

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 82 00

ARCHITECTURAL REQUIREMENTS

04/21

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 GENERAL DESIGN REQUIREMENTS
 - 1.2.1 Applicable Codes and Criteria
 - 1.2.2 Technical Specifications
 - 1.2.3 Handicapped Accessibility
 - 1.2.4 Occupational Safety and Health
 - 1.2.5 Antiterrorism/Force Protection
 - 1.2.6 Fire Protection and Life Safety
- 1.3 TYPE AND METHOD OF CONSTRUCTION
- 1.4 FUNCTIONAL BUILDING REQUIREMENTS
 - 1.4.1 Space and Square Footage Allocation
 - 1.4.2 Demolition Requirements
 - 1.4.2.1 Walls
 - 1.4.2.2 Secured Boundary
 - 1.4.2.3 Windows
 - 1.4.2.4 Doors
 - 1.4.2.5 Restrooms and Lockers
 - 1.4.2.6 Finishes
 - 1.4.3 New Construction and Renovation Requirements
 - 1.4.3.1 Desired Image and Architectural Compatibility
 - 1.4.3.2 Secured Boundary
 - 1.4.3.3 Antenna Platform
 - 1.4.3.4 Exterior Envelope
 - 1.4.3.5 Room Finishes
 - 1.4.3.6 Sound and Vibration Control
 - 1.4.3.7 Security and Access Control
 - 1.4.3.8 Sustainability and Energy Performance
 - 1.4.3.8.1 Air Barrier
 - 1.4.3.8.2 Building Envelope Energy Performance
 - 1.4.3.8.3 Daylighting
 - 1.4.3.8.4 Total Building Commissioning

PART 2 PRODUCTS

- 2.1 MATERIAL SELECTION CRITERIA
- 2.2 BUILDING CONSTRUCTION
- 2.3 ROOFS
 - 2.3.1 Existing Roof
- 2.4 DOORS AND FRAMES
 - 2.4.1 Exterior Doors
 - 2.4.1.1 Exterior Hollow Metal Doors
 - 2.4.1.2 Storefront Doors
 - 2.4.1.3 Thresholds
 - 2.4.2 Interior Doors

- 2.4.3 Acoustic Rated Doors
- 2.4.4 Fire Doors
- 2.4.5 Hardware
 - 2.4.5.1 Door Closers
 - 2.4.5.2 Keyed Access Entry Control Systems
 - 2.4.5.3 Keyless Access
- 2.5 STOREFRONTS
- 2.6 INTERIORS
 - 2.6.1 Secured Boundary Perimeters
 - 2.6.2 Gypsum Board Assemblies
 - 2.6.3 Gypsum Board Ceilings
 - 2.6.4 Acoustical Ceiling Tiles
 - 2.6.5 Exposed Structural Ceilings
 - 2.6.6 Insulation
 - 2.6.7 Raised Access Flooring (RAF)
- 2.7 ACCESS DOORS AND PANELS
- 2.8 Elevator
- 2.9 BUILDING EXPANSION JOINTS
- 2.10 INTERIOR SEALANT
- 2.11 CABINETRY AND CASEWORK
- 2.12 INFORMATION SPECIALTIES
 - 2.12.1 Bulletin Boards/Tackboards
 - 2.12.2 Wall-mount Television and Monitor Bracket
- 2.13 COMPARTMENTS AND CUBICLES
 - 2.13.1 Toilet Compartments
 - 2.13.2 Urinal Screens
 - 2.13.3 Solid Surface Shower Enclosures
- 2.14 TOILET ACCESSORIES
- 2.15 SAFETY SPECIALTIES
 - 2.15.1 Defibrillator Cabinets
- 2.16 STORAGE SPECIALTIES
 - 2.16.1 Cell Phone Lockers
 - 2.16.2 Personal Belongings Storage Lockers
 - 2.16.3 Restroom Lockers

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 82 00

ARCHITECTURAL REQUIREMENTS
04/21

PART 1 GENERAL

1.1 REFERENCES

The design publications listed below shall be used as sources of criteria for the architectural design. Where a date is not specified, the most current edition of the code or standard in effect, including errata and addenda available at the RFP proposal submission deadline shall be used as criteria for the design. The criteria from these sources may be supplemented but not supplanted, by applicable criteria contained in nationally recognized codes and standards.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

STEEL DOOR INSTITUTE (SDI/DOOR)

SDI/DOOR A250.8	(2017) Specifications for Standard Steel Doors and Frames
-----------------	--

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-200-01	(2019; with Change 1, 2020) DoD Building Code
UFC 1-200-02	(2020) High Performance and Sustainable Building Requirements
UFC 3-101-01	(2020; with Change 1, 2021) Architecture
UFC 3-110-03	(2012; with Change 5, 2020) Roofing
UFC 3-120-01	(2014; with Change 3, 2017) Design: Sign Standard
UFC 3-600-01	(2016; with Change 5, 2020) Fire Protection Engineering for Facilities
UFC 4-010-01	(2018; with Change 1, 2020) DoD Minimum Antiterrorism Standards for Buildings
UFC 4-010-05	(2013; with Change 2, 2022) Sensitive Compartmented Information Facilities Planning, Design, and Construction
DoD ABA Memorandum	(2008) Dod Memorandum - Access for People

with Disabilities

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7 (2017) Minimum Design Loads for Buildings and Other Structures

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING
ENGINEERS (ASHRAE)

ASHRAE 90.1 - IP (2019) Energy Standard for Buildings
Except Low-Rise Residential Buildings

ASTM INTERNATIONAL (ASTM)

ASTM E1514 (1998; R 2017) Standard Specification for Structural Standing Seam Steel Roof Panel Systems

ASTM E84 (2018a) Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM E1264 (2014) Acoustical Ceiling Products

FM GLOBAL (FM)

FM APP GUIDE (updated on-line) Approval Guide
http://www.approvalguide.com/

INTELLIGENCE COMMUNITY STANDARD (ICS)

ICD/ICS 705 (2021) Technical Specification for
Construction and Management of Sensitive
Compartmented Information Facilities

ICS 705-1 (2010) Physical and Technical Security
Standard for Sensitive Compartmented
Information Facilities

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2021) International Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10 (2018; ERTA 1-2 2018) Standard for Portable Fire Extinguishers

NFPA 101 (2021) Life Safety Code

NFPA 252 (2017) Standard Methods of Fire Tests of Door Assemblies

NFPA 80 (2019) Standard for Fire Doors and Other Opening Protectives

NFPA 286 (2019) Standard Methods of Fire Tests for Evaluating Contribution of Wall and

Ceiling Interior Finish to Room Fire Growth
UNDERWRITERS LABORATORIES (UL)

UL 10C (2016) UL Standard for Safety Positive
Pressure Fire Tests of Door Assemblies

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED BDC Ref Guide (2020) USGBC LEED Reference Guide for
Building Design and Construction, v4.1

1.2 GENERAL DESIGN REQUIREMENTS

1.2.1 Applicable Codes and Criteria

All pertinent building codes, life safety codes, and reference criteria shall be met or exceeded. This project utilizes the DoD Building Code, as defined by [UFC 1-200-01](#) and its references.

1.2.2 Technical Specifications

Government-provided technical guide specifications shall be completely edited and fully coordinated with the drawings to accurately and clearly identify the selected products and installation requirements for this project

Certain specifications and performance requirements, deemed critical to the project, have been included herein. Where requirements are not covered in the guide specifications, specification sections shall be prepared to cover those subjects and shall be in the same format as the guide specifications.

1.2.3 Handicapped Accessibility

Per [DoD ABA Memorandum](#), "It is the goal of the Department of Defense (DoD) to make its facilities accessible to persons with disabilities. To achieve that goal, the Department intends to go beyond the minimum requirements of law. Even if a facility is exempt from coverage under the Architectural Barriers Act of 1968 (ABA), compliance with the standards identified in this memorandum is recommended to the maximum extent that is reasonable and practicable without degrading the facility's military utility."

The facility, excluding mechanical, electrical, and telecommunication equipment rooms, and site access to the building must be designed and constructed to be accessible in accordance with the Architectural Barriers Act ([36 CFR 1191](#)). Ramps, including ramps to telecom/server rooms, shall be constructed to a maximum slope of 1:12. Exterior ramps shall be constructed of concrete with foundations (not open under the ramp). Modular, portable, or metal ramps will not be permitted for the exterior ramps. All ramps shall meet ABA compliance and shall join exit sidewalks for compliance with [NFPA 101](#) whether or not specifically required by the referenced documents. Access to the server rooms shall be similar to ABA requirements with curb cuts, ramps, etc. to facilitate rolling of equipment from a truck to the ramp and into the building so that personnel do not have to lift dollies or equipment over curbs and other obstructions. Use of existing curb ramps shall be permitted to achieve accessibility as long as the ramps occur in a convenient and usable configuration.

Interior ramps can be either of concrete, raised access flooring, or other means that complies with [UFC 1-200-01](#) and referenced codes. Design intent is that the intermediate landing of the ramp will be at the same level as two riser heights of southern stairwell Stair 1. Total height of both interior ramps shall be 18-inches to accommodate the raised access flooring.

The Mass Briefing Room does not currently meet ABA standards. As such an area for handicapped seating and access to the stage shall be provided. Seating on the first row shall be removed to allow for more flexible seating. A lift shall be provided for the stage. Lift installation shall include partial removal of the stage. Design shall include selection of a lift that is as unobtrusive as possible to the stage and shall have removable guardrails. Lift shall be a permanent installation, not a movable lift.

1.2.4 Occupational Safety and Health

Building design shall comply with [29 CFR 1910](#) Occupational Safety and Health Standards (OSHA) criteria for all items which must be included in the design to ensure safety compliance.

1.2.5 Antiterrorism/Force Protection

This building shall include design provisions meeting the requirements of [UFC 4-010-01](#) - DoD Minimum Antiterrorism Standards for Buildings. This includes, but is not limited to, minimum setbacks from parking areas and access drives, glazing and blast resistance requirements; visual screening; HVAC intake louver locations; and other protective features as outlined in the UFC. See Concept Drawings and [01 89 00 SITE WORK REQUIREMENTS](#) for requirements on eliminating the existing driveway to the front entrance and other requirements.

1.2.6 Fire Protection and Life Safety

Fire separation walls and egress from the facility shall meet or exceed the requirements of [NFPA 101](#) - Life Safety Code. The facility shall be protected by an automatic fire sprinkler system throughout the building. See Section [01 86 13 FIRE PROTECTION REQUIREMENTS](#) as well as [UFC 3-600-01](#) Fire Protection Engineering for Facilities.

Provide facility with semi-recessed fire extinguisher cabinets and brackets where required and complying with [UFC 3-600-01](#), [NFPA 10](#) and [NFPA 101](#). Provide brackets in utility spaces, and provide wall-mounted cabinets on walls that are a part of the secured boundary or on STC rated walls.

Fire extinguishers for each bracket and cabinet are included in the base bid.

1.3 TYPE AND METHOD OF CONSTRUCTION

This facility is existing, permanent construction and shall be redesigned and renovated as permanent construction. The definition of permanent construction is, "Facilities designed and constructed to serve a life expectancy of more than 25 years, should be energy efficient, and must have finishes, materials, and systems selected for low maintenance and low life-cycle cost." Reference [UFC 1-200-02](#) for additional design criteria.

The overall building occupancy classification for the facility is defined in Section 01 86 13 FIRE PROTECTION REQUIREMENTS. Construction "Type IIB" shall be used for the facility. Provide fire protection, separation, and life safety features as necessary for the occupancy and type of construction listed.

1.4 FUNCTIONAL BUILDING REQUIREMENTS

1.4.1 Space and Square Footage Allocation

The building spaces shall be arranged as shown on the drawings provided in this RFP. This arrangement has been arrived at after multiple meetings with the end user and has been determined as the best way to meet the functional needs of the client, in addition to meeting necessary code requirements. However, other design solutions which slightly modify the provided solutions may be acceptable, and will be reviewed on their design merits against the furnished criteria. Any changes to the floor plan must be approved by the Corps of Engineers Omaha District Design Branch Architectural Section and the contracting officer.

The gross square footage of the facility is 39,861 SF. Interior net square footage shown on plans is approximate and will vary from what is shown based on thickness of walls, location of furring, needs for mechanical/plumbing chases, etc. New wall locations are somewhat flexible, with adjustments being made as necessary to meet space functional requirements, structural requirements, and ICD/ICS 705 requirements for constructability. Rooms noted on the Room Data Sheets with specific/hard dimensions are not flexible. The layout of the mechanical, electrical, and telecommunications spaces (rooms, allocated floor and wall spaces, and chases) are suggestive and may require wall and ceiling configurations to be slightly altered to conform to equipment requirements.

1.4.2 Demolition Requirements

1.4.2.1 Walls

Majority of the interior walls are intended to be demolished and are as indicated on the AD sheets in the concept drawings package. Walls intended to remain may be required to have drywall and other appurtenances removed as required to accommodate the new layout, fire ratings, and STC requirements.

1.4.2.2 Secured Boundary

Existing walls, floors, ceilings, and roof that form the new secured boundary shall have all conduit, wiring, fire alarms, and other appurtenances removed. Boundary walls and ceilings shall have all gypsum wall board and batt insulation removed.

1.4.2.3 Windows

All interior windows, transoms, and sidelites shall be removed. All glassblock is to be removed except for the glassblock in the railing on the atrium. Exterior windows shall be removed as shown on the concept drawings.

Existing, exterior windows to remain shall have the glass removed and replaced with black, spandrel panels. Resulting construction shall meet

ICD/ICS 705 requirements.

[Am-0005] Windows in the atrium on the second floor are to be replaced with STC-50, RF-shielded windows. Windows shall have fixed glazing and can be picture windows or have mullions. Windows shall be equipped with IDS/glass breaks. [*Am-0005]

1.4.2.4 Doors

All exterior and interior personnel doors are to be removed whether or not indicated on the AD sheets. If new doors that are to remain in the same location as the removed doors, new door hardware aligns with the existing door frames, and the frames are in good condition, then the frames can remain in place.

Exterior sectional and roll-up doors shall be removed.

1.4.2.5 Restrooms and Lockers

All plumbing fixtures, toilet/urinal partitions, countertops, toilet accessories (i.e. soap, papertowel, toilet tissue, etc. dispensers), lockers, and benches shall be removed. See concept drawings for new layouts.

1.4.2.6 Finishes

All existing floor finishes, wall base, wall covering/paneling, wall tile, corridor railings, acoustical treatments, and acoustical ceiling tile and suspension systems shall be removed. Existing gypsum ceiling and wallboard can remain in place provided it is in good condition, meets the intended use, and can be verified that it meets the new requirements for water resistance, fire, and STC ratings.

1.4.3 New Construction and Renovation Requirements

Construct new layout as shown. See Room Data Sheets, specifications, and Concept Drawings for additional information.

1.4.3.1 Desired Image and Architectural Compatibility

Renovated exterior shall be similar to existing and shall be compatible with Bldg. 629 to the north.

1.4.3.2 Secured Boundary

The secured boundary, including exterior and interior walls, as shown on the drawings shall meet ICD/ICS 705 Standards. The entire roof forms part of the secured boundary and is required to be STC-50. If existing roof system does not meet the STC-50 requirement, then it must be enhanced to meet STC-50 requirements. The exterior walls are expected to have the wallboard removed, existing electrical and comm removed, and insulation removed. New materials will be installed to meet ICD/ICS 705 requirements.

Floors and ceilings that form the secured boundary and abut an unsecured area shall be modified to meet the same ICD/ICS boundary standards, including meeting STC-50 requirements. Penetrations of the secured boundary shall be kept to a minimum. All other locations shall [Am-0004]be flush mounted [*Am-0004] receptacles and drops. Depending on wall type and security design the contractor shall fur walls where necessary to

avoid compromising the integrity or performance of the secured boundary.

[Am-0004]The entire secured boundary must have continuous radio frequency (RF) shielding. That boundary and its shielding will include the walls, floors, and roofline and/or ceiling that form that boundary. The metal roof deck and second floor deck can be considered as RF shielding provided that they form a continuous boundary. Tie-in to such metal decks shall be directly to the decks and may require removal of concrete or other materials as required to securely attach to the deck. If use of the existing deck is not feasible or is undesirable, then RF shielding material must be used in order to form a continuous barrier. Doors and windows that form part of the boundary shall also be RF shielded. All RF shielding in walls and floors shall be protected by other materials, i.e. gypsum wall board, plywood, etc., to prevent damage. For example, raised access flooring pedestals shall not rest directly on RF foil material. Carpet and other flooring materials shall not be installed directly on RF foil. Metal sheeting is an acceptable alternative to foil and does not require additional protective covering unless required elsewhere in the RFP. Government CCTA and manufacturer's authorized representative shall inspect the shielding installation prior to being covered.

Any penetrations in the shielding must be protected. Once shielding is installed, penetrations such as nailing and screws will not be permitted. Any conduit or ductwork penetrating the shielding shall be grounded or have a dielectric break. Ductwork shall also have waveguides. The conductive layer on the outside of the shielding material or gasket shall be in the same galvanic range as the metal construction materials to prevent galvanic corrosion. Range shall be a maximum anodic index of 0.5 Volts.

Shielding effectiveness shall be 85dB at 100 MHz to 10GHz when tested to meet requirements of IEEE 299 and ASTM D4935. Install all components of RF shielding system in strict conformance with manufacturer's instructions and under direct supervision of a factory representative. Verify integrity of RF shielding before covering shield material with other finish materials. During and after RF shielding and penetration protection subsystem installation, Government CCTA shall inspect the installation for compliance with the specifications. Complete the inspection before a finish or concrete topping coat is installed.[*Am-0004]

Walls and ceilings that form part of the SWA boundary shall be inspectable on both sides. No electrical items (i.e. outlets, junction boxes, switches, conduit, etc.) shall not be part of the boundary walls. Electrical items shall be provided for in furring over the boundary wall. Electrical items in the JUA Comm room, and the SIM (OA) Server rooms, and Mechanical Rooms can be surface mounted without furring. Secured communication lines and boxes shall be surface mounted throughout the Bldg. 631. The walls of SWA walls shall be finished the same from the floor deck to the ceiling/floor deck or roof deck.

1.4.3.3 Antenna Platform

Provide a 20' x 20' x 20' high expanded or perforated metal platform for mounting all antennas as described in ICD Annex A. Access shall be via stairs in the center of the platform. Stairs shall have a lockable gate and be protected with steel mesh, expanded metal, or other permanent means to prevent intrusion. [Am-0004]Platform[*Am-0004] shall [Am-0004]have [*Am-0004] guardrails and stairs shall have handrails. [Am-0004]All

[*Am-0004] metal shall be primed and painted.

1.4.3.4 Exterior Envelope

Reference as-builts and concept drawings for envelope materials. Both are provided as appendices.

Any items, such as windows, doors, louvers, etc., removed on the exterior walls shall be filled in to match the existing construction. Louvers and any openings shall maintain the secured boundary integrity meeting the requirements of ICD 705. Any new metal panels required for the roof or walls shall match the profile and color of the existing metal panels. Any infill of walls shall be repaired and refinished, so that the new elevations does not appear as a series of patches, but rather as a cohesive whole. Provide EIFS repair mesh between the existing and new construction and at any existing cracks, overlapping the mesh as required by the manufacturer. [Am-0005]Repair EIFS finish around entire base of building (dark brown stripe), at canopy corners, and where roof abuts the wall at columns 3/B.1 and 3/I. [*Am-0005]

1.4.3.5 Room Finishes

See Room Data Sheets and Section 01 84 00 INTERIOR DESIGN REQUIREMENTS.

