APPENDIX E
ICE CABLING STANDARD

U.S. Immigration and Customs Enforcement

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INFORMATION and COMMUNICATIONS TECHNOLOGY SYSTEMS

STRUCTURED CABLE PLANT STANDARD

January 2025 Edition

Office of the Chief Information Officer (OCIO)
Information Technology Operations (IT OPS) Division

Homeland Security

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1 INTRODUCTION

1.1 SUMMARY OF CHANGES

This document, hereafter referred to as the Immigration and Customs Enforcement (ICE) Cabling Standard, replaces and supersedes previous releases of the ICE Structured Cable Plant Standard. The objective is to continuously improve upon the breadth, depth, and clarity of information. Also, to promote efficient use and comprehension. Approved changes integrated into this edition are reflected in Table 1. Suggestions for future editions may be submitted to:

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Table 1 Summary of Changes

Revision No.	Reference Section	Description
1	General	• Minor edits of section information to aid in clear interpretation with no significant changes unless otherwise noted.
2	Section 1: Definitions	• Section 1.4.B: Added copper cabling.
3	Section 2: Quality Assurance	• Section 2.3: Update references. • Section 2.5: Added requirement for cable testing pass results to exceed margin of error.
4	Section 3: Pathways	• Section 3.2 (A.3): Modified pull box requirements to indicate a pull box for every accumulated 180 degrees of conduit bend. • Section 3.2 (B.1): Added code and standards compliance. • Section 3.2 (B.3): Added textile innerduct requirement. • Section 3.2 (B.3.a): Changed steel to metallic. • Section 3.2 (B.4.g): Added requirement to offset back boxes. • Section 3.2 (C): Added textile innerduct requirement.
5	Section 4: Mechanical and Electrical	• Section 4.1: Section rewritten to reflect updates to codes and standards. • Section 4.1 (D.2): Changed RBB width.
6	Section 5: Distribution Closets	• Section 5.1 (C): Removed galvanized steel and uni-body construction requirement. • Section 5.2 (B.2): Added the use of frame-type patch panels are not allowed. • Section 5.3 (F-G): Changed 3-digit labeling requirement to 2-digit. • Section 5.4 (C): Added Fire protection to comply with ANSI/TIA 569-E. • Section 5.4 (F): Added requirement for door to swing out of the telecom space.
7	Section 6:	• Section 6.1 (D): Changed service loop location to field.

	Backbone Cabling	• Eliminated Category 3 as an acceptable backbone cable. • Section 6.3 (A): Added requirement for fusion splicing. • Section 6.3 (B): Changed all single-mode fiber to OS2. • Section 6.3 (B): Changed steel to metallic. • Section 6.4 (A-E): Added requirements for plenum-rating, armoring, and fusion splicing. • Section 6.4 (B.1): Deleted requirement for copper backbone cabling to the Title III Wire Room.
8	Section 7: Horizontal Cabling	• Section 7.3: Changed acceptable insertion loss from 0.75 dB to 0.3 dB per BICSI TDMM recommendation. • Section 7.4 (B.2): Added patch cord delivery requirement.

1.2 BACKGROUND

ICE is a component of the U.S. Department of Homeland Security (DHS); bringing a unified and coordinated focus to the enforcement of federal immigration, customs, and air security laws. ICE's primary mission is to detect vulnerabilities and protect national security. The Office of the Chief Information Officer (OCIO), Information Technology Operations (IT OPS) Division supports the ICE mission by providing deployment, project management, and design services for diverse and complex Information and Communications Technology (ICT) systems to over 600 facilities worldwide.

ICE projects involve various Programs with unique ICT systems requirements. The ICT low voltage cabling infrastructure is intended to support the following special systems (powered equipment and end user devices not in scope):

A. **Commercial Television:** Community Antennae Television (CATV) or satellite applications.
B. **Telephony:** Voice over Internet Protocol (VoIP) or Public Branch Exchange (PBX), and plain old telephone (POTS)/analog applications.
C. **Ethernet Local Area Networks (LAN):** Wired and 802.11 wireless applications.
D. **Service Provider utilities:** Facilitate circuit extension within the facility via ICE owned riser backbone cabling.

1.3 PURPOSE

The purpose of the ICE Cabling Standard is to serve as a performance specification and basis of design for Architects, Engineers, Consultants, Contractors, and ICE staff involved in the planning, design, and construction of ICE facilities, and supplements the latest edition of the ICE Facility Design Guide. In addition, OCIO will provide a Site-Specific Cabling Requirements (SSCR) Document, hereafter referred to as the OCIO Cabling Package, which shall be used in combination with the ICE Cabling Standard to provide a complete and fully functional ICT cabling infrastructure. The OCIO Cabling Package includes:

A. Site requirements narrative.
B. Floor plans with power and communications outlet locations, and configuration details.
C. Enlarged Distribution Closet layouts and rack elevations.

1.4 DEFINITIONS

A. **Contractor:** The prime contractor responsible for performing the work as defined by the ICE Cabling Standard and OCIO Cabling Package. It is the responsibility of the Contractor to coordinate the cabling design and installation with other trades and utilities, ensuring other building systems and design elements are compatible, complementary, and achieve symmetry with the overall project requirements.
   1. **Furnish:** Term used to describe Contractor or Owner purchased products supplied for installation by others.
   2. **Provide:** Term used to describe Contractor purchased products installed, tested, labeled, and ready for use.

B. **Backbone Cabling:** Optical fiber, copper, and coaxial cables, and connecting hardware between Distribution Closets.

C. **Distribution Closets:**
   1. **Demarcation Room (Demarc):** The building's entrance facility for public communications utilities and private campus Outside Cable Plant (OSP). Also, the location of utility Service Provider/Local Exchange Carrier (LEC) head end network equipment.
   2. **Main Distribution Frame Room (MDF):** The centralized location for head end equipment supporting OCIO network and telephony systems, and the distribution point for associated copper and optical fiber backbone cabling. Also, the MDF is the floor or space serving OCIO telecommunications room for terminating backbone and horizontal cabling infrastructure supporting Work Area Outlets.
   3. **Remote Wiring Closet (RWC):** The floor or space serving OCIO telecommunications room for terminating backbone and horizontal cabling infrastructure supporting Work Area Outlets.
   4. **Riser Closets:** Closets in multi-story facilities for the routing of cabling between floors.
   5. **Special Program Spaces:** Special purpose work areas containing dedicated network equipment and associated cabling, with unique security and construction requirements. Typical spaces include: Controlled Access Area (CAA), Computer Forensics, Homeland Security Data Networks (HSDN) Room, and Title III Wire Room.

D. **Horizontal Cabling:** Optical fiber, copper, and coaxial cables and connecting hardware between the floor or space serving MDF/RWC and Work Area Outlets.

E. **Pathways:** Infrastructure that conceals, protects, and supports backbone and horizontal cabling between Distribution Closets, Work Area Outlets, and building risers.

F. **Work Area Outlet (WAO):** Horizontal distribution cabling interface connection points supporting peripheral communications end user devices. Examples include laptops, telephones, printers, etc.

**** END OF SECTION 1 ****

2 QUALITY ASSURANCE

2.1 ARCHITECTURAL DESIGNS

The Architect is completely responsible for construction drawings and specifications that accurately meet OCIO requirements.

