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FACILITIES CRITERIA (FC)

# NAVY AND MARINE CORPS INDUSTRIAL CONTROL SYSTEMS MONITORING STATIONS

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## NAVY AND MARINE CORPS INDUSTRIAL CONTROL SYSTEMS MONITORING STATIONS



U.S. ARMY CORPS OF ENGINEERS

NAVAL FACILITIES ENGINEERING COMMAND (Preparing Activity)

AIR FORCE CIVIL ENGINEER CENTER

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# FOREWORD

Facilities Criteria (FC) provide functional requirements (i.e., defined by users and operational needs of a particular facility type) for specific DoD Component(s), and are intended for use with unified technical requirements published in DoD Unified Facilities Criteria (UFC). FC are applicable only to the DoD Component(s) indicated in the title, and do not represent unified DoD requirements. Differences in functional requirements between DoD Components may exist due to differences in policies and operational needs.

All construction outside of the United States is also governed by Status of Forces Agreements (SOFA), Host Nation Funded Construction Agreements (HNFA), and in some instances, Bilateral Infrastructure Agreements (BIA.) Therefore, the acquisition team must ensure compliance with the most stringent of the UFC (replace w/ FC), the SOFA, the HNFA, and the BIA, as applicable.

Because FC are coordinated with unified DoD technical requirements, they form an element of the DoD UFC system applicable to specific facility types. The UFC system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applicable to the Military Departments, Defense Agencies, and the DoD Field Activities. The UFC System also includes technical requirements and functional requirements for specific facility types, both published as UFC documents and FC documents.

FC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and the Air Force Civil Engineer Center (AFCEC) are responsible for administration of the UFC system. Defense agencies should contact the preparing service for document interpretation and improvements. Technical content is the responsibility of the cognizant DoD working group. Recommended changes with supporting rationale should be sent to the respective service proponent office by the following electronic form: Criteria Change Request. The form is also accessible from the Internet site listed below.

FC are effective upon issuance and are distributed only in electronic media from the following source:

- Whole Building Design Guide web site http://dod.wbdg.org/.

Refer to UFC 1-200-01, *General Building Requirements*, for implementation of new issuances on projects.

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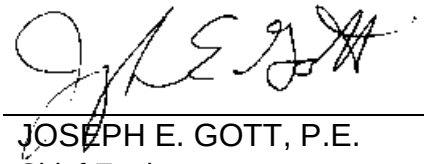

JOSEPH E. GOTT, P.E.
Chief Engineer
Naval Facilities Engineering Command

# FACILITIES CRITERIA (FC)
# NEW SUMMARY SHEET

**Document:** FC 4-141-05N, *Navy and Marine Corps Industrial Control Systems Monitoring Stations*

**Superseding:** None

**Description:** This FC provides design and construction standards for Navy and Marine Corps Industrial Control Systems (ICS) Monitoring Stations, facilities that provide a central location intended to monitor and regulate building control systems, utilities, and equipment with high energy-consumption.

**Reasons for Document:** With the complexities of Navy and Marine Corps buildings and utility systems that need to be monitored, this FC establishes some uniformity for standards—and illustrates some best practices—to improve this facility type for the Navy and Marine Corps.

**Impact:** This FC should reduce initial design and construction costs, and provide ICS Monitoring Stations that effectively monitor and reduce energy costs.

**Unification Issues:** None.

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# CHAPTER 1 INTRODUCTION

## 1-1 BACKGROUND.

The Navy and Marine Corps Smart Grid Program aggregates building energy information, utility information, and operational technologies (i.e. Industrial Controls System (ICS)) in order to reduce facility maintenance costs, reduce energy consumption, and support mission assurance. Centralization of ICS requires the establishment of Regional- and Installation-level Industrial Control Systems Monitoring Stations where various building and utility systems can be monitored and controlled.

## 1-2 DEFINITION OF AN INDUSTRIAL CONTROL SYSTEM (ICS) MONITORING STATION.

The ICS Monitoring Station is the utility support facility that houses the operational components of the ICS as well as the personnel that operate the system. The ICS Monitoring Station is a component of the ICS and makes the ICS complete and usable. An ICS Monitoring Station should not be confused with a National Operations Center (NOC), Regional Operations Center (ROC) or Emergency Operations Center (EOC).

### 1-2.1 Types of ICS Monitoring Stations.

Although a variety of ICS Monitoring Station types are possible, they all encompass processes that enable the intelligent monitoring, forecasting, response to and control of Navy and Marine Corps building and utility systems. ICS Monitoring Stations are organized around a central master control space, ranging from a large room with multiple workstations to a single computer workstation. For this FC, it is assumed that a ICS Monitoring Station will be one of two basic types:

- Consolidated: Integrates all required systems and components into one facility.
- Distributed: Locates required spaces and components throughout two or more facilities or locations.

Many variations are possible with these two basic types. (Currently, the Marine Corps has no plans for distributed ICS Monitoring Stations).

## 1-3 PURPOSE AND SCOPE.

This FC provides requirements for designing Navy and Marine Corps Industrial Control Systems (ICS) Monitoring Stations based on the Navy and Marine Corps Smart Grid Capability Development Document.

## 1-4 APPLICABILITY.

This document provides planning and design criteria for DoD components and participating organizations. This document applies to construction, renovation, and

repair projects for Navy and Marine Corps ICS Monitoring Stations. This FC does not apply to contingency, or field operating facilities.

## 1-5 GENERAL BUILDING REQUIREMENTS.

Comply with UFC 1-200-01, *General Building Requirements*. UFC 1-200-01 provides applicability of model building codes and government-unique criteria for typical design disciplines and building systems, as well as for accessibility, antiterrorism, security, high performance and sustainability requirements, and safety. Use this FC in addition to UFC 1-200-01 and the UFCs and other Government criteria referenced therein.

## 1-6 REFERENCES.

Appendix A contains a list of references used in this document. The publication date of the code or standard is not included in this document. In general, use the latest issuance of the reference.

## 1-7 BEST PRACTICES.

Appendix B contains best practices and possible room layouts and configurations to consider for accomplishing the mission of ICS Monitoring Stations.

## 1-8 GLOSSARY.

Appendix C contains acronyms, abbreviations, and terms.

# CHAPTER 2 PLANNING AND LAYOUT

## 2-1 GENERAL PLANNING REQUIREMENTS.

This chapter is intended to make planners aware of ICS Monitoring Station requirements that may affect the facility scope and budget. It is not intended to document the standard planning processes related to project development. For ICS Monitoring Station Space Planning Factors and Basic Facility Requirement (BFR) development, use: UFC 2-000-05N, 800 Series, and Category Code Number (CCN) 89051.

### 2-1.1 ICS Monitoring Station Planning Considerations

Considerations specific to ICS Monitoring Stations during the planning process may include:

- Proximity of Command Information Office (CIO) support.
- Quantity of operators (based on facility count or physical control point count)
- Base/installation mission as it relates to physical security requirements
- ICS Monitoring Station workstation configuration/layout should be consistent (as it relates to the distributed ICS Monitoring Station model).
- Space access requirements depending upon staffing type (i.e., in-house civilian staff vs. base operations support contractors)
- Need for remote monitoring capability (e.g. in a supervisor's office or break room).
- Miscellaneous storage needs (e.g., technical manuals, ICS Monitoring Station Operator personal items, etc.)
- Need for coordination with the Emergency Operations Center (e.g., high level status screenshots/summary from the ICS Monitoring Station).

## 2-2 VULNERABILITY AND RISK ASSESSMENT.

A vulnerability and risk assessment must be conducted prior to beginning any security project. Upon identifying facility or asset vulnerabilities to threats, countermeasures may be deployed to reduce vulnerabilities. Defining the assets to be protected, vulnerabilities, and countermeasures involves an interdisciplinary team. The team should consider all interests relating to a project to determine how security fits into the total project design. The specific membership of the team will be based on local considerations, but in general, the following functions should be represented; facility user, antiterrorism officer, operations, security, logistics, architecture, engineering, life safety, and others as required. This team identifies the design criteria, which includes the assets to be protected, policy based requirements, threats to the identified assets (the Design Basis Threat), and the level of protection to be provided to protect the assets.