1.4.3.6 Sound and Vibration Control

Walls and ceilings shall be designed and constructed to impede transmission of equipment vibrations and other noises between rooms and within a room. Wall construction in this facility shall be insulated or isolated to the minimum levels as defined by the room data sheets and as shown on the concept drawings. When spaces with differing values about one another, the more stringent value shall govern.

Where not otherwise defined, walls separating individual spaces in this project shall be constructed to comply with UFC 3-101-01 Chapter 4.. Interior "stub" walls or other walls that do not serve as a means of physically enclosing a space need not be insulated. Walls that are rated STC 42 or higher shall extend to structural deck above.

Rooms on the first floor noted to be STC-50 shall have the ceiling/floor above them also STC-50 rated. Rooms on the second floor that are to be STC-50 or are above areas not designated as part of the secured boundary shall meet STC-50 criteria so that a continuous boundary for the STC rated rooms are formed.

1.4.3.7 Security and Access Control

The majority of the facility will be considered a Secured Work Area (SWA). As such the entire facility will be secured with one entrance. All other personnel doors will be exit only. All doors that are a part of the secured boundary shall meet ICD/ICS 705 and ICS 705-1.

Boundaries of the secured area are noted on the Concept Drawings. All penetrations of the boundary shall be dielectric breaks or non-conductive material in compliance with ICD/ICS 705 and ICS 705-1. Boundaries shall be inspectable on both sides. The main corridors, stairways, restrooms, and break areas are to be considered non-discussion areas.

Provide a knox box at the primary building entrance for fire department

access.

1.4.3.8 Sustainability and Energy Performance

1.4.3.8.1 Air Barrier

The existing facility shall be inspected for gaps in the exterior, especially at the roof to wall connections, and an air barrier shall be designed and installed to seal penetrations, holes, etc. in order to improve the air barrier system. Any holes in the exterior walls or controlled boundary walls, ceilings, or floors shall be filled. New, exterior infill and furring walls shall be designed to be airtight. Testing of the air barrier is required. Testing shall follow the requirements in [UFC 1-200-02](#) and [UFC 3-101-01](#). Air barrier specifications Section [07 27 10.00 10 BUILDING AIR BARRIER SYSTEM](#) and Section [07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS](#) are to be edited by the contractor. On design drawings, indicate air barrier limits and provide detail drawings and specifications for construction. Mechanical rooms are exempt from testing. All other areas shall be segregated and constructed for required air barrier construction with full blower door testing.

1.4.3.8.2 Building Envelope Energy Performance

The contractor shall meet the minimum building envelope energy performance values of [ASHRAE 90.1 - IP](#). The contractor shall insulate the building as needed to meet these values. The contractor shall also meet the minimum energy reduction requirements as listed in Federal mandates, as outlined in [UFC 1-200-02](#).

1.4.3.8.3 Daylighting

Daylighting is generally not required in this facility due to the SWA requirements. Existing windows as part of the controlled boundary shall be removed or blocked as a minimum to meet the secured boundary requirements as described elsewhere in this RFP and the associated bridging documents.

The only areas for daylighting are in the areas outside of the secured boundary, i.e. the Transition/Landing Zone and the Heritage room. In addition, the existing atrium clerestory windows shall remain as that corridor is a non-discussion area. The opening to the first floor of the atrium shall be filled with laminated glazing to allow daylighting to the main corridor on the first floor. Fire rating requirements shall be maintained.

1.4.3.8.4 Total Building Commissioning

Apply total building commissioning principles and fully commission the facility, in compliance with Section [01 91 00.15 TOTAL BUILDING COMMISSIONING](#) and [UFC 1-200-02](#).

PART 2 PRODUCTS

2.1 MATERIAL SELECTION CRITERIA

Material selections shall be based upon reducing operation and maintenance costs. All materials shall be easy to clean and resist soiling.

2.2 BUILDING CONSTRUCTION

The building is constructed of structural steel columns and beams and steel joists. The first floor is a slab on grade with concrete footings while the second floor is concrete on steel deck. The roofs are gable pitched with metal roofing on steel joists. Exterior walls consist of structural steel columns and steel bracing, 6" 16 gage steel studs at 16" on center with 6" batt insulation (R-19), 1/2" exterior gypsum wallboard, and R-10 exterior insulated finish system (EIFS). The interior side of the exterior walls have 5/8" gypsum wall board on 2-1/2" 16 gage metal studs at 16" on center, and a vapor barrier. See as-builts for detailed information.

2.3 ROOFS

2.3.1 Existing Roof

Existing roofing is standing seam metal roofing. Any new roofing required to fill removed equipment or other items shall match existing construction.

Gutters and downspouts shall be removed, designed, sized, and installed according to current standards.

The entire roof other than entry canopies forms the secured boundary. Any penetrations through the roof that are a part of the secured boundary shall be protected in accordance with ICD/ICS 705, ICS 705-1, and UFC 4-010-05.

2.4 DOORS AND FRAMES

2.4.1 Exterior Doors

All doors in the controlled boundary areas shall comply with the applicable criteria including but not limited to provisions for forced entry, security pins, required thickness, alarming, and STC rating per ICD/ICS 705, ICS 705-1, and UFC 4-010-05. All exterior doors shall be equipped with panic hardware.

2.4.1.1 Exterior Hollow Metal Doors

All exterior doors not otherwise designated shall be insulated hollow metal and minimum Level 2 performance Level B per SDI/DOOR A250.8. All door frames shall be welded. No knock-down frames shall be allowed. Reuse of existing door frames where doors are to be replaced is acceptable if the door frames are in good condition and are capable of receiving the new door hinges, latch, etc. of the new door. Minimum thickness for hollow metal doors shall be 1-3/4 inches. Door frames not located under protective overhangs shall have continuous overhead rain drips for the full length of the door opening. Minimum thickness of the steel shall be 18 gauge. All doors shall include aluminum thresholds and aluminum housed weather seals. Doors to the SIM Servers and Comm Room shall have kickplates on both sides of the door.

Exterior doors and frames shall receive a painted finish. Exterior doors shall exceed minimum insulation required in ASHRAE 90.1 - IP. Door frames shall be filled with spray foam insulation. Exterior doors and frames shall comply with UFC 4-010-01.

2.4.1.2 Storefront Doors

Provide doors with hardware and finishes compatible with storefront requirements listed above. Doors in storefronts shall be fully-glazed.

2.4.1.3 Thresholds

All exterior door shall have thresholds which shall be thermally broken.

2.4.2 Interior Doors

Interior doors shall be solid core wood veneer unless other requirements dictate otherwise. Doors shall be factory stained and finished and factory prepared for door hardware. All doors shall be 3'-0" x 7'-0" unless otherwise note. Some doors are required to be 4'-0" wide in order to accommodate equipment. 4'-0" wide doors that are required to meet ABA but do not meet the clearance requirements due to location of walls shall have a 3'-0" leaf and a 1'-0" leaf. the 1'-0" leaf shall be secured in place with flush bolts for standard usage.

Existing door frames that are where doors are to be replaced can be reused provided that they are in good condition and will receive the new door hinges, latch, etc. of the new door. Door frames shall be welded hollow metal type. Knock-down frames are not allowed. All new and existing frames shall be painted.

Door frames shall be located at a minimum four inches away from perpendicular walls.

2.4.3 Acoustic Rated Doors

Doors noted to be STC-50 on the Room Data Sheets, form part of the secured boundary, or are in STC-50 rated walls shall be a complete fully tested "assembly" including door, frame, gasketing, threshold, etc. of a single manufacturer, and certified to achieve an STC-50 rating. Doors that are located in STC-45 walls shall be STC-35 or greater and shall have sound seals.

2.4.4 Fire Doors

Doors shall comply with [NFPA 80](#). Doors to have a fire resistance rating shall conforming to the requirements of [UL 10C](#) or [NFPA 252](#) for the class of door required. Affix a permanent metal label with raised or incised markings indicating testing agency's name and approved hourly fire rating to hinge edge of each door.

2.4.5 Hardware

Provide door hardware in type and configuration appropriate for the spaces being served. Provide panic hardware on all doors serving the primary building circulation system including all building exits, all exterior doors, and all doors that separate building circulation spaces and corridors. Use lever handles per ABA for doors that do not have panic hardware. All hardware shall comply with ANSI/BHMA standards for heavy use. Provide non-removable security pins on door hinges in exterior building perimeter and as required by referenced criteria. Finish for hardware shall be consistent throughout the facility when practical. Provide brushed stainless steel or satin nickel finish on exposed hardware.

For restrooms, provide a keyed dead bolt lock on the doors so that the restroom can be closed off for maintenance.

Door stops are required at all interior and exterior locations. Stops can be floor mounted, wall mounted, or closer stops as best suits the location and type of door.

All coordination of doors and door hardware is the responsibility of the construction contractor.

2.4.5.1 Door Closers

Automatic door closers shall be used on exterior doors, fire doors, and restroom doors. Provide fusible links on applicable fire rated doors with hold-open device as indicated on Concept Drawings.

2.4.5.2 Keyed Access Entry Control Systems

Provide cylinders and cores for all new keyed locksets. Provide cylinders compatible with base core requirements. To meet the Grand Forks AFB master key plan, provide all keyed locksets with Best Lock Corporation or ASSA ABLOY Corporation Small Format Interchangeable Cores (SFIC), which are removable by a special control key. Factory set the cores with seven pin tumblers using the BEST or MEDECO Keymark x4 patented keyways. Provide master keyed cores in one system for this project. The contractor shall validate functionality of all keys for the respective core including the master key(s). Coordinate additional core requirements with Base CES, the O&M contractor locksmith and Installation Physical Security through the KO.

Contractor shall provide temporary construction cores, replaceable by permanent cores. Permanent cylinders/cores shall be forwarded to the Base lock shop, separately from key, by means as directed by the KO. Contractor shall replace construction cores with permanent cores as directed by KO. Installation will be in the presence of the COR.

Existing exterior mechanical room doors shall remain as is. Access to mechanical and electrical rooms shall be limited to authorized personnel through lockable doors. These rooms shall be keyed independently from the building master system for access by installation maintenance personnel. The Unclassified Communication Room doors shall be on a different core than other electrical and mechanical areas. The contractor shall coordinate with Base CES to ensure that key systems match existing base keying systems for these type of spaces.

All cores shall include four keys for each interior doors and five keys for each exterior doors and with two master keys for each KNOX box placed at the building location. Furnish a quantity of key blanks equal to 20-percent of the total number of file keys. Stamp all keys with "U.S. GOVERNMENT DO NOT DUPLICATE". In addition, stamp the keys and cores with the core number. Do not place room number on keys. Turn over all master keys provided to the Grand Forks AFB O&M locksmith for security control through the Contracting Officer's Representative (COR). Inventory and turn over all other keys to the Government for issue to the building occupants through the COR. Provide a key cabinet and control system for all facility keys, including a floor plan cross referenced to all key locations. Coordinate cabinet mounting location with Contracting Officer.

2.4.5.3 Keyless Access

Provide keyless entry control hardware and infrastructure. Keyless access shall be installed at locations as indicated on the concept drawings and in the room data sheets as designated to have card readers. Doors shall have card readers with PIN unless otherwise specified elsewhere. Provide electrified mortise locks with integrated request to exit (REX) function for doors that have card readers. Base is currently using Vindicator and Advantior keyless access systems.

Infrastructure shall extend from the required locations to a secure server rack in the facility telecom rooms. See 01 86 26 ELECTRICAL REQUIREMENTS for detailed requirements. Accommodations shall be made for associated low voltage and communications lines.

2.5 STOREFRONTS

New storefront windows shall be provided in the general size, color, materials, and configuration to match existing as indicated in the bridging documents. Glazing units shall be low-E, and insulated with a U-value (Winter nighttime) of 0.29 or lower. Frames shall be thermally broken aluminum. Storefronts shall comply with applicable portions of UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings.

2.6 INTERIORS

2.6.1 Secured Boundary Perimeters

Where walls and/or ceilings are part of secured boundary or designated to be ICD/ICS 705 compliant shall comply with ICD/ICS 705, ICS 705-1, and UFC 4-010-05. Treat all penetrations per the appropriate criteria.

Contractor may provide conduits, junction boxes, and light switches in the secured boundary wall. Data/telecom and cabling shall be surface-mounted on all walls, secured boundary or not. Plumbing shall not be installed on secured boundary walls.

New walls shall be installed in a manner compliant with secured boundary requirements for perimeter wall inspection on both sides. Existing walls that are to be a part of the secured boundary shall be made compliant. Walls that occur on the secured boundary shall be installed from structural floor to structural deck, with substrate (such as drywall level of finish, etc.) and finishes installed continuously from structural floor to structural deck to allow for ease of inspection and identification of tampering.

Structural decks that enclose a boundary wall but are not a part of the roof shall be made compliant with the applicable boundary requirements. See UFC 4-010-05 for requirements relating to finishing and sealing of secured boundary walls.

2.6.2 Gypsum Board Assemblies

All gypsum wall board shall be 5/8" thick minimum. Provide fire-resistant gypsum board where required to achieve fire-ratings. Provide impact resistant gypsum board from top of slab to a minimum of 4 feet above finished floor in corridors. Provide glass-mat gypsum board on walls of all toilet and shower rooms. Provide water-resistant gypsum board on all plumbing walls. Pre-decorated gypsum board panels and trim system or

similar type products and assemblies are not permitted.

Interior partitions requiring physical security, fire ratings, and/or sound ratings shall be designed and constructed in accordance with manufacturers' approved, tested system designs. These partitions shall extend to the underside of the structural ceiling and shall be sealed to maintain security, fire rating, and/or sound rating unless otherwise identified in the bridging documents.

All interior walls shall be insulated with a minimum of 3" fiberglass batt or mineral wool insulation. Walls not required to go to the structural deck can terminate 12 inches above the finish ceiling. Interior "stub" walls or other walls that do not serve as a means of physically enclosing a space need not be insulated.

Gypsum board shall be finished per UFGS 09 29 00 and shall be finished to a Level IV finish.

2.6.3 Gypsum Board Ceilings

Gypsum board in toilet rooms, showers, and janitor's closets shall be water/mold-resistant. Fire-resistant gypsum board shall be utilized where required to achieve fire-rating.

2.6.4 Acoustical Ceiling Tiles

Provide acoustical ceiling tiles in the locations identified in the bridging documents. Tiles shall be 24-inch by 24-inch panels on a medium duty suspension system. Ceiling tiles shall have a Noise Reduction Coefficient (NRC) of 0.75 or higher, have a light reflectance of 0.8 or higher, have an Articulation Class (AC) of [Am-0005] 170[*Am-0005] or higher, and be sag resistant. Ceiling tiles shall have a "E" pattern designation, "lightly textured" per ASTM E1264. Ceiling tiles shall have tegular edges. Sprinkler heads, smoke detectors, speakers, and other ceiling fixtures should be installed centered on the ceiling tile.

2.6.5 Exposed Structural Ceilings

See Room Data Sheets for exposed structural ceiling finish. Paint exposed structural ceilings

2.6.6 Insulation

Do not expose insulation on interior wall surfaces. Where pipe insulation is exposed in maintenance areas, use insulation jackets of durable, protective fabric in accordance with the applicable criteria.

Use the most appropriate type of insulation for its intended function and install location. Batts, mineral fibers, spray foams, rigid, etc. are all acceptable as long as they are installed per manufacturer instructions and meet applicable code and criteria thresholds.

2.6.7 Raised Access Flooring (RAF)

Provide RAF system in the Operations Area (OA) and the Joint Use Area (JUA) and as noted in the room data sheets (majority of the first floor, north end of Bldg. 631). The RAF section shall consist of modular and removable cementitious filled, welded all-steel panels supported on all four edges by structural steel members that are designed to bolt onto

adjustable height pedestal assemblies forming a modular grid pattern. The raised access flooring shall have a minimum weight load of 250 PSF to support racks and simulators. Raised floor system shall not utilize crossbracing to resist lateral loads. Crossbracing interferes with the cable tray runs. Panels shall be easily removed by one person with a lifting device and shall be interchangeable except where cut for special conditions. Finishes shall be permanently attached by access floor manufacturer. RAF shall have integrated cable trays. The RAF depth will be 18". See drawings for locations and quantity of interior ramps and steps to accommodate the grade change.

2.7 ACCESS DOORS AND PANELS

Access doors and panels shall be flush type. Frames for access doors shall be fabricated of not lighter than 16-gauge steel with welded joints and finished with anchorage for securing into construction. Access doors shall be a minimum of 14-inches by 20-inches and of not lighter than 14-gauge steel, with stiffened edges, complete with attachments. Access doors shall be hinged to frame and provided with a flush face and a screwdriver operated latch. Exposed metal surfaces shall have a shop applied prime coat. Finished paint coat shall match surrounding surfaces. Panel shall be installed in uninhabited rooms (i.e., closets) and/or non-conspicuous locations. Panels shall be installed at all locations requiring access to plumbing, mechanical and electrical controls, and as required for inspection of Controlled Area perimeter.

2.8 Elevator

The elevator's cab interior finishes shall be removed and replaced. Flooring shall match adjacent corridor. Walls shall be laminate. New hand rails shall be installed. Ceiling and lighting shall be replaced with new.

2.9 BUILDING EXPANSION JOINTS

Existing expansion joints location shall remain and be continued through any new construction. Contractor can keep the existing in places if in good condition or shall replace and/or install with comparable material to accommodate the required expansion.

2.10 INTERIOR SEALANT

Provide sealant complying with ASTM C 834.

For interior traffic joints in horizontal surfaces, low VOC sealant shall comply with ASTM C 920, Type C, S, or M, Grade P, Class 25, Use T.

For interior locations subject to moisture, sealant shall be Low VOC silicone complying with ASTM C 920, Type S, Grade NS, Class 25, and with ANSI A 108.1 for mold growth.

Use acoustical sealant at joints, perimeter edge conditions and penetrations for all sound-rated partitions and ceilings. Sealant shall be a low VOC rubber- or polymer-based acoustical sealant conforming to ASTM C 919, and shall have a flame spread of 25 or less and a smoke developed rating of 50 or less, when tested in accordance with ASTM E 84. Acoustical sealant must have a consistency of 250-310, when tested in accordance with ASTM C 919, and must remain flexible and adhesive after 500 hours of accelerated weathering as specified in ASTM C 734, and must be non-staining.

Use firestop or smoke-stop sealant at all partitions with fire or smoke ratings.

2.11 CABINETS AND CASEWORK

Provide casework in the basic locations, configuration, and designed to accommodate the equipment and fixtures as shown in the RFP documents.

Provide base and wall cabinets in indicated locations, unless noted otherwise. All casework shall be laminate clad.

Unless otherwise noted on the drawings, all materials, construction methods, fabrication, and install shall conform to and comply with the "custom" grade quality standards as outlined in AWI AWS, Section for laminate clad cabinets. Cabinet style, in accordance with AWI AWS, Section 400-G descriptions, shall be reveal overlay.

Provide solid surface countertops for restroom lavatories and break room countertops and as per 01 84 00 INTERIOR DESIGN REQUIREMENTS.

2.12 INFORMATION SPECIALTIES

2.12.1 Bulletin Boards/Tackboards

Provide tackboards in quantity, sizes, and general locations identified in the bridging documents.