- Projects are open bid and performance based.
- Do not specify product manufacturers or part numbers.
- Submit Architectural and Engineering designs to OCIO at each design phase for technical compliance review and approval.
- Submit issues, requests for information (RFIs), and change requests in writing for OCIO response and/or approval.

2.2 PROPOSALS

Submit Contractor proposals to OCIO for technical compliance review and approval prior to award and execution of work. Submit requests for information (RFIs) and changes in writing for OCIO response and/or approval. When necessary, perform a site survey to determine conditions and submit a report of findings with contacts, references to specific requirements and issues, markups, and recommendations. Submit proposal documentation as one comprehensive file in pdf format and include the following information:

A. Identify team members with roles and qualifications. The installation team shall be certified by the proposed solutions manufacturer and under the direct supervision of a skilled Technician experienced in all aspects of the work.
B. Reference the ICE Cabling Standard version, OCIO Cabling Package version, and other documents provided by ICE used for pricing.
C. Detailed Statement of Work (SOW) with assumptions, exclusions, and a detailed installation schedule. Schedule work in consecutive business days, through to completion and ready for use, unless agreed otherwise by ICE.
D. Quantity and configuration of WAOs per wiring closet, wiring closets build details, backbone cabling details, understanding of Classified cabling requirements, and test equipment details.
E. Detailed Bill of Materials (BOM) including manufacturers, part numbers, and quantities. Include product technical data sheets, shop drawings, and other documentation as required by the Accrediting Officer (AO) of Controlled Access Areas.
F. Product and installation warranty scope and correction period for deficiencies.

2.3 REFERENCES

The ICE Cabling Standard defers to the following sources when data is extensive. The entirety of the ICT system cabling design and installation shall meet the latest edition of the following codes and standards:

A. National and local regulations enforced by the authority having jurisdiction (AHJ).
B. BICSI, *Telecommunications Distribution Methods Manual (TDDM), 15th Edition.*
C. ANSI/BICSI 007-2024, *Information Communication Technology Design and Implementation Practices for Intelligent Buildings and Premises.*

D. ANSI/BICSI 008-2024, *Wireless Local Area Network (WLAN) Systems Design and Implementation Best Practices.*

E. ANSI/BICSI N1-2019, *Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure.*

F. ANSI/BICSI N2-17, *Practices for the Installation of Telecommunications and ICT Cabling to Support Remote Power Applications.*

G. ANSI/BICSI N3-20, *Planning and Installation Methods for the Bonding and Grounding of Telecommunication and ICT Systems and Infrastructure.*

H. BICSI G1-17, *ICT Outside Plant Construction and Installation: General Practices.*

I. TIA, *Building Telecommunications Wiring Standards.*

J. NECA 1, *National Electrical Contractors Association Standards for Good Workmanship.*

K. CNSSAM TEMPEST/1-13 17 January 2014 Red/ Black Installation Guide.

L. Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities, V1.5.1, July 26, 2021, *IC Tech Spec for Intelligence Community Directive/Intelligence Community Standards (ICD/ICS) 705, Physical and Technical Standards for Sensitive Compartmented Information Facilities.*

M. Underwriters Laboratories, Inc. (UL).

N. American Society for Testing and Materials (ASTM) International.

O. National Electrical Manufacturers Association (NEMA) Standards.

2.4 MANUFACTURED PRODUCTS

A. Products provided or furnished by the Contractor are required to be new using matched and certified manufacturer solutions listed for its intended purpose by a nationally recognized testing laboratory. The Contractor is required to match products in existing facilities being modified if they meet current standards.

B. The Contractor is required provide products manufactured in the USA that have been in satisfactory use in similar service for not less than 3 years, and which replacement parts are readily available. The Contractor is required to protect products during shipment, storage, and installation against damage. Damaged products, as determined by OCIO, shall be replaced with new product.

C. Cabling infrastructure installation shall comply with manufacturer requirements and all applicable codes and standards.

2.5 TESTING

A. Properly clean connector ports prior to testing. Test and certify the backbone and horizontal cabling using equipment, patch/launch cords, and adapters matched and qualified by the equipment manufacturer, and to the performance category of the cabling provided. Ensure test equipment is properly calibrated, referenced, and has up-to-date software/firmware. Resolve deficiencies to achieve an overall “pass” result. Marginal Pass results (often noted with an asterisk on test results) will not be accepted and must be resolved.

B. Provide test results in a complete report transferred from the test instrument to a computer and saved as pdf files. Organize results per floor, distribution closet, and specified labeling scheme.

C. Each fiber optic strand, backbone and horizontal, and copper horizontal cable shall be submitted individually as it is recorded in the testing equipment.

2.6 INSPECTIONS & REPORTS

Contractor shall submit written installation progress reports with digital photos at significant completion of rough-in, distribution closet(s) buildout, and cable termination phases. Include enough detail to confirm compliance with approved project requirements.

**** END OF SECTION 2 ****

3 PATHWAYS

3.1 GENERAL

A. Remove abandoned cables and existing cables that do not meet specifications, in their entirety. Coordinate removal with local ICE point of contact.

B. Communications cable and pathway clearances:

1. Maintain 6-inches minimum clearance from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
2. Sources of electromagnetic interference (EMI):
    a. Maintain 5-inches minimum clearance from fluorescent lighting.
    b. Maintain 12-inches minimum clearance from conduit and cables used for electrical power distribution under 5 kilo Volt Amps (kVA).
    c. Maintain 24-inches minimum clearance from conduit and cables used for electrical power distribution over 5 kilo Volt Amps (kVA).
    d. Maintain 48-inches minimum clearance from motors or transformers.
3. Cross perpendicularly to electrical power cables and conduits.
4. Controlled Access Area (CAA) and Homeland Security Data Network (HSDN) Rooms: Maintain a minimum 3-inches separation between classified pathways, cabling and outlets, and all other communications and power pathways, cables, and outlets.

C. Align and route pathways and cables parallel or perpendicular to the building lines and furniture layouts to the extent possible, ensuring accessibility to cable supports and pull boxes.

D. Firestopping and sealing: Seal openings between penetrated floors and walls with a listed manufacturer-made mechanical assembly, approved by the local authority having jurisdiction (AHJ). Maintain the structural, fire, and/or smoke rating integrity, and allow re-entry for future use with minimal impact.

E. Pathway systems to be structurally supported, rigidly secured, and not exceed 40 percent fill factor.

F. Provide separate pathways for conveyance of dissimilar signal types and voltage levels. Examples are Ethernet, Audio Visual (AV), and overhead paging cabling.

G. Conceal pathways within finished walls, ceilings, and floors. Exposed pathways only permitted as noted for specific applications or approved through submittal review process.

H. Create pathway bends with smooth sweeping turns that safeguard against bend radius violations.

I. CAA: Label Classified and Unclassified cabling pathways entering and within CAA space. Pathways embedded in concrete or that do not support the CAA space may not pass through CAA space.

3.2 CONDUIT, BOXES & FITTINGS

A. General:

1. Provide a continuous rigid thin wall conduit for cables passing through non-ICE controlled space, non-accessible ceilings, and where vulnerable to damage. Include polypropylene or monofilament plastic line with minimum 200-pound tensile strength.

2. Provide a pull box every 100 feet and every accumulated 180 degrees change in direction. Route conduits supporting continuous cable runs with openings facing each other in the box.
3. Conduit cable fill (Table 2): Table includes baseline figures. Validate fill rates per manufacturer specified cable dimensions and listed firestop assembly guidelines.