For information on Security Engineering Planning process, refer to UFC 4-020-01. The engineering risk analysis conducted as part of UFC 4-020-01 should be consistent with the terrorism risk analysis conducted by the installation security/AT staff.

## 2-3 SPACE TYPES.

Each component of the ICS Monitoring Station should be planned and sized based on the operational requirement of the facility, the type and number of monitored facility and utility system assets (which impacts the number of operators), and the utilization of the facility.

### 2-3.1 Master Control Room.

The Master Control Room (MCR) is the central monitoring and control location within the ICS Monitoring Station. MCR sizing is based primarily on number of operators and associated work stations. Refer to Appendix B for possible room layouts.

Provide a minimum for two operator stations, with a number of personnel, control center console(s), task chairs, map rack(s), safe(s) and bookcase(s), as required. Consider consoles with return space for laying out drawings as well as sight lines.

### 2-3.2 Telecommunication Equipment Room.

The Telecommunication Equipment Room is the central location for communications equipment within or for the ICS Monitoring Station. Telecommunication Equipment Room sizing is based on the number of communications racks and supporting equipment required.

Typical furnishings or equipment may include: rack-mounted uninterrupted power supply (UPS) / power distribution unit (PDU), platform enclave primary rack, ELMRS transceivers and network gear, and computer room air conditioning (CRAC) unit and server racks. ICS server rack(s) and Service Provider (telecommunications provider) racks may be collocated in this room with proper security controls (but are typically located in a separate closet or room).

### 2-3.3 Additional Example Spaces.

The following are provided as examples of additional possible spaces.

#### 2-3.3.1 Special Purpose Spaces.

- ICS Integration and Application Space
- Information Technology (IT) Storage Space
- Technical Equipment Area
- Break Room
- Berthing Room for Emergency Events

- Kitchen
- Locker Room
- Shower Space

**2-3.3.2 Office and Assembly Spaces.**

- Private Office Space
- Open Office Space
- Conference Room
- Reception Area

**2-3.3.3 Net to Gross Spaces.**

- Electrical Room
- Mechanical Room
- Rest Room(s)

## 2-4 NEW VERSUS EXISTING LOCATIONS.

ICS Monitoring Stations may be located in an existing facility or in a new, standalone, facility. The use of existing facilities is preferred since projects are extremely budget-driven due to multiple funding sources (e.g., Military Construction (MILCON), Energy Conservation Investment Program (ECIP), and Operations and Maintenance (O&M)).

### 2-4.1 New Building Construction.

If there is no existing space available, or none that meets the risk factors identified for the ICS Monitoring Station, a new structure may be considered. The ICS Monitoring Station can be incorporated into a multipurpose facility, or created as a standalone facility. Consider incorporating ICS Monitoring Station requirements when planning for new facility construction for other purposes.

### 2-4.2 Repurposing.

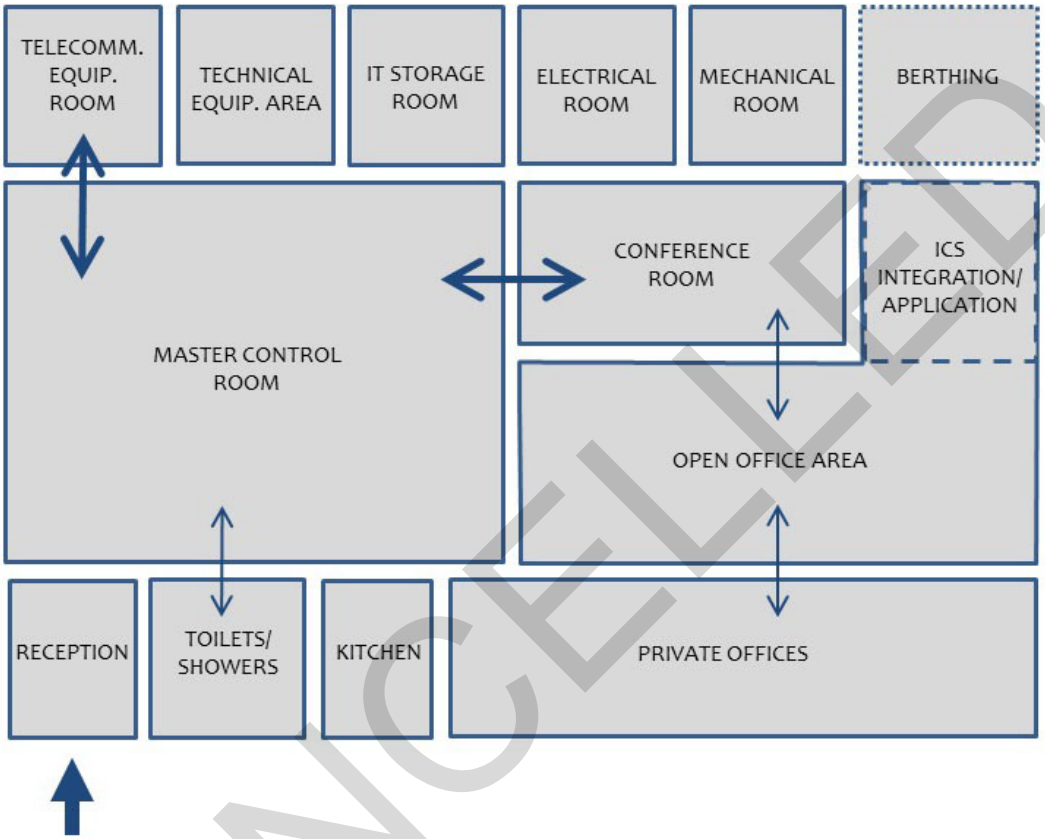
If there is available space in existing facilities, whether consolidated or distributed, it may be more economical to repurpose and convert these facilities versus constructing a new facility.

## 2-5 LAYOUT AND ADJACENCIES.

The adjacency diagram in Figure 2-1 indicates an example of relative adjacencies of the functional spaces for a Consolidated ICS Monitoring Station. Some areas indicated may not be included in an ICS Monitoring Station. Adjacencies may be accommodated through a hallway rather than a direct entrance/exit from one space to another. Sizes shown are not to scale and convey a possible means to accommodate the needed adjacencies. They do not represent mandatory layouts.

By definition a Distributed ICS Monitoring Stations may consist of any combination of the functional spaces, to be “distributed” throughout a building or multiple buildings.

**Figure 2-1 Example Functional Adjacency Diagram (Consolidated ICS Monitoring Station)**



# CHAPTER 3 GENERAL DESIGN CRITERIA

## 3-1 GENERAL.

References within this FC to applicable criteria and codes are intended to assist the designer in identifying the required statutes. These references are not intended to identify all those that may apply. It is the responsibility of the designer of record to identify and comply with all required statutes.

## 3-2 CIVIL.

Comply with UFC 1-200-01 and with the stated core UFCs.

### 3-2.1 Site Design.

Comply with UFC 3-201-01 and the stated and cross referenced requirements.

## 3-3 ARCHITECTURAL.

Refer to UFC 1-200-01, and comply with stated and cross referenced requirements for Architecture, with the following additions and exceptions for this facility type.

### 3-3.1 Exterior Design.

For situations where a new ICS Monitoring Station building is required, design the exterior to comply with UFC 3-101-01.

#### 3-3.1.1 Landscaping.

Comply with UFC 3-201-02. Accentuate main entrances to the facility with plant materials and durable paving. Design must be low-maintenance oriented.

#### 3-3.1.2 Exterior Finishes.

Provide durable and low-maintenance exterior finishes. Coordinate the exterior finishes with the Service-specific design standards noted below under Interior Finishes.

#### 3-3.1.3 Doors and Windows.

The ICS Monitoring Stations should have a minimum number of door, window, and vent openings. Size doors to accommodate equipment and personnel needs. Provide convenient access from receiving area to spaces with storage and large equipment. Minimize exterior openings into Master Control Room.

