UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
****

SECTION TABLE OF CONTENTS

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

SECTION 28 31 33.13 20

EXTERIOR FIRE REPORTING SYSTEM, RADIO TYPE

04/06

PART 1 GENERAL

1.1 REFERENCES
1.2 RELATED REQUIREMENTS
1.2.1 Continuity of Protection
1.3 SYSTEM DESIGN
1.4 SUBMITTALS
1.5 DRAWINGS
1.5.1 System Layout Drawings
1.5.2 Wiring Diagrams
1.5.3 Mounting Details
1.6 ALARM SYSTEM POWER CALCULATIONS
1.7 FIRE ALARM SYSTEM UL OR FM LISTING
1.8 QUALIFICATIONS
1.8.1 List of Prior Installations
1.8.2 Manufacturer's Technical Representative
1.9 SYSTEM AS-BUILT DRAWINGS
1.10 QUALITY ASSURANCE
1.10.1 Qualifications of Installer
1.10.2 Manufacturer's Technical Representative
1.10.3 Qualification of System Technician

PART 2 PRODUCTS

2.1 RADIO ALARM TRANSMITTERS
2.1.1 Transmitter Identity Code
2.1.2 Environmental Operating Requirements
2.1.3 RF Power Output
2.1.4 Memory
2.1.5 Transmission Confirmation
2.1.6 Automatic Test
2.1.7 Battery Monitoring
2.1.8 Inputs/Zone Connections
2.1.8.1 Zone Annunciation
2.1.8.2 Zone Disconnecting Means
2.1.8.3 Monitoring for Integrity

2.1.9 Trouble Annunciator
2.1.10 Transmitter Power Source
2.1.11 Transmitter Enclosure
2.1.11.1 Security
2.1.12 Antennas and Cables
2.1.13 Lightning Protection
2.1.14 Moisture Protection
2.2 RADIO MASTER BOXES
2.2.1 Signal Designations
2.2.1.1 Tamper
2.2.1.2 Fire
2.2.1.3 Master
2.2.1.4 Medical Emergency
2.2.1.5 Police Emergency
2.2.2 Housing (Enclosure)
2.2.2.1 Operating Panel
2.2.2.2 Interface Device for Master Box Radio Transmitters
2.3 RADIO STREET BOXES
2.3.1 Signal Designations
2.3.1.1 Tamper
2.3.1.2 Fire
2.3.1.3 Medical Emergency
2.3.1.4 Police Emergency
2.3.2 Power Source
2.3.2.1 Photovoltaic Power System
2.3.3 Housing (Enclosure)
2.3.3.1 Operating Panel
2.4 MANUAL FIRE ALARM BOXES
2.5 BOX LOCATION LIGHT
2.5.1 Box Location Marker (Non-Electric)
2.6 BASE STATION RECEIVING OR CONTROL EQUIPMENT
2.6.1 Display
2.6.2 Memory
2.6.2.1 Memory Readout
2.6.3 Digital Clock
2.6.4 Printer
2.6.5 Audible Annunciation
2.6.6 Receivers
2.6.7 Decoders
2.6.8 Primary Power Source
2.6.9 Emergency Power Source
2.6.9.1 Emergency Power Switchover
2.6.10 Network Battery Charger
2.6.11 Monitoring for Network Integrity
2.6.11.1 Receiver Monitoring for Integrity
2.6.11.2 Power Monitoring for Integrity
2.6.11.3 Meters
2.6.12 Component Connections
2.6.13 Protective Finish
2.6.14 Base Station Receiving or Control Network Antennas
2.6.15 Lightning Protection
2.6.16 Field Programming Capability
2.7 COMPUTER-AIDED DISPATCH (CAD) SYSTEM
2.7.1 Interconnection to Alarm System
2.7.2 Monitor and Keyboard
2.7.3 Printer
2.7.4 Automatic Display
2.7.5 Manual Alarm Entry Capability
2.7.6 Unit Status Tracking Capability