Table 2 Conduit Fill Table

Cable Outside Diameter	Conduit Trade Size						
	1”	1 ¼”	1 ½”	2”	2 ½”	3”	4”
.25-inch Cables	7	12	16	27	41	60	103
.5-inch Cables	1	3	4	6	10	15	25
1-inch Cables	0	1	1	1	2	3	6

B. Inside Cable Plant:
   1. Conduit design and installation shall be code and standards compliant for telecommunication pathways.
   2. Provide Electrical Metallic Tubing (EMT) conduit with compression type fittings with insulated throats.
   3. Provide a minimum of two 4-inch trade size sleeves or conduits between the Demarc and MDF, between Distribution Closets, and between building riser closets. Install textile fabric 3-pack innerducts with factory pull tape in one 4-inch sleeve and/or conduit for future use.
      a. *EXCEPTION:* Optical fiber cable with specified interlocking metallic armored construction does not require continuous conduit protection when installed independently.
      b. *EXCEPTION:* Provide a minimum 3-inch trade size continuous conduit from the primary floor serving Distribution Closet (MDF or RWC) to Homeland Security Data Network (HSDN) and Controlled Access Area (CAA) workspaces to support Unclassified cabling. Include a dielectric break when penetrating the workspace secure wall partition.
   4. WAO wall boxes: Provide a minimum 5-inches square x 2 7/8-inches deep with minimum 1-inch knockouts, and a single or two-gang device ring (per outlet configuration). Provide a minimum 1-inch trade size conduit from WAO stubbed above accessible ceiling.
      a. *EXCEPTION:* Where conduit installation is impractical, "ring and string" installations permitted with ICE approval.
      b. *EXCEPTION:* Provide surface mounted raceway dedicated for Classified WAOs in Homeland Security Data Network (HSDN) and Controlled Access Area (CAA) workspaces.
      c. *EXCEPTION:* Route Wi-Fi horizontal cables directly to designated locations and terminate in a plenum rated surface mount box above false ceilings, unless otherwise dictated by code.

d. *EXCEPTION:* Route horizontal cables serving modular furniture through furniture raceways directly to each WAO and terminate in a compatible snap-in faceplate to furniture base. Surface mount boxes are permitted for WAOs with high cable count with ICE approval.
e. Serial connections (daisy chaining) of conduits supporting WAOs not permitted.
f. Provide separate conduits for WAOs containing optical fiber and copper cables.
g. Mount WAO boxes on opposite sides of walls in separate vertical channels offset from each other.
h. Locate communications and general-purpose electrical outlets to be practical and readily accessible. When necessary, provide a 4-inch access hole with a grommet in the back of stationary office furniture.

5. Floor boxes: Provide capacity to accommodate specified power, Audio Visual (AV), and communications WAOs. Power poles and/or floor surface raceway not permitted without ICE approval. Install floor boxes flush with finished floor.
6. WAO mounting height: Match general purpose electrical outlet heights, approximately 18-inches to center above finished floor.
   a. *EXCEPTION:* Mount WAOs at counter type workspaces above the counter space, approximately 42-inches to center above finished floor.
   b. *EXCEPTION:* Mount Community Antennae Television *(*CATV) WAO above proposed display mounting brackets, approximately 72-inches to center above finished floor
   c. *EXCEPTION:* Mount wall phone WAO at 48-inches to center above finished floor.
7. Conference/Training rooms:
   a. Provide one minimum 1-1/4-inch trade size conduit from a two-gang WAO backbox at typical wall outlet height at the AV headend equipment location, within the conference space, to accessible ceiling. Continue conduit from the WAO to the nearest conference table floor box. Include brush style WAO faceplate.
   b. Provide one minimum 1-1/4-inch trade size conduit from a two-gang WAO backbox at display locations to accessible ceiling. Include brush style WAO faceplate.
   c. Provide one minimum 1-1/4-inch trade size conduit from a two-gang WAO backbox at typical wall outlet height at podium location to accessible ceiling. Include brush style WAO faceplate.
   d. See OCIO Cabling Package for elevation detail.

C. Outside Cable Plant:
1. Provide high-density polyethylene (HDPE) conduit with weatherproof pull boxes designed for flush burial and having structural load rating consistent with installed location. Secure pull box with tamper-resistant locking devices.
2. Provide a minimum of two 4-inch trade size conduits between buildings in a campus environment. Install outdoor-rated textile fabric 3-pack innerducts with factory pull tape in one 4-inch conduit for future use.
3. Provide a minimum of two 4-inch trade size conduits from communications utilities easements to the building Demarc. Install outdoor-rated textile fabric 3-pack innerducts with factory pull tape in one 4-inch conduit for future use.

4. Coordinate requirements for communications and television utility cabling entering the facility directly with local service providers early in space planning phase.

3.3 CABLE TRAYS & RUNWAYS

A. Provide couplings, offsets, adapters, end caps, horizontal and vertical cable bend radius components, and other fittings for a complete cable support system. All metallic components shall be bonded to the telecommunication grounding system.

B. Verify no intruding items such as debris, pipes, hangers, or other equipment are in the pathways prior to cable installation.

C. Additional Clearances: Maintain 8-inches minimum access clearance above, below, and at least one accessible side of cable trays and runways.

D. Dimensions: Internal maximum height of 2-inches and minimum width of 12-inches.

E. Work Areas: Provide continuous wire mesh style cable tray above false and open accessible ceilings from the work areas to the distribution closets to support backbone and horizontal cabling.

   1. *EXCEPTION:* J Hooks may be used in facilities with existing false ceilings and other areas approved by ICE and the local authority having jurisdiction (AHJ). Support open air cables every 36-inches.

F. Distribution Closets: Provide ladder style runway in distribution closets to support backbone and horizontal cabling to wall fields, open equipment racks, and enclosed cabinets. Locate cable tray a minimum 2-inches above racks, cabinets, and closet door trims.

   1. Finish: Manufacturer's standard finish in black.
   2. Attach open racks to the tray system with manufacturer recommended hardware.

**** END OF SECTION 3 ****

4 MECHANICAL & ELECTRICAL

4.1 GROUNDING & BONDING

A. Telecommunications Bonding Conductor (TBC): Provide a TBC to bond the PBB to the service equipment (power) ground.
   1. TBC size: TBC to be determined by the project's electrical engineer and shall not exceed 30 feet.
   2. TBC shall be installed by the Division 26 electrical contractor.

B. Primary Bonding Busbar (PBB): Provide a PBB adjacent to the Electrical Entrance Facility and bond to the Electrical Entrance Facility grounding electrode system, the alternating current (AC) main electrical branch circuit panel, and structural building steel if available.
   1. PBB must be listed.
   2. PBB size: Predrilled solid copper with minimum dimensions of 0.25-inch-thick, 4-inches wide, and 20-inches long.

C. Secondary Bonding Busbar (SBB): Provide a SBB in every Distribution Closet and Wall Field as shown in the Cabling Package drawings.
   1. SBB must be listed.
   2. SBB size: Predrilled solid copper 0.25-inch-thick, 2-inches wide, and 12-inches long.
   3. All SBBs must be bonded to structural steel as required by code.
   4. Bonding conductor size shall be determined by Table 1 in ANSI/TIA-607-E.
   5. Bonding conductors shall be insulated and stranded.

