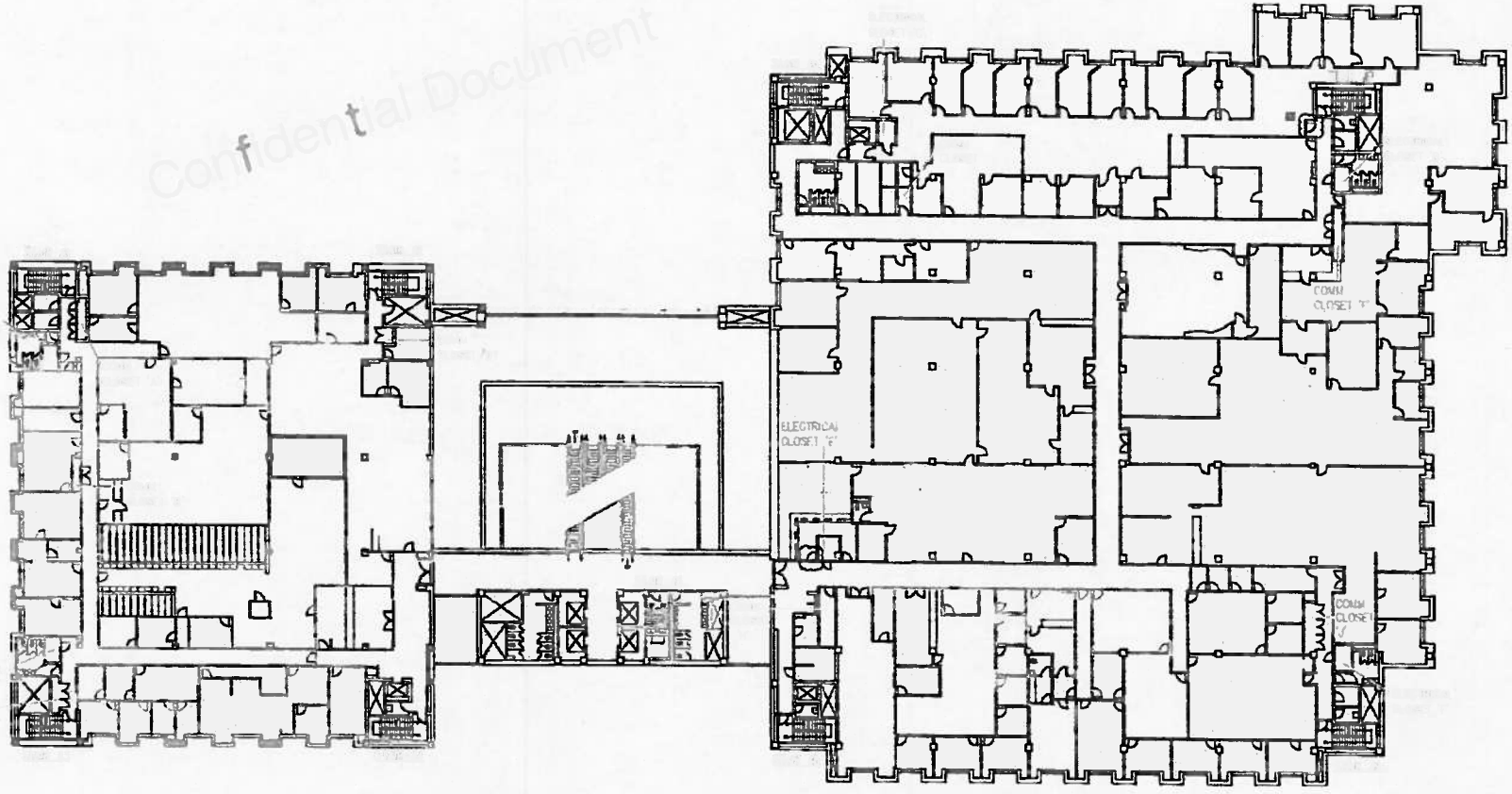
Electrical/Telecom Closet Plan

Confidential Document



Moultrie Courthouse—Third Level

Electrical/Telecom Closet Plan

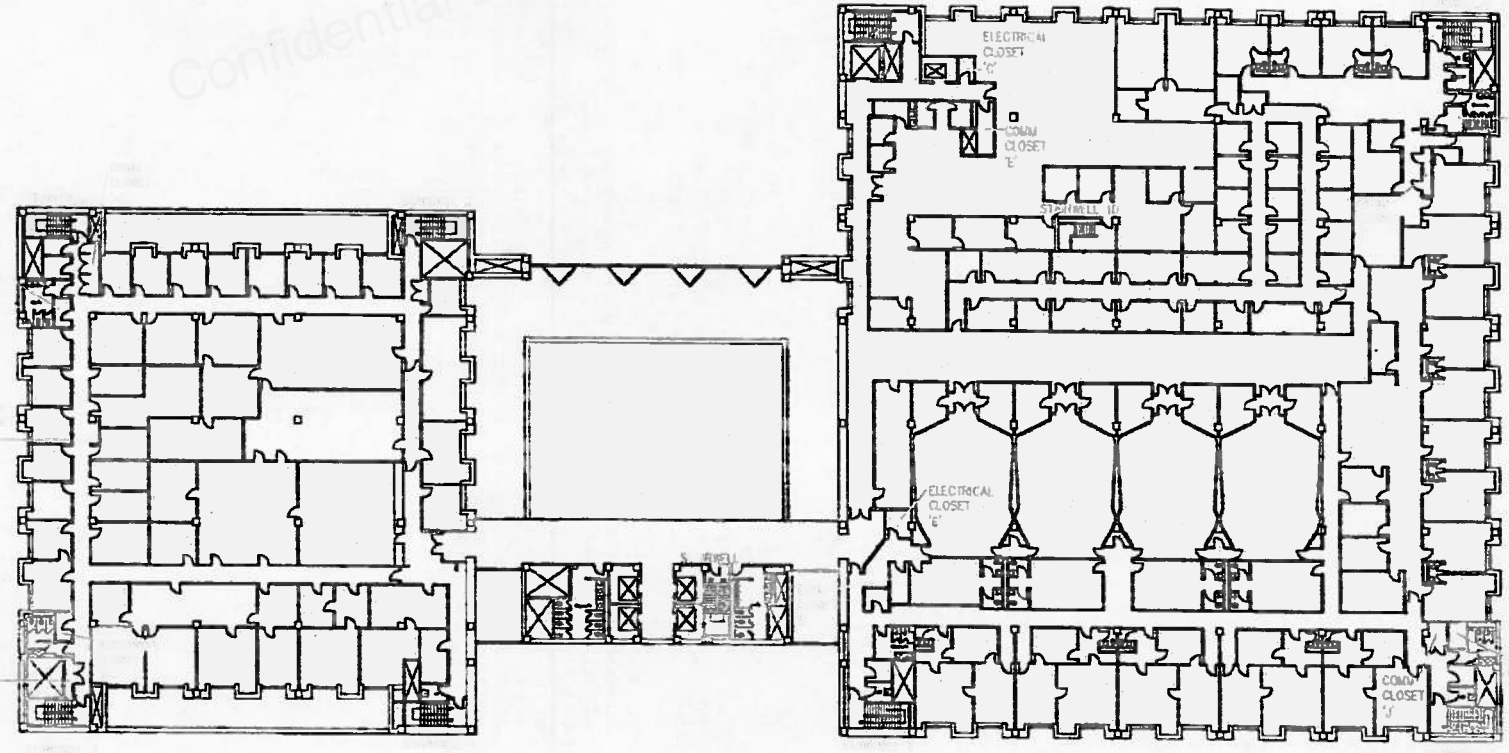


Moultrie Courthouse - Fourth Level

Electricity Tableau Sheet File

Confidential Document

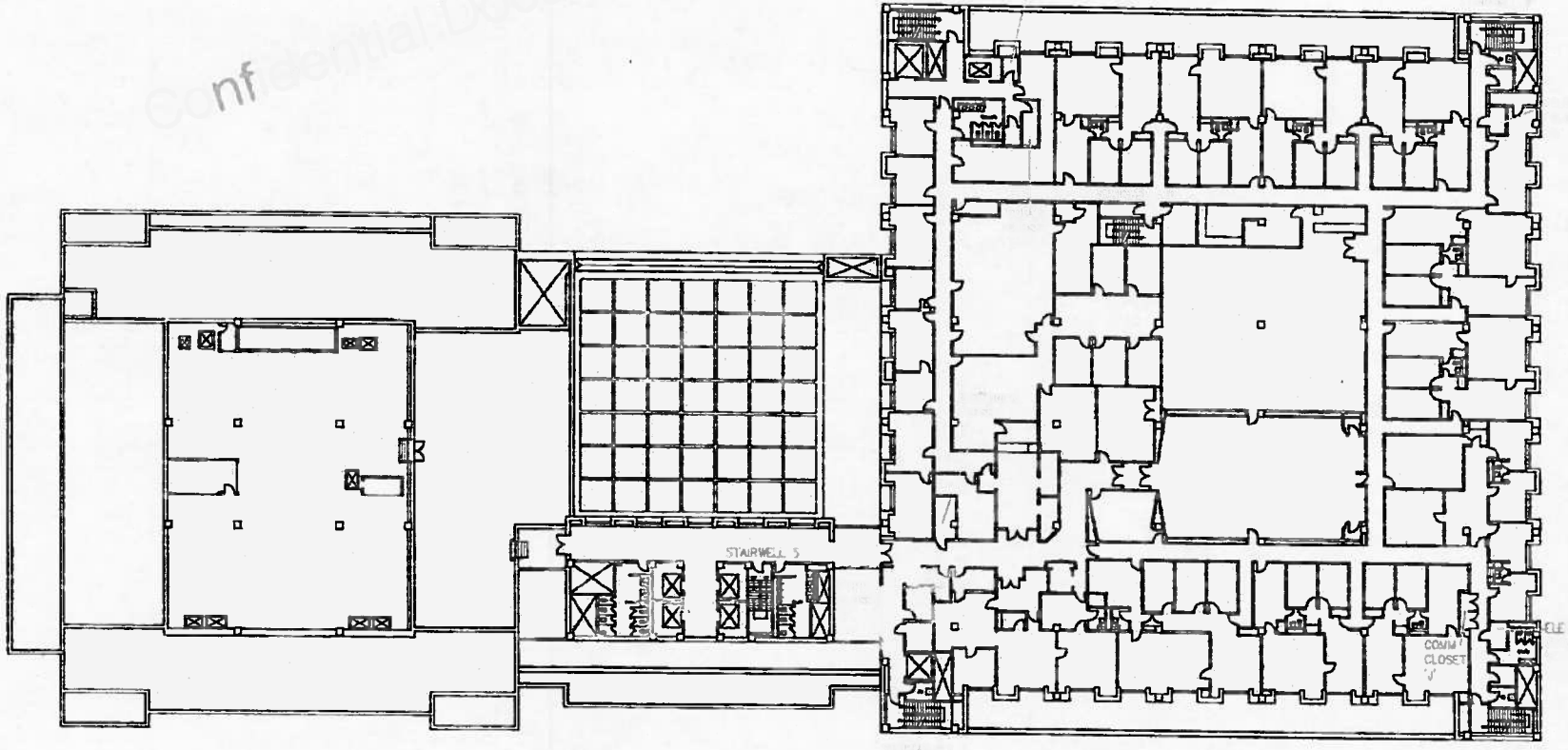
Confidential Document



Moultrie Courthouse - Fifth Level

Electrical/Telecom Closet Plan

Confidential Document



Mature Courtyard - Sixth Level

Attachment B

Closet Access Forms

Request for Access to Communication Closets

TO: DC Courts' Personnel and Contractors

FROM: Mary Ann Satterthwaite, Building Operations Manager

RE: Access to IT and Telecom Closets
Placement of Equipment in Closets

Please complete the attached Closet Access Request Form using the following instructions as a guide.

Location section
Building: Enter the name of the building where the work is to be performed. Use one form per building.
Floor: Identify the floor(s).
Closet Name: Identify the closet(s) where the work is to be performed.

Type and Description of Work
Type of Work: Check appropriate boxes for the type of work.
Description of Work: Provide a detailed description of the work and attach an 8 ½ X 11 sketch of the work/panel placement request area.

Date(s) Requested
Provide the number of days you will need access to each closet.

Approvals Granted by