2.7.7 Pre-Incident Plan Retrieval
2.7.8 Hazardous Materials Data Retrieval
2.7.9 Power Source
2.7.9.1 Uninterruptible Power Supply (UPS)
2.8 INTERCONNECTION WITH EXISTING COMPUTER-AIDED DISPATCH (CAD) SYSTEM
2.8.1 Interconnection to Alarm Reporting System
2.9 SURGE SUPPRESSION
2.10 RADIO ALARM TRANSMITTER BATTERY CONDITIONER
2.10.1 Capacity
2.10.2 Meter
2.11 RADIO ALARM TRANSMITTER BATTERY LOAD TESTER
2.12 SAFETY DISCONNECT SWITCH
2.13 PROTECTED PREMISES CONTROL UNITS
2.13.1 Fire Alarm Control Units
2.13.2 Fire Suppression/Extinguishing System Control Units
2.13.3 Fire Pump Control Units
2.14 DRY CONTACT INITIATING DEVICES
2.14.1 Sprinkler Waterflow Alarm Initiating Devices
2.14.2 Fire Extinguishing System Discharge Alarm Initiating Devices
2.14.3 Valve Position Supervisory Initiating Devices
2.14.4 Pressure Supervisory Initiating Devices
2.14.5 Temperature Supervisory Signal Initiating Devices
2.14.6 Water Level Supervisory Signal Initiating Devices
2.15 CONDUIT
2.15.1 Rigid Steel Conduit
2.15.2 Intermediate Metal Conduit (IMC)
2.15.3 Electrical Metallic Tubing (EMT)
2.15.4 Surface Metal Raceway and Fittings
2.16 OUTLET BOXES
2.17 FITTINGS FOR CONDUIT AND OUTLET BOXES
2.18 WIRING
2.19 GROUND RODS
2.20 SPARE PARTS

PART 3 EXECUTION

3.1 RADIO FREQUENCY ASSIGNMENT
3.2 INSTALLATION
3.2.1 Conductor Identification
3.2.2 Conduit Installation
3.2.3 Additional Installation Requirements
3.3 PROGRAMMING
3.3.1 Programming Revisions During Preliminary Testing
3.3.2 Programming Revisions During the Final Acceptance Stage
3.4 FIELD TESTING
3.4.1 Tests During Installation
3.4.2 Final Acceptance Test
3.5 ADDITIONAL TESTS
3.6 INSTRUCTION OF GOVERNMENT PERSONNEL
3.6.1 Instruction of Operating Personnel
3.6.2 Instruction of Maintenance Personnel
3.6.3 Advanced Maintenance Training

-- End of Section Table of Contents --

****

USACE / NAVFAC / AFCEC / NASA	**UFGS-28 31 33.13 20 (April 2006)**

Preparing Activity: NAVFAC	**Replacing without change UFGS-13853N (August 2003)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021

****

SECTION 28 31 33.13 20

EXTERIOR FIRE REPORTING SYSTEM, RADIO TYPE
04/06

****

NOTE: This guide specification covers the requirements for a complete base-wide radio fire reporting system which provides reporting of fire alarms to a central processing location through the use of radio transmitters connected to various building interior fire alarm systems and optional manual exterior alarm transmitters "street boxes".

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

****

****

NOTE: Interior building fire alarm systems are covered by Section 28 31 60 INTERIOR FIRE ALARM SYSTEM, NON-ADDRESSABLE, Section 28 31 66 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, NON-ADDRESSABLE, Section 28 31 70 INTERIOR FIRE ALARM SYSTEM, ADDRESSABLE, and Section 28 31 76 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, ADDRESSABLE.

****

****

NOTE: Close coordination by the designer with the EFD/EFA Fire Protection Engineer, the Federal Fire Chief, and facility fire alarm maintenance personnel

is absolutely essential to achieving the goal of an alarm reporting system that meets the needs of the customer.

****

****

NOTE: The following information shall be included in the contract drawings:

1. Complete scale map(s) of the Government facility (or portion thereof) where the system is to be installed, showing building locations and numbers, roads and streets by name and/or number, and significant landmarks such as airfield runways, navigable water, etc. Such map(s) shall show the location of each transmitter to be installed, and location of existing equipment to be reconnected or removed under this contract.