D. Rack Bonding Busbar (RBB): Provide a listed RBB in every two-post rack and wall cabinet.
   1. Locate RBB at bottom of the racks and cabinets.
   2. RBB size: Predrilled solid copper 0.25-inch-thick, 0.75-inch wide, and 19-inches long.
   3. Bond the RBB to the SBB with a #6 AWG stranded copper conductor.

E. Telecommunications Bonding Backbone (TBB): Provide a TBB conductor from the PBB to a Secondary Bonding Busbar (SBB) located in each Distribution Closet and bond the SBB to the alternating current (AC) electrical branch circuit panel that supports dedicated receptacles in the closet, and to structural building steel if available.
   1. TBB size: TBB to be determined per Table 1 in ANSI/TIA-607-E by the telecommunication infrastructure install contractor's designer and installed by the telecommunication install contractor.
   2. Multi-story facilities require the TBB to be extended to the top of the facility riser and SBBs independently bonded to the TBB. Facilities constructed with two or more TBB risers require a Backbone Bonding Conductor (BBC) between the systems Secondary Bonding Busbars (SBB) at the top floor and then every third floor.
      a. Backbone Bonding Conductor (BBC) size: BBC to be determined per Table 1 in ANSI/TIA-607-E by the telecommunication infrastructure install contractor's designer and installed by the telecommunication install contractor. The BBC shall be labeled at its attachment point with destination identifiers and "Warning! Telecommunications Bonding Conductor. Do Not Remove or Disconnect!".

F. Installation:
   1. Locate Primary and Secondary busbars in locations shown on Cabling Package drawings.

2. Install bonding busbars on 4-inch minimum insulated spacers using stainless steel hardware and label “Telecommunications Primary Bonding Busbar” and “Telecommunications Secondary Bonding Busbar” accordingly.
3. All lugs must be listed and two-hole.
4. Route conductors directly between termination points without splices and a minimum bend radius of 8-inches at the busbar and 10 times the diameter of the conductor along the pathway. No one bend may exceed 90 degrees.
5. Outside Cable Plant: Provide primary lightning and fault protection for communications cables routed underground or exposed to outdoor elements, and bond to nearest Bonding Busbar per manufacturer specifications.
6. Bond equipment frames, racks, cabinets, raised floor systems, cable shields, and cable pathways to the SBB using a minimum #6 AWG stranded copper bonding conductor no longer than 30 feet, and jumpers no longer than 12-inches.

4.2 POWER & LIGHTING

A. General purpose receptacles: Provide outlets 120 Volt/20 Amp NEMA 5-20R duplex non-switched receptacles, not connected to dedicated communications panel boards.
   1. Distribution Closets: Install outlets every 6 feet around perimeter walls and identify as convenience outlets.
   2. Work Areas: Install one outlet located within 2 feet of each communications WAO.
      a. *EXCEPTION*: Wi-Fi WAOs do not require supplemental power.

B. Dedicated branch circuit receptacles: Provide red non-switched receptacles in Distribution Closets, connected to dedicated communications panel boards and on emergency power if available.
   1. Wall outlets: Install a minimum of two 120 Volt/20 Amp NEMA 5-20R quad receptacles on perimeter walls.
      a. *EXCEPTION*: - Install one 120 Volt/20 Amp NEMA 5-20R quad receptacle in Homeland Security Data Network (HSDN) rooms and Title III Wire rooms.
   2. Enclosed equipment cabinets: Provide one 120 Volt/20 Amp NEMA 5-20R quad receptacle, one 120 Volt/30 Amp NEMA L5-30R, and one 208 Volt/30 Amp NEMA L6-30R receptacles. Attach outlets to overhead cable runway above each cabinet.
      a. *EXCEPTION:* Replace L5-30R with additional L6-30R receptacle in Forensics Server rooms.
      b. *EXCEPTION:* L6-30R not required for Security cabinets.
   3. Two-post open racks: Provide one 120 Volt/20 Amp NEMA 5-20R quad receptacle and one 120 Volt/30 Amp NEMA L5-30R receptacles. Attach to the rear of vertical cable management in each rack.
      a. *EXCEPTION:* Replace L5-30R with L6-30R receptacle in Forensics Server Room.
      b. *EXCEPTION:* L5-30R receptacle not required in Controlled Access Area Server Room.

C. Distribution closet lighting: Provide occupancy sensor-controlled lighting with a minimum 500 lux in the horizontal plane and 200 lux in the vertical plane measured at 3 feet above finished floor, not connected to dedicated communications circuit panel boards and on emergency power if available.

4.3 ENVIRONMENTAL CONDITIONING

A. Distribution Closets: Provide a dust free environment with continuous and dedicated environmental control 24 hours day/365 days a year and on emergency power if available. Maintain a positive pressure with a minimum of one air change per hour, temperature between 64 – 81 degrees F and a maximum relative humidity of 60%.

1. Load calculations: Baseline maximum Power Density/Heat Rejection for each enclosed equipment cabinet and two-post open rack provided for preliminary planning. Coordinate true values with special systems Engineers.
    a. Full size enclosed cabinets: 6 kilowatts (Kw)/20,485 British Thermal Units (Btu)/Hr.
    b. Full size two-post open racks: 3 Kw/10,242 Btu/Hr.

**** END OF SECTION 4 ****

5 DISTRIBUTION CLOSETS

5.1 EQUIPMENT RACKS & CABINETS

A. General:
   1. Finish: Manufacturer's standard finish in black.
   2. Mounting requirements: Structurally and rigidly secured to slab floors, overhead ladder tray pathways, and walls.

B. Two-post open racks: Sized 19-inch wide x 84-inches tall.

C. Enclosed cabinets:
   1. Doors: Concealed hinge, lockable flush latch, vented and removable doors, with matching key/lock design where multiple cabinets are installed.
   2. Removable and lockable side panels with gaskets.
   3. Solid top with brushed openings or grommets for cable access, ventilation fan kit, and a solid bottom panel.
   4. Dimensions:
      a. Free standing cabinets: 24-inches wide x 42-inches deep x 84-inches high with adjustable leveling feet.
      b. Wall-mounted cabinets: Rear-mount cabinet, 24-inches wide (with 19-inch rails) x 32-inches deep x 36”h (18 rack units) with fan kit and capable of opening fully 180 degrees.

D. Hinged wall Bracket: 4 Rack Mount Units high x 19-inch wide x 6-inches deep.

5.2 PATCH PANELS & CABLE MANAGEMENT

A. General: Provide separate connecting blocks, patch panels, and fiber housings for each color and performance category of cables installed. Include capacity for the number of cables, pairs, and optical fiber strands terminated, plus 25 percent spare.
   1. Finish: Manufacturer's standard finish in black.

B. Copper patch panels:
   1. Copper patch panels: Flat metal face with standard 110D type Insertion Displacement Connector (IDC) rear termination and 8P8C (RJ-45) front interface, and clear window label covers. Use printed label backgrounds, font or icons to match specified cable colors.
   2. Partially loaded modular, or frame, type patch panels are not allowed.

C. 110 style connecting blocks: High impact plastic with C5 termination wafers.

D. Optical fiber housings & panels:
   1. Metal enclosed rack and wall mounted, as specified, modular panel housings with single-mode and multi-mode coupling panels available in duplex SC and LC configurations.
   2. Fill unused openings with blank panels.