The Information and Communication Branch Manager will issue a Closet Access Card for the duration needed to complete the work. The vendor will submit a Driver's license or State Issued Identification Card in exchange for the closet access card. Access to the electrical closets will be restricted until approval is granted. Temporary access cards must be returned immediately after work is completed and Driver's License or Identification Card will be returned.

Follow-up Inspection
Future access to communications closets requires a satisfactory rating during the follow-up inspection.

CAPITOL PROJECTS AND FACILITIES MANAGEMENT DIVISION
REQUEST FOR ACCESS TO TELECOMMUNICATIONS CLOSETS

DC Courts: Cable/ Wire Management

DATE SUBMITTED:

LOCATION[S]:
BUILDING: _____
FLOOR: _____
CLOSET NAME: _____

☐ PRE-INSPECTION REQUESTED
DATE SCHEDULED: _____

VENDOR COMPANY NAME: _____

NAMES OF EMPLOYEES ASSIGNED TO WORK:

TYPE OF WORK:
- ☐ DATA
- ☐ VOICE
- ☐ SECURITY
- ☐ CABLE TV
- ☐ ENERGY MANAGEMENT
- ☐ ELECTRICAL
- ☐ FIRE ALARM
- ☐ RECORDING CABLE
- ☐ OTHER

DESCRIPTION OF WORK:

DATE[S] REQUESTED:

ACCESS APPROVAL GRANTED BY: **DATE:** _____

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____
SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

PRE-INSPECTION REPORT: **DATE OF INSPECTION:** _____

PRE-INSPECTION APPROVED BY:

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____
SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