2.12.2 Wall-mount Television and Monitor Bracket

Provide universal, horizontal-sliding, vertical-tilt, wall-mount television brackets as identified on the concept drawings or as listed in the Room Data Sheets for wall-mounted monitors. Brackets shall be capable of accepting a wide-array of flat panel televisions or flat panel commercial monitors. Bracket shall be able to accommodate screen sizes ranging from 32 inches to 90 inches and up to 150 pounds in weight. Bracket shall be capable of horizontal adjustments of 2" in each direction and tilting of 10 degrees in the vertical direction.

Provide universal horizontal-sliding, vertical-tilt, wall-mount monitor/television brackets as identified in the RFP documents. Brackets shall be capable of accepting a wide array of LCD, LED or plasma type flat panel monitors/televisions. Bracket shall be capable of accepting a wide-array of flat panel televisions or flat panel commercial monitors. Bracket shall be able to accommodate screen sizes ranging from 32 inches to 75 inches and up to 150 pounds in weight.

For stud walls, provide continuous 3/4" plywood blocking in stud cavity behind mounting locations. Coordinate final mounting height and location with Contracting Officer's Representative.

2.13 COMPARTMENTS AND CUBICLES

2.13.1 Toilet Compartments

Toilet partitions shall be floor-mounted, overhead-braced type. Material shall be solid solid polyethelene. Furnish basic configuration shown on RFP documents. Provide doors/stiles with a nominal width of 1 inch. Provide panels with a nominal width of 1 inch. Panels shall be scratch and

water resistant; graffiti resistant; non-absorbent. Prepare panels as required to receive toilet paper holders, grab bars, and other toilet accessories as appropriate.

2.13.2 Urinal Screens

Urinal screens shall be floor mounted type. Secure wall hung urinal screens with continuous flanges that are full height of the screens. Fabricate screens from the same types of panels and pilasters as the toilet partitions. Use corrosion-resistant steel fittings and fasteners.

2.13.3 Solid Surface Shower Enclosures

Provide shower bases, surrounds, and/or enclosures in locations indicated on the plans. Shower bases and enclosures shall be fabricated from solid-polymer material specifically formulated for such installations. Provide at least one ABA accessible shower unit per sex as required by 36 CFR 1191 unless approved otherwise by the Government. Non-ABA shower size shall be minimum 36" by 36".

Shower wall enclosures shall provide a complete system of solid polymer components to include: shower base, wall panels, corner trim, soap dish, shampoo shelf, accessible transition/ramp, and panel edge trim. Dimensions of all components shall be standard manufacturer's dimensions to be field cut to fit. Panels shall be full width and height with seams occurring only at the inside corners of the enclosure. Soap dish and shampoo shelf shall be of a configuration, shape, and location as standard with the manufacturer's system.

2.14 TOILET ACCESSORIES

Provide all toilet accessories typical in restrooms, in quantities proportional to the size and fixture count in the restroom. Provide ABA compliant fixtures in locations and quantities as required by ABA. Provide commercial-grade items in all spaces. Provide stainless steel or satin nickel finish. Required items are as follows:

- a. Mirror(s) over lavatories, either individually or as one mirror spanning multiple lavatories
- b. Toilet Paper Dispensers
- c. Paper Towel Dispensers, automatic operating
- d. Sanitary Napkin Disposers
- e. Soap Dispensers, automatic operating
- f. Electric Hand Dryers
- g. Towel and Robe Hooks (NLT 2 per shower)
- h. Coat Hooks (NLT 1 per toilet stall)
- i. Grab Bars as required for accessibility
- j. Shower Curtain Rod and Shower Curtain (1 per shower) plus one for the entry to shower area
- k. Folding seats (1 per shower) as indicated on the drawings
- l. Folding wall mounted baby changing tables in the Men's and Women's restrooms in the unclassified areas (2 changing tables total)
- m. Recessed soap holders (1 per shower, same material and finish as wall material)

2.15 SAFETY SPECIALTIES

2.15.1 Defibrillator Cabinets

Provide three Defibrillator Cabinets for automated external defibrillators (AED). Locations to be determined during design. Cabinets shall be compatible with all major defibrillator models. Cabinet doors shall clear acrylic windows for observing defibrillators. Provide cabinet with audible alarm powered by 9 volt battery. Alarm shall be configured to sound when door is opened, and sound for 3 minutes. Alarm shall have an audible low battery indicator. Provide cabinets with graphics identifying the cabinets as defibrillator cabinets. Provide cabinets with text warning that alarm will sound if cabinets are opened. Provide text stating that defibrillator shall be used by trained responders only. Provide v-shaped projection-style wall signs. Locate signs on wall above defibrillator cabinets to mark their locations. AEDs are part of the FF&E bid option. Provide one AED per cabinet. AEDs that are located in the secured work area cannot use WiFi. AED shall be provided audio and visual prompts for CPR compression strength.

2.16 STORAGE SPECIALTIES

2.16.1 Cell Phone Lockers

Provide not less than 75 individually lockable aluminum or steel storage units for storage of cell phones. Cabinets shall be surface mounted on a wall that is not a part of the controlled boundary. Each phone storage unit shall be individually numbered and shall have a 5" tall by 6" wide by 8" nominal depth (or equivalent volume).

2.16.2 Personal Belongings Storage Lockers

Personal storage lockers for the Transition/Landing Zone shall be a minimum of 12" wide by 72" high by 12" deep, consisting of a double locker. Provide a base for the lockers to sit on. Lockers shall have hooks on the interior. Each locker shall be keyed and have number plate on them. Provide two keys for each storage locker, and two master keys for facility manager access. Coordinate keying and numbering requirements with contracting officer.

2.16.3 Restroom Lockers

Lockers shall be a minimum of 15" wide by 72" high by 12" deep, consisting of a double locker. Provide a base for the lockers to sit on. Lockers shall have at least two hooks on the interior. Doors shall be equipped for user-provided padlocks. Each locker shall have a number plate.

PART 3 EXECUTION

NOT USED

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 83 00

STRUCTURAL REQUIREMENTS

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 PROJECT DESCRIPTION AND REQUIREMENTS
 - 1.2.1 General Requirements
 - 1.2.2 Design Code Criteria
- 1.3 STRUCTURAL DESIGN LOADS AND CONDITIONS
 - 1.3.1 Dead Loads
 - 1.3.2 Roof Live Loads and Snow Loads
 - 1.3.2.1 Minimum Roof Live Load
 - 1.3.2.2 Roof Snow Load
 - 1.3.2.3 Rain-On-Snow Load
 - 1.3.3 Floor Live Loads
 - 1.3.4 Wind Loads
 - 1.3.5 Seismic Loads
 - 1.3.6 Interior Partition Lateral Loads
 - 1.3.7 Load Combinations
 - 1.3.8 Wind Uplift Resistance
 - 1.3.9 Deflections
 - 1.3.10 Drift
 - 1.3.11 Vibrations
 - 1.3.12 Foundation and Slab-On-Grade Design Criteria
 - 1.3.12.1 Foundation Design
 - 1.3.12.2 Subgrade Preparation
 - 1.3.12.3 Slabs-on-Grade Design
 - 1.3.12.4 Slabs-On-grade General Requirements
 - 1.3.12.5 Slabs-on-Grade with Ceramic or Quarry Tile Finish
 - 1.3.12.6 Structural Stoops at Exterior Doorways
 - 1.3.12.7 Concrete Floor Slab Finishes
 - 1.3.12.8 Interior Equipment Pads
 - 1.3.12.9 Exterior Equipment Pads
- 1.4 STRUCTURAL MATERIALS DESIGN DATA
 - 1.4.1 Reinforced Concrete
 - 1.4.1.1 Design
 - 1.4.1.2 Concrete Strength
 - 1.4.1.3 Reinforcing Steel
 - 1.4.1.4 Concrete Joints
 - 1.4.2 Concrete Masonry
 - 1.4.2.1 Design
 - 1.4.2.2 Concrete Masonry Material Strengths
 - 1.4.2.3 Concrete Masonry Reinforcing
 - 1.4.3 Structural Steel
 - 1.4.3.1 Design
 - 1.4.3.2 Structural Steel Materials
 - 1.4.3.3 Connections
 - 1.4.4 Steel Joists
 - 1.4.4.1 Design
 - 1.4.5 Steel Decking

- 1.4.5.1 Design
- 1.4.5.2 Steel Decking Material
- 1.4.6 Cold-Formed Metal Framing (CFMF)
 - 1.4.6.1 Design
 - 1.4.6.2 Cold-Formed Metal Framing Material
- 1.5 Special Inspections

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 83 00

STRUCTURAL REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

The design publications listed below are sources of criteria for structural design. The criteria from these sources may be supplemented, but not supplanted, by applicable criteria contained in nationally recognized codes, standards, and specifications.

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-200-01	(2019; with Change 1, 2020) DoD Building Code
UFC 3-301-01	(2019, with Change 1, 2022) Structural Engineering
UFC 3-310-04	Seismic Design for Buildings (1 June 2013, including Change 1)
UFC 3-320-06A	Concrete Floor Slabs Subjected to Heavy Loads (1 March 2005)
UFC 4-010-01	(2018; with Change 1, 2020) DoD Minimum Antiterrorism Standards for Buildings

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 302.1R	(2015) Guide for Concrete Floor and Slab Construction
ACI 318/318R	(2014) Building Code Requirements for Structural Concrete and Commentary
ACI 530/530.1	(2013) Building Code Requirements and Specification for Masonry Structures and Related Commentaries

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 325	(2017) Steel Construction Manual
AISC 341	(2016) Seismic Provisions for Structural Steel Buildings
AISC 360	(2016) Specification for Structural Steel Buildings

AISC Steel Design Guide 3 Serviceability Design Considerations for
Steel Buildings (2nd Edition, 2004)

AISC Steel Design Guide 5 Low-and Medium-Rise Steel Buildings (2003)

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI S100 (2012) North American Specification for
the Design of Cold-Formed Steel Structural
Members

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7 (2017) Minimum Design Loads for Buildings
and Other Structures

ASTM INTERNATIONAL (ASTM)

ASTM A36 Specification for Carbon Structural Steel
(2019)

ASTM A53 Standard Specification for Pipe, Steel,
Black and Hot-Dipped, Zinc-Coated, Welded
and Seamless (2018)

ASTM A500 Standard Specification for Cold-Formed
Welded and Seamless Carbon Steel
Structural Tubing in Rounds and Shapes
(2020)

ASTM A615 Specification for Deformed and Plain
Billet-Steel Bars for Concrete
Reinforcement(2020)

ASTM A653 Specification for Steel Sheet, Zinc-coated
Galvanized or Zinc-iron Alloy-Coated
Galvannealed by the Hot-dip Process (2015;
E 2020)

ASTM A706 Specification for Low-Alloy Steel Deformed
and Plain Bars for Concrete Reinforcement
(2016)

ASTM A992 Standard Specification for Structural
Steel Shapes (2011; R 2015)

ASTM A1064 Standard Specification for Carbon-Steel
Wire and Welded Wire Reinforcement, Plain
and Deformed, for Concrete (2018)

ASTM C62 (2017) Standard Specification for Building
Brick (Solid Masonry Units Made from Clay
or Shale)

ASTM C90	(2021) Standard Specification for Loadbearing Concrete Masonry Units
ASTM C270	(2019a; E 2019) Standard Specification for Mortar for Unit Masonry
ASTM C476	(2020) Standard Specification for Grout for Masonry
ASTM E1745	(2017) Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
ASTM F1554	(2020) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F3125	Standard Specification for High Strength Structural Bolts, and Assemblies, Steel and Alloy Steel, Heat-Treated, Inch Dimensions 120/105 ksi Minimum Tensile Strength (2019)

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code
---------	------------------------------------

STEEL DECK INSTITUTE (SDI)

SDI DDM04	(2015; Errata 1-3 2016; Add 1 2015; Add 2 20162006) Diaphragm Design Manual; 4th Edition
SDI DM	Design Manual for Composite Decks, Form Decks, and Roof Decks (MOC3 2016)

STEEL JOIST INSTITUTE (SJI) PUBLICATION

Steel Joist Institute	Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joists Girders (2010)
-----------------------	---

1.2 PROJECT DESCRIPTION AND REQUIREMENTS

1.2.1 General Requirements

The facility is an existing structure originally constructed in 1997 and located at Grand Forks AFB. The north and south parts of the building are one story, while the middle part is two story. The structural system consists of steel frames, steel joists, and concrete floors. This project would include a full building renovation to be used as a Formal Training Unit (FTU) with a new supporting antenna farm located outside of the building. Please see Section 01 82 00, ARCHITECTURAL REQUIREMENTS for additional information for the FTU. Please see Section 01 82 00, ARCHITECTURAL REQUIREMENTS and Section 01 86 29, COMMUNICATIONS REQUIREMENTS for additional information for the antenna farm.

1.2.2 Design Code Criteria

The existing facility structural systems shall be inspected and evaluated before the design. The renovation and addition shall be accordance with the 2018 International Building Code (ICC IBC), International Existing Building Code (IEBC), standards established by the United States Department of Defense (DoD), and other national standards. The facility renovation shall be structurally designed and configured by the Contractor in accordance with the criteria shown on the RFP documents and contained herein. The facility renovation need to comply with DoD Force Protection requirements per the Unified Facilities Criteria

1.3 STRUCTURAL DESIGN LOADS AND CONDITIONS

Structural loading criteria shall be developed for the building using site and project specific criteria and the criteria and procedures indicated below. The building shall be classified as [Am-0005]an "Risk/Occupancy Category II" [*Am-0005] facility in accordance with ICC IBC (Table 1604.5 for the determination of snow, seismic, and wind loads). The structural design should account for the effect of upgrading HVAC, electrical, plumbing, fire protection and communication systems on the capacity of the existing structure and its members. Structural renovation design of the building shall be compatible with the architectural design drawings.

It is the contractor responsibility for ensure the structure integrity for the building and its structural components during all construction stages. The structural design calculations and drawings shall be sealed by a professional engineer licensed by one of the 50 states

1.3.1 Dead Loads

Minimum design dead loads for common building materials shall be obtained from ASCE 7 or estimated from the existing building as applicable.

1.3.2 Roof Live Loads and Snow Loads

1.3.2.1 Minimum Roof Live Load

A minimum roof live load of 20 psf shall be provided for in the design to account for construction and maintenance loads. The minimum roof live load can be reduced. The minimum roof live load shall be applied in accordance with ASCE 7 and shall be used as a loading condition for the roof and independent of the calculated snow loads. Where uniform roof live loads are reduced to less than 20 psf in accordance with ASCE 7-16 Section 4.8.2 and are applied to the design of structural members arranged so as to create continuity, the reduced roof live load shall be applied to adjacent spans or to alternate spans, whichever produces the greatest unfavorable load effect.

1.3.2.2 Roof Snow Load

Roof snow load shall be applied in accordance with ASCE 7. Factors used in determining snow loads are as follows:

Terrain Category	=	C (ASCE 7 Section 26.7, Exposure C)
Snow Exposure Factor, Ce		(ASCE 7 Table 7.3-1, Partially Exposed)
Snow Thermal Factor, Ct		(ASCE 7 Table 7.3-2, All Structures)

Unless Noted Otherwise)
Snow Importance Factor, Is (ASCE 7 Table 1.5-2, Category II)
Occupancy
Ground Snow Load, Pg = 60 psf (Base standard)
Flat Roof Snow Load, Pf = $0.7C_eC_tI_sP_g$ (ASCE 7 Section 7.3)

1.3.2.3 Rain-On-Snow Load

A rain-on-snow load, if applicable, shall be applied in accordance with ASCE 7.

1.3.3 Floor Live Loads

Floor live loads shall be in accordance with ASCE 7 for the type of occupancy indicated, except as modified herein, and to accommodate any special requirements from the buildings user after the renovation.

1.3.4 Wind Loads

Wind loads for both the main wind force resisting system and for components and cladding shall be determined in accordance with ICC IBC and ASCE 7 using the following parameters:

Basic Wind Speed, V = 110 mph
Wind Exposure Category = C (ASCE 7, Section 26.7)
Directionality Factor, Kd = 0.85 (ASCE 7, Table 26.6-1)

1.3.5 Seismic Loads

Seismic loads shall be determined in accordance with the applicable requirements of UFC 3-310-04, ICC IBC, and ASCE 7. The total lateral seismic force shall be determined using the following parameters:

Occupancy Category = II
Seismic Importance Factor, Ie = 1.0 (ASCE 7 Table 1.5-2)
Mapped Spectral Response Acceleration, Ss = 0.045
Mapped Spectral Response Coefficient, S1 = 0.017
Design Spectral Response Acceleration, Sds = 0.048
Design Spectral Response Coefficient, Sd1 = 0.027
Site Classification = Class D *
Seismic Design Category = A *

* Preliminary Site Classification assumed per ASCE 7 Section 11.4.2.
Final Seismic Design Category shall be based on the Site Classification determined and noted in the Final Geotechnical Report to be provided by the Contractor.

1.3.6 Interior Partition Lateral Loads

Interior partitions shall be designed for a wind pressure of 5 psf normal to the partition. The deflection of interior partitions due to wind load shall not exceed $1/360$ the span for walls with brittle finishes and $1/240$ for walls with flexible finishes. Other design requirements such as seismic may be more restrictive and control the design of the partitions.

1.3.7 Load Combinations

Load combinations shall be in accordance with the [ICC IBC](#).

1.3.8 Wind Uplift Resistance

Wind uplift calculations for roofing systems shall be based on the criteria for Wind Loads contained herein.

1.3.9 Deflections

Deflections of structural members and systems shall not be greater than allowed by applicable codes, references, and material standards (IBC, ACI, AISC, etc.) and shall not impair the serviceability of the structure. Deflection limits needed to restrict damage to ceilings, partitions, and other fragile non-structural elements shall not exceed the deflection over span length (1) limits permitted by the [ICC IBC](#).

1.3.10 Drift

Lateral deflection or drift of structures and deformations of horizontal diaphragms and bracing systems due to code-specified wind effects shall not impair the serviceability of the structure. Drift limits applicable to wind loads shall be in accordance with [ICC IBC](#), recommendations contained in [AISC Steel Design Guide 3](#) "Serviceability Design Considerations for Steel Buildings" and [AISC Steel Design Guide 5](#) "Low-and Medium-Rise Steel Buildings". The building structure shall be designed such that the code-specified wind loads (criteria noted above) do not cause a drift ratio of 0.002 (H/500) or a maximum inter-story drift of $3/8$ inch to be exceeded.

Drift limits applicable to code-specified seismic loads (criteria noted above) shall be in accordance with the [ICC IBC](#).

1.3.11 Vibrations

All vibration producing mechanical (including roof top units), electrical, or other equipment shall be mounted in manner as to prevent the transfer of vibrations to adjacent parts or areas of the building. If necessary, large vibration producing equipment installed within the facility on the ground level shall be supported on individual isolated foundations. The isolated foundations shall be separated from the building slab-on-grade by a continuous $3/4$ inch expansion joint. The depth of floor framing members shall be selected with consideration to minimizing the effect of occupant-induced floor vibrations.

1.3.12 Foundation and Slab-On-Grade Design Criteria

1.3.12.1 Foundation Design

Foundation design criteria and the foundation type proposed to be built by the Contractor shall be based on recommendations contained in the Final Geotechnical Investigation Report which shall be provided by the Contractor. All parts of the foundation system shall be designed to keep dead load and maximum load footing pressures relatively uniform, in order to minimize differential settlements.