E. Cable Management: Provide metal or high impact plastic cable management.
   1. 110 style connecting blocks: Flexible finger-style cable management above, between, and sides of each block.

2. Two-post open racks: 6-inches wide, rack-length, double-sided, vertical cable management with integral wire retaining fingers and covers between, and on ends of each rack.
3. Copper patch panels:
    a. Rear horizontal cable support bars for each patch panel.
    b. Front horizontal cable management sized 1 and 2 rack units, as specified, with integral wire retaining fingers and covers above and below each patch panel.

5.3 LABELING CONVENTIONS

A. Provide durable machine printed adhesive-tape labels to identify structured cabling system. Confirm facility labeling scheme with designated local ICE ITFO Site Lead.
B. The size, color, and contrast of all labels should be selected to ensure that the identifiers are easily read. Labels should be visible during normal maintenance of the infrastructure.
C. Labels should be resistant to the environmental conditions at the point of installation (such as moisture, heat, or ultraviolet light), and should have a design life equal to or greater than that of the labeled component.
D. The text on labels shall be machine generated.
E. Provide a clear flexible vinyl or polyester laminate wrap-around type label on each end of cables 4-inches from termination point.
    1. Controlled Access Area (CAA): Identify each cable as “Classified” or “Unclassified” within 2 feet of entering CAA space, and on each termination end.
F. Identifiers:
    1. Distribution Closets: Identify room number per signage.
    2. Cabling racks: Label in series using alpha characters. Example: A, B, C, etc.
    3. Patch panels: Label in series in each rack or cabinet using alpha characters. Example: A, B, C, etc.
    4. Patch Panels: Label in series in each patch panel using two-digit numeric characters. Example: 01, 02, 03, etc.
    5. 110 connecting blocks and optical fiber panels: Identify each copper pair and fiber strand in series using three-digit numeric characters. Example: 001, 002, 003, etc.
G. Labeling example: 111-A-A01 (closet 111, cabling rack A, patch panel A, cable 01).

5.4 SPACE PLANNING

A. Distribution Closet Locations: Centrally locate closets on the floor or area being served in spaces that do not restrict expansion or working clearances. When feasible, stack closets vertically or readily accessible to building communications risers in multi-story facilities. Do not exceed 295 feet (90 m) for terminated WAO cable lengths (including routing and slack). Provide supplemental RWCs if the usable floor space to be served exceeds 20,000 square feet or cable lengths exceed limitations.
B. Walls: Enclosed room floor to deck with a fire/smoke rating compliant with local Authority Having Jurisdiction (AHJ). Provide 0.75-inches thick x 48-inches wide x 96-inches tall A/C grade, void free, fire-retardant treated plywood (FRTP) installed vertically on all wall surfaces, unless otherwise noted.
C. Fire protection:

1. Fire protection shall be provided as per applicable code. Installation of preaction sprinkler or other “dry” fire- suppression system is recommended. If wet pipe sprinklers are installed:
    a. the heads shall be provided with wire cages to prevent accidental operation; and
    b. drainage troughs shall be placed under the sprinkler pipes to prevent leakage onto the equipment within the room.

D. Ceilings: Minimum height of 10 feet without false ceiling tiles, unless necessary to ensure adequate cooling or required by code. Ceiling spaces shall be open and free of obstructions. Utilities and infrastructure that do not support the Distribution Closet shall not be installed in or pass through the space. Ex: Environmental conditioning systems, plumbing, electrical services or equipment that emits excessive Electrical Magnetic Interference or Radio Frequency Interference.

E. Floors: Finished with dust limiting, anti-static paint or tile and rated to withstand a minimum 100 pounds per square foot.

F. Doors: Minimum 36-inches wide x 84-inches high with a solid wood core, electronic badge access and capable of opening fully 180 degrees. The primary opening shall swing out of the telecom room.

G. Working clearances: Provide a minimum clearance of 36-inches of unobstructed space in the front, rear, and exposed sides of equipment cabinets, loaded racks, and wall mounted equipment. Allocate a minimum floor space of 24-inches wide x 42-inches deep for each enclosed cabinet, 30-inches wide x 36-inches deep for each open rack with vertical cable management, and 6-inches deep along perimeter walls for vendor equipment and cabling wall fields.

H. Demarcation Room (Demarc) dimensions: Coordinate space requirements with the telecommunications utilities that serve the facility. Provide a dedicated room with a minimum 10.5 feet x 10.5 feet of unobstructed space for equipment racks and/or cabinets, cabling, and wall fields.

I. Main Distribution Frame (MDF) Room dimensions (Figure 1): Provide a minimum 10.5 feet x 14.5 feet of unobstructed space to support up to 20,000 square feet of usable floor space and up to 192 multi-cable WAOs. Coordinate Security space requirements with the ICE Office of Professional Responsibility (OPR). Unidentified vendor, utilities, or Special Program equipment and cabling anticipated to be collocated within the MDF shall be reviewed and approved by OCIO, and additional space provided to accommodate requirements.

2. *EXCEPTION:* MDFs supporting less than 10,000 square feet of usable floor space and up to 96 multi-cable WAOs may not require Cabling Rack “B”. Change(s) shall be approved by OCIO.
3. *EXCEPTION:* MDFs supporting less than 5,000 square feet of usable floor space and up to 48 multi-cable WAOs may not require an OCIO Server cabinet or Cabling Rack “A” and may be considered for an enclosed wall-mount equipment cabinet. To be approved by OCIO.

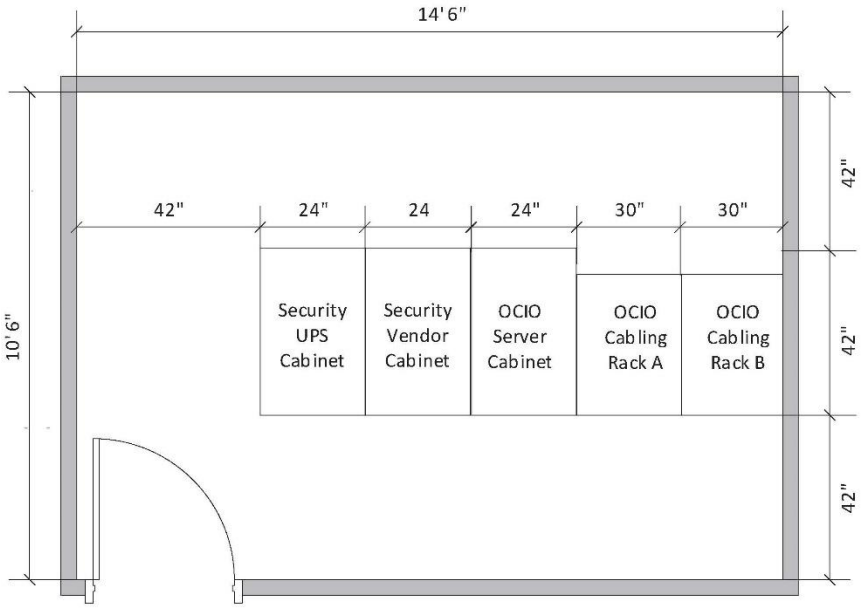


Figure 1 MDF Room Dimensions

J. Remote Wiring Closet (RWC) dimensions (Figure 2): Provide a minimum 10.5 feet x 10.5 feet of unobstructed space to support up to 20,000 square feet of usable floor space and up to 192 multi-cable WAOs. Coordinate Security space requirements with the ICE Office of Professional Responsibility (OPR). Unidentified vendor, utilities, or Special Program equipment and cabling anticipated to be collocated within the RWC shall be reviewed and approved by OCIO, and additional space provided to accommodate requirements.