USE THE ADDITIONAL INSPECTION REPORTS BELOW FOR PROJECTS REQUIRING MULTIPLE INSPECTIONS

1ST FOLLOW-UP INSPECTION REPORT: **DATE OF INSPECTION:**_____

INSPECTION APPROVED BY:

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

2ND FOLLOW-UP INSPECTION REPORT: **DATE OF INSPECTION:**_____

INSPECTION APPROVED BY:

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

3RD FOLLOW-UP INSPECTION REPORT: **DATE OF INSPECTION:**_____

INSPECTION APPROVED BY:

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

4TH FOLLOW-UP INSPECTION REPORT: **DATE OF INSPECTION:**_____

INSPECTION APPROVED BY:

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

Request for Access to Electrical Closets

TO: DC Courts' Personnel and Contractors

FROM: Mary Ann Satterthwaite, Building Operations Manager

RE: Access to Electrical Closets
Placement of Equipment in Closets

Please complete the attached Closet Access Request Form using the following instructions as a guide. Use one form per closet.

Location section
Building: Enter the name of the building where the work is to be performed.
Floor: Identify the floor(s).
Closet Name: Identify the closet where the work is to be performed.

Type and Description of Work
Type of Work: Check appropriate boxes for the type of work.
Description of Work: Provide a detailed description of the work and attach an 8 ½ X 11 sketch of the work/panel placement request area.