#### 3-3.1.4 Acoustics.

General noise and vibration control requirements are identified in UFC 3-101-01, and UFC 3-450-01.

### 3-3.2 Interior Design.

#### 3-3.2.1 Interior Finishes.

Construction and finishes (walls, floor, and ceiling) must support the cohesive image and theme of the facility. Comply with UFC 1-200-01 and UFC 3-600-01 for fire resistance of finish materials.

Durability is important when specifying materials for interior construction and finishes. Select finishes that meet the requirements listed in NFPA 101. In moist climates, do not cover the inside of exterior walls with impervious materials such as mirrors or vinyl wall coverings. This is due to a concern over mold development in the wall. For more information on finishes in specific areas, see Functional Data Sheets in Chapter 4.

#### 3-3.2.2 Interior Signage.

Develop a comprehensive signage package that addresses both way-finding and definition of all spaces within the facility. Signage will reflect and complement the environment through colors, images and materials used. Refer to UFC 3-120-01 when developing interior signage packages.

#### 3-3.2.3 Counters, Casework, and Cabinets.

Counters, casework, and cabinets must be of high-quality and durable construction. Specify Architectural Woodwork Institute (AWI) Premium or Custom for finishes per *AWI Quality Standards Illustrated, Current Edition.* Casework, cabinet doors, and drawer faces should be provided as veneer panel core. Doors, drawers, and casework faces should be plastic laminate at a minimum. Countertops must be solid surface/solid composite plastics only. Specify 3/4-inch (19mm) minimum thickness for plywood, plywood backing, and solid wood panels.

#### 3-3.2.4 Window Treatments.

Provide all windows and other glazed openings to the exterior of the building with horizontal blinds or solar shading systems. Horizontal blinds and solar shading systems are considered part of the construction project.

#### 3-3.2.5 Acoustics.

General noise and vibration control requirements are identified in UFC 3-101-01 and UFC 3-450-01. The Sound Transmission Coefficient (STC) ratings for spaces unique to ICS Monitoring Stations are identified in Chapter 4, Functional Data Sheets.

#### 3-3.2.6 Furnishings, Fixtures and Equipment (FF&E).

Furniture and Equipment contribute directly to the ICS Monitoring Station's ability to function. Provide furniture items that are durable, reliable and ergonomic. Furnishings, Fixtures & Equipment (FF&E) items specific to ICS Monitoring Stations are listed for specific spaces in Chapter 4 Functional Data Sheets.

The Whole Building Design Guide provides instruction on creating ergonomically designed furniture and spaces that offer comfortable and productive environments. See Appendix A for additional resources on ergonomics when designing the ICS Monitoring Station.

## 3-4 STRUCTURAL.

Refer to UFC 1-200-01 and comply with stated and cross referenced requirements for Structural Systems. Determine Risk Category in accordance with UFC 3-301-01. ICS Monitoring Stations are not normally considered essential facilities.

## 3-5 MECHANICAL.

### 3-5.1 Heating, Ventilating, and Air Conditioning (HVAC).

Refer to UFC 1-200-01 and comply with stated and cross-referenced requirements for HVAC Systems, including UFC 3-410-01, UFC 1-200-02, and ITG FY05-2. Design mechanical systems using the outdoor design criteria indicated in the UFC 3-410-01 paragraph entitled “Spaces Conditioned for Specialized Technical Requirements.”

### 3-5.2 Sound and Vibration Isolation.

Refer to UFC 3-410-01 and UFC 3-450-01 for sound and vibration isolation requirements specific to HVAC systems. Design the mechanical systems for all normally occupied spaces to satisfy a maximum Room Criteria rating of 35.

## 3-6 PLUMBING.

### 3-6.1 Plumbing Design.

Refer to UFC 1-200-01 and comply with stated and cross-referenced requirements for plumbing systems, including UFC 3-420-01 and UFC 1-200-02.

## 3-7 FIRE PROTECTION.

### 3-7.1 Fire Protection Systems.

Refer to UFC 1-200-01, and comply with stated and cross referenced requirements for Fire Protection Systems.

### 3-7.2 Automatic Sprinkler Protection.

ICS Monitoring Station spaces must be located in buildings that are protected throughout by wet-pipe sprinkler systems.

### 3-7.3 Clean Agent Fire Extinguishing System.

Provide a supplementary clean agent fire extinguishing system for the Telecommunication Equipment Room.

### 3-7.4 Smoke Detection.

Provide early warning smoke detection system in the Telecommunication Equipment Room for activation of the clean agent systems. Provide early warning smoke detection system in the Master Control Room.

## 3-8 ELECTRICAL.

Provide site electrical utilities, interior distribution systems, communications in accordance with UFC 3-501-01 and UFC 3-550-01. Site Electrical Utilities include equipment, overhead power distribution, underground electrical systems, grounding, metering, and exterior site lighting. Interior distribution systems include distribution and service entrance equipment, surge protective devices (SPDs), wiring devices, raceways, conductors, interior lighting systems, lighting protection systems, and hazardous locations. Communications includes telecommunications systems, Cable Television System (CATV), and Closed Circuit Television (CCTV).

### 3-8.1 Lighting.

Provide lighting system designs in accordance with the above which includes UFC 3-530-01 and the requirements of the Illuminating Engineering Society of North America's (IESNA) *Lighting Handbook Reference and Application*, 10th Edition (hereafter called the *Lighting Handbook*).

#### 3-8.1.1 Exterior Lighting.

Ensure that parking areas and the facility complies with UFC-3-530-01, for safety, evacuation, and security measures. If the facility is near a flightline, site lighting should not interfere with or be a distraction to aircraft movement at night.

#### 3-8.1.2 Security Lighting.

Provide illumination for a Medium Level of Protection (MLOP).

#### 3-8.1.3 Interior Lighting.

Provide lighting systems designed in accordance with UFC 3-530-01, and Illuminating Engineering Society of North America's (IESNA) Lighting Handbook Reference and Application (hereafter called the Lighting Handbook). Interior lighting requirements will vary throughout the ICS Monitoring Station based on the type of operations. Lighting in critical areas (Master Control Room and the Telecommunications Equipment Room) should be served by the emergency generator back-up power system to allow continuous operation of the ICS Monitoring Station in the event of a power outage. Provide lighting fixtures with battery backup at console positions as well as areas required by NFPA 101.

### 3-8.2 Power.

Provide additional power receptacles per specific ICS Monitoring Station equipment requirements.

### 3-8.3 Emergency Power.

Provide emergency generator per UFC 3-540-01.

Due to the required use in emergency response situations, provide 100% emergency generator back-up power to the Master Control Room and the Telecommunications Equipment Room of the ICS Monitoring Station. Provide an isolation switch to bypass the emergency generator during generator maintenance.

### 3-8.4 Uninterrupted Power Supply (UPS).

Critical equipment and systems that cannot risk loss of data or performance should be placed on UPS to ensure continued performance during a power outage or allow time for an orderly shutdown.

Provide non-redundant standalone type UPS with maintenance bypass switch sized to accommodate critical electrical demand of ICS Monitoring Station. Use the anticipated load to determine the size of the UPS. Smaller ICS Monitoring Stations can utilize desk-top/rack type UPS equipment. Provide a UPS in installations for all critical technical loads and the specific requirements of the Activity.

### 3-8.5 Cable Television System (CATV).

Provide the infrastructure for a CATV system for access cable television programs. This normally consists of the conduit, wire and outlets from the outside point of connection to the local provider, via the telecommunications room, to the individual locations required by ICS Monitoring Station. See Chapter 4, Functional Data Sheets for recommended outlet locations specific to ICS Monitoring Stations.

### 3-8.6 CCTV.

Provide the ICS Monitoring Station support infrastructure (e.g., conduit/junction box system, workstation space for racks, space for monitoring, etc. for an installed CCTV system) to meet operational requirements. The Program Manager will determine if design and construction funds will be provided for a complete and usable CCTV system.

### 3-8.7 Telecommunications.

Provide the telecommunications (data and telephone) system infrastructure.