1. *EXCEPTION:* RWCs supporting less than 10,000 square feet of usable floor space and up to 96 multi-cable WAOs may not require Cabling Rack “B”. To be approved by OCIO.
2. *EXCEPTION:* RWCs supporting less than 5,000 square feet of usable floor space and up to 48 multi-cable WAOs may not require an OCIO Server cabinet or Cabling Rack “A” and may be considered for an enclosed wall-mount equipment cabinet. To be approved by OCIO.

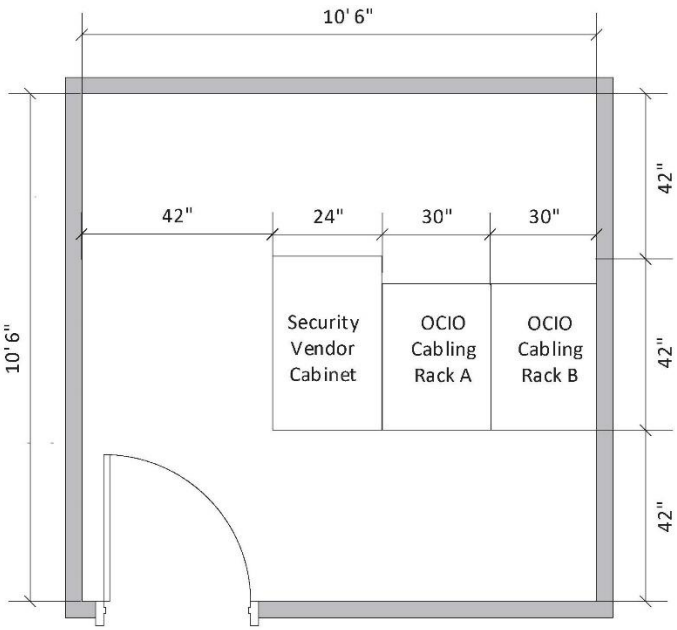


Figure 2 RWC Room Dimensions

K. Special Program Spaces:

1. Controlled Access Areas (CAA) and Computer Forensics Rooms each require a dedicated Distribution Closet comparable to an RWC or MDF within their space, based on site-specific functional requirements.
2. Homeland Security Data Networks (HSDN) Rooms and Wire Rooms each require a dedicated 4 feet x 8 feet vertical plywood wall field within their space, based on site-specific functional requirements.

**** END OF SECTION 5 ****

6 BACKBONE CABLING

6.1 GENERAL

A. Install cables in a star topology routed to Distribution Closets and terminated directly to connecting blocks and patch panels without bridged taps, splitters, splices, etc.

B. Conceal cables in ceilings, walls, and floors utilizing approved pathways. Exposed cabling other than unfinished spaces not permitted without ICE OCIO approval.

C. Provide cables with imprinted cable rating, length, category, and pairs or strand count.

1. Inside Cable Plant: Plenum rated.
2. OSP: Indoor/outdoor plenum rated.

D. Bring cable to room temperature before installing, maintain manufacturer cable bend radius and pulling tension requirements, and provide a minimum 10-foot service loop at WAO end.

E. Bundle, lace, and train cables within industry standard restrictions using fabric hook and loop style cable wraps listed for the environment. Maintain separation of dissimilar signal types and voltage levels. Ex: Ethernet, AV, and overhead paging.

F. Connecting hardware: Terminate cables with performance matching connecting hardware per manufacturer instructions.

G. Coordinate requirements for telecommunications and commercial television (CATV) utility cabling entering the facility directly with local service providers early in planning phase. CATV system signal balancing to be performed by the Service Provider. Locate ICE backbone cables adjacent to Service Provider circuit interface connection points in the Demarcation Room.

6.2 COPPER CABLING

A. Typical cable types:

1. Category 5e: 25-pair or higher, 100-ohm, balanced Unshielded Twisted Pair (UTP).
2. Coaxial (coax): RG11, and RG6, 75-ohm, 2000 megahertz (MHz) dual shield.

6.3 OPTICAL FIBER CABLING

A. Connecting hardware:

1. All optical fiber connectors shall be fusion spliced.
2. Quick-connect, non-keyed, duplex, Lucent Connectors (LC) and Subscriber Connectors (SC) with insertion loss less than 0.3 decibel (dB).
3. Colors - multimode (beige) and single-mode (blue).

B. Typical cable types: Provide interlocking metallic armored plenum-rated cables.

4. Multi-mode: Multi-strand, tight buffer, 50/125-micron, laser-optimized OM3 supporting 10 gigabit (Gb) Ethernet up to 984 feet (300 m). Jacket color: Aqua.
    a. Maximum Attenuation: 3.5 decibel/kilometer (dB/km) at 850 nanometers (nm) and 1.5 dB/km at 1300 nm.
    b. Minimum Modal Bandwidth: 1500 megahertz/kilometer (MHz-km) at 850 nm and 2000 MHz-km at 1300 nm.
5. Single-mode: Multi-strand, tight buffer, 9/125-micron OS2. Jacket color: Yellow.
    a. Maximum Attenuation: 0.4 (OS2) dB/km at 1310 nm and 0.4 (OS2) dB/km at 1550 nm.

6.4 SPACE PLANNING

Typical Program provisions are identified below. See OCIO Cabling Package for site-specific requirements.

A. Provide from Demarcation Room to Main Distribution Frame (MDF) Room:
   1. Twelve strands OS2 single-mode and twelve strands OM3 multi-mode fiber optic cables terminated in wall mounted distribution panel in the Demarc Room and rack mounted distribution panel in rack “A” in the MDF Room using fusion-spliced duplex Lucent Connectors (LC). Cables shall be armored and plenum-rated.
   2. Fifty-pairs Unshielded Twisted Pair (UTP) CAT-5e copper cable terminated on 110 blocks with C5 wafers at each end. Cables shall be plenum-rated.
   3. One RG11 coax cable terminated with “F” type connectors on high definition (HD) digital 1 gigahertz (GHz) directional passive splitter, one port of equal value for each WAO coax cable, to support Community Antennae Television (CATV) service. Include terminator caps for unused ports. Cables shall be plenum-rated.

B. Provide from Main Distribution Frame (MDF) Room to Remote Wiring Closet (RWC):
   1. Twelve strands OM3 multi-mode optical fiber cable terminated in rack mounted distribution panels located in rack “A” on each end using fusion-spliced duplex LC connectors. Cables shall be armored and plenum-rated.
   2. Twenty-five pairs Unshielded Twisted Pair (UTP) CAT-3 cable terminated on wall mounted 110 blocks with C5 wafers on each end. Cables shall be plenum-rated.
      a. PBX sites: In addition, provide CAT-5e cable from RWC 110 block to rack mounted modular patch panel, terminating one-pair per port on pins 4 and 5.
   3. One RG11 coax cable terminated with “F” type connectors on high definition (HD) digital 1 gigahertz (GHz) directional passive splitter, one port of equal value for each WAO coax cable, to support Community Antennae Television (CATV) service. Include terminator caps for unused ports. Cables shall be plenum-rated.