Date(s) Requested
Provide the number of days you will need access to each closet.

Approvals Granted by
The Chief Engineer will issue a Closet Access Card for the duration needed to complete the work. The vendor will submit a Driver's license or State Issued Identification Card in exchange for the Closet Access Card. Access to the electrical closets will be restricted until approval is granted. Temporary access cards must be returned immediately after work is completed and Driver's License or Identification Card will be returned.

Follow-up Inspection
Future access to electrical closets requires a satisfactory rating during the follow-up inspection.

CAPITOL PROJECTS AND FACILITIES MANAGEMENT DIVISION
REQUEST FOR ACCESS TO ELECTRICAL CLOSETS

DC Courts: Cable/ Wire Management

DATE SUBMITTED:

LOCATION[S]:
BUILDING: _____
FLOOR: _____
CLOSET NAME: _____

☐ PRE-INSPECTION REQUESTED
DATE SCHEDULED: _____

VENDOR COMPANY NAME: _____

NAMES OF EMPLOYEES ASSIGNED TO WORK:

TYPE OF WORK:
- ☐ DATA
- ☐ VOICE
- ☐ SECURITY
- ☐ CABLE TV
- ☐ ENERGY MANAGEMENT
- ☐ ELECTRICAL
- ☐ FIRE ALARM
- ☐ RECORDING CABLE
- ☐ OTHER

DESCRIPTION OF WORK:

DATE[S] REQUESTED:

ACCESS APPROVAL GRANTED BY: **DATE:** _____

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____
SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

PRE-INSPECTION REPORT: **DATE OF INSPECTION:** _____

PRE-INSPECTION APPROVED BY:

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____
SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

USE THE ADDITIONAL INSPECTION REPORTS BELOW FOR PROJECTS REQUIRING MULTIPLE INSPECTIONS

1ST FOLLOW-UP INSPECTION REPORT: **DATE OF INSPECTION:**_____

INSPECTION APPROVED BY:

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

2ND FOLLOW-UP INSPECTION REPORT: **DATE OF INSPECTION:**_____

INSPECTION APPROVED BY:

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

3RD FOLLOW-UP INSPECTION REPORT: **DATE OF INSPECTION:**_____

INSPECTION APPROVED BY:

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

4TH FOLLOW-UP INSPECTION REPORT: **DATE OF INSPECTION:**_____

INSPECTION APPROVED BY:

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

SIGNATURE: _____ PRINT NAME: _____ TITLE: _____

Attachment C

Secure Area Access Forms

CAPITOL PROJECTS AND FACILTIES MANAGEMENT DIVISION
REQUEST FOR ACCESS TO_____.

Name of Contractor/Vendor:

Request to enter [Name of Area] on [Date].

The following task(s) will require admittance to your secure area on the above date.

TASK(S):

[Name of Individual giving Authorization] Permission to enter on above date

_____ _____

Signature Date

NOTE: Your area will be protected from dirt and dust, and will be cleaned by the contractor. Any furniture moved will be returned to its proper place. All Chambers require the presence of the DC Courts Security Officer or Capitol Projects and Facilities Management Division (CPFMD) Personnel, during the scheduled task(s). The designated individual will remain with the contractor while work is in progress.

_____ _____ _____
[If Required] Signature of DC Court Security Officer upon completion of above referenced work: Date Time

_____ _____ _____
Signature of CPFMD Project Manager that above area task (s) was completed and area was cleaned. Date Time

Attachment D

NECA/BICSI 568-2006 Manual

(Viewed upon request)

Attachment E

Closet Inventory

Moultrie Courthouse
Cable Management
Closet Inventory

Parking Level		
Closet	**Type of panel**	**Notes**
Electrical Closet A		
Mechnical Closet A		
Electrical Closet B		
Mechanical Closet B	2/120-208v ; 3/ 265-460v ; > 2/transformers; 2 generator control	
Electrical Closet C	2/120-208v ; 3/ 265-460v ; 2/800amp > 2/transformers; 1 honeywell; 2 generator control	
Mechanical Closet C	1/120-208v >1 tranformer ; 1/800 amp	
C Street		
Closet		
Communication Closet A	VOICE TERMINATION 110 & 66 BLOCKS	
Electrical Closet A		
Electrical Closet A2	4/120-208v ; 1/265 -460v	
Electrical Closet B	2/120- 208v ; 2/265-460v > 1fire alarm	
Communications Closet C	VOICE TERMINATION 110 & 66 BLOCKS; (1) Model 3512 switch providing network connectivity to that area.	
Electrical Closet C	3/120-208v ;1/265-460v > 1fire alarm	
Elec Closet A1/Comm Closet D	VOICE TERMINATION 110 & 66 BLOCKS	
Electrical Closet D		
Elec/Comm Closet D1		
Elec/Comm Closet D2	**control room** 1/120-208v ; 1/265-460v **cell block** 1/120v	
Electrical Closet E	2/120-208v & (1sub) ; 1/265-460v > transformer/ 1fire alarm	
Communication Closet E	3 Security Control Panels (#01, #02, #03), VOICE TERMINATION 110 & 66 BLOCKS ADT SECURITY & I&T SERVER &RACK; (1) Model 3524 and (1) Model 3548 switch providing newtork connectivity to that area	Panel #01 serves Parking Level, Panels #02 & #03 serve C-Level
Electrical Closet F	2/120-208v ; 3/265-460v > transformer/ old honeywell	
Communication Closet G	VOICE TERMINATION 110 & 66 BLOCKS; old fiber box	
Communication closet H	VOICE TERMINATION 110 & 66 BLOCKS ATM INDUSTRIAL BANK MODEM; (1) Model 3548 switch providing newtork connectivity to that area.	
Communication Closet I	VOICE TERMINATION 110 & 66 BLOCKS	
Communication Closet K	N/A	
JM Level		
Closet		
Communication Closet A	VOICE TERMINATION 110 & 66 BLOCKS I&T SERVER & DATA RACK; (3) Model 3548 switch's providing newtork connectivity to that area.	
Electrical Closet A	1/120-208v (1 sub) ; 1/265-460v > 1 old honeywell; 5 fire alarm	
Electrical Closet A1	2/120-208v subs from "A"	
Communication Closet B	VOICE TERMINATION 110 & 66 BLOCKS	