2. Individual building plans of sufficient detail and scale to clearly indicate locations of transmitters and of local alarm systems ("protected premises control units" per NFPA 72), fire extinguishing system control units, and individual initiating devices to be connected to radio alarm transmitters. Show points of connection to AC power for transmitter (and location light for outdoor master boxes and/or manual fire alarm boxes).

3. Table(s) showing: each transmitter location; transmitter code number; the number of zones to be connected and their descriptions; and the make and model of local control unit(s) to be tied into the transmitter. (e.g.: Bldg. 591; transmitter # 0591, Zone 1 - FACU common alarm contact, Zone 2 - carbon dioxide control unit common alarm contact, Zone 3 - fire pump running, Zone 4 - fire pump switch off normal, Zone 5 - fire pump trouble, Zone 6 - Spare; FACU is an XYZ Co. model ABC, carbon dioxide control unit is a UVW Co. model EFG, etc.).

NOTE: WHEN INDICATING CONNECTIONS TO EXISTING CONTROL UNITS, DESIGNERS MUST DETERMINE THAT THERE ARE DRY (Form A or Form C) CONTACTS AVAILABLE WITHIN THE CONTROL UNIT TO PERMIT THE CONNECTION. Designers must be aware that many older control units may lack the necessary contacts. If necessary to provide additional contacts, the designer must ascertain from the control unit manufacturer whether the necessary parts are available. In cases where the necessary contacts are not available, it will be necessary to indicate replacement of the control unit or other remedial action.

4. A complete layout of the fire/emergency communications center operations room or fire alarm watch office showing locations of all new equipment, existing equipment that is to remain, and equipment to be removed. Show points of connection to power

source(s).

5. Mounting details of the base station antennas, including structural design of antenna supporting towers if towers are required.

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

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.

FM GLOBAL (FM)

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

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C62.11	(2020) Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits (>1kV)
IEEE C62.41.1	(2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C80.1	(2005) American National Standard for Electrical Rigid Steel Conduit (ERSC)

ANSI C80.3	(2015) American National Standard for Electrical Metallic Tubing (EMT)
NEMA ICS 6	(1993; R 2016) Industrial Control and Systems: Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 12	(2018) Standard on Carbon Dioxide Extinguishing Systems
NFPA 12A	(2018) Standard on Halon 1301 Fire Extinguishing Systems
NFPA 13	(2019; Errata 19-1; Errata 19-2; TIA 19-1; TIA 19-2; TIA 19-3; TIA 19-4; Errata 19-3; Errata 20-4; TIA 19-5; TIA 19-6) Standard for the Installation of Sprinkler Systems
NFPA 17	(2021) Standard for Dry Chemical Extinguishing Systems
NFPA 17A	(2021) Standard for Wet Chemical Extinguishing Systems
NFPA 20	(2018; ERTA 1 2018; TIA 18-1; TIA 18-2) Standard for the Installation of Stationary Pumps for Fire Protection
NFPA 22	(2018) Standard for Water Tanks for Private Fire Protection
NFPA 25	(2020) Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code
NFPA 72	(2019; TIA 19-1; ERTA 1 2019) National Fire Alarm and Signaling Code
NFPA 111	(2019) Standard on Stored Electrical Energy Emergency and Standby Power Systems
NFPA 1221	(2019) Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems
NFPA 2001	(2018) Standard on Clean Agent Fire Extinguishing Systems

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

SAE AMS-STD-595A	(2017) Colors used in Government Procurement

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-222	(2018H; Add 1 2019) Structural Standard for Antenna Supporting Structures and Antennas and Small Wind Turbine Support Structures

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009; Rev 2012) Manual on Uniform Traffic Control Devices

UNDERWRITERS LABORATORIES (UL)