C. Provide from Main Distribution Frame (MDF) Room to Homeland Security Data Networks (HSDN) Room:
   1. Six-strand OM3 multi-mode optical fiber cable terminated in a dedicated rack mounted distribution panel in the MDF Room and a dedicated wall mounted distribution panel in the HSDN Room using fusion-spliced duplex LC connectors. Cables shall be armored and plenum-rated.

D. Provide from Main Distribution Frame (MDF) Room to Controlled Access Area (CAA) Server Room:
   1. Six-strand OM3 multi-mode optical fiber cable terminated in a dedicated rack mounted distribution panel on both ends using fusion-spliced duplex LC connectors. Cables shall be armored and plenum-rated.

E. Provide from Main Distribution Frame (MDF) Room to Computer Forensics Server Room:
   1. Six strands OM3 multi-mode optical fiber cable terminated in a dedicated rack mounted distribution panel on both ends using fusion-spliced duplex LC connectors. Cables shall be armored and plenum-rated.

**** END OF SECTION 6 ****

7 HORIZONTAL CABLING

7.1 GENERAL

A. Install cables in a star topology routed directly to Distribution Closets and terminated directly to connecting blocks and patch panels without bridged taps, splitters, splices, etc.

B. Conceal cables in ceilings, walls, and floors utilizing approved pathways. Exposed cabling other than unfinished spaces not permitted without ICE OCIO approval.

C. Provide cables with imprinted cable rating, length, category, and pairs or strand count.

1. Inside Cable Plant: Plenum rated.
2. OSP: Indoor/outdoor plenum rated.

D. Bring cable to room temperature before installing, maintain manufacturer cable bend radius and pulling tension requirements, and provide a minimum 10-foot service loop on each end.

E. Bundle, lace, and train cables within industry standard restrictions using fabric hook and loop style tie wraps listed for the environment. Maintain separation of dissimilar signal types and voltage levels. Ex: Ethernet, AV, and overhead paging.

F. Terminate cables with performance matching connecting hardware per manufacturer instructions. Provide cable and connector performance categories and colors per specified outlet configuration details.

7.2 COPPER CABLING

A. Typical cable types:

1. Category (CAT) 6 and 6A: 4 pair, 100-ohm, balanced Shielded and Unshielded Twisted Pair (STP/UTP), CAT-6-250 megahertz (MHz), and CAT-6A-500 megahertz (MHz). Terminate ANSI/TIA T568B in flush mount modular snap-in connectors, non-keyed RJ-45 (4 pair/eight position), with 110D type IDC printed circuit board (PCB).
2. Coaxial (coax): 75-ohm, 2000 megahertz (MHz), RG6 dual shield terminated with female “F” style connectors on both ends with male faceplate insert.

7.3 OPTICAL FIBER CABLING

A. Connecting hardware: Non-keyed, duplex, fusion-spliced LC connectors and SC connectors with insertion loss less than 0.3 dB.

B. Multi-mode: Multi-strand, armored, tight buffer, 50/125-micron, laser-optimized OM3 supporting 10GB Ethernet up to 984 feet (300 m). Jacket color: Aqua.

1. Maximum Attenuation: 3.5 dB/km at 850 nm and 1.5 dB/km at 1300 nm.
2. Minimum Modal Bandwidth: 1500 MHz-km at 850 nm and 2000 MHz-km at 1300 nm.

7.4 FACEPLATES & PATCH CORDS

A. Faceplates: Provide faceplates in multiple gang and port variations to accommodate specified WAO connecting hardware and include clear window outlet label covers. Coordinate styles and finishes per WAO location and application the Architect and local ICE point of contact. Provide blank cover plates for unused WAOs or outlet ports.

1. Modular furniture WAOs: Route modular furniture cables through furniture raceways directly to each WAO and terminate in a compatible snap-in faceplate to furniture base. Surface mount boxes permitted for WAOs with high cable count with ICE approval.

2. Conference tables: Coordinate with furniture vendor and local ICE point of contact to terminate cables in a compatible pop-up style outlet.

B. Patch cords: Furnish factory made and certified equipment copper and fiber patch cords, as specified in the OCIO Cabling Package, to the local ICE point of contact for installation. Confirm quantity and lengths with local ICE point of contact prior to purchase and ensure combined channel length (patch cables and horizontal cable) does not exceed 328 feet (100 m).

1. Purchase patch cords with snag resistant stress relief boots and match color, performance category, and connector type with the specified WAO cables and connecting hardware installed.
2. Patch cords shall be provided to the local ITFO. Provide a signoff sheet to verify delivery of the patch cords.

7.5 SPACE PLANNING

A. Typical WAO requirements are identified in Table 3. Not all outlet types may apply or are shown. See OCIO Cabling Package for site-specific requirements.

Table 3 Outlet Locations

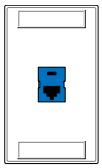
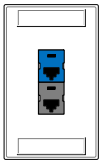
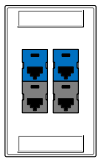
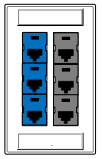
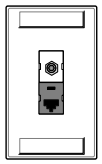
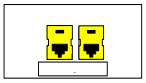
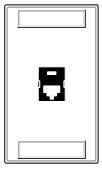
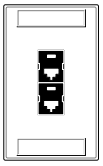
Work Area	Quantity	WAO Configuration	Special Notes
Common Area Offices	2	A2	
	1	A5	
Common Area Workstations	1	A2	
Reception Area	2	A2	
Common Area Enterprise Wi-Fi	1-5	A6	Installing Owner furnished wireless access points (WAPs) and housings not in scope, unless otherwise noted in OCIO Cabling Package. When applicable, survey site conditions with the local ICE point of contact and provide a code compliant and government approved mounting solution. Connect WAPs to the WAO and label with cable identifier and WAP MAC address. Network switch connection, device testing, and validation not in scope.
Gyms, Waiting Rooms & Break	1	A1	Mounted at wall phone height. Refer to OCIO Cabling Package detail.

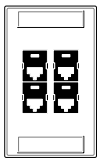
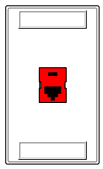
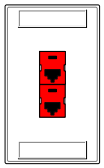
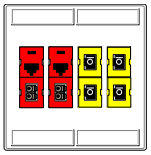
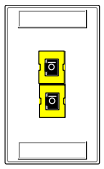
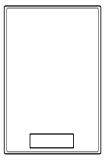
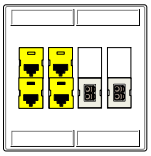
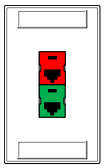
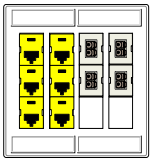
Rooms	1 - 2	A5	
Common Area Conference, Training, and Multi-Purpose Rooms	4 - 6	A2	Coordinate conference table connectivity requirements. Also, coordinate wall outlets with Audio Visual headend equipment and potential podium locations.
	1 - 4	A3	Coordinate outlet locations to be compatible with training table configurations.
	1 - 3	A5	
Homeland Security Data Networks Rooms (each workstation)	2	A8	
	2	B1	Classified outlet: Maintain a minimum 3-inch separation, in its entirety, between all other wire lines, pathways, and outlets.
Controlled Access Area (each workstation)	1	A8	
	1	B2	Classified outlet: Maintain a minimum 3-inch separation, in its entirety, between all other wire lines, pathways, and outlets.
Computer Forensics Room (each workstation)	1	A2	
	1	C1	
Title III Wire Room (each workstation)	1	A2	
	1	D1	
Distribution Closets	3	A1	(1) at wall phone height and (2) at Security wall field locations terminated with 20’ service loops. WAOs at security wall fields to be extended to final location by Electronic Security Systems vendor and activation coordinated with local ICE point of contact.