Coordinate the quantities and locations of outlets with the end user to support the specific equipment requirements in the individual areas.

### 3-8.8 Lightning Protection.

Ensure facility has lightning protection system when required per UFC 3-501-01.

## 3-9 PHYSICAL SECURITY.

Physical security is that part of security concerned with physical measures designed to safeguard personnel; to prevent or delay unauthorized access to equipment, installations, material, and documents; and to safeguard them against espionage, sabotage, damage and theft.

### 3-9.1 Physical Security Requirements.

For individual projects, consideration must be given to whether the building will have public- or staff-only spaces. Typically, the building will have some level of public access, but the control and operations areas may be an enclave within the building requiring access control.

Doors accessing master control room, telecommunication equipment rooms, and similar spaces must have secure locks. Keep the number of entrance/egress points to the minimum required by the Life Safety Code.

### 3-9.2 Access Controlled Areas

If determined by the Risk Analysis, the control and operations areas of the ICS Monitoring Station may be designed as an Access Controlled Area. When required, provide an Access Control System (ACS) for the control and operations areas to ensure only authorized personnel are permitted ingress and egress. The ACS should log and archive all transactions and alert authorities of unauthorized entry attempts. Equipment containing access control software programs must be located in the master control room. Unless otherwise directed, the Common Access Card (CAC) is the default ACS identifier credential. Design the ACS in accordance with UFC 4-021-02.

### 3-9.3 Intrusion Detection System

If it is determined that an Intrusion Detection System (IDS) is required, monitor the control and operations areas when not continuously occupied. In addition, emergency exit door(s) may need to be continuously alarmed and equipped with local annunciation. Design the IDS in accordance with UFC 4-021-02.

# CHAPTER 4 SPECIFIC DESIGN CRITERIA

## 4-1 INTRODUCTION.

This chapter identifies the ICS Monitoring Station specific design needs for functional areas as outlined in the space program. Tables 4-1 through 4-14 provide this data in a standard Functional Data Sheet format.

The interior construction specialties, equipment and furnishings criteria provided in these tables are broken down as follows:

- Casework/Built-in Equipment. This includes anything physically attached or plumbed to the building such as counters, cabinets, casework, toilet accessories, and recessed projection screens.
- Furnishings, Fixtures, and Equipment (FF&E). This includes contractor-furnished, contractor-installed loose items such as desks, tables, chairs, bookshelves, and televisions (if mounted, TV mount would be built-in).
- User-provided FF&E. This includes all government-furnished, government-installed items, which are typically limited to office equipment such as computers, printers, copiers, and projectors (if mounted, projector mount would be built-in).

## Table 4-1 Master Control Room

| | |
|---|---|
| **Description/ Usage** | Control center for controlling and maintaining building information systems |
| **Ceiling Ht.** | Minimum 9 ft. (2.7m), consider higher or sloped ceiling if required for monitor wall sightlines. |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as high performance latex paint.<br>**Floor.** Provide commercial grade carpet tile on raised access flooring with rubber base. Consider severe wear classification for carpet tile.<br>**Ceiling.** Provide suspended acoustical panel system. |
| **Plumbing** | None required, consider drinking fountain in or near room. |
| **HVAC** | Provide CRAC HVAC per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system and early warning smoke detection system. |
| **Power** | Provide per Chapter 3, Electrical and to support electrical equipment for specific ICS Monitoring Station.<br>**Emergency Power.** Provide generator back-up power for electronic equipment, security equipment, HVAC equipment, UPS and lighting. |
| **Lighting** | Provide per Chapter 3, Electrical. Provide dimmable indirect lighting system to minimize direct source glare. |
| **Communication** | **CCTV.** Provide CCTV infrastructure (conduit/junction box system, workstation space for racks and monitoring, etc.) or complete operational system including monitoring equipment as determined by Program Manager.<br>**CATV/Internal Video.** Provide CATV outlets to support specific ICS Monitoring Station.<br>**Telephone.** Provide number of outlets to support specific ICS Monitoring Station.<br>**Data.** Provide one ICS drop for each system plus one additional spare drop. Provide one Service Provider drop for each system plus one additional spare drop. Coordinate with specific ICS Monitoring Station requirements.<br>**Security.** The doors must have an access control system using card readers, key pads or similar technology capable of recording access events. The space must be monitored by an intrusion detection system using volumetric sensors and point sensors on doors. |
| **Acoustics** | STC 45. |
| **Casework/ Built-in Equipment** | None. |
| **Furnishings Fixtures & Equipment (FF&E)** | Provide control center console(s), task chairs, map rack(s), safe(s) and bookcase(s) as required. Consider height adjustable consoles with return space for laying out drawings. Consider sight lines. Provide adequate ventilation for under counter storage to accommodate multiple pieces of equipment. |
| **User-provided Equipment** | Computers, computer monitor screens, radios and ELMRS equipment. |
| **Special Requirements** | Raised access flooring 1 ft. (0.3m) minimum height. |

## Table 4-2 Telecommunications Equipment Room

| | |
|---|---|
| **Description/ Usage** | Computer Equipment and Telecommunications Room. |
| **Ceiling Ht.** | Minimum 9 ft. (2.7m). |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as performance latex paint.<br>**Floor.** Provide low maintenance laminate or resilient tile flooring on raised access flooring with rubber wall base.<br>**Ceiling.** Provide suspended acoustical panel systems. |
| **Plumbing** | None required. |
| **HVAC** | Indoor design conditions: 70-72°F (21-22°C) and 45-65% relative humidity with air movement less than 4-6 inches (102-152 mm) per second. Provide CRAC HVAC per Chapter 3, Mechanical. |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system clean agent system, and early warning detection system. |
| **Power** | Provide per Chapter 3, Electrical and to support electrical equipment for specific ICS Monitoring Station.<br>**Emergency Power.** Provide generator back-up power for electronic equipment, security equipment, HVAC equipment, UPS and lighting. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Provide CCTV infrastructure (conduit/junction box system, workstation space for racks and monitoring, etc.conduit/junction box system) or complete operational system including monitoring equipment as required determined by Program Manager.<br>**CATV/Internal Video.** Not required.<br>**Telephone.** Provide number of outlets to support specific ICS Monitoring Station.<br>**Data.** Provide one ICS drop for each system plus one additional spare drop. Provide one Service Provider drop for each system plus one additional spare drop. Coordinate with specific ICS Monitoring Station requirements.<br>**Security.** The doors must have an access control system using card readers, key pads or similar technology capable of recording access events. The space must be monitored by an intrusion detection system using volumetric sensors and point sensors on doors. |
| **Acoustics** | STC 45. |
| **Casework/ Built-in Equipment** | Provide work surface(s) suitable for equipment repair. |
| **Furnishings Fixtures & Equipment (FF&E)** | Provide ICS server rack(s), operation racks and Service Provider server rack(s) space. Racks shall include servers, switches, routers and other equipment to support specific ICS Monitoring Station requirements. |
| **User-provided Equipment** | Server. |
| **Special Requirements** | Raised access flooring 1 ft. (0.3m) minimum height. |

## Table 4-3 Rest Room(s) (Lavoratories/Shower/Locker Room)

| | |
|---|---|
| **Description/ Usage** | Restroom, locker room and shower. |
| **Ceiling Ht.** | 8 ft. (2.4m) minimum. |
| **Finishes** | **Walls.** Provide ceramic tile. Consider tiling walls full-height.<br>**Floor.** Provide porcelain floor tile. Consider mosaic tiles at showers, dynamic coefficient of friction and cove base.<br>**Ceiling.** Provide suspended acoustical panel system or painted moisture resistant gypsum board. Consider humidity in selection. |
| **Plumbing** | Provide per Chapter 3, Plumbing. |
| **HVAC** | Provide per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system. |
| **Power** | Provide per Chapter 3, Electrical. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Not required.<br>**CATV/Internal Video.** Not required.<br>**PA/Audio.** Not required.<br>**Telephone.** Not required.<br>**Data.** Not required.<br>**Security.** Not required. |
| **Acoustics** | |
| **Casework/ Built-in Equipment** | Provide 2 ft. (0.6m) deep minimum durable material, such as solid surface, countertop with laminate apron. Provide durable partitions, such as solid plastic (HDPE) or color-through phenolic. Provide full length mirror. Provide 2 ft. (0.6m) deep lockers, metal or phenolic. Provide bench(es). |
| **Furnishings Fixtures & Equipment (FF&E)** | |
| **User-provided Equipment** | |
| **Special Requirements** | Consult with user and core UFC's for fixture count. Consider if facility may be used for 24/7, unsupported operations at any time. |