1.3.12.2 Subgrade Preparation

Final foundation and slab criteria, design, foundation type, and subgrade proposed to be built by the Contractor shall be based on recommendations contained in the Final Geotechnical Investigation Report which shall be provided by the Contractor.

1.3.12.3 Slabs-on-Grade Design

Slabs-on-grade (interior) shall be designed in accordance with the recommendations contained in the project specific Final Geotechnical Investigation Report and the guidelines of [ACI 302.1R](#), "Guide to Concrete Floor and Slab Construction". Specifically, the design shall also be in accordance with [UFC 3-320-06A](#) "Concrete Floor Slabs Subjected to Heavy Loads", using the design vehicular loads.

Proper construction methods, workmanship, slab-on-grade materials and preparation, and concrete mix proportioning specifications shall follow the guidelines of [ACI 302.1R](#), "Guide to Concrete Floor and Slab Construction".

The floor finish systems for the facility additions generally require that the moisture/vapor transmission rate through the slab be limited to a maximum of 3 pounds per 1000 square feet in a 24 hour period. This limit for moisture/vapor transmission rate can be achieved with a vapor retarder system in lieu of a vapor barrier system. As a minimum, a 20 mil thick, Class A, vapor retarder system meeting the requirements of [ASTM E1745](#), shall be required beneath all building slabs-on-grade.

The slab-on-grade supporting subgrade system shall be in accordance with the recommendations of [ACI 302.1R](#) and recommendations contained in the Final Geotechnical Investigation Report. All interior slabs-on-grade shall be constructed over a vapor retarder system over a compacted 6 -inch capillary water barrier on compacted subgrade. The location of the vapor retarder system relative to the capillary water barrier shall be in accordance with recommendations contained in [ACI 302.1R](#).

Slabs-on-grade shall be jointed and reinforced with temperature and shrinkage reinforcement located near the top of the slab in order to control shrinkage and limit curling. Slab-on-grade temperature and shrinkage reinforcement shall not be less than 0.18 percent per [ACI 318/318R](#) requirements. Maximum spacing of the slab-on-grade reinforcing bars shall not exceed three times the slab thickness.

1.3.12.4 Slabs-On-grade General Requirements

Slabs-on-grade shall be designed as "floating slabs" without rigid edge support and lateral and vertical movement unrestrained. An isolation joint

consisting of 30 lb. felt or 1/2-inch expansion joint material, is required where slabs abut vertical surfaces.

Crack control measures shall be incorporated in the slab design. Control joint spacing and details shall be as delineated in [ACI 302.1R](#), as applicable.

1.3.12.5 Slabs-on-Grade with Ceramic or Quarry Tile Finish

Slabs-on-grade to receive a covering of ceramic or quarry tile shall have a minimum thickness of 5-inches, and shall be reinforced with No. 4 bars at 12-inches on center each way. The slab surface shall be as required to facilitate the installation of the tile. At interior edge locations the slab shall be doweled into the adjacent slab with 3/4 inch diameter x 16 inch long dowels at 12 inches on center.

1.3.12.6 Structural Stoops at Exterior Doorways

Structural stoops shall be provided at exterior doorways. Stoops shall have foundations extending down to frost depth and shall be rigidly attached to the building foundation walls. Stoops shall have 12 inches of uncompacted fill under the stoop slab. Stoop slabs shall drop 1/2 inch relative to the interior floor slab-on-grade at the threshold and slope away from the building at a 1/4 inch per foot slope minimum.

1.3.12.7 Concrete Floor Slab Finishes

All interior concrete slabs will receive a trowel finish unless noted otherwise. Interior slabs to receive mortar setting beds will receive rough slab finish. Slabs-on-grade shall be painted to prevent dusting at locations where the space between access flooring and the slab-on-grade beneath it serve as an air plenum.

1.3.12.8 Interior Equipment Pads

Floor mounted mechanical and electrical equipment shall be installed on 6-inch thick raised concrete housekeeping pads. The pads shall be reinforced with at least the minimum temperature reinforcement required by ACI 318. The pads shall be sized 6 inches larger on all sides than the dimensions of the base of the piece of equipment furnished, and all edges of the pad shall be chamfered.

1.3.12.9 Exterior Equipment Pads

Exterior mechanical or electrical equipment shall be installed on concrete pads. Equipment pads shall be a minimum of 8 inches thick and reinforced with at least the minimum temperature and shrinkage reinforcement required by [ACI 318/318R](#). The pads shall be sized a minimum of 12 inches larger all around than the piece of equipment furnished and all edges of the pad shall be chamfered. The Contractor shall coordinate the design of the exterior equipment pads with the mechanical and electrical system design and the equipment selected to be installed by the Contractor.

1.4 STRUCTURAL MATERIALS DESIGN DATA

Materials for structural elements shall be as indicated herein and/or on the RFP drawings.

1.4.1 Reinforced Concrete

1.4.1.1 Design

Reinforced concrete shall be designed and detailed in accordance with the ICC IBC as modified by ACI 318/318R, and related current ACI publications that are applicable to the design. All concrete elements shall be reinforced with temperature and shrinkage reinforcement as recommended by ACI as a minimum.

1.4.1.2 Concrete Strength

The required 28-day concrete compressive strength (f'_c) shall be left to the Contractor's discretion, except the following shall be the minimum used for the locations shown:

Location	f'_c (Min.)	Unit Weight
Foundations	4500psi	145pcf
Slabs-on-Grade	4500psi	145pcf

The water cement ratio for any strength of concrete strength shall not be more than 0.48.

1.4.1.3 Reinforcing Steel

Reinforcing bars (deformed) used in concrete design shall be ASTM A615, Grade 60 ($F_y = 60\text{ksi}$). Reinforcing bars (deformed) required to be welded shall be ASTM A706, Grade 60 ($F_y = 60\text{ksi}$). The minimum bar size is No. 4 except for stirrups and ties which may be No. 3 per ACI. Nosing bars shall not be used in exterior concrete stairs.

Welded Wire Fabric, where used, shall be provided in flat sheets and conform to ASTM A1064 with a minimum yield strength, $F_y = 60\text{ksi}$. Precast concrete blocks shall not be used to support Welded wire fabric. Bar supports of steel or plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic shall support the fabricated bar mats, reinforcing steel and welded wire fabric adequately to remain in the designated location as prescribed in the design drawings; even during concrete placement.

1.4.1.4 Concrete Joints

Control joints and contraction joints shall be located to limit concrete cracking to a minimum. All exposed concrete joints shall be sealed with appropriate joint sealant.

1.4.2 Concrete Masonry

1.4.2.1 Design

Brick and concrete masonry design shall be in accordance with ACI 530/530.1 as modified by the ICC IBC. Reinforcement shall be sufficient to satisfy the calculated and prescriptive requirements for strength, shrinkage crack control, and seismic design.

Lateral support and connections between walls and the structural steel frames shall be designed to allow frame movement with minimum influence on

adjoining walls.

Concrete masonry crack control measures comprised of masonry control joint, joint reinforcement, and bond beams shall be incorporated in the design of concrete masonry walls and partitions. Masonry control joints (MCJ) shall be judiciously located at spacing no greater than the maximums recommended by the National Concrete Masonry Association. Masonry control joints shall not be placed closer than 24 inches from openings.

1.4.2.2 Concrete Masonry Material Strengths

Masonry materials shall meet the following minimum requirements:

Masonry shall have a specified prism strength $f'_m = 2000\text{psi}$ at 28 days.

Hollow concrete masonry units (CMU) shall be two cell normal weight aggregate units conforming to [ASTM C90](#), Type I and have a minimum compressive strength of 1900psi on the net area (1000 psi on the gross area) at 28 days.

Brick masonry shall conform to ASTM C62.

Mortar shall be Type S, or matching existing type for masonry work built into existing masonry walls. Mortar shall conform to [ASTM C270](#), with a specified minimum compressive strength of 1800psi at 28 days.

Grout shall conform to [ASTM C476](#) and shall have a specified minimum compressive strength (f'_c) of 2000psi at 28 days.

1.4.2.3 Concrete Masonry Reinforcing

Reinforcing bars (deformed) used in masonry design shall be [ASTM A615](#), Grade 60 ($F_y = 60\text{ksi}$). Reinforcing bars (deformed) required to be welded shall be [ASTM A706](#), Grade 60 ($F_y = 60\text{ksi}$). The minimum reinforcing bar size is a No. 4.

1.4.3 Structural Steel

1.4.3.1 Design

Structural steel shall be designed in accordance with the [ICC IBC](#) and the AISC Specifications. All structural steel members shall be designed by the structural engineer to support all applicable loads. Structural drawings shall clearly show all structural members and their locations. Types of connections shall be consistent with the design assumptions for the basic type of steel construction used. Connections shall be designed and detailed to provide adequate capacities for the applied forces and moments. Connection design shall be the responsibility of the structural engineer and shall not be delegated to the steel fabricator.

1.4.3.2 Structural Steel Materials

Structural steel materials shall meet the following minimum requirements:

Steel Type	ASTM	Grade	Min. Yield Strength, F_y
Structural Wide Flange Beams & Columns (W-Shapes)	ASTM A992		50ksi 50ksi

Structural Tees (WT-Shapes)	ASTM A992		50ksi
Structural Channels & Angles (C, MC, & L-Shapes)	ASTM A36		36ksi
Structural Plates & Bars	ASTM A36		36ksi
Structural Steel Pipe	ASTM A53	B, Type E or S	35ksi
Structural Steel Tubing (TS-Shapes)	ASTM A500	B	46ksi
Rectangular or Square	ASTM A500	C	50ksi
Hollow Structural Sections (HSS Shapes)			
Structural Anchor Rods	ASTM F1554		36ksi
High Strength Structural Bolts	ASTM F3125		Fu=120ksi
			Fu=150ksi
Welding Rods (Structural Steel)	E70XX		Fu=70ksi
Welding Rods (Steel Decking)	E60XX		Fu=60ksi

1.4.3.3 Connections

Types of connections shall be consistent with the design assumptions for the basic type of steel construction used. Connections shall be designed and detailed to provide adequate capacities for the applied forces and moments. Connection design shall be the responsibility of a licensed structural engineer and shall not be delegated to the steel fabricator.

1.4.4 Steel Joists

1.4.4.1 Design

The design and selection of steel joists shall be governed by the [Steel Joist Institute](#) (SJI) Standard Specifications for Steel Joists and Joist Girders. The wind uplift requirements shall be clearly delineated on the design drawings or with the specifications. Joists requiring special design to resist wind uplift and non-uniform loads shall be designated as such on the drawings, and the required design loads provided. The designer shall provide joist-loading diagrams on the drawings for all joists with geometric configurations outside the scope of the SJI Standard Specifications for Steel Joists and Joist Girders. Joist end supports and anchorage to resist uplift shall be designed to accommodate the applied forces, including those resulting from wind and seismic loading.

1.4.5 Steel Decking

1.4.5.1 Design

The design and selection of steel deck shall be in accordance with the provisions of the Steel Deck Institute (SDI) Design Manual ([SDI DM](#)) for Composite Decks, Form Decks and Roof Decks. The designation of the steel decking type and gauge shall conform to SDI standards. Steel deck manufacturer's designations shall not be used. The minimum required section properties of the steel deck shall be required to be specified or noted on the design drawings and shall be determined as prescribed by the appropriate specifications of the Steel Deck Institute (DM) Design Manual for Composite Decks, Form Decks and Roof Decks.

Steel deck designed to function as a shear diaphragm shall be designed in accordance with the provisions of the Steel Deck Institute (DDM4) (SDI) "Diaphragm Design Manual" (4th Edition)([SDI DDM04](#)).

1.4.5.2 Steel Decking Material

Steel decking materials shall meet the following minimum requirements:

Type	Minimum Yield Strength, Fy
Steel Roof Deck (Wide Rib)	33ksi
Composite Steel Floor Deck	33ksi

1.4.6 Cold-Formed Metal Framing (CFMF)

1.4.6.1 Design

Design and detailing of wall systems using cold-formed metal framing (CFMF) members to anchor masonry veneers shall be in accordance with the provisions of **ICC IBC**. Wall systems shall be specified using UFGS 05 40 00 Cold-Formed Metal Framing. Wind load deflection of wall systems to which masonry veneer is anchored shall be no more than 1/600 of the span of the wall. Design assumptions and details shall be coordinated with the specifications. Cold-Formed Metal Framing shall be designed in accordance with AISI S100.

1.4.6.2 Cold-Formed Metal Framing Material

Cold-formed metal framing shall be formed from corrosion-resistant steel, corresponding to the requirements of **ASTM A653**. Structural members shall have a minimum yield strength, Fy = 33ksi.

1.5 Special Inspections

Requirements for Special Inspections, as defined in the **ICC IBC** for various materials and building components, and as modified by UFC 3-301-01, shall be identified in Specification Section UFGS 01 45 35 "Special Inspections", as edited by the Designer of Record (DOR), to be included in the design documents, and are to be accompanied by a "Statement of Special Inspections" and a "Schedule of Special Inspections", as defined and required by UFGS 01 45 35 and **ICC IBC**, and also as edited by the DOR in accordance with the specific design conditions of the project. Specific inspection requirements included in the specification and schedule are to be consistent with the inspections required by the various design criteria codes, specifications and standards which govern the design, as defined and referenced hereinbefore. Special inspection inspectors shall be qualified as required by the most stringent of the qualifications defined in **ICC IBC**, UFGS 01 45 35, or the applicable codes and standards governing the design and construction, as referenced herein. The UFGS 01 45 35 specification inspector qualifications shall be edited accordingly. It should be noted that Special Inspections are to be conducted by an independent third party not in an ongoing business relationship with the contractor. Special inspection reports shall be developed, updated and submitted in accordance with the requirements of **ICC IBC** and UFGS 01 45 35.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 84 00

INTERIOR DESIGN REQUIREMENTS

07/18

PART 1 INTERIOR DESIGN REQUIREMENTS

- 1.1 REFERENCES
- 1.2 DESIGN CRITERIA
- 1.3 BUILDING INTERIOR FINISHES
 - 1.3.1 Floor Surface Preparation and Materials
 - 1.3.2 Carpet
 - 1.3.2.1 Minimum Pile Characteristics
 - 1.3.2.2 Static Control
 - 1.3.2.3 Flammability and Critical Radiant Flux Requirements
 - 1.3.2.4 Tuft Bind
 - 1.3.2.5 Warranty
 - 1.3.2.6 Recycling of Existing Carpet
 - 1.3.2.7 Installation
 - 1.3.3 Tread Inserts for Entrance Mat
 - 1.3.4 Static Control Flooring
 - 1.3.4.1 Static Dissipative Resilient Flooring
 - 1.3.4.1.1 Static Dissipative Vinyl Tile
 - 1.3.5 Luxury Vinyl Tile
 - 1.3.6 Rubber Flooring
 - 1.3.7 Stair Treads, Risers, and Stringers
 - 1.3.8 Wall Base
 - 1.3.9 Transition Strips
 - 1.3.10 Ceramic Tile/Porcelain
 - 1.3.11 Vinyl Wallcovering
 - 1.3.12 Corner Guards
 - 1.3.13 Chair Rails
 - 1.3.14 Paints and Coatings
 - 1.3.15 Interior Signage
 - 1.3.16 Solid Surface Material
 - 1.3.17 Shower Surrounds and Shower Pans
 - 1.3.18 Roller Window Shades
 - 1.3.19 Fixed Auditorium Seating (Upholstered)
 - 1.3.20 Warranty
 - 1.3.21 Installation of Finishes
 - 1.3.22 Extra Materials
- 1.4 BUILDING FINISH COLORS
 - 1.4.1 Color Schedule
 - 1.4.1.1 Interior Finish Colors
 - 1.4.1.2 Exterior Finish Colors
- 1.5 FURNITURE, FIXTURES AND EQUIPMENT (FF&E)
 - 1.5.1 FF&E Design
 - 1.5.2 Furniture Requirements
 - 1.5.3 Furniture Plans
 - 1.5.4 Purchase and Installation

PART 2 NOT USED

PART 3 NOT USED

-- End of Section Table of Contents --

SECTION 01 84 00

INTERIOR DESIGN REQUIREMENTS
07/18

PART 1 INTERIOR DESIGN REQUIREMENTS

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with the latest edition of the UFGS guide specification.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC 134 (2016) Electrostatic Propensity of Carpets

AATCC 174 (2016) Antimicrobial Activity Assessment
of New Carpets

ASTM INTERNATIONAL (ASTM)

ASTM C109/C109M (2021) Standard Test Method for
Compressive Strength of Hydraulic Cement
Mortars (Using 2-in. or (50-mm) Cube
Specimens)

ASTM C423 (2009a) Sound Absorption and Sound
Absorption Coefficients by the
Reverberation Room Method

ASTM D395 (2016; E 2017) Standard Test Methods for
Rubber Property - Compression Set

ASTM D412 (2016) Standard Test Methods for
Vulcanized Rubber and Thermoplastic
Elastomers - Tension

ASTM D1054 (2002; R 2007) Rubber Property -
Resilience Using a Rebound Pendulum

ASTM D1335 (2017; E 2018) Standard Test Method for
Tuft Bind of Pile Yarn Floor Coverings

ASTM D256 (2010) Determining the Izod Pendulum
Impact Resistance of Plastics

ASTM D2047 (2017) Standard Test Method for Static
Coefficient of Friction of Polish-Coated
Floor Surfaces as Measured by the James
Machine

ASTM D2859 (2016) Standard Test Method for Ignition
Characteristics of Finished Textile Floor
Covering Materials

ASTM D7330	(2015) Standard Test Method for Assessment of Surface Appearance Change in Pile Floor Coverings Using Standard Reference Scales
ASTM F150	(2006; R 2013) Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring
ASTM E1155	(2020) Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM F510	(2014) Standard Test Method for Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method
ASTM E648	(2019a) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM F793	(2010a) Wallcovering by Durability Characteristics
ASTM F1066	(2004; R 2014; E 2014) Standard Specification for Vinyl Composition Floor Tile
ASTM F1303	(2004; R 2021) Standard Specification for Sheet Vinyl Floor Covering with Backing
ASTM F1344	(2021a) Standard Specification for Rubber Floor Tile
ASTM F1700	(2020) Standard Specification for Solid Vinyl Floor Tile
ASTM F1859	(2021a) Standard Specification for Rubber Sheet Floor Covering Without Backing
ASTM F1861	(2021) Standard Specification for Resilient Wall Base
ASTM F1913	(2004; R 2014) Vinyl Sheet Floor Covering Without Backing
ASTM F2034	(2008; R 2013) Sheet Linoleum Floor Covering
ASTM F2169	(2015; R 2020; E 2020) Standard Specification for Resilient Stair Treads
ASTM F2195	(2013) Linoleum Floor Tile

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A137.1 (2019) American National Standards
Specifications for Ceramic Tile

CSA GROUP (CSA)

CSA B45.5-11/IAPMO Z124 (2011; Update 1 2012) Plastic Plumbing
Fixtures - First Edition

CARPET AND RUG INSTITUTE (CRI)

CRI 104 (2015) Carpet Installation Standard for
Commercial Carpet

CRI 105 (2015) Carpet Installation Standard for
Residential Carpet

CRI Test Method 103 (2015) Standard Test Method for the
Evaluation of Texture Appearance Retention
of Carpet Standards Program

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101 (2021; TIA 21-1) Life Safety Code

NFPA 265 (2019) Standard Methods of Fire Tests for
Evaluating Room Fire Growth Contribution
of Textile or Expanded Vinyl Wall
Coverings on Full Height Panels and Walls

NFPA 286 (2019) Standard Methods of Fire Tests for
Evaluating Contribution of Wall and
Ceiling Interior Finish to Room Fire Growth

NFPA 701 (2019) Standard Methods of Fire Tests for
Flame Propagation of Textiles and Films

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-200-02 (2020; with Change 1, 2020; Change 2,
2022) High Performance and Sustainable
Building Requirements

UFC 3-120-01 (2014; with Change 3, 2017) Design: Sign
Standards

UFC 3-120-10 (2018; with Change 2, 2021) Interior
Design

UFC 3-600-01 (2016; with Change 6, 2021) Fire
Protection Engineering for Facilities

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS CCC-W-408 (Rev D; Notices 1, 2, 3) Wallcovering,
Vinyl Coated

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1630	Standard for the Surface Flammability of Carpets and Rugs (FF 1-70)
36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

UNDERWRITERS LABORATORIES (UL)

UL 723	(2018) UL Standard for Safety Test for Surface Burning Characteristics of Building Materials
--------	--

1.2 DESIGN CRITERIA

Design this building in accordance with this document, NFPA 101, 36 CFR 1191, UFC 3-600-01, UFC 3-120-10, UFC 3-120-01, and Grand Forks Air Force Base Installation Facilities Standards. Comply with the flame spread and smoke development limits herein and the requirements of NFPA 101 for all interior finish materials.