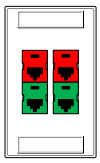
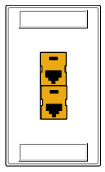
B. Typical WAO configuration details are identified in Table 4. Not all outlet types may apply or are shown. See OCIO Cabling Package for site-specific requirements.

1. Terminate horizontal “A” Series cabling headend in the MDF or RWC.
2. Terminate horizontal “B” Series cabling headend in the HSDN or CAA Server Room.
3. Terminate horizontal “C” Series cabling headend in the Forensics Server Room.
4. Terminate horizontal “D” Series cabling headend in the WIRE Room.

Table 4 WAO Configuration Details

OUTLET TYPE	DESCRIPTION	EXAMPLE
PROGRAM: ENTERPRISE “A” SERIES		
A1	WAO: (1) blue CAT-6 UTP.	
A2	WAO: (1) blue and (1) gray CAT-6 UTP.	
A3	WAO: (2) blue and (2) gray CAT-6 UTP.	
A4	WAO: (3) blue and (3) gray CAT-6 UTP.	
A5	CATV outlet: (1) white RG6, 75-ohm, 2000 MHz dual shield coax terminated with “F” type connector and (1) gray CAT-6 UTP.	
A6	Wireless Access Point (WAP) outlet: (2) yellow CAT-6A UTP in a plenum rated surface mount box, with a 20’ service loop, structurally supported above false ceilings or open areas.	
A7	WAO: (1) black CAT-6 STP.	
A8	WAO: (2) black CAT-6 STP.	

A9	WAO: (4) black CAT-6 STP.	
PROGRAM: HSI "B" SERIES		
B1	Classified WAO: (1) red CAT-6 STP. Maintain a minimum 3-inch separation, in its entirety, between all other wire lines, pathways, and outlets.	
B2	HSDN Classified WAO: (2) red CAT-6 STP. Terminate on wall mounted patch panel. Maintain a minimum 3-inch separation, in its entirety, between all other wire lines, pathways, and outlets.	
B3	Controlled Access Area Classified WAO: (2) red CAT-6 STP (HSDN), (1) red 4-strand OM3 multi-mode optical fiber terminated with duplex LC connectors (B LAN), and (1) yellow 4-strand OM3 multi-mode optical fiber terminated with duplex SC connectors (C LAN). Maintain a minimum 3-inch separation, in its entirety, between all other wire lines, pathways, and outlets.	
B4	Controlled Access Area VTC Classified WAO: (1) yellow 2-strand OM3 multi-mode optical fiber terminated with duplex SC connectors (C LAN). Maintain a minimum 3-inch separation, in its entirety, between all other wire lines, pathways, and outlets.	
B5	6 strand OM3 multi-mode fiber, unterminated with a blank faceplate, from CAA Cabinet B with a 10' service loop on each end.	
PROGRAM: FORENSICS "C" SERIES		
C1	WAO: (4) yellow CAT-6A UTP and (1) 4 strand OM3 multi-mode optical fiber terminated with duplex LC connectors.	
C2	WAO: (1) red and (1) green CAT-6A UTP.	
C3	WAO: (6) yellow CAT-6A UTP and (4) 2 strand OM3 multi-mode optical fiber terminated with duplex LC connectors.	

C4	WAO: (2) red and (2) green CAT-6A UTP.	
PROGRAM: TITLE III WIRE "D" SERIES		
D1	WAO: (2) orange CAT-6 UTP. Terminate on hinged, swing out wall mounted patch panel.	

**** END OF SECTION 7 ****

8 CLOSING DOCUMENTS

Provide project closing documents to ICE OCIO within 15 business days of cable plant installation for review and acceptance of project completion, prior to information and communications systems (ITS) deployment and submitting invoices. Create documents in electronic formats including Microsoft Word, VISIO, Excel, and Autodesk AutoCAD. Combine all electronic documents and submit as one Adobe Acrobat pdf file.

8.1 WORK RESULTS REPORT

A. Provide a written report on Contractor corporate letterhead with name, address, contact information, and submission date.
   1. Address report to the authorized ICE contract representative and include project name, address, contract number, task order number, purchase order number, IT Service Request number, approved Contractor proposal version, ICE Cabling Standard, and OCIO Cabling Package version.
   2. Include a detailed summary of installation dates, work performed, deviations from approved requirements, and identify who approved changes.
   3. Include a certification statement affirming that the entirety of the installation meets agreed requirements, tested, labeled, and ready for use. Identify the scope of tests performed and attest to the accuracy of the results.
   4. Include warranty scope and correction period for deficiencies.
   5. Include final inspection report with acceptance signature from ICE contract representative.

B. Provide clear, legible, and accurate test results, as-built record drawings, and WAO schedules.
   1. Include drawings sized Architectural “D” (24-inch x 36-inch). Identify WAOs with typed labeling schemes of each cable installed, backbone cabling diagrams, Distribution Closets, major pathway and cabling routes, and structural penetrations.
   2. Include test results for each cable installed from a certified tester and identified per corresponding as-built drawings.
   3. Include an Excel spreadsheet of each cable installed per Distribution closet and identified per corresponding as-built drawings.

**** END OF SECTION 8 ****

9 RISK MANAGEMENT

Construction projects constantly demand time-sensitive information and actions throughout their lifecycle and effective communication between multiple stakeholders is critical to achieve planned outcomes. Significant and unproductive time is often expended addressing avoidable cabling issues that risk costly changes and/or delays design, construction, and completion schedules. Below are vital steps to reduce these risks. However, they are not intended as a comprehensive process.

A. OCIO PMs initiate internal project kickoff early in design phase to identify stakeholders, define objectives, and coordinate design activities.

B. OCIO cabling subject matter expert (SME) produces a complete and vetted cabling package and ICE PMs process the approved documents for Architectural & Engineering (A&E) coordination. Moving forward with changes to approved requirements without SME review and approval undermines information and communications systems engineering tasks and risks project failure.

C. OCIO cabling SME performs a technical review of complete A&E bid documents for compliance with the approved cabling package. Moving forward without review and approval undermines information and communications systems engineering tasks.

D. OCIO cabling SME performs a technical review of complete cabling contractor proposal documents for compliance with the approved cabling package. Moving forward without review and approval undermines information and communications systems engineering tasks.

E. The Contractor is responsible for installing cabling infrastructure in compliance with this Cabling Standard, the approved OCIO cabling package, and reporting progress. OCIO PMs attend progress meetings, but periodic inspections by OCIO representatives are performed to identify and address issues and not intended as a progress assessment or approval.

F. OCIO cabling SME performs a technical review of complete cabling Contractor final deliverables for compliance with the approved cabling package. Moving forward with project close-out without review and approval undermines information and communications systems engineering tasks.

**** END OF SECTION 9 ****