UL 5	(2016; Reprint Aug 2020) UL Standard for Safety Surface Metal Raceways and Fittings
UL 346	(2005; Reprint Sep 2019) UL Standard for Waterflow Indicators for Fire Protective Signaling Systems
UL 467	(2013; Reprint Jun 2017) UL Standard for Safety Grounding and Bonding Equipment
UL 497B	(2004; Reprint Dec 2012) Protectors for Data Communication Circuits
UL 514A	(2013; Reprint Aug 2017) UL Standard for Safety Metallic Outlet Boxes
UL 514B	(2012; Reprint May 2020) Conduit, Tubing and Cable Fittings
UL 1242	(2006; Reprint Aug 2020) Standard for Electrical Intermediate Metal Conduit -- Steel
UL 1449	(2014; Reprint Jul 2017) UL Standard for Safety Surge Protective Devices
UL Fire Prot Dir	(2012) Fire Protection Equipment Directory

1.2 RELATED REQUIREMENTS

Materials and workmanship shall conform to Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM, with the additions and modifications specified herein. Include provision of all labor, material, tools and equipment necessary for and incidental to the provision of a complete and usable[base-wide] radio fire alarm reporting system. The system shall be in accordance with NFPA 70, NFPA 72 , and as specified herein. Radio transmitting and receiving/decoding equipment furnished under this section shall be the current products of one manufacturer regularly engaged in production of such equipment. All other materials and equipment furnished under this section shall be the current products of one or more manufacturers regularly engaged in production of such materials and equipment. All electronics shall be solid state. Equipment shall be listed by the Underwriters' Laboratories, Inc. (UL) or approved by the Factory Mutual System (FM) as a Public Fire Reporting system, in accordance with NFPA 72. Equipment used to interconnect the

system with protected premises fire alarm system control units and fire suppression / extinguishing system control units [and dry-contact initiating devices] shall be UL listed or FM approved for that service, in accordance with NFPA 72. As an alternate to the above listing requirements, all equipment shall be UL Fire Prot Dir listed or FM APP GUIDE approved as a Supervising Station Fire Alarm System in accordance with NFPA 72. Radio transmitters and receivers shall comply with all requirements for FCC Type Acceptance, except that they shall be capable of operation in the military frequency bandwidths and at the power output specified herein. In the NFPA publications referred to herein, the advisory provisions shall be considered mandatory, as though the word "shall" had been substituted for "should" wherever it appears; reference to the "authority having jurisdiction" shall be interpreted to mean the [[_____] Division] [Engineering Field Activity [_____]], Naval Facilities Engineering Command, Fire Protection Engineer.

1.2.1 Continuity of Protection

During installation of this system, there shall be no loss of function of the existing base fire reporting system, or of the protected premises alarm and suppression / extinguishing systems connected thereto. Transfer of protected premises system connections from the existing base reporting system shall not result in loss of alarm transmitting or receiving capability. Temporary interruption of individual protected premises systems connections, not to exceed 8 hours duration, will be permitted with the approval of the Contracting Officer. No interruption of alarm or communications functions at the central[fire/emergency communications center] will be permitted.

1.3 SYSTEM DESIGN

****

NOTE: Include all types of fire alarm control panels and fire suppression / extinguishing system control panels and initiating devices to which system transmitters must be connected. A/E must investigate existing systems in each building. For connection to the radio alarm transmitter, each protected premises control unit must have at least one common normally open (closes on alarm) dry alarm contact available for use. If it is desired to transmit protected premises supervisory and/or trouble signals, then the control unit requires additional common trouble or supervisory output dry contacts. In cases where it may be desirable to transmit distinct alarm signals per zone, or per group of initiating devices, the control unit will need individual zone output dry alarm contacts or programmable output dry contacts. In some cases it may be necessary to modify existing control units by installing additional output modules supplied by the manufacturer of the control unit. If modification of existing control units is not possible due to non-availability of the necessary modules or lack of space within the panel, replacement with new control units in order to provide the necessary dry alarm contacts will be required. For installation of new control units , include Section 28 31 60 INTERIOR FIRE ALARM SYSTEM,

NON-ADDRESSABLE, Section 28 31 66 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, NON-ADDRESSABLE, Section 28 31 70 INTERIOR FIRE ALARM SYSTEM, ADDRESSABLE, or Section 28 31 76 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, ADDRESSABLE as appropriate. For additional guidance, consult the NAVFAC EFD/EFA Fire Protection Engineer having jurisdiction.