## Table 4-4 Kitchen

| | |
|---|---|
| **Description/ Usage** | Kitchen suitable for daily requirements of assigned staff. |
| **Ceiling Ht.** | 8 ft. (2.4m) minimum. |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as high performance latex paint.<br>**Floor.** Provide low maintenance resilient tile flooring with rubber wall base. Consider porcelain tile flooring and wall base.<br>**Ceiling.** Provide suspended acoustical panel system. |
| **Plumbing** | Provide per Chapter 3, Plumbing. |
| **HVAC** | Provide per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system. |
| **Power** | Provide per Chapter 3, Electrical and to support kitchen equipment for specific ICS Monitoring Station. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Not required.<br>**CATV/Internal Video.** Not required.<br>**PA/Audio.** Not required.<br>**Telephone.** Provide outlets as required for specific ICS Monitoring Station.<br>**Data.** Not required.<br>**Security.** Not required. |
| **Acoustics** | |
| **Casework/ Built-in Equipment** | Provide 2 ft. (0.6m) deep minimum durable material, such as solid surface countertop with backsplash. Provide upper and lower cabinets for storage. |
| **Furnishings Fixtures & Equipment (FF&E)** | Provide refrigerator/freezer, microwave, trash and recycling containers. Provide table(s) and seating. |
| **User-provided Equipment** | |
| **Special Requirements** | Consider if facility may be used for 24/7, unsupported operations at any time. |

## Table 4-5 Electrical Room

| | |
|---|---|
| **Description/ Usage** | Electrical Room to house electrical panels and equipment. |
| **Ceiling Ht.** | Provide vertical clearance under roof structure as required for specified equipment. |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as performance latex paint.<br>**Floor.** Provide low maintenance resilient tile flooring with rubber wall base.<br>**Ceiling.** None required. |
| **Plumbing** | None required. |
| **HVAC** | Provide per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system. |
| **Power** | Provide per Chapter 3, Electrical. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Not required.<br>**CATV/Internal Video.** Not required.<br>**PA/Audio.** Not required.<br>**Telephone.** Provide lines as required for specific ICS Monitoring Station.<br>**Data.** Provide data connections to support required equipment.<br>**Security.** Not required. |
| **Acoustics** | Provide per Chapter 3. |
| **Casework/ Built-in Equipment** | |
| **Furnishings Fixtures & Equipment (FF&E)** | |
| **User-provided Equipment** | |
| **Special Requirements** | |

## Table 4-6 Mechanical Room

| | |
|---|---|
| **Description/ Usage** | Mechanical room to house mechanical equipment. |
| **Ceiling Ht.** | Provide vertical clearance under roof structure as required for specified equipment. |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as performance latex paint.<br>**Floor.** Provide sealed concrete.<br>**Ceiling.** None required. |
| **Plumbing** | Provide per Chapter 3, Plumbing. |
| **HVAC** | Provide per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system. |
| **Power** | Provide per Chapter 3, Electrical. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Not required.<br>**CATV/Internal Video.** Not required.<br>**PA/Audio.** Not required.<br>**Telephone.** Provide outlets as required for specific ICS Monitoring Station.<br>**Data.** Provide data connections to support required equipment for ICS Monitoring Station.<br>**Security.** Not required. |
| **Acoustics** | Provide per Chapter 3. |
| **Casework/ Built-in Equipment** | |
| **Furnishings Fixtures & Equipment (FF&E)** | |
| **User-provided Equipment** | |
| **Special Requirements** | |

## Table 4-7 Private Offices

| | |
|---|---|
| **Description/ Usage** | Offices that require acoustic and/or visual privacy and security. |
| **Ceiling Ht.** | 8 ft. (2.4m) minimum. |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as performance latex paint.<br>**Floor.** Provide commercial grade carpet tile with rubber wall base. Consider severe wear classification for carpet tile.<br>**Ceiling.** Provide suspended acoustical panel systems. |
| **Plumbing** | None required. |
| **HVAC** | Provide per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system. |
| **Power** | Provide per Chapter 3, Electrical. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Not required.<br>**CATV/Internal Video.** Not required.<br>**PA/Audio.** Not required.<br>**Telephone.** Provide outlets as required for specific ICS Monitoring Station.<br>**Data.** Provide one ICS drop for each system plus one additional spare drop. Provide one Service Provider drop for each system plus one additional spare drop. Coordinate with specific ICS Monitoring Station requirements.<br>**Security.** Not required. |
| **Acoustics** | STC 45. |
| **Casework/ Built-in Equipment** | |
| **Furnishings Fixtures & Equipment (FF&E)** | Provide desk, task chair, file cabinet, bookcase, task light, side chair(s). |
| **User-provided Equipment** | Computer and associated equipment. |
| **Special Requirements** | |

## Table 4-8 Open Offices

| | |
|---|---|
| **Description/ Usage** | Workstations in an open arrangement. |
| **Ceiling Ht.** | 9 ft. (2.7m) minimum. |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as performance latex paint.<br>**Floor.** Provide commercial grade carpet tile with rubber wall base. Consider severe wear classification for carpet tile.<br>**Ceiling.** Provide suspended acoustical panel systems. |
| **Plumbing** | None required. |
| **HVAC** | Provide per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system. |
| **Power** | Provide per Chapter 3, Electrical. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Not required.<br>**CATV/Internal Video.** Not required.<br>**PA/Audio.** Not required.<br>**Telephone.** Provide outlets as required for specific ICS Monitoring Station.<br>**Data.** Provide one ICS drop for each system plus one additional spare drop. Provide one Service Provider drop for each system plus one additional spare drop. Coordinate with specific ICS Monitoring Station requirements.<br>**Security.** Not required. |
| **Acoustics** | |
| **Casework/ Built-in Equipment** | |
| **Furnishings Fixtures & Equip. (FF&E)** | Provide workstations, task chairs, file cabinets, task lights. |
| **User-provided Equipment** | |
| **Special Requirements** | |

## Table 4-9 Conference Room

| | |
|---|---|
| **Description/ Usage** | Conference room suitable for formal briefing and training of staff. |
| **Ceiling Ht.** | 9 ft. (2.7m) minimum. |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as performance latex paint. Consider tackable fabric wall panels for acoustic and map display needs.<br>**Floor.** Provide commercial grade carpet tile with rubber wall base. Consider severe wear classification for carpet tile.<br>**Ceiling.** Provide suspended acoustical panel systems. |
| **Plumbing** | None required. |
| **HVAC** | Provide per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system. |
| **Power** | Provide per Chapter 3, Electrical and to support electrical equipment for specific ICS Monitoring Station. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Not required.<br>**CATV/Internal Video.** Not required.<br>**Telephone.** Provide outlets as required for specific ICS Monitoring Station.<br>**Data.** Provide one ICS drop for each system plus one additional spare drop. Provide one Service Provider drop for each system plus one additional spare drop. Coordinate with specific ICS Monitoring Station requirements.<br>**Security.** Not required. |
| **Acoustics** | STC 50. |
| **Casework/ Built-in Equipment** | |
| **Furnishings Fixtures & Equipment (FF&E)** | Provide seminar tables that can be used in a training/seminar and conference set-up, chair(s), whiteboard(s), smartboard(s), lectern as required. |
| **User-provided Equipment** | |
| **Special Requirements** | Serve as “gallery” or observational area for Master Control Room. |