1.3 BUILDING INTERIOR FINISHES

Reference Room Data Sheets for locations of interior finishes.

1.3.1 Floor Surface Preparation and Materials

Prepare substrate and provide surface preparation materials, including any recommended underlayments, in accordance with the flooring manufacturer recommendations for the subfloor conditions.

1.3.2 Carpet

Provide antistatic carpet with three distinctly different colors. Carpet must be broadloom and tile, 100% continuous filament, solution dyed and/or yarn dyed, branded nylon with loop construction. Provide synthetic primary and secondary backing materials that are customarily used and accepted by the trade for each type of carpet. Preference should be given to products containing recovered material when possible. Carpet must meet the following minimum requirements:

1.3.2.1 Minimum Pile Characteristics

Provide carpet with tufted construction, loop pile, minimum 1/8" gauge and minimum pile density of 4725. Provide carpet with a greater than or equal to 3.0 (Heavy) TARR traffic level classification in accordance with ASTM D7330 or CRI Test Method 103.

1.3.2.2 Static Control

Provide static control that is appropriate for the function of the room.

1.3.2.3 Flammability and Critical Radiant Flux Requirements

Carpet must comply with 16 CFR 1630 or ASTM D2859. Provide carpet in corridors and exits with a minimum average critical radiant flux of .45

watts per square centimeter when tested in accordance with ASTM E648.

1.3.2.4 Tuft Bind

Comply with ASTM D1335 for tuft bind force required to pull a tuft or loop free from carpet backing with a minimum 10 pound average force for loop pile broadloom, 3 pound average force for cut pile broadloom, and 8 pound average force for modular carpet tile.

1.3.2.5 Warranty

Provide manufacturer's standard performance guarantees or warranties including minimum ten year wear warranty, two year material and workmanship and ten year tuft bind and delamination.

1.3.2.6 Recycling of Existing Carpet

Recycle existing carpet to be removed so it doesn't go to a landfill. Add requirement to the carpet specification that carpet is to be removed with delivery to a manufacturer that accepts recycled carpet. Removal and handling of existing carpet must be per the manufacturer's recommendations. Include a submittal requirement (SD-07 Certificate) in the carpet specification for recycled carpet that shows compliance with these requirements. It is recommended that this requirement be included in UFGS 01 74 19 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT.

1.3.2.7 Installation

Perform all work by manufacturer's approved installers in accordance with the manufacturer's printed instructions and CRI 104/CRI 105. For warranties to be valid install all carpet in accordance with the installers guidelines, including preparation of subfloor. Install broadloom carpet direct glue down or pre-applied adhesive glue down. Install carpet tile with release adhesive or a manufacturer approved adhesive tab system. Provide water resistant, mildew resistant, nonflammable, and nonstaining adhesives and concrete primers for carpet installation as required by the carpet manufacturer.

1.3.3 Tread Inserts for Entrance Mat

Provide tread inserts consisting of carpet/bristle filament mix .

1.3.4 Static Control Flooring

1.3.4.1 Static Dissipative Resilient Flooring

1.3.4.1.1 Static Dissipative Vinyl Tile

Static-dissipative vinyl tile must be a homogeneous vinyl product and conform to ASTM F1700. Provide electrical resistance from surface to surface and surface to ground between 1,000,000 ohms (1.0×10 to the 6th) and 1,000,000,000 ohms (1.0×10 to the 9th) when tested in accordance with ASTM F150. Tile must be 24 inches square and 1/8 inch thick.

1.3.5 Luxury Vinyl Tile

Conform to ASTM F1700 Class III printed film (minimum wear layer thickness 0.030 inch (30 mil) and minimum overall thickness 0.098 inch. Provide tile with a factory protective finish that enhances cleanability and

durability. Provide minimum 15 year manufacturer's standard performance warranty.

1.3.6 Rubber Flooring

Conform to [ASTM F1344](#) for tile, Class 1 homogeneous, Type A (solid color) or Type B (through mottled). Provide smooth or hammered surface.

1.3.7 Stair Treads, Risers, and Stringers

Conform to [ASTM F2169](#) for rubber treads, risers, and stringers. Provide treads with hammered or raised surface. Provide either a one piece nosing/tread/riser or a two piece nosing/tread design with a matching coved riser. Provide stringer angles on both the wall and banister sides of the stairs and landing trim.

1.3.8 Wall Base

Conform to [ASTM F1861](#) for rubber base. Provide coved (installed with resilient flooring) and straight (installed with carpet) base, 4 inches high and a minimum 1/8 thick with job formed corners.

1.3.9 Transition Strips

Provide transition strips where flooring termination is higher than the adjacent finished flooring and at transitions between different flooring materials. When transition strips are required at doors install them under door centerlines. Transition strips are not required at doorways where thresholds are provided. Provide tapered mouldings of vinyl or rubber unless otherwise specified. Provide an aluminum transition strip between porcelain tile and other flooring types. Provide types as recommended by flooring manufacturer for both edges and transitions of flooring materials specified.

1.3.10 Ceramic Tile/Porcelain

Conform to [ANSI A137.1](#), moderate to heavy grade only. Provide glazed or unglazed porcelain tile, base, and trim with the color extending uniformly through the body of the tile. Except for accent tile provide large format tile larger than 12 x 12 inches. Provide floor tiles with a wet dynamic coefficient of friction (DCOF) value of 0.42 or greater when tested in accordance with [ANSI A137.1](#) requirements. [Am-0005]Where tile wainscot is required, provide tile to 72" above finished floor at a minimum.[*Am-0005]

[Am-0005]1.3.11 Vinyl Wallcovering

Provide a vinyl coated woven or nonwoven wallcovering fabric. Conform to FS CCC-W-408 Type II.[*Am-0005]

[Am-0005]1.3.12 Corner Guards

Provide stainless steel or resilient corner guards on external corners of interior walls, partitions, and columns. Corner guards are to be flush mounted or surface and extend from floor to ceiling.[*Am-0005]

[Am-0005]1.3.13 Chair Rails

Provide chair rails where indicated of high impact resistant resilient material, minimum 0.070 inch thick. Provide chair rails with slices,

cushions, mounting hardware and other accessories standard with the manufacturer.[*Am-0005]

1.3.14 Paints and Coatings

Provide paints and coatings appropriate for the exposure condition, required performance characteristics, and type of substrate to accept such finish. Surface preparation and material requirements must comply with LEED VOC limitations and with the minimum requirements identified in UFGS 09 90 00 PAINTS AND COATINGS. See the bridging documents for spaces to be painted.

The following surfaces are not to be painted:

- a. Metal surfaces of aluminum, stainless steel, chromium plate, bronze, copper, or similar finish materials.
- b. Surfaces of hardware, fittings, sprinkler heads, fire protection equipment, and other factory finished items not requiring a painted finish.
- c. Factory finished surfaces must not be painted unless specifically listed to receive paint.

1.3.15 Interior Signage

Signage must conform to 36 CFR 1191 (ABA-ADA), NFPA 101, and UFC 3-120-01 Design: Sign Standards. Provide signage for all rooms, including toilets, unless otherwise directed by the Contracting Officer. Provide stairwell and tactile exit signs as required by NFPA 101. Also, provide no smoking signs at building entrances as required by UFC 1-200-02 and the User. Provide all signs with exception of those for toilets, mechanical, electrical and communications rooms, stairwell, no smoking, and exit signs with a clear sleeve that will accept a paper insert, unless otherwise noted by the Base Civil Engineer (BCE) Office. Provide paper and software for creating text and symbols for computers identified by owner for Owner production of replacement paper inserts required after project completion. Provide building directories and directional signage. Provide alarm system, restricted area, and other facility specific signs as required to meet design and project requirements. Coordinate all signage requirements, including message content, room numbering, and placement of signs with User and Contracting Officer.

1.3.16 Solid Surface Material

Provide solid surface material for countertops, backsplashes, lavatories, and window sills. Solid surface material to be homogeneous filled solid polymer, not coated, laminated or of a composite construction, meet CSA B45.5-11/IAPMO Z124 requirements and be composed of cast 100 percent acrylic. Color and pattern must go through the thickness of the material. Provide minimum of 1/2 inch thick material for countertops and window sills.

1.3.17 Shower Surrounds and Shower Pans

Provide solid surface material for shower surrounds and shower pans. Material to be homogeneous filled solid polymer, not coated, laminated or of a composite construction, meet CSA B45.5-11/IAPMO Z124 requirements, and be composed of cast 100 percent acrylic. Color and pattern must go

through the thickness of the material.

1.3.18 Roller Window Shades

Provide roller window shades with light filtering shade cloth. Provide an L-shaped fascia. Roller tube must operate smoothly and be of sufficient diameter and thickness to prevent excessive deflection. Operation to be manual and operated chain drive. The shade cloth must meet the performance described in NFPA 701, small scale test. Provide hardware that allows for field adjustment or removal of shade roller tube and other operable hardware component without requiring removal of brackets and end or center supports.

[Am-0005]1.3.19 Fixed Auditorium Seating (Upholstered)

Provide fixed auditorium seating with back assembly of the fixed type and consisting of a hard injection molded surface rear panel with an upholstered inner panel. Rear panel extends below the seat unit to completely conceal and protect the seat assembly. Seat to be upholstered with the front center edge of each seat equipped with a recess identification plate. Equip each chair with armrests and a fold-away tablet arm assembly faced with plastic laminate on the writing surface. Provide both left and right handed tablet arms. Provide seating with number and letter plates for seat and row designations.[*Am-0005]

1.3.20 Warranty

Provide warranties that comply with the UFGS specification minimum requirements, unless otherwise noted. When manufacturers standard performance guarantees or warranties exceed the minimum requirements identified, provide the standard performance guarantee or warranty.

1.3.21 Installation of Finishes

All finishes must be installed as per manufacturer's recommended installation instructions, to include recommended equipment, adhesives, and other related items. Furnish and install all finishes and related accessory components necessary for a complete, functional, and finished installations.

1.3.22 Extra Materials

Provide extra material for all finishes in minimum quantities of 2% to 5%. Required quantity for range of percentage must be coordinated with the Contracting Officer.

1.4 BUILDING FINISH COLORS

The word "color" as used herein includes surface color and pattern. Color selections must provide an aesthetically pleasing, comfortable, easily maintainable, and functional environment for the occupants. Coordination of interior and exterior building colors and finishes is necessary for a cohesive design. Color selection must be appropriate for the building type. Limit the number of similar colors for each material.

Grout: Provide medium range colors for ceramic and porcelain tile grouts to help hide soiling.

Plastic Laminate and Solid Surface Material: Provide materials that are patterned or are mottled, flecked or speckled; except for solid surface lavatories solid colors are not acceptable. Countertops at sinks must be light to medium range in color to help hide water spotting. Dark color solid surface materials are not recommended since they show scratches more readily.

Carpet: Solid color carpet may be used as a border or small area of accent in higher profile spaces to add interest. Recommend the use of several coordinating carpet patterns within the same color-way within the facility to provide variety and continuity between different areas.

Patterns:

- Use variation of color or floor patterns to visually shorten long corridors and add interest.
- Provide wall and/or floor tile patterns using several coordinating colors in the toilets as appropriate. Tile patterns must be appropriate to size and shape of rooms.

Accent Walls: Recommend the use of accent walls when appropriate to add interest.

Stained Woodwork: Match stained woodwork throughout the facility.

Miscellaneous Items: Finish colors of fire extinguisher cabinets, receptacle bodies and plates, fire alarms/warning lights, emergency lighting, and other miscellaneous items must be coordinated with the building interior design. Match color of equipment items on ceilings (speakers, smoke detectors, grills, etc.) with the ceiling color.

1.4.1 Color Schedule

Finish colors are listed to establish design direction for the facility. The manufacturers referenced are not intended to limit the selection of equal colors from other manufacturers. Colors for finishes not identified must be compatible and coordinate with the listed finish colors and must be coordinated with the Contracting Officer.

1.4.1.1 Interior Finish Colors

Coordinate interior finishes and colors with the User.

1.4.1.2 Exterior Finish Colors

See Section 01 82 00 ARCHITECTURAL REQUIREMENTS for exterior finish and color information.

1.5 FURNITURE, FIXTURES AND EQUIPMENT (FF&E)

1.5.1 FF&E Design

Provide FF&E design and conform to the requirements of the [UFC 3-120-10](#) Design: General Interior Design Requirements. Coordinate product and functional requirements with the User. Consider quality, function, aesthetics, comfort, safety, and sustainability during the selection of furnishings. Furniture items to be included in the FF&E package include workstations, seating, tables, storage, filing, artwork, appliances, automated external defibrillators (AEDs), and accessories. Coordinate furniture styles, finishes, and upholsteries with the building design.

Design the furniture package in accordance with the Federal Acquisition Requirements, the User Requirements, and the Contracting Office's procurement methodology. Coordination is required with Contracting Office to insure that the FF&E design package is procurable. Specify furniture from the GSA Schedules.

Provide three automated external defibrillators (AEDs) as part of the FF&E Design. Locations to be determined during design. Provide AED's that are compatible with defibrillator cabinets that are specified as part of the base bid. AEDs that are located in the secured work area cannot use WiFi. AED shall be provided audio and visual prompts for CPR compression strength.

1.5.2 Furniture Requirements

Provide fire retardant materials to the maximum extent possible and comply with U.L. listings where applicable. Specify user friendly features such as radius edges. Sharp edges and exposed connections are not acceptable. Conceal clips, screws, and other construction elements where possible. When specifying furniture consider features that prevent damage from vacuum cleaners and maintenance products. Upholstery fabric must meet Wyzenbeek Abrasion Test; 35,000 minimum double rubs, 50,000 preferred. It is recommended that heavier use areas have a minimum 50,000 double rubs. A topical or inherent soil retardant treatment is required. Upholstery fabric must be patterned to help hide soiling. Specify silicone, vinyl, Crypton or hard surface material in heavy use areas as coordinated with the User and Corps Interior Designer. Coordinate specific furniture features and requirements with the User and Corps Interior Designer. Furniture systems must be powered and support communications, unless directed otherwise.

1.5.3 Furniture Plans

See drawings for furniture plan. Furniture layout must be functional and coordinate with the building design to assure that locations of electrical outlets, switches, J-boxes, communication outlets, and lighting within the building are appropriate. The layout must also be coordinated with other building features such as architectural elements, thermostats, location of TVs, etc. Locate furniture in front of windows only if the top of the item falls below the window. The furniture layout must conform to requirements specified in [36 CFR 1191](#), and [NFPA 101](#).

1.5.4 Purchase and Installation

FF&E purchase and installation is a bid option to the construction contract.

PART 2 NOT USED

PART 3 NOT USED

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 86 13

FIRE PROTECTION REQUIREMENTS

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 OCCUPANCY FOR THE PROJECT
- 1.3 CONSTRUCTION PER 2021 INTERNATIONAL BUILDING CODE (IBC)
- 1.4 CORRIDORS
- 1.5 INTERIOR FINISHES
- 1.6 EGRESS CAPACITY:
- 1.7 MEASUREMENT OF TRAVEL DISTANCE TO EXITS:
- 1.8 FIRE EXTINGUISHER CABINETS:
- 1.9 AUTOMATIC SUPPRESSION SYSTEMS:
- 1.10 PRESENCE OF DISABLED OCCUPANTS
- 1.11 FUNCTIONAL AND TECHNICAL REQUIREMENTS
 - 1.11.1 Building Construction Type
 - 1.11.1.1 Exterior Walls
 - 1.11.1.2 Roof
 - 1.11.1.3 Interior Walls
 - 1.11.1.4 Interior Finishes
- 1.12 FIRE ALARM AND DETECTION SYSTEMS
 - 1.12.1 New: Fire Alarm and Mass Notification Panels
 - 1.12.2 Initiating and Notification Devices
 - 1.12.3 Mass Notification System
 - 1.12.4 Interfaces to Other Systems
 - 1.12.5 Layout Considerations
- 1.13 FIRE PROTECTION SPECIFICATIONS (SUBMITTALS AND ACCEPTANCE TESTS)
- 1.14 DESIGN OBJECTIVES AND PROVISIONS
 - 1.14.1 Zoning and Treatment of Each Potential Hazard
 - 1.14.1.1 Limiting Fire Spread
 - 1.14.2 Provision and Maintenance of an Unobstructed Emergency Egress System
 - 1.14.3 Maximum dead ends.
 - 1.14.4 Egress locations
 - 1.14.5 Outside Exit Doors
 - 1.14.6 Required Fire Exits
- 1.15 Penetrations Through Secured Boundary

-- End of Section Table of Contents --

SECTION 01 86 13

FIRE PROTECTION REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

The publications are referred to in the text by the basic designation only. The most current edition shall be used whenever a specific edition is not mentioned.