Moultrie Courthouse
Cable Management
Closet Inventory

Electrical Closet B	4/120-208v ; 265-460v > 1 EMS	
Communication Closet C	VOICE TERMINATION 110 & 66 BLOCKS I&T SERVER, DATA RACK & UPS; (1) 3548 switch providing newtork connectivity to that area.	
Electrical Closet C	3/120-208v (1 sub) ; 1/265-460v > 2 old honeywell	
Communications Closet D	1 Security Control Panel (#16), VOICE TERMINATION 110 & 66 BLOCKS & ADT SECURITY	Panel #16 serves JM Level
Electrical Closet D	1/120-208v (1 sub) ; 1/265-460v > 2 old honeywell	
Electrical Closet E	3/120-208v (1 sub) ; 1/265-460v	
Communication Closet E	1 Security Control Panel (#09), VOICE TERMNIATION 110 & 66 BLOCKS I&T SERVER, DATA RACK ADT SECURITY; (1) Model 3524 and (1) Model 3512 switch providing newtork connectivity to that area	Panel #09 serves JM Level
Communication Closet F	1 Security Control Panel (#10), VOICE TERMINATION 110 & 66 BLOCKS I&T SERVER, DATA RACK & ADT SECURITY; (1) Model 3524 and (1) Model 3548 switch providing newtork connectivity to that area.	Panel #10 serves JM Level
Electrical Closet F	2/120-208v ; 1/265-460v > 1 EMS	
Communication Closet G	VOICE TERMINATION 110 & 66 BLOCKS	
Communication Closet H	VOICE TERMINATION 110 & 66 BLOCKS I&T SERVER & DATA RACK; (2) Model 3548 switch's providing newtork connectivity to that area.	
Communication Closet I	VOICE TERMINATION 110 & 66 BLOCKS I&T SERVER & DATA RACK	
Communication Closet J	1 Security Control Panel (#11), VOICE TERMINATION 110 & 66 BLOCKS, INFORMATION OFFICE ANNOUNCEMENT	Panel #11 serves JM Level
Communication Closet K	3 Security Control Panels (#05, #06, #13)	Panel #05 serves Parking Level, Panel #06 serves C-Level, Panel #13 serves JM Level
Indiana Level		
Closet		
Communication Closet A	1 Security Control Panel (#23), VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK; (2) Model 3524 switch's providing newtork connectivity to that area	Panel #23 serves IA Level
Electrical Closet A	1/120-208v ; 1/265-460v	
Electrical Closet B	2/120-208v ; 2/265-460v > 1 EMS	
Communication Closet C	1 Security Control Panel (#22), VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK	Panel #22 serves IA Level
Elcectrical Closet C	4/120-208v ; 1/265-460v >1EMS ; 1 transformer ; 1 old honeywell	
Electrical Closet D	3/120-208v ; 1/265-460v > 1 transformer	
Electrical Closet E	3/120-208v ; 1/265-460v > 1 transformer	
Communication Closet E	1 Security Control Panel (#17), VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK; (1) Model 3548 switch providing newtork connectivity to that area.	Panel #17 serves IA Level
Communication Closet F	VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK; (1) Model 3524 and (1) Model 3548 switch providing newtork connectivity to that area.	
Electrical Closet F	4/120-208v ; 1/265-460v > 1EMS	
Communciation Closet G	VOICE TERMINATION 110 & 66 BLOCKS	