## Table 4-10 Technical Equipment Area

| | |
|---|---|
| **Description/ Usage** | Space for charging, check-out network update, and maintenance of laptop, ELMRS radios, etc. |
| **Ceiling Ht.** | 8 ft. (2.4m) minimum. |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as performance latex paint.<br>**Floor.** Provide low maintenance tile flooring with rubber wall base.<br>**Ceiling.** Provide suspended acoustical panel systems. |
| **Plumbing** | None required. |
| **HVAC** | Provide per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system. |
| **Power** | Provide per Chapter 3, Electrical and to support electrical equipment for specific ICS Monitoring Station. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Not required.<br>**CATV/Internal Video.** Not required.<br>**Telephone.** Provide outlets as required for specific ICS Monitoring Station.<br>**Data.** Provide one ICS drop for each system plus one additional spare drop. Provide one Service Provider drop for each system plus one additional spare drop. Coordinate with specific ICS Monitoring Station requirements.<br>**Security.** Not required. |
| **Acoustics** | |
| **Casework/ Built-in Equipment** | |
| **Furnishings Fixtures & Equipment (FF&E)** | Provide shelving suitable for storage of servers, batteries and other heavy, sensitive electronic equipment. |
| **User-provided Equipment** | |
| **Special Requirements** | |

## Table 4-11 Reception

| | |
|---|---|
| **Description/ Usage** | Workstation for receiving visitors and controlling access to ICS Monitoring Station spaces. |
| **Ceiling Ht.** | 8 ft. (2.4m) minimum. |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as performance latex paint.<br>**Floor.** Provide porcelain floor tile and base.<br>**Ceiling.** Provide suspended acoustical panel systems. |
| **Plumbing** | None required. |
| **HVAC** | Provide per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system. |
| **Power** | Provide per Chapter 3, Electrical. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Provide CCTV infrastructure (conduit/junction box system, workstation space for racks and monitoring, etc. conduit/junction box system) or complete operational system including monitoring equipment as required determined by Program Manager.<br>**CATV/Internal Video.** Not required.<br>**PA/Audio.** Not required.<br>**Telephone.** Provide outlets as required for specific ICS Monitoring Station.<br>**Data.** Provide one ICS drop for each system plus one additional spare drop. Provide one Service Provider drop for each system plus one additional spare drop. Coordinate with specific ICS Monitoring Station requirements.<br>**Security.** Not required. |
| **Acoustics** | |
| **Casework/ Built-in Equipment** | |
| **Furnishings Fixtures & Equip. (FF&E)** | |
| **User-provided Equipment** | |
| **Special Requirements** | |

## Table 4-12 ICS Integration and Application Space

| | |
|---|---|
| **Description/ Usage** | Space suitable for permanent ICS Monitoring Station personnel, but not continuously manned, used for training and work bench. |
| **Ceiling Ht.** | As appropriate for specific application. |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as performance latex paint.<br>**Floor.** Provide commercial grade carpet tile with rubber wall base. Consider severe wear classification carpet tile.<br>**Ceiling.** Provide suspended acoustical panel systems. |
| **Plumbing** | None required. |
| **HVAC** | Provide per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system. |
| **Power** | Provide per Chapter 3, Electrical. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Not required.<br>**CATV/Internal Video.** Not required.<br>**PA/Audio.** Not required.<br>**Telephone.** Provide outlets as required for specific ICS Monitoring Station.<br>**Data.** Provide one ICS drop for each system plus one additional spare drop. Provide one Service Provider drop for each system plus one additional spare drop. Coordinate with specific ICS Monitoring Station requirements.<br>**Security.** Not required. |
| **Acoustics** | |
| **Casework/ Built-in Equipment** | |
| **Furnishings Fixtures & Equipment (FF&E)** | Provide control center consoles, task chairs whiteboards, and work bench as required. |
| **User-provided Equipment** | |
| **Special Requirements** | |

## Table 4-13 IT Storage Space

| | |
|---|---|
| **Description/ Usage** | Storage area for IT equipment and supplies. |
| **Ceiling Ht.** | 8 ft. (2.4m) minimum. |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as performance latex paint.<br>**Floor.** Provide low maintenance commercial carpet or resilient tile flooring and rubber wall base.<br>**Ceiling.** Provide suspended acoustical panel systems. |
| **Plumbing** | None required. |
| **HVAC** | Provide per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide wet pipe sprinkler system. |
| **Power** | Provide per Chapter 3, Electrical. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Not required.<br>**CATV/Internal Video.** Not required.<br>**PA/Audio.** Not required.<br>**Telephone.** Not required.<br>**Data.** Not required.<br>**Security.** Not required. |
| **Acoustics** | |
| **Casework/ Built-in Equipment** | |
| **Furnishings Fixtures & Equipment (FF&E)** | |
| **User-provided Equipment** | |
| **Special Requirements** | |

## Table 4-14 Berthing (Bunk) Room

| | |
|---|---|
| **Description/ Usage** | Storage area for IT equipment and supplies.<br>Berthing room for 24/7 operations, if required. |
| **Ceiling Ht.** | As appropriate for specific application. |
| **Finishes** | **Walls.** Provide low maintenance, durable finish such as performance latex paint.<br>**Floor.** Provide resilient tile flooring and rubber wall base.<br>**Ceiling.** Provide suspended acoustical panel systems. |
| **Plumbing** | None required. |
| **HVAC** | Provide per Chapter 3, Heating Ventilating, and Air Conditioning (HVAC). |
| **Fire Protection** | Provide per Chapter 3. Provide smoke detection and wet pipe sprinkler system. |
| **Power** | Provide per Chapter 3, Electrical. |
| **Lighting** | Provide per Chapter 3, Electrical. |
| **Communication** | **CCTV.** Not required.<br>**CATV/Internal Video.** Not required.<br>**PA/Audio.** Not required.<br>**Telephone.** Not required.<br>**Data.** Not required.<br>**Security.** Not required. |
| **Acoustics** | |
| **Casework/ Built-in Equipment** | |
| **Furnishings Fixtures & Equipment (FF&E)** | |
| **User-provided Equipment** | |
| **Special Requirements** | |

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# APPENDIX A REFERENCES

## ARCHITECTURAL WOODWORK INSTITUTE

AWI Quality Standards Illustrated http://www.awinet.org

## ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA)

Lighting Handbook Reference and Application, 10th Edition, www.ies.org

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

http://www.nfpa.org

NFPA 101, *Life Safety Code*

## NAVAL FACILITIES ENGINEERING COMMAND

ITG FY05-2, NAVFAC *Humid Area HVAC Design Criteria,* *http://www.wbdg.org/ccb/browse_org.php?o=30.*

## UNIFIED FACILITIES CRITERIA

http://www.wbdg.org/ccb

UFC 1-200-01, *General Building Requirements*

UFC 1-200-02, *High Performance and Sustainable Building Requirements*

UFC 2-000-05N *Facility Planning Criteria for Navy/Marine Corps Shore Installations*

UFC 3-101-01, *Architecture*

UFC 3-120-01, *Design: Sign Standards*

UFC 3-201-01, *Civil Engineering*

UFC 3-201-02, *Landscape Architecture*

UFC 3-301-01, *Structural Engineering*

UFC 3-450-01, *Noise and Vibration Control*

UFC 3-410-01, *Heating, Ventilating and Air Conditioning Systems*

UFC 3-420-01, *Plumbing Systems*

UFC 3-450-01, *Noise and Vibration Control*

UFC 3-501-01, *Electrical Engineering*

UFC 3-530-01, *Design: Interior and Exterior Lighting and Controls*

UFC 3-540-01, *Engine-Driven Generator Systems for Backup Power Applications*

UFC 3-550-01, *Exterior Electrical Power Distribution*

UFC 3-600-01, *Fire Protection Engineering for Facilities*

UFC 4-020-01, *DoD Security Engineering Facilities Planning Manual*

UFC 4-021-02, *Electronic Security Systems*

**UNITED STATES DEPARTMENT OF NAVY**

OPNAVINST 5100.23G, *Navy Safety and Occupational Health Program Manual*, Chapter 23, Ergonomics Program, http://doni.daps.dla.mil/allinstructions.aspx.