ASTM INTERNATIONAL (ASTM)

ASTM E 84 (2022) Standard Test Method for Surface Burning Characteristics of Building Materials

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2021) International Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 1 Fire Code

NFPA 10 Standard for Portable Fire Extinguishers

NFPA 13 Standard for the Installation of Sprinkler Systems

NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection

NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances

NFPA 70 National Electrical Code

NFPA 72 National Fire Alarm and Signaling Code

NFPA 90A Standard for the Installation of Air Conditioning and Ventilating Systems

NFPA 101 Life Safety Code

NFPA 291 Recommended Practice for Fire Flow Testing and Marking of Hydrants

NFPA 855 Standard for the Installation of Stationary Energy Storage Systems

NFPA 2001 Standard on Clean Agent Fire Extinguishing Systemse

U.S. DEPARTMENT OF DEFENSE (DoD)

UFC 1-200-01	DoD Building Code
UFC 3-600-01	Fire Protection Engineering for Facilities
UFC 4-010-06	Cybersecurity of Facility-Related Control Systems
UFC 4-021-01	Design and O&M: Mass Notification Systems
UFC 4-021-02	Electronic Security Systems
TSFPEWG G 3-600-01.01-18	Air Force Fire Protection Engineering Criteria and Technical Guidance for Mission Continuity of Electronic, Information Technology, and Telecommunications Equipment Installations
ECB 2018-17	(2018 Revision 1) New Requirements for Visual Notification for Mass Notification Systems

This project is located at Grand Forks Air Force Base, North Dakota, for the Building 631 renovation project. Any new egress, suppression system (sprinklers), and alarm and mass notification systems shall meet the requirements stated herein. Fire protection shall be based on sound fire protection engineering principles and shall give safeguards against loss of life and property by fire, consistent with the mission, risk involved, and economical utilization. A Life Safety/Building Code analysis shall be provided by the Fire Protection Engineer for each facility. At final submission, the Fire Protection Engineer shall stamp and seal the Life Safety/Building Code plans. Fire protection criteria shall also be based on the codes listed above and on the following code requirements:

ADA and ABA Accessibility Guidelines for Buildings and Facilities
(www.access-board.gov/ada-aba/final.cfm)

Omaha District Design Guide (July 2019)

Building type specific criteria is listed below. The requirements of these criteria documents shall be met, except as modified by these specifications. Refer to 01 81 00 for each building type and requirements including prototype references, etc. The following buildings are part of the scope of work:

Building 631
Communication Hut

Criteria for facilities can be found on the Whole Building Design Guide (WBDG) website ([https://www.wbdg.org/Prototypes, UFCs, ECBs, etc. are located on this website.](https://www.wbdg.org/Prototypes,UFCs,ECBs,etc.are/located%20on%20this%20website))

All requirements of the latest aforementioned codes shall be incorporated into the designs. A Fire Protection Engineer shall be part of the design team in accordance with UFC 3-600-01 and shall be a single person. The Fire Protection Engineer shall provide a Life Safety Code Analysis and Building

Code Analysis of each new facility as well as be responsible for the designs of all of the new fire alarm, fire sprinkler, and mass notification systems. At 100% design submission, the Fire Protection Engineer of Record shall submit a letter to USACE certifying all of the projects meet all of the mentioned codes, and NFPA 101 criteria.

The Life Safety Code

NFPA 101 relative to the designs shall give special attention to the application of fire codes as they relate to Life Safety. Features of fire protection based on the following shall be included in the design: Automatic operating devices; Exiting for inhabitants and the protection of egress components; Personnel safety in hazardous areas; Appropriate ratings of fire and smoke partitions, doors and windows; Travel distances; Common paths of travel; Occupancy types; Hazard of occupancies and their contents; and Isolation from the remainder of the facility.

Applicable requirements of the International Building Code shall also be included in the design. These shall include the following: Types of construction; Fire area limitations; Increases to allowable floor areas; and Separation of structures.

All military construction must comply with the code requirements set forth in UFC 1-200-01, UFC 4-010-06, UFC 4-021-01, UFC 3-600-01, and Air Force TSFPEWG G 3-600-01.01-18. Additional guidance and design criteria includes NFPA 1, NFPA 10, NFPA 13, NFPA 20, NFPA 24, NFPA 70, NFPA 72, NFPA 90A, NFPA 101, NFPA 291, NFPA 855, NFPA 2001, and ECB 2018-17.

All fire protection designs shall be done by a Fire Protection Engineer in accordance with UFC 3-600-01. Refer to section 28 31 76 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEMS for additional information regarding qualification requirements for the fire alarm and mass notification systems designer. The fire protection engineer shall perform a Life Safety/Building Code analysis for each of the facilities and structures including egress capacity and pathways. At final submission, the Life Safety/Code Analysis shall be stamped and sealed by the Fire Protection Engineer of Record for each facility and structure. The life safety analysis shall be submitted with the first submittal for each facility and structure for review. Life safety analysis shall comply with UFC 3-600-01 and NFPA 101. The new floor plans shall be evaluated for compliance with NFPA 101. The life safety and building code plans in the Request for Proposal (RFP) are for reference only. A life safety analysis and building code analysis is required to be provided as part of the project by a Fire Protection Engineer.

1.2 OCCUPANCY FOR THE PROJECT

The facility will be classified in accordance with NFPA 101. According to Chapter 3 and Chapter 4 of the International Building Code (IBC), the facility will be classified as part of the Life Safety Code and Building Analysis. Review all applicable occupancies such as assembly, storage, industrial, and business occupancies.

1.3 CONSTRUCTION PER 2021 INTERNATIONAL BUILDING CODE (IBC)

Construction type of the facility shall be a minimum of Type IIB. The hourly fire rating requirements for walls and columns for each of the building systems and components shall not be less than those specified in the performance specifications sections of IBC.

1.4 CORRIDORS

Review NFPA 101 to determine fire rating of all corridors and exits.

Separation of incidental use areas shall be provided per NFPA 101. Corridors on the first floor leading from the egress stairs shall be fire rated to 1 hour construction and also be a smoke barrier.

1.5 INTERIOR FINISHES

Interior wall and ceilings of all exits shall be in accordance with NFPA 101. Review based upon occupancy.

Interior floor finishes in all exits shall be in accordance with NFPA 101. Review based upon occupancy.

No downgrade in finish Class due to complete coverage by an automatic sprinkler system shall be allowed.

1.6 EGRESS CAPACITY:

Egress capacities shall be in accordance with NFPA 101 and included as part of the scope of work and Life Safety Code Analysis.

1.7 MEASUREMENT OF TRAVEL DISTANCE TO EXITS:

NFPA 101, SEC 7.6 - Review as part of the Life Safety Code Analysis. Maximum distance shall be based upon most stringent occupancy requirements in NFPA 101 for each facility and structure.

1.8 FIRE EXTINGUISHER CABINETS:

NFPA 10 - Review as part of the Life Safety Code Analysis. Provide in all areas of the building.

1.9 AUTOMATIC SUPPRESSION SYSTEMS:

Demolition: Demolish and remove the existing sprinkler system in its entirety except in the Mechanical Room where the riser is located. Demolish and remove all sprinkler heads, valves, tamper switches, flow switches, and distribution piping from both floors. The main riser shall remain as well as the water service entrance.

New: Provide a clean agent suppression system for any IT or Electrical Room designated as noted on the plans and in the Room Data Sheets. Provide all fire walls, smoke exhaust, fire detection, clean agent suppression system, sprinkler system, and all other requirements per TSFPEWG G 3-600-01.01-18. Only UFGS fire suppression specifications shall be edited and used for this system (Section 21 22 00.00 40). Provide clean agent suppression systems for each server room that is used for the simulators. Comply with NFPA 2001. The clean agent suppression system is in addition to a wet pipe sprinkler system. Each wet pipe sprinkler system for the servers shall have a separate feed from the riser with a control valve for each room. Provide high temperature heads in these rooms (200 deg. F). Provide a very early smoke detection system for each room. Refer to fire alarm paragraphs.

New: Provide new sprinkler system for the building. Provide areas and

densities per UFC 3-600-01 and per the RFP drawings Provide pre-action sprinkler system for any areas subject to freezing. Provide a new double check valve assembly on the riser if one is not present. Provide a forward flow test assembly for the new back flow prevention device if one is not there. Systems shall be designed per UFC 3-600-01. Also, provide fire sprinkler systems for any overhangs, canopies, or storage areas where required by NFPA 101 or UFC 3-600-01. Hydraulically calculate each new system per NFPA 13. Obtain a current fire hydrant flow data for the design of the new system in accordance with NFPA 291. A structural engineer shall be part of the contractor's design team. The structural engineer shall review all piping supports for the facility. The new sprinkler systems shall not overload the building's structural capacity. Only UFGS fire suppression specifications shall be edited and used for this project (Section 21 13 13, 21 13 16, 21 13 18, etc.). Provide di-electric breaks for any sprinkler piping penetrating the secure area walls. Refer to Architectural Plans for those wall locations. Provide concealed sprinkler heads for the Sim Rooms 107, 108, 109, 116, 117, and 118.

1.10 PRESENCE OF DISABLED OCCUPANTS

Disabled personnel will potentially be present. Provisions for accessibility and usability will be made for physically handicapped individuals for exiting these facilities. Refer to Paragraph 1.12 for fire alarm system requirements.

1.11 FUNCTIONAL AND TECHNICAL REQUIREMENTS

1.11.1 Building Construction Type

These facilities shall comply with a minimum Construction Type IIB, in accordance with ICC IBC. Review as part of the Life Safety/Building Code Analysis. Downgrading of the structure's construction type is not allowed.

1.11.1.1 Exterior Walls

Exterior walls of each of the facilities and structures will not be rated as long as minimum distances from other buildings are maintained and the area and size of the structure does not require it per IBC. Review as part of the Life Safety/Building Code Analysis. Standoff distances shall be maintained for explosives and high hazard occupancies. Review and show on site plans any explosive impact standoff distances.

1.11.1.2 Roof

Each building's or structures's roof covering shall be in accordance with UFC 3-600-01. Review as part of the Life Safety/Building Code Analysis.

1.11.1.3 Interior Walls

All penetrations in fire and smoke rated walls (conduits, pipes, cable trays, etc.) shall be fire or smoke stopped according to their respective wall/floor/ceiling rating at each penetration. Review all building walls as part of the Life Safety/Building Code Analysis and provide smoke and fire rated walls as necessary as part of NFPA 101 and 3-600-01. Provide a 1 hour fire rated walls for the corridors serving the interior egress stairs. Corridor walls shall be fire rated and a smoke barrier Fire rated walls in the facility shall be a UL listed one hour fire rated assembly (1 hour fire rated wall). Fire rate any walls serving spaces identified as IT Rooms, Electrical Rooms, or as noted on the plans and in the Room Data

Sheets where clean agent suppression systems are being provided.

1.11.1.4 Interior Finishes

Interior finish materials on walls, ceilings, partitions, and furnishings of all types in all exits shall be as defined in NFPA 101. All other areas will have interior finish materials for walls, ceilings, and furnishings as required by NFPA 101. Smoke Developed Ratings will not exceed 450 for Class A, Class B, Class C materials when tested in accordance with ASTM E 84 in accordance with UFC 3-600-01.

Provide self-closing hardware and gasketing at all fire-rated doors as well as smoke rated doors.

1.12 FIRE ALARM AND DETECTION SYSTEMS

Demolition: Demolish and remove all of the fire detection, alarm, and mass notification system throughout the facility.

New: Installation of the Fire Alarm and Mass Notification Systems shall require a Certification and Accreditation to be obtained, refer to section 01 86 29 COMMUNICATIONS REQUIREMENTS for additional information.

1.12.1 New: Fire Alarm and Mass Notification Panels

Provide the facility with a new Monaco addressable fire alarm, detection, and mass notification system and panel (FACP). All new circuits to the addressable type fire alarm systems shall comply with NFPA 72, UFC 3-600-01, and NFPA 101. Contractor shall install new detectors and initiating devices as required. Provide appropriate interfaces at the new panels to allow all new alarm detection, new fire alarm devices and new initiation devices to be connected to the addressable panel. System shall meet the Grand Forks Air Force Base Requirements and all other applicable standards. Grand Forks AFB requires the use of Monaco Fire Alarm systems. Provide new transmission devices to send fire alarms and mass notifications signals to the receiving equipment located at the base fire department. Provide single Fire Alarm (FA) and Mass Notification System (MS) Strobe and LED text signs in accordance with ECB 2018-17: New Requirements for Visual Notification for Mass Notification Systems.

The system shall be addressable to each reporting device and with turnkey MNS. MNS devices shall be combination speaker/strobe on ceilings or walls. The system shall be complete with the new control panels in the building and required devices. The addressable system shall transmit and receive addresses and data between the control panel and the new devices. Comply with UFC 4-021-01 and ECB 2018-17 for all aspects of the Mass Notification System. New fire alarm and mass notification system shall be provided for the facility and shall integrate with the existing Grand Forks AFB base-wide system. Existing Fire Alarm receiving station on Grand Forks AFB is Monaco D21.

For any room designated as requiring a clean agent suppression system on the plans or in the Room Data Sheets, provide a Very Early Smoke Detection Apparatus (VESDA) Aspirating system. VESDA system shall send a signal to the releasing panel. Provide a releasing panel for the clean agent suppression system. Provide in compliance with the requirements of TSFPEWG G 3-600-01.01-18 for IT Rooms. Provide VESDA systems for each of the server rooms of the simulators.

1.12.2 Initiating and Notification Devices

The new system shall include addressable manual pull stations, addressable heat detectors, addressable duct smoke detectors, addressable spot type smoke detectors, and audible and visual notification appliances that comply with ADA requirements.

1.12.3 Mass Notification System

Provide edited UFGS Specification 28 31 76. Design shall be per **UFC 4-021-01** and **ECB 2018-17** for the Mass Notification System(s). Provide a new Mass Notification System for the building. **[Am-0005][Am-0005]**

1.12.4 Interfaces to Other Systems

The new system shall shut down appropriate air handling equipment, smoke dampers, and release magnetic door holding devices, and shall hold on lighting controlled by automatic means in the egress paths per NFPA 101 as necessary for proper operation of the facility. Provide a "Sequence of Operations Matrix" to coordinate with alarm functions in Section 28 31 76 ADDRESSABLE FIRE ALARM AND MASS NOTIFICATION SYSTEMS for the facility. The "Sequence of Operations Matrix" shall be approved by the Contracting Officer. The system shall meet requirements of **UFC 4-021-02**, if applicable.

1.12.5 Layout Considerations

Duct smoke detectors shall be provided on all new air handling supply fans over **2000 CFM**, and all new return fans over **15,000 CFM**. Smoke detectors, shall be provided where electromagnetic door holders are used. Audible and visual notification appliances shall be provided to meet these specifications. This includes all new interior egress doors. Designs shall comply with ADA Requirements, **NFPA 101** and **NFPA 72**. Provide an audible notification appliance on the exterior at each exit door. Addressable initiating device circuits modules shall be provided for each non-addressable device, excluding notification appliances. Visual strobes shall be located in every space within the building.

1.13 FIRE PROTECTION SPECIFICATIONS (SUBMITTALS AND ACCEPTANCE TESTS)

The sprinkler and fire alarm submittals shall be reviewed and approved by the Base Fire Chief or designated representatives as well as USACE Omaha District Fire Protection Engineer. Only UFGS fire alarm and fire suppression specifications shall be edited and used for this project. All submittals shall be stamped and sealed by a Registered Fire Protection Engineer.

Representatives of the Base Fire Department shall inspect and witness all final acceptance testing prior to the Contracting Officer accepting the sprinkler and fire alarm systems.

Fire water services shall be installed and tested in accordance with **NFPA 24** guidelines. Fire sprinkler systems shall be tested in accordance with **NFPA 13** guidelines. Fire alarm and mass notification shall be tested in accordance with **NFPA 72** guidelines.

1.14 DESIGN OBJECTIVES AND PROVISIONS

1.14.1 Zoning and Treatment of Each Potential Hazard

1.14.1.1 Limiting Fire Spread

Every horizontal opening and hazardous locations as defined by NFPA 101.

1.14.2 Provision and Maintenance of an Unobstructed Emergency Egress System

All corridor widths, clear space requirements relative to exit doors, etc., shall be in accordance with the Uniform Federal Accessibility Standards and the Americans with Disabilities Act for unobstructed egress. Emergency lighting shall be installed in accordance with NFPA 101.

1.14.3 Maximum dead ends.

Maximum dead ends shall be as per NFPA 101 based upon most stringent occupancy requirements. Verify as part of the Life Safety/Building Code Analysis.

1.14.4 Egress locations

All egress locations shall be marked with exit signs per NFPA 101. Review as part of the Life Safety/Building Code Analysis.

1.14.5 Outside Exit Doors

All outside exit doors shall swing in the direction of exit travel. Outside exit doors shall be equipped with panic hardware mounted 44 inches above the finish floor and have a minimum clear width of 34 inches to allow for egress. Exit doors requiring security hardware shall be reviewed as part of the Life Safety/Code Analysis. Review per NFPA 101.

1.14.6 Required Fire Exits

All required fire exits from the building shall lead to a public way or to a clear safe area at a minimum distance of 75-feet from the the building with sidewalks.

[Am-4]

1.15 Penetrations Through Secured Boundary

All penetrations through the secured boundary shall meet the requirements of Specification 01 82 00 Subpart "Secured Boundary".

[*Am-4] -- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 86 29

COMMUNICATIONS REQUIREMENTS

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 DEFINITIONS
- 1.3 Coordination of Communications Criteria
- 1.4 Designer and Installer Requirements
- 1.5 Scope and Standards
 - 1.5.1 Appendix H and Appendix I
 - 1.5.2 Penetrations Through Secured Boundary
- 1.6 Cybersecurity
- 1.7 INTERIOR BLDG. REQUIREMENTS
 - 1.7.1 Demolition
 - 1.7.2 Interior Communications Cabling Systems
 - 1.7.3 Security Classifications and Requirements
 - 1.7.4 Cable TV (CATV)
 - 1.7.5 Cable Types
 - 1.7.6 Emergency Systems
 - 1.7.7 Audio-Visual System (A/V)
 - 1.7.8 Components
 - 1.7.9 Outlet Requirements
 - 1.7.10 Entrance Facility (EF)
 - 1.7.10.1 Building Protector Assemblies
 - 1.7.10.2 Protector Modules
 - 1.7.11 Telecommunications Room (TR)
 - 1.7.12 Patch Panels
 - 1.7.13 Terminations
 - 1.7.14 Backboards
 - 1.7.15 Racks and Cabinets
 - 1.7.16 Cable Tray
 - 1.7.17 Labeling
- 1.8 TELECOMMUNICATIONS FACILITIES
 - 1.8.1 Communications Hut
 - 1.8.2 Antenna Farm
- 1.9 Outside Plant (OSP)
 - 1.9.1 Exterior Construction Standards
 - 1.9.2 Cable Pulling
 - 1.9.2.1 Pulling Eyes
 - 1.9.3 Maintenance Holes (MH) and Hand Holes (HH)
 - 1.9.4 Fiber Optic Cable Specifications
- 1.10 Splices Cases and Splicing Standards
 - 1.10.1 General
 - 1.10.2 In Vault or Manhole
 - 1.10.3 Shield Connectors
 - 1.10.4 Grounding and Bonding Conductors
- 1.11 Conduit

PART 2 TESTS, INSPECTIONS, AND VERIFICATIONS

- 2.1 Testing
 - 2.1.1 Quality Control and Acceptance Testing

- 2.1.2 Verification Tests
- 2.1.3 Performance Tests
- 2.1.4 Final Verification Tests
- 2.2 Cable Inspection

-- End of Section Table of Contents --

SECTION 01 86 29

COMMUNICATIONS REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

Publications, codes, specifications, and standards shall be used as the basis for the project design. Publications and codes that imply recommendations shall be taken to be mandatory. Where there are conflicting criteria, the requirements of this RFP take precedence. References shall include, but not be limited, to the following.

The most current edition of the code or standard (with revisions, reprintings, changes, notices, errata, and addenda) available at the RFP proposal submission deadline shall be used as criteria for the design, unless noted otherwise. The criteria from these sources may be supplemented, but not supplanted, by applicable criteria contained in nationally recognized codes and standards.