Moultrie Courthouse
Cable Management
Closet Inventory

Communication Closet H	VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK & ADT SECURITY; (2) Model 3524 and (1) Model 3548 switch providing newtork connectivity to that area	
Communication Closet I	VOICE TERMINATION 110 & 66 BLOCKS	
Communciation Closet J	2 Security Control Panels (#18, #19), VOICE TERMINATION 110 & 66 BLOCKS	Panels #18 & 19 serve IA Level
Communication Closet K	N/A	
Second Level		
Closet		
Communication Closet A	1 Security Control Panel (#31), VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK	Panel #31 serves 2nd Floor
Electrical Closet A	1/120-208v ; 1/265-460v > 1 old honeywell	
Communication Closet B	VOICE TERMINATION 110 & 66 BLOCKS; (1) Model 3524 and (1) Model 3548 switch providing newtork connectivity to that area.	
Electrical Closet B	1/120-208v ; 1/265-460v > 1 EMS	
Communication Closet C	VOICE TERMINATION 110 & 66 BLOCKS; (1) Model 3524 switch providing newtork connectivity to that area.	
Electrical Closet C	2/120-208v ; 1/265-460v > 1 fire alarm ; 1 ADT	
Communication Closet D		
Electrical Closet D	1/120-208v ; 1/265-460v >1 EMS	
Communication Closet E	1 Security Control Panel (#25), VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK; (1) Model 3524 and (1) Model 3548 switch providing newtork connectivity to that area.	Panel #25 serves 2nd Floor
Electrical Closet E	3/120-208v ; 1/265-460v	
Communication Closet F	1 Security Control Panel (#26), VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK; (1) Model 3548 switch providing newtork connectivity to that area.	Panel #26 serves 2nd Floor
Communication Closet H	VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK; (1) Model 3548 switch providing newtork connectivity to that area.	
Communication Closet I	VOICE TERMINATION 110 & 66 BLOCKS	
Communication Closet J	1 Security Control Panel (#27), VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK & ADT SECURITY	Panel #27 serves 2nd Floor
Communication Closet K	1 Security Control Panel (#29)	Panel #29 serves 2nd Floor
Electrical Closet K		
Electrical Clset F	2/120-208v ; 1/265-460v > 1 EMS; 1 old honeywel	
Third Level		
Closet		
Communication Closet A	1 Security Control Panel (#39), VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK & ADT SECURITY; (1) Model 3548 switch providing newtork connectivity to that area.	Panel #39 serves 3rd Floor
Electrical Closet A	2/120-208v (1sub) ; 1/265-460v > 1 fire alarm ; 1 transformer	
Electrical Closet A1	1/120-208v	
Communication Closet B	VOICE TERMINATION 110 & 66 BLOCKS	
Electrical Closet B	2/120-208v (1sub) ; 1/265-460v > 3 fire alarm ; 1EMS	

Moultrie Courthouse
Cable Management
Closet Inventory

Communication Closet C	1 Security Control Panel (#38), VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK & ADT SECURITY; (2) Model 3524 switch's providing newtork connectivity to that area.	Panel #38 serves 3rd Floor
Electrical Closet C		
Communication Closet D	VOICE TERMINATION 110 & 66 BLOCKS & I&T NETWORK DATA RACK	
Electrical Closet D		
Electrical Closet E	3/120-208v (1 sub) ; 1/265-460v	
Communication Closet E	1 Security Control Panel (#33), VOICE TEMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK & ADT SECURITY; (1) Model 3548 switch providing newtork connectivity to that area.	Panel #33 serves 3rd Floor
Communication Closet F	1 Security Control Panel (#34), VOICE TERMINATION 110 & 66 BLOCKS,I&T SERVER & DATA RACK & ADT; (1) Model 3548 switch providing newtork connectivity to that area.	Panel #34 serves 3rd Floor
Electrical Closet F	3/120-208v (1 sub); 1/265-460v > 1 EMS ; 1 old honeywell	
Communication Closet H	VOICE TERMINATION 110 & 66 BLOCKS, I&T SERVER & DATA RACK; (1) Model 3548 switch providing newtork connectivity to that area.	
Communication Closet I	VOICE TERMINATION 110 & 66 BLOCKS	
Communication Closet J	1 Security Control Panel (#35), VOICE TERMINATION 110 & 66 BLOCKS & I&T NETWORK DATA RACK	Panel #35 serves 3rd Floor
Communication Closet K	N/A	
Fourth Level		
Closet		
Communication Closet A	1 Security Control Panel (#47), VOICE TERMINATION 110 & 66 BLOCKS & I&T SERVER & DATA RACK, ADT; (1) Model 3524 and (1) Model 3548 switch providing newtork connectivity to that area.	Panel #47 serves 4th Floor
Electrical Closet A	1/120-208v (1sub); 1/265-460v > 1 old honeywell	
Communication Closet B	VOICE TERMINATION 110 & 66 BLOCKS	
Electrical Closet B	2/120-208v (2 sub) ; 2/265-460v	
Communication Closet C	VOICE TERMINATION 110 & 66 BLOCKS & I&T SERVER & DATA RACK, ADT; (1) Model 3524 and (1) Model 3548 switch providing newtork connectivity to that area.	
Electrical Closet C	1/120-208v (1sub); 1/265-460v > 1 old honeywell ; 1 ADT	
Communication Closet D	VOICE TERMINATION 110 & 66 BLOCKS	
Electrical Closet D	1/120-208v (1sub) ; 1/265-460v > 2 old honeywell ; ADT	
Electrical Closet E	2/120-208v ; 1/265-460v	
Communication Closet E	2 Security Control Panels (#41, #42), VOICE TERMINATION 110 & 66 BLOCKS & I&T SERVER & DATA RACK; old coax and multiplexer, child supoprt network, (3) Model 3548 switch's providing newtork connectivity to that area.	Panels #41 & #42 serve 4th floor
Communication Closet F	VOICE TERMINATION 110 & 66 BLOCKS & I&T SERVER & DATA RACK; (2) Model 3548 switch's providing newtork connectivity to that area.	
Electrical Closet F	1/120-208v ; 1/265-460v > 1 EMS	
Communication Closet H	2 Security Control Panels (#43, #44), VOICE TERMINATION 110 & 66 BLOCKS & I&T SERVER & DATA RACK & ADT; (2) Model 3548 switch's providing newtork connectivity to that area.	Panels #43 & #44 serve 4th floor