OPNAVINST 11010.20H, Navy Facilities Projects, http://doni.daps.dla.mil/allinstructions.aspx.

# APPENDIX B BEST PRACTICES

## B-1 INTRODUCTION.

The Figures in this Appendix do not represent mandatory or even suggested floor plans and configurations. They are provided to illustrate possible means to accommodate room configurations. Note that the written criteria in this FC take precedence over these figures. If there is any confusion between the text and the figures, follow the guidance outlined in the text.

## B-2 MASTER CONTROL ROOM.

Figure B-1 illustrates a possible Large Master Control Room. Figure B-2 illustrates a possible Small Control Room. Both diagrams show basic components within the spaces. Figures B-3 and B-4 illustrate some ergonomic and sight line considerations for a Master Control Room. However, many alternatives are possible. The best arrangement for a particular project must be derived from the required process of analysis, planning, programming and designing an ICS Monitoring Station. Rooms should be sized to accommodate the total population of the space.

## Figure B-1 Large Master Control Room

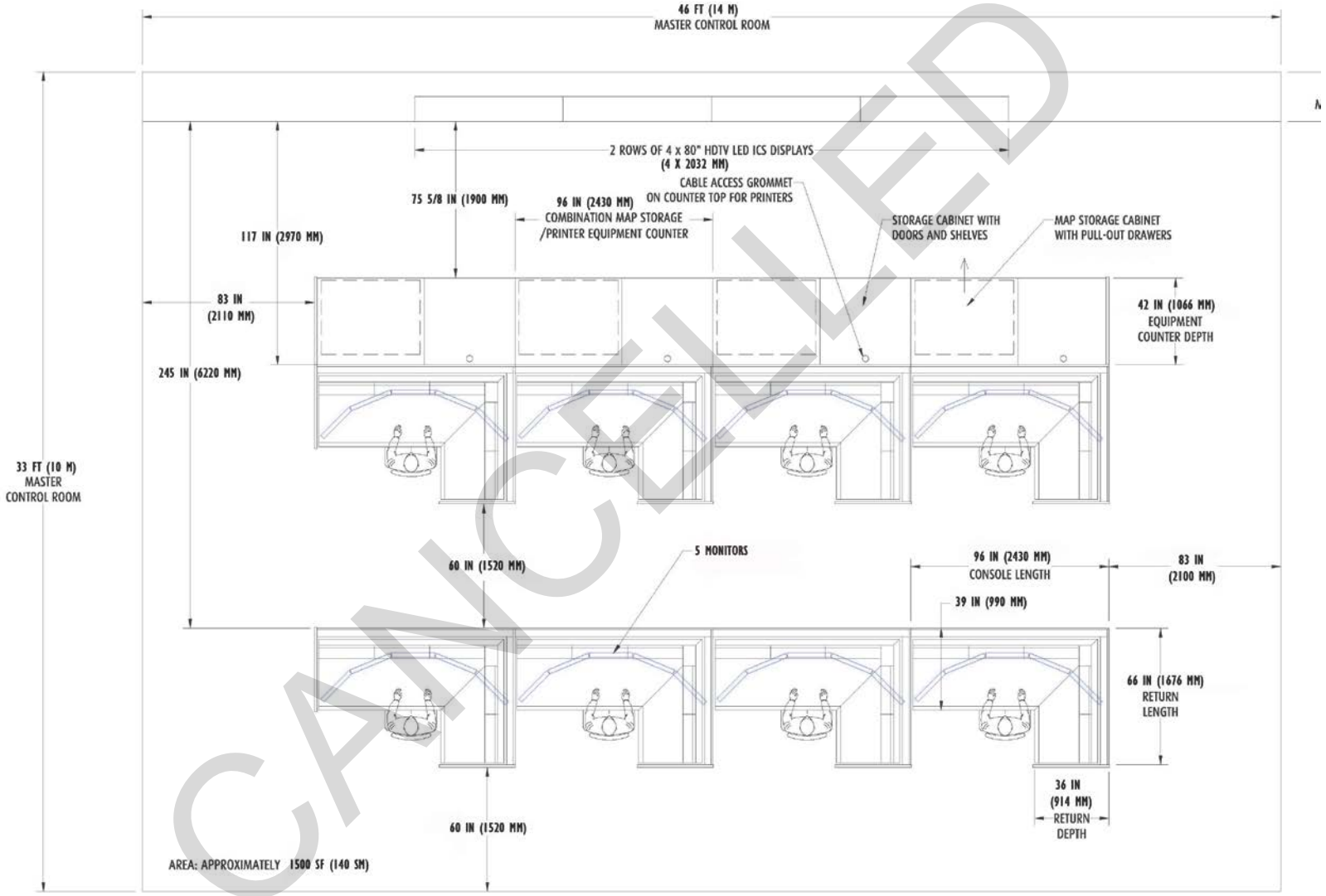