38 ES/ENCE

38 ES/ENCE EMNS

Emergency Mass Notification System ESS

U.S. AIR FORCE (USAF)

AF 91-501

Air Force Consolidated Occupational Safety Standard

AFGM 2017-32-01

Air Force Guidance Memorandum, Civil Engineer Control Systems Cybersecurity

AFI 10-2501

Air Force Emergency Management Program Planning and Operations

AFI 33-210

Certification and Accreditation (C&A) Program

AFI 64-101

Cable Television on Air Force Bases

AFI 32-1065

(2017) Grounding Systems

AFMAN 32-1084

(2020) Facility Requirements

TSFPEWG G 3-600-01.01-18

Air Force Fire Protection Engineering Criteria and Technical Guidance for Mission Continuity of Electronic, Information Technology, and Telecommunications Equipment Installations

MILITARY

MIL-HDBK-419A Grounding, Bonding, and Shielding for
Electronic Equipments and Facilities

AMERICAN SOCIETY FOR TESTING AND MATERIALS INTERNATIONAL (ASTM)

ASTM B1 (2018) Standard Specification for
Hard-Drawn Copper Wire

ASTM B8 (2011; R 2017) Standard Specification for
Concentric-Lay-Stranded Copper Conductors,
Hard, Medium-Hard, or Soft

ASTM C857 (2019) Standard Practice for Minimum
Structural Design Loading for Underground
Precast Concrete Utility Structures

ASTM F512 (2017) Smooth-Wall Poly (Vinyl Chloride)
(PVC) Conduit and Fittings for Underground
Installation

ASTM F2160 (2022) Standard Specification for Solid
Wall High Density Polyethylene (HDPE)
Conduit Based on Controlled Outside
Diameter (OD)

ARMY CORPS OF ENGINEERS (COE)

EM 385-1-1 (2014) Safety and Health Requirements
Manual

BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL (BICSI)

TDMM Telecommunications Distribution Methods
Manual, 13th Edition

U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS 1755 Telecommunications Standards and
Specifications for Materials, Equipment
and Construction

RUS Bull 345-65 (1985) Shield Bonding Connectors (PE-65)

RUS Bull 1753F-201 (1997) Acceptance Tests of
Telecommunications Plant (PC-4)

U.S. DEPARTMENT OF DEFENSE (DOD)

DODI 8500.01 (2019) Cybersecurity

DODI 8510.01 (2022) Risk Management Framework (RMF) for
DoD Information Technology (IT)

UFC 3-575-01 (2012; with Change 1, 2021) Lightning and
Static Electricity Protection Systems

UFC 3-580-01 (2016; Change 1 2016) Telecommunications
Interior Infrastructure Planning and Design

UFC 3-600-01 (2016; with Change 6, 2021) Design: Fire
Protection Engineering for Facilities
Design: Fire Protection Engineering for
Facilities

UFC 4-010-05 (2013; with Change 1, 2013) Sensitive
Compartmented Information Facilities
Planning, Design, and Construction

UFC 4-010-06 (2016; with Change 1, 2017) Cybersecurity
of Facility-Related Control Systems

UFC 4-021-01 (2008; with Change 1, 2010) Design and
O&M: Mass Notification Systems

UFC 4-021-02 (2013; with Change 1, 2019) Electronic
Security Systems

INTELLIGENCE COMMUNITY STANDARD (ICS)

ICS 705-1 (2010) Physical and Technical Security
Standard for Sensitive Compartmented
Information Facilities

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

ICEA S-83-596 (2021) Indoor Optical Fiber Cables

ICEA S-87-640 (2016) Optical Fiber Outside Plant
Communications Cable; 6th Edition

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100 (2000; Archived) The Authoritative
Dictionary of IEEE Standards Terms

IEEE C2 (2023) National Electrical Safety Code

IEEE 81 (2012) Guide for Measuring Earth
Resistivity, Ground Impedance, and Earth
Surface Potentials of a Ground System

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191 Americans with Disabilities Act (ADA)
Accessibility Guidelines for Buildings and
Facilities; Architectural Barriers Act
(ABA) Accessibility Guidelines

UNDERWRITERS LABORATORIES (UL)

UL 5 Surface Metal Raceways and Fittings

UL 5A Nonmetallic Surface Raceways and Fittings

UL 5C Standard for Surface Raceways and Fittings

for Use with Data, Signal, and Control
Circuits

UL 83 Thermoplastic-Insulated Wires and Cables

UL 444 Communications Cables

UL 467 (2022) Grounding and Bonding Equipment -
Eleventh Edition

UL 497 Protectors for Paired-Conductor
Communication Circuits

UL 497B (2004; Reprint Feb 2022) Standard for
Protectors for Data Communications and
Fire-Alarm Circuits - Fourth Edition

UL 510 (2020) Polyvinyl Chloride, Polyethylene
and Rubber Insulating Tape

UL 514A (2013; Reprint Jun 2022) Metallic Outlet
Boxes - Eleventh Edition

UL 514B (2012; Reprint May 2022) Conduit, Tubing
and Cable Fittings - Sixth Edition

UL 514C (2014; Reprint Feb 2020) Nonmetallic
Outlet Boxes, Flush-Device Boxes, and
Covers - Fourth Edition

UL 514D Cover Plates for Flush-Mounted Wiring
Devices

UL 651 (2011; Reprint May 2022) Standard for
Schedule 40 and 80 Rigid PVC Conduit and
Fittings - Eighth Edition

UL 797 Electric Metallic Tubing - Steel

UL 969 (2017; Reprint Mar 2018) Standard for
Marking and Labeling Systems - Fifth
Edition

UL 1666 Test for Flame Propagation Height of
Electrical and Optical-Fiber Cables
Installed Vertically in Shafts

UL 2239 Hardware for the Support of Conduit,
Tubing, and Cable

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-455 (2014c) General requirements for standard
test procedures for optical fibers,
cables, transducers, sensors, connecting
and terminating devices, and other fiber
optic components

TIA-455-78 (2020c) FOTP-78 Optical Fibres - Part

	1-40: Measurement Methods and Test Procedures - Attenuation
TIA-455-78-B	(2020c) FOTP-78 Optical Fibres - Part 1-40: Measurement Methods and Test Procedures - Attenuation
TIA-455-107	(1999a) FOTP-107 Determination of Component Reflectance or Link/System Return Loss using a Loss Test Set
TIA-472D000	(2007b) Sectional Specification (Adopted ANSI/ICEA S-87-640-2006) Standard for Optical Fiber Outside Plant Communications Cable
TIA-492AAAA	(2009b) 62.5-um Core Diameter/125-um Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers
TIA-492AAAB	(2009a) 50-Um Core Diameter/125-Um Cladding Diameter Class IA Graded-Index Multimode Optical Fibers
TIA-492CAAA	(2002) Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers
TIA-492E000	(1996; R 2002) Sectional Specification for Class IVd Nonzero-Dispersion Single-Mode Optical Fibers for the 1550 nm Window
TIA-526-7	(2015a; R 2022) OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
TIA-526-14	(2015c)Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant; Modification of IEC 61280-4-1 edition 2, Fiber-Optic Communications Subsystem Test Procedures- Part 4-1: Installed Cable Plant-Multimode Attenuation Measurement
TIA-568.0	(2020e) Generic Telecommunications Cabling for Customer Premises
TIA-568.1	(2020e) Commercial Building Telecommunications Infrastructure Standard
TIA-568.2	(2018d) Balanced Twisted-Pair Telecommunications Cabling and Components
TIA-568.3	(2016d) Optical Fiber Cabling and Components Standard
TIA-569	(2019e) Telecommunications Pathways and Spaces
TIA-590	(1997a) Standard for Physical Location and

Protection of Below Ground Fiber Optic
Cable Plant

TIA-604-10	(2008) FOCIS 10B Fiber Optic Connector Intermateability Standard- Type LC
TIA-606	(2021d) Administration Standard for Telecommunications Infrastructure
TIA-607	(2019d) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
TIA-758	(2012b) Customer-Owned Outside Plant Telecommunications Infrastructure Standard
TIA-942	(2017b) Telecommunications Infrastructure Standard for Data Centers
TIA-1152	(2016; R 2021) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
TIA/EIA-598	(2014D; Add 2 2018) Optical Fiber Cable Color Coding

ELECTRONIC COMPONENTS INDUSTRY ASSOCIATION (ECIA)

ECIA EIA/ECA 310-E	(2005) Cabinets, Racks, Panels, and Associated Equipment
--------------------	--

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C62.61	(1993) American National Standard for Gas Tube Surge Arresters on Wire Line Telephone Circuits
NEMA WC 63.1	(2005) Performance Standard for Twisted Pair Premise Voice and Data Communications Cable
NEMA TC 6 & 8	(2020) Standard for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installations
NEMA WC 66	(2019) Standard for Category 6 and 6A, 100 Ohm, Individually Unshielded Twisted Pairs, Indoor Cables (With or Without an Overall Shield) for Use in LAN Communication Wiring Systems
NEMA VE 1	(2017) Metal Cable Tray Systems
NEMA VE 2	(2018) Cable Tray Installation Guidelines

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70

(2023) National Electrical Code

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA CFR 29 Part 1910.268

Telecommunications

1.2 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in this specification shall be as defined in TIA-568.2, TIA-568.3, TIA-606, and IEEE 100 and herein.

1.3 Coordination of Communications Criteria

All communications criteria provided in this section shall be coordinated with all other sections of the RFP. The locations of all equipment indicated in the communications requirements are approximate. Contractor shall coordinate the final number/locations of all equipment with the Contracting Officer. Contractor shall meet the requirements of the Americans with Disabilities Act (ADA) 36 CFR 1191.

1.4 Designer and Installer Requirements

All voice and data communications design shall be performed by a BICSI Registered Communications Distribution Designer (RCDD). The communications media (Telephone cables, LAN cables, and fiber optic cables) shall be installed by BICSI certified technicians and installers. The structured cabling system shall be certified by the manufacturer with the longest warranty available.

The installers assigned to the installation of the telecommunications system or any of its components shall be regularly and professionally engaged in the business of the application, installation, and testing of the specified telecommunications systems and equipment. Key personnel; i.e., supervisors and lead installers assigned to the installation of this system, or any of its components shall be BICSI Registered Cabling Installers. Submit documentation of current BICSI certification for each of the key personnel.

1.5 Scope and Standards

See Section 01 81 00 for a description of the facility and overall scope of work.

Building telecommunications cabling systems (BCS) and outside plant (OSP) telecommunications-cabling system shall conform to applicable criteria. This project will include all design, calculations, etc., for all systems required. All associated references are required to be included in this design and construction of the renovated buildings.

A survey of existing conditions, including location of underground utilities, shall be provided and incorporated prior to submitting the 100% design.

If the UFGS products or systems are applicable to the project, the DOR shall edit these referenced UFGS sections and submit them as a part of the design submittal specification.

Design and construction shall follow all applicable Department of Defense, U.S. Air Force and industry codes and standards set forth in Subpart 1.1 "References".

In addition to this specification, refer to the Room Data Sheets in Appendix A and Facility ICD Annexes A and B located in Appendix H and Appendix I for requirements specific to individual spaces and space types.

All equipment shall be rated for an elevation of 975 feet above sea level or derated for such elevation.

Contractor shall repair any cuts made to existing road, sidewalk, and parking lot surfaces that are to remain in place after construction. Repair shall match existing road, sidewalk, and parking lot cross section, respectively.

Except as explicitly indicated, wireless and plug-and-play controls shall not be used.

1.5.1 Appendix H and Appendix I

Appendix H Facility ICD Annex A and Appendix I Facility ICD Annex B provide additional design requirements from the customer including requirements for specific Room Data Sheets in Appendix A. The design shall meet the requirements of Appendix H and Appendix I. In the event of a conflict, the requirements of this specification, the drawings, and Room Data Sheets shall supersede Appendix H Facility ICD Annex A and Appendix I Facility ICD Annex B.

[Am-4]

1.5.2 Penetrations Through Secured Boundary

All penetrations through the secured boundary shall meet the requirements of Specification 01 82 00 Subpart "Secured Boundary".

[*Am-4]

1.6 Cybersecurity

Provide cybersecurity in accordance with specification section 01 86 25 CYBERSECURITY FOR FACILITY RELATED CONTROL SYSTEMS for all systems that meet the definition of an industrial control system (ICS), SCADA, or facility related control system (FRCS).

1.7 INTERIOR BLDG. REQUIREMENTS

1.7.1 Demolition

Remove all existing interior telecommunications cabling, jacks, and gangboxes.

1.7.2 Interior Communications Cabling Systems

All voice and data communications design shall be performed by a BICSI Registered Communications Distribution Designer (RCDD). The communications media (Telephone cables, LAN cables, and fiber optic cables) shall be installed by BICSI certified technicians and installers. The structured cabling system shall be certified by the manufacturer with

the longest warranty available. All work shall be at a minimum in accordance with UFC 3-580-01 and applicable industry codes and standards as listed in Subpart 1.1 "References".

The design shall form a complete voice and data communications system, including, but not limited to: wires, terminations, raceway, cable tray, cabinets/racks, outlets, etc., to support both secure and unsecure workstation voice and data outlets.

Workstation outlets shall be located at each workstation, printer, and podium/lecturn location as indicated on drawings.

All wiring shall be tested; sample testing shall not be permitted. Design and installation shall be provided by BICSI (Building Industry Consulting Services International) certified personnel. Proof of certification must be provided. The installed structured cable system shall be certified by the manufacturer and installer to perform at TIA standards for Category 6 and OM4 MM Fiber for a period of not less than 15 years. The contractor shall provide the required warranty to support the system certification.

All interior communication wiring systems shall have the cabling labeled with a unique alphanumeric number at beginning and end termination points of the cable. The alphanumeric number shall also be placed by the jack on the device plate.

A record of all communication wiring installed by this contract shall be provided in a Windows based cable management software along with a hard copy of the printout. A licensed copy of the cable management software shall be provided. Labeling shall be done per TIA-606.

1.7.3 Security Classifications and Requirements

All backbone, riser, and horizontal cable is subject to red/black separation and physical and technical security requirements as applicable per UFC 4-010-05, ICS 705-1, and the IC Tech Spec-for ICD/ICS 705 unless otherwise noted.

Cabling, patch panels, connector blocks, work area outlets, and cable connectors must be color coded to distinguish their classification level. If color coding is not possible, cabling must be clearly marked to indicate their classification level.

All classified cabling/jacks shall terminate in secured Telecommunications room.

1.7.4 Cable TV (CATV)

Wiring for CATV shall be provided for the Heritage Room. It shall only include rough-ins with outlets, plates, and cabling back to the communication room.

Space shall be made available within the telecommunications rooms for the future installation of equipment by satellite providers.

1.7.5 Cable Types

This facility shall be pre-wired for voice, and data communication systems.

Horizontal cabling shall be Category-6 unshielded twisted pair (UTP)

copper cable for unclassified voice and NIPR data and OM4 or better Multimode fiber optic cable for classified voice and SIPR data. All interior telecommunications cables shall be Plenum rated.

Each workstation within Secured Work Area (SWA) spaces shall consist of 12 strands of OM4 MM Fiber terminated to dual LC connectors and 4 CAT6 UTP ethernet cables terminated to RJ45 connectors at a minimum. All workstations in unclassified spaces shall have 4 CAT 6 ethernet cables. All cables shall be new and meet or exceed the fire prevention requirements of NFPA 70, NFPA 75, and NFPA 780 as applicable to telecommunication wire and cable. All cables shall have a minimum of 25 feet of slack.

1.7.6 Emergency Systems

Copper cables for emergency or life-safety phone lines shall be 24 AWG, 4 pair, TIA-568.2 Category-6, unshielded, twisted pair (UTP), plenum-rated, solid copper station cable. All cables, including patch cords, shall be tested meeting TIA-1152, for Category 6 performance. Extrapolation from a lower frequency is not allowed. The installation acceptance test shall be a "channel test" and includes all patch connections and cables. Testing shall be accomplished with a Cat 6, Level III compliant tester. One cable shall be dedicated to one jack. Daisy chaining is not be permitted.

1.7.7 Audio-Visual System (A/V)

Full design and infrastructure provisions for the installation of low voltage and communication lines shall be provided as part of the base bid package. The A/V systems shall be complete and functional assemblages of equipment required to achieve the specified functionality, performance, and design intent. The A/V systems will utilize the latest equipment and capabilities that are determined to best meet the functional requirements. This includes but is not limited to:

- a. Audio equipment: Speakers (Speakers are required for Mass Briefing room and Heritage room. Briefing rooms A and B as well as Conference room do not require speakers), mixers, amplifiers, microphones, signal processing equipment, and source equipment.
- b. Video equipment: Displays, signal routing and processing equipment, and source equipment.
- c. Video projection screens and monitors.
- d. Remote control equipment including touch panels, control processors, software, and programming.
- e. Equipment racks and associated hardware such as rack screws, power distribution products, cooling products, and blank panels.
- f. Cables, snakes, connectors, plates, and wiring.
- g. Other similar parts that may be required for normal operation such as projector bulbs and lenses.
- h. Mounts, rigging, and required hardware such as all-thread, unistrut, chains, and cables.
- i. System commissioning.

j. Training.

k. Documentation.

A/V equipment would be permanently installed on ceilings, walls, within cabinets, and/or within portable lecterns in each room to minimize system setup time and enable ease of operation.

In spaces using identical A/V system equipment and/or controls, provide a common platform for ease of use for users moving between rooms. Integrated AV control systems with touch screen controllers shall be provided to simplify the control of complex equipment and/or functions, while providing the flexibility to support future changes in system operation.

All video distribution systems and presentation systems will be designed to support 4K/UHD resolution and the latest digital video standards and protocols. All signals inside secured spaces will be converted to fiber for routing between other secured spaces and systems. Several spaces will have operator's desks for controlling the AV presentations. Most of these desks will also have computers from different classifications. All the desks will be designed such that the proper separation can be achieved between these devices.

1.7.8 Components

All passive components of the communications distribution system, such as patch panels, interconnection cabling, patch cords, wire manager, termination backboards, communication racks/cabinets, outlet boxes and raceway systems, jacks, and connectors shall be included. Provide one horizontal wire manager for each patch panel installed and one vertical wire manager for each 2-post equipment rack installed.

Active electronic components associated with the enterprise network systems, such as computers, hubs, routers, telephone instruments, and other electronic LAN equipment will be provided and installed by the Government.

This project shall also install conduit and pull string to accommodate the CLIN options of the following systems:

- a. CCTV camera system as described in paragraph "CCTV" in section 01 86 26.
- b. Keyless Access Control System as described in paragraph "Keyless Access Control System(s) (ACS)" in section 01 86 26.
- c. Intrusion Detection System as described in paragraph "Intrusion Detection System(s) (IDS)" in section 01 86 26.

Wiring requirements for the above-listed items shall be coordinated through the COR.

1.7.9 Outlet Requirements

The standard telecommunications outlet for administrative spaces consists of 4 8-pin/8-position CAT 6 modular USOC RJ-45 jacks and 6 duplex LC

connectors and adapters mounted in a single faceplate co-located with two duplex 120-VAC, 60-Hz general-purpose electrical receptacles. Refer to section 01 86 26 Electrical Requirements for additional information.

All NIPRNET drop identifiers in room data sheets (NIPRNET data drops, NIPRNET voice drops) describe the function only. Data and voice require the same green CAT 6 cable and jacks, both connected to the same patch panels/network. All NIPR voice and data cables shall be routed to the communications room, all SIPR data cables shall be routed to the secure communications room.

1.7.10 Entrance Facility (EF)

The entrance facility (EF) will consist of the pathways, spaces, protection devices, and other equipment that will be used to connect building telecommunications infrastructure to outside plant cabling, access providers (AP), inter-building backbone and horizontal cabling and infrastructure. The EF shall meet the requirements of UFC 3-580-01, TIA 568.1, and TIA-569.

1.7.10.1 Building Protector Assemblies

Provide self-contained units supplied with a field cable stub factory connected to protector socket blocks to terminate and accept protector modules for outside cable. Building protector assembly shall have interconnecting hardware for connection to interior cabling at full capacity. Provide manufacturers instructions for building protector assembly installation.