****

Provide a complete and useable standard system, complying with NFPA 70, NFPA 72, and this specification Provide system connections to protected premises fire alarm system [and fire suppression/extinguishing system] control units[,and dry contact initiating devices] as shown in accordance with NFPA 72.[New protected premises fire alarm systems are specified in [28 31 60 INTERIOR FIRE ALARM SYSTEM, NON-ADDRESSABLE] [28 31 66 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, NON-ADDRESSABLE] [28 31 70 INTERIOR FIRE ALARM SYSTEM, ADDRESSABLE] [28 31 76 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, ADDRESSABLE]]. Provide system with[manual alarm ("street") boxes][and][master boxes] as defined in NFPA 72 where shown, to allow manual initiation of fire[and emergency medical][and police response] alarm transmissions. System shall be permitted to use one-way or two-way (interrogation) communication, or both, to comply with the performance requirements specified herein. If a two-way system is provided, the term "transmitter" as used in this section shall be interpreted to mean "transmitter/receiver".

1.4 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G". Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification

and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.

****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

fire alarm reporting system; G[, [_____]]

SD-02 Shop Drawings

System Layout Drawings; G[, [_____]]

Wiring Diagrams; G[, [_____]]

Mounting Details; G[, [_____]]

SD-03 Product Data

Radio alarm transmitters; G[, [_____]]

Interface Device for Master Box Radio Transmitters; G[, [_____]], unless integral with transmitters

MANUAL FIRE ALARM BOXES; G[, [_____]]

Antennas and Cables; G[, [_____]]

BASE STATION RECEIVING OR CONTROL EQUIPMENT; G[, [_____]]

Emergency Power Source; G[, [_____]]

SAFETY DISCONNECT SWITCH; G[, [_____]]

BOX LOCATION LIGHT; G[, [_____]]

lightning arresters for transmitter antennas; G[, [_____]]

lightning arresters for base station antennas; G[, [_____]]

SURGE SUPPRESSION; G[, [_____]]

COMPUTER-AIDED DISPATCH (CAD) SYSTEM; G[, [_____]]

SD-05 Design Data

ALARM SYSTEM POWER CALCULATIONS; G[, [_____]]

Transmitter Identity Code; G[, [_____]]

SD-06 Test Reports

Tests during installation; G[, [_____]], NFPA 72 "Inspection and Test Form"

Final Acceptance Test; G[, [_____]]

ADDITIONAL TESTS; G[, [_____]]

SD-07 Certificates

List of Prior Installations; G[, [_____]]

FIRE ALARM SYSTEM UL OR FM LISTING; G[, [_____]]

FCC type acceptance; G[, [_____]]

Manufacturer's Technical Representative; G[, [_____]]

Qualifications of Installer; G[, [_____]]

Qualification of system technician; G[, [_____]]

SD-10 Operation and Maintenance Data

radio fire alarm system, Data Package 5; G[, [_____]]

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

SD-11 Closeout Submittals

Instruction of Maintenance Personnel; G[, [_____]]

SYSTEM AS-BUILT DRAWINGS; G[, [_____]]

1.5 DRAWINGS

1.5.1 System Layout Drawings

Submit alarm system layout drawings, showing location of all alarm transmitting, receiving, and interfacing equipment and devices relative to building locations. Indicate graphic scale and compass directions on all drawings. Submit plan view and cross-section of emergency communications center operations room, showing all new and retained existing equipment and furnishings, drawn in 1:50 or larger scale.

1.5.2 Wiring Diagrams

Submit wiring diagrams for the complete system showing points of connection and terminals to be used for each field connection. Show wire color coding, wire counts, and end-of line-supervisory devices.

1.5.3 Mounting Details

Submit details of each type of transmitter mounting including antenna mounting detail.

1.6 ALARM SYSTEM POWER CALCULATIONS

Submit design calculations to substantiate that the battery capacity provided exceeds supervisory and alarm power requirements for radio alarm transmitters[and interface units] and for receiving, decoding and control equipment.

1.7 FIRE ALARM SYSTEM UL OR FM LISTING

Submit copies of current UL Fire Prot Dir listings or FM APP GUIDE approvals for all equipment furnished. Submit UL listing or FM approval for transmitters, interface equipment, and receiving/control equipment showing that such equipment is listed or approved for use together as an integrated system.