**Figure B-2 Small Control Room**

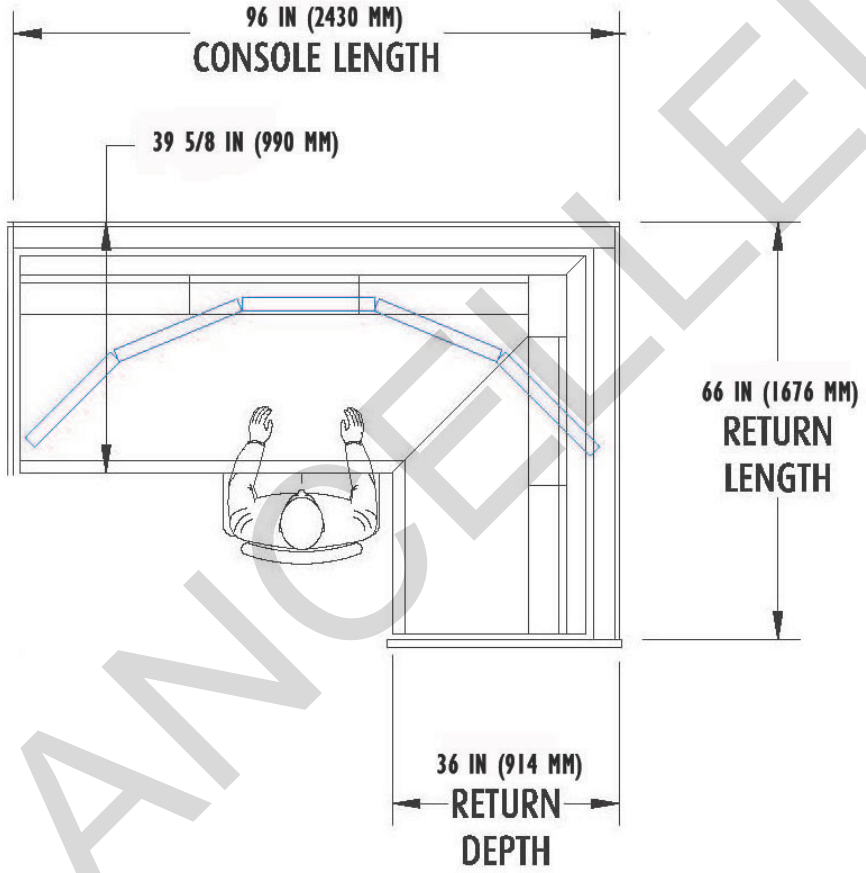


**Figure B-3 Ergonomics**

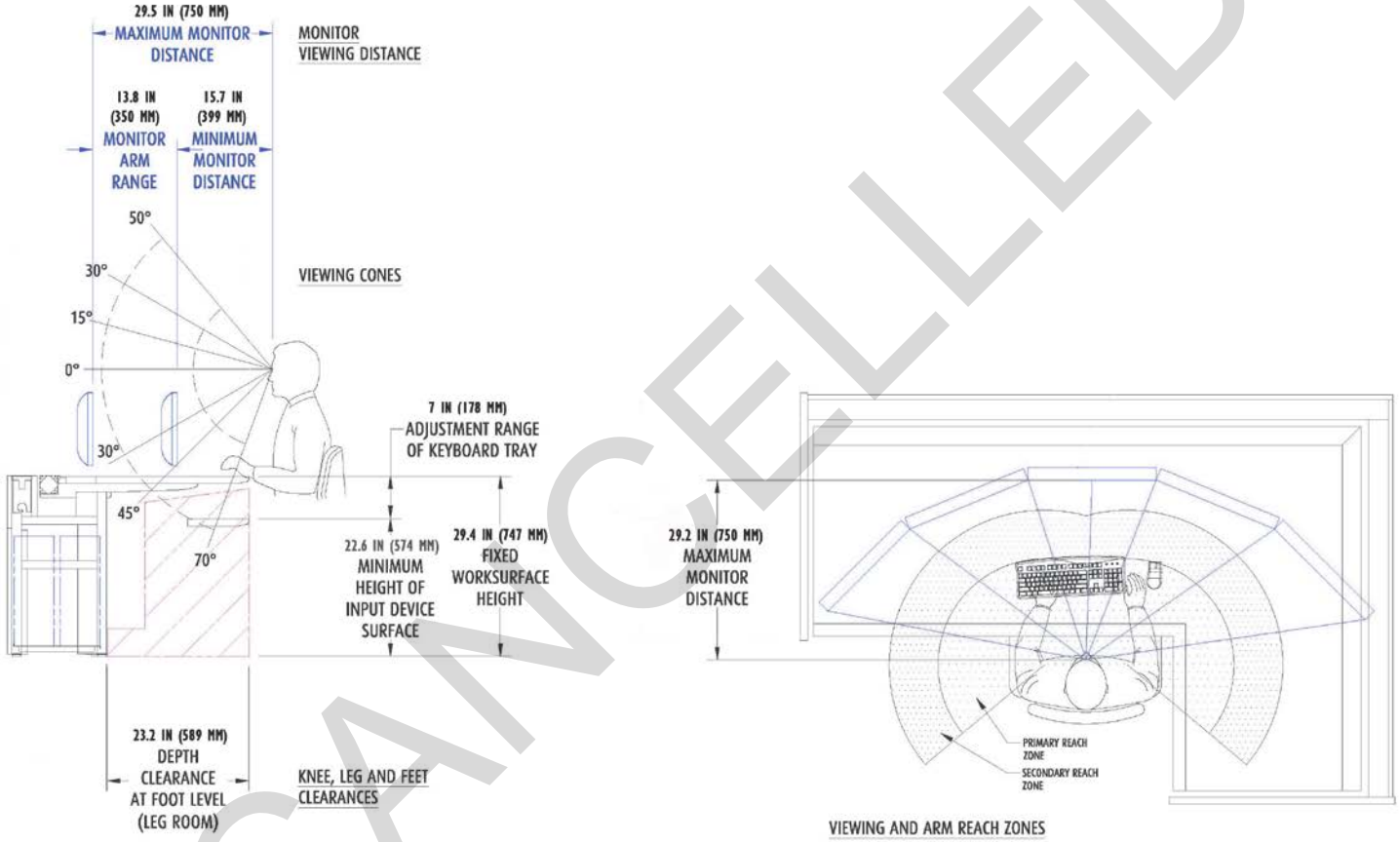
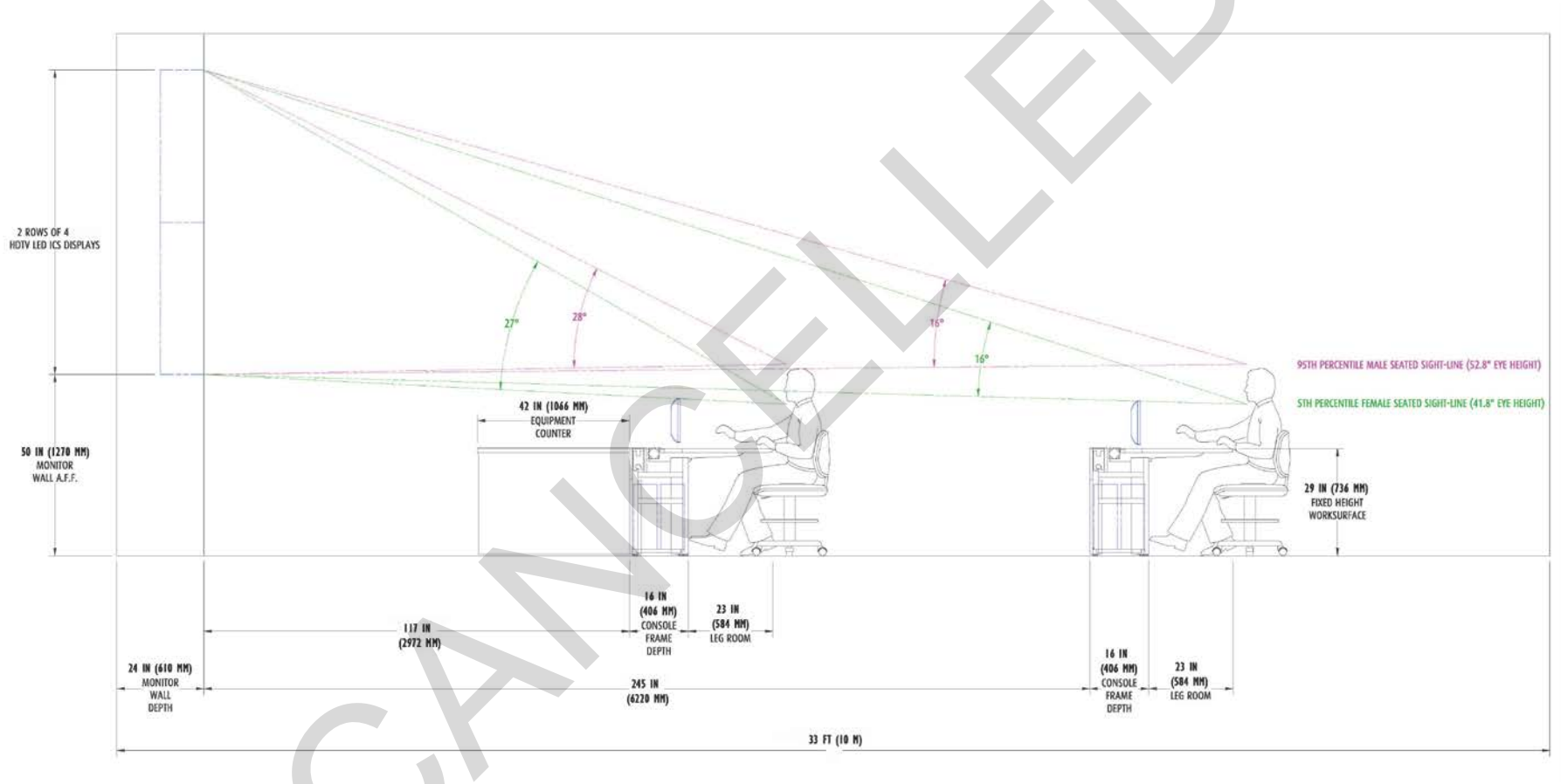


**Figure B-4 Sightline**



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# APPENDIX C GLOSSARY

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACS | Access Control System |
| AFCEC | Air Force Civil Engineer Center |
| AWI | Architectural Woodwork Institute |
| BIA | Bilateral Infrastructure Agreements |
| CATV | Cable Television |
| CCTV | Closed Circuit Television |
| CIO | Command Information Officer |
| CRAC | Computer Room Air Conditioner |
| ELMRS | Enterprise Land Mobile Radio System |
| HDPE | High Density Polyethylene |
| HNFA | Host Nation Funded Construction Agreements |
| HQUSACE | Headquarters, U.S. Army Corps of Engineers |
| ICS | Industrial Controls System |
| IDS | Intrusion Detection System |
| IT | Information Technology |
| NAVFAC | Naval Facilities Engineering Command |
| PDU | Power Distribution Unit |
| SOFA | Status of Forces Agreements |
| STC | Sound Transmission Coefficient |
| UFC | Unified Facilities Criteria |
| UPS | Uninterrupted Power Supply |