Moultrie Courthouse
Cable Management
Closet Inventory

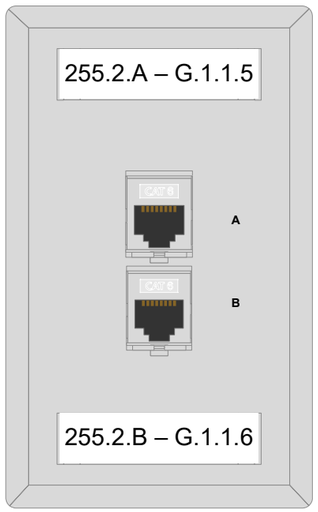
Communication Closet J	VOICE TERMINATION 110 & 66 BLOCKS & I&T SERVER & DATA RACK ; (1) Model 3524 and (1) Model 3548 switch providing newtork connectivity to that area.	
Fifth Level		
Closet		
Communication Closet A	1 Security Control Panel (#55), VOICE TERMINATION 110 & 66 BLOCKS, OLD COAX MULTIPLEXER & I&T DATA RACK; (1) Model 3524 and (1) Model 3548 switch providing newtork connectivity to that area	Panel #55 serves 5th Floor
Electrical Closet A	1/120-208v (1sub) ; 1/265-460v > 4 fire alarm ; 1 transformer	
Communication Closet B	VOICE TERMINATION 110 & 66 BLOCKS & I&T DATA RACK	
Electrical Closet B	2/120-208v ; 1/265-460v > 1 EMS ; 4 fire alarm	
Communication Closet C	VOICE TERMINATION 110 & 66 BLOCKS & I&T DATA RACK; (1) Model 3548 switch providing newtork connectivity to that area.	
Electrical Closet C	1/120-208v (1sub) ; 1/265-460v > 1 EMS	
Electrical Closet D	1/120-208v ; 1/265-460v > 2 fire alarm	
Electrical Closet E		
Communication Closet E	1 Security Control Panel (#49), VOICE TERMINATION 110 & 66 BLOCKS & I&T DATA RACK; (1) Model 3524 switch providing newtork connectivity to that area	Panel #49 serves 5th Floor
Communication Closet F	VOICE TERMINATION 110 & 66 BLOCKS & I&T DATA RACK; (1) Model 3524 switch providing newtork connectivity to that area.	
Electrical Closet F	1/120-208v (1sub) ; 1/265-460v > 1 EMS ; 1 old honeywell	
Communication Closet H	2 Security Control Panels (#51, #52), VOICE TERMINATION 110 & 66 BLOCKS & I&T DATA RACK; (1) Model 3548 switch providing newtork connectivity to that area.	Panels #51 & #52 serve 5th floor
Communication Closet J	VOICE TERMINATION 110 & 66 BLOCKS & I&T DATA RACK	
Sixth Level		
Closet		
Electrical Closet C	1/120-208v (1sub) ; 1/265-460v	
Electrical Closet D	1/120-208v ; 1/265-460v > 1 EMS	
Electrical Closet E	2/120-208v (3sub) ; 1/265-460v	
Communication Closet E	1 Security Control Panel (#57), VOICE TERMINATION 110 & 66 BLOCKS	Panel #57 serves 6th Floor
Electrical Closet F	1/120-208v (1sub) ; 1/265-460v > 1 EMS	
Communication Closet H	2 Security Control Panels (#59, #60), VOICE TERMINATION 110 & 66 BLOCKS; (1) Model AT&T Fiber switch connecting the two courts.	Panels #59 & #60 serve 6th floor
Communication Closet J	VOICE TERMINATION 110 & 66 BLOCKS	