1.7.10.2 Protector Modules

Provide, in accordance with [UL 497](#), electrode gas tube or solid-state-type rated for the application. Gas tube protection modules shall be heavy duty, A>10kA, B>400, C>65A where A is the maximum single impulse discharge current, B is the impulse life and C is the AC discharge current in accordance with [ANSI C62.61](#). The gas modules shall shunt high voltage to ground, fail short, and be equipped with an external spark gap and heat coils in accordance with [UL 497](#). Provide the number of surge protection modules equal to the number of pairs of exterior cable of the building protector assembly.

1.7.11 Telecommunications Room (TR)

All TRs will be sized according to the requirements for the service being provided and the size of the facility in accordance with UFC 3-580-01, TIA 568.1, and TIA-569, except that the minimum TR size for DoD buildings is 10 feet x 8 feet (3m x 2.4m). TRs shall be placed so that the maximum horizontal cable length to the farthest outlet shall not exceed 90 meters or 295 feet. If these limits need to be exceeded to provide service to any area of the building, additional TRs or telecommunications enclosures shall be required.

1.7.12 Patch Panels

Provide copper cabling patch panels in accordance with TIA-568-C.1, TIA-568.1 and TIA-568-C.2. Panels shall be third party verified and shall comply with EIA/TIA Category 6 requirements. Panel shall be constructed of 0.09 inches minimum

aluminum and shall be rack mounted and compatible with an ECIA EIA/ECA 310-E 19 inches equipment. Panel shall provide keyed or non-keyed (as indicated), 8-pin modular ports, wired to T568A. Patch panels shall terminate the building cabling on Type 110 IDCs and shall utilize a printed circuit board interface. The rear of each panel shall have incoming cable strain-relief and routing guides. Panels shall have each port factory numbered and be equipped with laminated plastic nameplates above each port.

Provide fiber optic patch panels for maintenance and cross-connecting of optical fiber cables. Panel shall be constructed of 16 gauge steel or 11 gauge aluminum minimum and shall be rack mounted and compatible with a ECIA EIA/ECA 310-E 19 inches equipment rack. Each panel shall provide multimode or single-mode adapters as duplex LC in accordance with TIA-604-10 with zirconia ceramic alignment sleeves. The rear of each panel shall have a cable management tray a minimum of 8 inches deep with removable cover, incoming cable strain-relief and routing guides. Panels shall have each adapter factory numbered and be equipped with laminated plastic nameplates above each adapter.

Enough patch panels shall be installed to accomodate all installed cabling plus 25 percent spare.

1.7.13 Terminations

Terminate CAT6 UTP cable at the workstations to CAT6 rated RJ45 type jacks in accordance with TIA-568.1, TIA-568.2, and the TIA-568A wiring configuration. Terminate fiber optic cables at workstation locations to Duplex LC type connectors in accordance with TIA-568.3.

1.7.14 Backboards

Provide void-free, interior grade A-C plywood 3/4 inch thick 4 by 8 feet. Backboards shall be fire-rated by manufacturing process. Fire stamp shall be clearly visible. Backboards shall be provided on a minimum of two adjacent walls in the telecommunication spaces.

1.7.15 Racks and Cabinets

The contractor shall provide all racks required for this project. Refer to the room data sheets for rack locations. Racks shall be floor-mounted modular type, 16 gauge steel or 11 gauge aluminum construction, minimum, treated to resist corrosion. Provide rack with vertical and horizontal cable management channels, top and bottom cable troughs, grounding lug. Racks shall be provided with surge protected power strip with 6 duplex 20 amp receptacles, input plug shall match receptacle type and configuration as indicated on plans. Racks shall be compatible with 19 inches panel mounting. Cabinets shall be freestanding modular type, 16 gauge steel or 11 gauge aluminum construction, minimum, treated to resist corrosion. Cabinet shall have removable and lockable side panels, front and rear doors, and have adjustable feet for leveling. Cabinet shall be vented in the roof and rear door. Cabinet shall be provided with surge protected power strip with 6 duplex 20 amp receptacles, input plug shall match receptacle type and configuration as indicated on plans. Cabinet shall have cable access in the roof and base and be compatible with 19 inch panel mounting.

1.7.16 Cable Tray

All distribution of cable throughout the buildings shall be via conduit and cable tray. All conduit and cable tray shall be installed above the drop ceiling or below the raised access flooring as required. The cable tray shall be a minimum of 12" (w) x 4" (d). Cable tray containing fiber optic cabling shall have a solid bottom. Cable tray within the communications rooms shall be ladder type. Cable tray that passes through mechanical spaces shall be totally enclosed type with removable covers.

Provide 12 inches of clearance above cable trays for future access. Contractor must coordinate with other disciplines to ensure clearances can be achieved.

All cables shall be in minimum 1" EMT Conduit between the cable tray and outlet locations.

1.7.17 Labeling

Terminations shall be labeled and color-coded in accordance with **UFC 3-580-01** and **TIA-606**.

1.8 TELECOMMUNICATIONS FACILITIES

1.8.1 Communications Hut

The installation of a new communications hut is required. The communications hut will be prefabricated and located in the area indicated on the drawings. The Contractor shall provide 5 full size 4-post racks/cabinets, horizontal and vertical cable management, ladder racking, and bonding/grounding system. All work shall be done in accordance with UFC-3-580-01, TIA-568, TIA-607, NFPA 70 and UFC 3-520-01.

In addition the the building will be environmentally controlled (redundant system) in accordance with TIA-569-C and ASHRAE TC 9.9, have a fire alarm and fire suppression system, and lighting and power in accordance with UFC 3-530-01 and UFC 3-580-01.

1.8.2 Antenna Farm

An "antenna farm" consisting of a tower platform as specified in Section **01 82 00** ARCHITECTURAL REQUIREMENTS, pathway, cabling, and weather proof boxes is required. Cabling will include LMR-400 Coaxial cabling and CAT6 Twisted pair copper cabling. Pathway shall be conduit as specified in Section **01 86 26** ELECTRICAL REQUIREMENTS. The pathway will be routed between the "antenna farm" and the JUA server room. Cabling is to be terminated in JUA Server room on Rack 1 and on the antenna platform w/ bulkhead connectors in a lockable weatherproof box. Refer to Appendix H Facility ICD Annex A for further requirements.

1.9 Outside Plant (OSP)

Outside Plant (OSP) includes all cable pathways, splicing, trenching, plowing, pole mounting hardware, duct banks, cable vaults, hand holes, pull boxes, main distribution frames, and pedestals. All OSP work shall conform to TIA-758.

This project will include the following OSP:

a. Two 4-inch conduits with 3 cell mesh innerduct installed and routed from the newly installed "communications hut" to hand hole HH 62.

b. 3-Cell mesh innerduct with 12 strand SM fiber installed and routed to the 319 CS node located in Building 607 from the "communications hut", utilizing existing and new pathway.

c. 3 cell mesh innerduct with 96 strand SM fiber installed through existing and new pathway and routed from the "communications hut" to the service entrance for B631.

d. Conduit pathway, Coaxial and Twisted Pair CAT6 cabling routed from the antenna platform to the JUA Server room in B631.

Service entrances for communications shall utilize 4-inch conduit with 3 cell mesh innerduct.

1.9.1 Exterior Construction Standards

Facilities are required to bring communication lines back to the nearest communication manhole/handhole.

- a. Duct bank shall consist of a 2 x 4" duct minimum, 4 inch, schedule 40 PVC, unless otherwise authorized by 319 CS. [Am-0005] The minimum bury depth for duct bank and cabling is 36" below grade.[*Am-0005]If duct bank is less than 36" below the surface, it shall be concrete encased. Duct bank underneath roads or parking areas shall be schedule 80 PVC.
- b. One 4" conduit shall contain innerduct. Innerduct authorized for use is either multi-celled mesh innerduct per 4" duct. Fiber is mandated to be installed in innerduct. All ducts to have pre-lubricated, measuring, pulling tape with a minimum breaking strength of 1,200 lbs (i.e. Mule Tape) secured at each end. When performing duct placement, new ducts shall be swept down and installed in the lowest available duct position within the lowest available duct window in the MH/HH.
- c. Install one tracer wire per duct bank. Place the tracer wire centered on the top duct formation. Tracer wire shall be terminated at MH/HH in the test well or in lip of ring. In this configuration the base locators will not have to enter the MH/HH. After installation, test the tracer wire to verify continuity of the tracer wire system and provide a continuity report.
- d. All underground cables shall include a maintenance loop and shall be labeled where it enters and exits the maintenance hole. Labeling shall be done in accordance with TIA-606.
- e. Provide tags for each telecommunications cable or wire located in manholes, handholes, and vaults. Handwritten labeling is unacceptable.
- f. Conduit from stub-ups inside of building to five feet from building exterior shall be steel.

Conduit systems will not exceed 500' between pull points and will not exceed a total of 180 degrees in bends between pull points. Pull points

are manholes unless handholds are specifically authorized.

1.9.2 Cable Pulling

Test duct lines with a mandrel and swab out to remove foreign material before the pulling of cables. Avoid damage to cables in setting up pulling apparatus, or in placing tools or hardware. Do not step on cables when entering or leaving the manhole. Do not place cables in ducts other than those shown, without prior written approval of the Contracting Officer. Roll cable reels in the direction indicated by the arrows painted on the reel flanges. Set up cable reels on the same side of the manhole as the conduit section in which the cable is to be placed. Level the reel and bring into proper alignment with the conduit section so that the cable pays off from the top of the reel in a long, smooth bend into the duct without twisting. Under no circumstances shall the cable be paid off from the bottom of a reel. Check the equipment set up prior to beginning the cable pulling to avoid an interruption once pulling has started. Use a cable feeder guide of suitable dimensions between cable reel and face of duct to protect cable and guide cable into the duct as it is paid off the reel. As cable is paid off the reel, lubricate and inspect cable for sheath defects. When defects are noticed, stop pulling operations and notify the Contracting Officer to determine required corrective action. Cable pulling shall also be stopped when reel binds or does not pay off freely. Rectify cause of binding before resuming pulling operations. Provide cable lubricants recommended by the cable manufacturer. Avoid bends in cables of small radii and twists that might cause damage. Do not bend cable and wire in a radius less than 10 times the outside diameter of the cable or wire.

1.9.2.1 Pulling Eyes

Equip cables 1.25 inches in diameter and larger with cable manufacturer's factory installed pulling-in eyes. Provide cables with diameter smaller than 1.25 inches with heat shrinkable type end caps or seals on cable ends when using cable pulling grips. Rings to prevent grip from slipping shall not be beaten into the cable sheath. Use a swivel of 3/4 inch links between pulling-in eyes or grips and pulling strand.

1.9.3 Maintenance Holes (MH) and Hand Holes (HH)

The size of a maintenance hole shall be specified to include the ultimate duct structure capacity and the need for equipment located in the maintenance hole.. The lid must be cast to say "COMMUNICATIONS," and all materials installed in the manhole will be resistant to corrosion or rust. A handhole shall not exceed 1.2 m (4 ft) in length by 1.2 m (4 ft) in width by 1.2 m (4 ft) depth and should not be used in runs of more than three trade size 103 (trade size 4) conduits. A handhole shall not be used in place of a maintenance hole.

- a. MH/HH placement and specifications shall be in accordance with base guidelines. Additional requirements for every newly installed standard MH/HH shall include an approved galvanized ladder, support bar and C-Steps.
- b. All newly constructed MH/HH and duct banks shall have a 12 AWG insulated solid copper tracer wire installed with them and terminated either on a test lug inside the MH/HH lip or at the test well located directly adjacent to MH/HH.

- c. MH/HH shall be stenciled in accordance with local guidelines.
- d. All maintenance holes and hand holes shall have a ground rod and bonding ribbon in accordance with base guidelines.
- e. Horizontal Unistrut channels are the preferred method of anchoring the vertical cable racks in the MH.

1.9.4 Fiber Optic Cable Specifications

Provide single-mode fiber optic cable. Provide optical fibers as indicated. Fiber optic cable shall be specifically designed for outside use with loose buffer construction. Provide fiber optic color code in accordance with [TIA/EIA-598](#)

Provide strength members with sufficient tensile strength for installation and residual-rated loads to meet the applicable performance requirements in accordance with [ICEA S-87-640](#). The strength member is included to serve as a cable core foundation to reduce strain on the fibers, and shall not serve as a pulling strength member.

- a. The type of protective covering required for fiber optic cables installed in a variety of methods and differing environments situations are identified in Table below.

Table 1.4.4: Protective of Fiber Optic Cable		
	JACKET LAYERS	ARMOR
DIRECT BURIAL	Double	Double
DUCT BANK	Single	Single
CONCRETE ENCASED DUCT BANK	Single	Dielectric

- b. All new terminating connectors for fiber optic cable shall be LC connector.

1.10 Splices Cases and Splicing Standards

1.10.1 General

When existing copper splice cases are re-entered to place an additional cable, the entry end cap and all sealing tape on the cable going through that end cap shall be replaced followed by the closing of the case. Depending on the type of case and manufacturer's recommendations, a sustainment test shall be performed by pressurizing the splice case. Filled splice cases are not the preferred method of installation. Do not place re-enterable compound in a splice case. All end plates will be "Field Drilled" to ensure proper cable sizing and proper tape layering.

1.10.2 In Vault or Manhole

Provide underground closure suitable to house splice organizer in a protective housing, into which can be poured an encapsulating compound. Closure shall be of thermoplastic, thermoset, or stainless steel material

supplying the structural strength necessary to pass the mechanical and electrical requirements in a vault or manhole environment. Encapsulating compound shall be reenterable and shall not alter the chemical stability of the closure.

1.10.3 Shield Connectors

Provide connectors with a stable, low-impedance electrical connection between the cable shield and the bonding conductor in accordance with [RUS Bull 345-65](#).

1.10.4 Grounding and Bonding Conductors

Provide grounding and bonding conductors in accordance with [RUS 1755.200](#), [TIA-607](#), [IEEE C2](#), and [NFPA 70](#). Solid, bare, copper wire meeting the requirements of [ASTM B1](#) for sizes No. 8 AWG and smaller, and stranded, bare, copper wire meeting the requirements of [ASTM B8](#), for sizes No. 6 AWG and larger. Insulated conductors shall have 600-volt, Type TW insulation meeting the requirements of [UL 83](#).

1.11 Conduit

Provide conduit as specified in Section [01 86 26](#) ELECTRICAL REQUIREMENTS.

PART 2 TESTS, INSPECTIONS, AND VERIFICATIONS

2.1 Testing

Test 100 percent OTDR test of FO media at the factory in accordance with [TIA-568.3](#). Use [TIA-526-14](#) Method B for multi mode fiber measurements. Calibrate OTDR to show anomalies of 0.2 dB minimum. Submit test reports, including manufacture date for each cable reel, and receive approval before delivery of cable to the project site.

2.1.1 Quality Control and Acceptance Testing

Perform acceptance testing in accordance with [RUS Bull 1753F-201](#), and as further specified in this section. Provide personnel, equipment, instrumentation, and supplies necessary to perform required testing. Notification of any planned testing shall be given to the Contracting Officer at least 14 days prior to any test unless specified otherwise. Testing shall not proceed until after the Contractor has received written Contracting Officer's approval of the test plans as specified. Test plans shall define the tests required to ensure that the system meets technical, operational, and performance specifications. The test plans shall define milestones for the tests, equipment, personnel, facilities, and supplies required. The test plans shall identify the capabilities and functions to be tested. Provide test reports in booklet form showing all field tests performed, upon completion and testing of the installed system. Measurements shall be tabulated on a pair by pair or strand by strand basis.

- a. Contractor shall submit a detailed test plan for all the cable plant installation for government review and concurrence. Include information on the test equipment and its calibration documentation
- b. All testing shall be conducted using TIA/EIA standards and with all equipment within current manufacturer's recommended time frame for

calibration. A copy of the calibration certification shall be carried with all equipment and be presented upon request by 319CS designated representative (PM or QA). If equipment is not within current manufacturer's recommended time frame, test results shall be rejected by the 319CS and no telecommunication services will be activated in the tested facility until corrected and retested.

c. OSP Cable Testing

OSP Fiber Optic Cable

All OSP fiber strands shall be tested with OTDR and power meter/light source. OTDR shall be dual frequency, launch and receive, cable. Power meter/light source shall be dual frequency/bi-directional.

- d. OTDR Test: The OTDR test shall be used to determine the adequacy of the cable installations by showing any irregularities, such as discontinuities, micro-bendings or improper splices for the cable span under test. Hard copy fiber signature records shall be obtained from the OTDR for each fiber in each span and shall be included in the test results. The OTDR test shall be measured in both directions. A reference length of fiber, 66 feet minimum, used as the delay line shall be placed before the new end connector and after the far end patch panel connectors for inspection of connector signature. Conduct OTDR test and provide calculation or interpretation of results for single-mode fiber. Splice losses shall not exceed 1.0 db.
- e. Attenuation Test: End-to-end attenuation measurements shall be made on all fibers, in both directions, using a 1550 nanometer light source at one end, and the optical power meter on the other end, to verify that the cable system attenuation requirements are met in accordance with TIA-526-14 for single-mode fiber optic cables. The measurement method shall be in accordance with TIA-455-78-B. Attenuation losses shall not exceed 0.5 db/km at 1310 nm and 0.4 db/km at 1550 nm for single-mode fiber.
- f. Bandwidth Test: The end-to-end bandwidth of all single-mode fiber span links shall be measured by the frequency domain method. The bandwidth shall be measured in both directions on all fibers. The bandwidth measurements shall be in accordance with TIA/EIA-455-204.
- g. Test Result Formatting
 - 1. All test results can be submitted in softcopy format in original form and PDF.
 - 2. All failed readings found require a description of corrective actions taken.
 - 3. Test plans, test results, test equipment calibration certification and test documentation shall be included in the record drawing set. A copy of the test document shall be received in the NEC at a minimum of 10 days prior to pre-final inspection of facility or building complex (2 or more buildings sharing infrastructure resources).

2.1.2 Verification Tests

UTP backbone copper cabling shall be tested for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors, and between conductors and shield, if cable has overall shield. Test operation of shorting bars in connection blocks. Test cables after termination, but prior to being cross-connected.

2.1.3 Performance Tests

Perform testing for each outlet as follows:

- a. Perform Category 6 link tests in accordance with TIA-568.1 and TIA-568.2. Tests shall include wire map, length, insertion loss, NEXT, PSNEXT, ELFEXT, PSELFEXT, return loss, propagation delay, and delay skew.
- b. Optical Fiber Links. Perform optical fiber end-to-end link tests in accordance with TIA-568.3.

2.1.4 Final Verification Tests

Perform verification tests for UTP and optical fiber systems after the complete telecommunications cabling and workstation outlet/connectors are installed.

2.2 Cable Inspection

Promptly repair indicated utility lines or systems damaged during site preparation and construction. Damages to lines or systems not indicated, which are caused by Contractor operations, shall be treated as "Changes" under the terms of the Contract Clauses. When Contractor is advised in writing of the location of a nonindicated line or system, such notice shall provide that portion of the line or system with "indicated" status in determining liability for damages. In every event, immediately notify the Contracting Officer of damage.

Handle cable and wire provided in the construction of this project with care. Inspect cable reels for cuts, nicks or other damage. Damaged cable shall be replaced or repaired to the satisfaction of the Contracting Officer. Reel wraps shall remain intact on the reel until the cable is ready for placement.

-- End of Section --