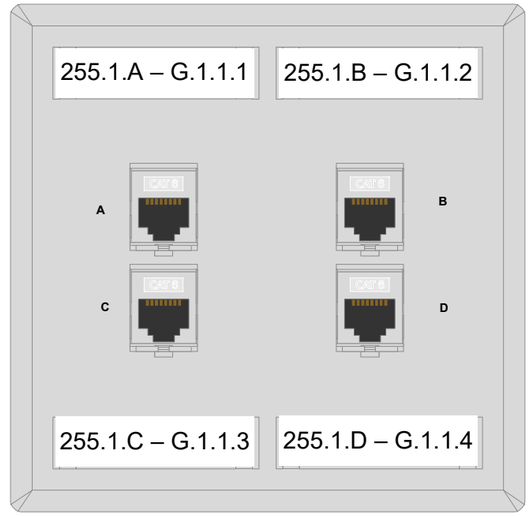
Attachment F

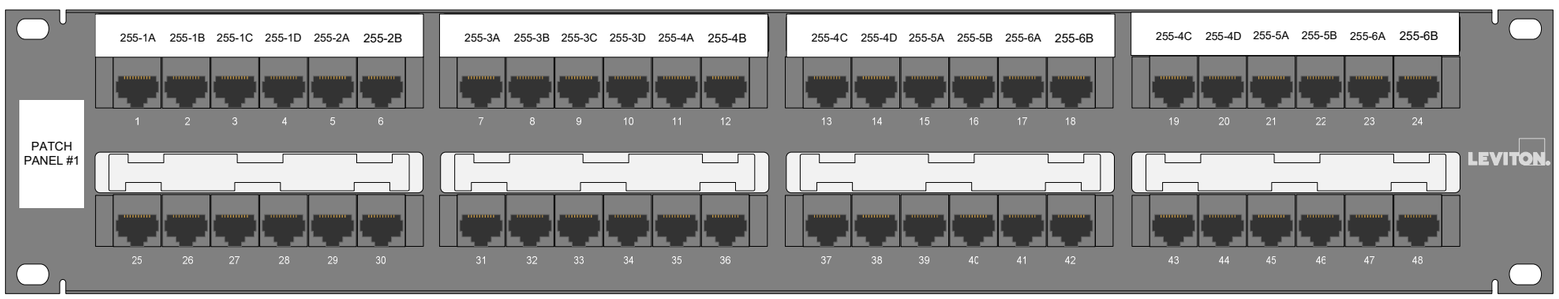
Wire Labeling/ Identification

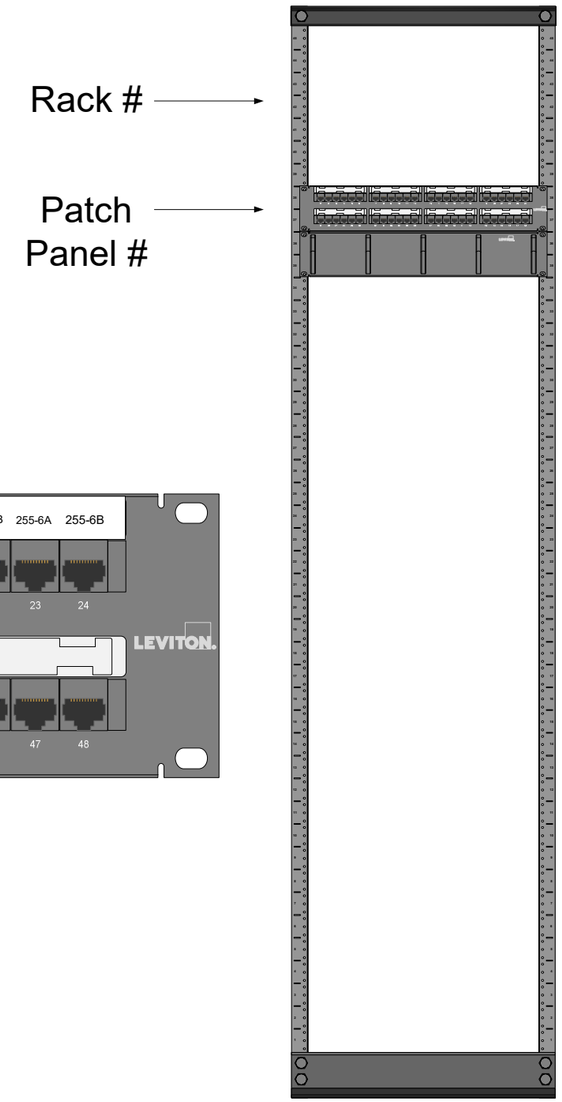
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

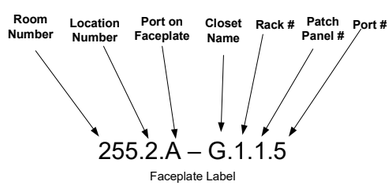
DC Courts Labeling

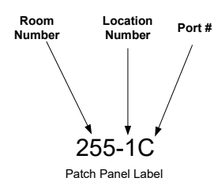












Notes:

- **Faceplates- The faceplate labels have two sections that identify both ends of a cable. Starting from left to right, the first number is the room number for where the drop is located, (This could be a wall drop, or furniture, or floor). The second number is the location #. This is the identifier of a particular drop in a given room. The third position is the faceplate port identifier. This is followed by a separator (-). The forth item is the closet letter. The next Item identifies the number of the rack in the closet. The next item is the patch panel number on a particular rack. The last item is the Port Identifier on which the cable is terminated on the patch panel.**
- **Patch Panels- Labeling space is very limited on a patch panel. The patch panels will be given a sequential number starting from the top down. This label will be on the viewable side. Above each port the label will fist show the room #. Next the Location # of the faceplate and the port on that faceplate.**

IDENT No. DRAFT		AMERICAN	
SHEET		DC Courts Labeling Standard	
DESIGNED BY Murtha	DATE 11/18/2016		
DRAWN BY Murtha	DATE 11/18/2016		
CHECKED BY	DATE		
APPROVED BY	DATE		
DESIGN ACTIVITY		SIZE D / CAGE CODE	DRAWING No. Labeling Standard / REVISION
		SCALE	SHEET