1.8 QUALIFICATIONS

1.8.1 List of Prior Installations

Prior to commencing work, submit data showing that the Contractor has successfully installed radio fire reporting systems, or that he has a firm contractual agreement with a subcontractor having such required experience. The data shall include the names and locations of at least two installations where the Contractor, or the subcontractor referred to above, has installed such systems. Indicate the type and design of these systems and provide written certification from the users that these systems have performed satisfactorily in the manner intended for a period of not less than 18 months.

1.8.2 Manufacturer's Technical Representative

Submit names of the manufacturer's technical representative(s) who will supervise installation and testing of the system, and who will provide instruction to government personnel, along with the manufacturer's certification of the qualifications of the named representative(s).

1.9 SYSTEM AS-BUILT DRAWINGS

Upon completion, furnish to the Contracting Officer one complete set of reproducible as-built drawings and five copy sets, including system layout drawings and field wiring diagrams. Drawings shall be "D" size 850 by 550 mm 34 by 22 inches, drawn to the same scale as the contract drawings, with title block similar to the contract drawings. Reproducible drawings shall be on mylar film. Furnish as-built drawings in addition to the record drawings required by Division 01.

1.10 QUALITY ASSURANCE

1.10.1 Qualifications of Installer

Ensure that the installer is UL certified for the installation and testing of the fire alarm systems. Furnish proof of this listing. A list of installer's personnel shall be furnished as part of the submittals package.

1.10.2 Manufacturer's Technical Representative

Provide the services of a qualified manufacturer's technical representative or technician, experienced in the installation and operation of the type of system being provided to supervise the

installation, adjustment, preliminary testing and final testing of the system and to provide instruction to Government maintenance and operating personnel

1.10.3 Qualification of System Technician

Installation drawings, shop drawings and as-built drawings shall be prepared by, or under the supervision of, a qualified technician. Qualified technician shall be an individual who is experienced with the types of work specified herein, and is currently certified by the National Institute for Certification in Engineering Technologies (NICET) as an engineering technician with minimum Level-III certification in fire alarm system program. Contractor shall submit data showing the names and certification of the technician as specified in the paragraph entitled "Submittals".

PART 2 PRODUCTS

2.1 RADIO ALARM TRANSMITTERS

****

NOTE: OPNAV INSTRUCTION 2410.11H requires that funds shall not be obligated for the procurement of radio equipment until frequency allocation authority has been obtained. As soon as possible, but no later than Schematic Design, the designer shall contact the Area Radio Frequency Coordinator (usually the base Communications Officer) to determine the availability of radio frequencies and to ensure that the using activity submits a DD Form 1494, APPLICATION FOR FREQUENCY ALLOCATION, for a Stage 1 ("Conceptual Development") allocation (See DD Form 1494 Preparation Guide). Stage 1 allocation authority (i.e. approval) must be obtained prior to advertisement of the contract.

In order to avoid potential contract delays, the frequency assignment should be included in the specification when possible. In some cases it may be necessary or desirable for the designer to perform a frequency intermodulation analyses or set up radio monitoring and recording equipment on the proposed frequency to verify that the frequency is free from interference.

For additional information, contact the facility Communications Officer or the Naval Electronics System Command, Code 08H at (202) 692-7523.

****

Provide radio alarm transmitters completely assembled, tested at the factory, and delivered ready for installation and operation. The transmitter electronics package shall be contained within the housing as a complete assembly, removable to facilitate servicing and replacement. Transmitters shall operate on any frequency within the [138-150.8 or 162-174 MHz] [406-420 MHz] [_____] band and shall be operable within a 12.5 KHz channel. The specific frequency shall be [_____]MHz [as directed by the Contracting Officer, within [90] [_____] days following submission

of completed application for frequency allocation following contract award]. If 2-way transmitter/receivers are provided to fulfill the requirements as specified herein for radio alarm transmitters, they shall transmit and receive on separate frequencies. The second frequency will be as assigned within [90] [_____] days following submission of completed application for frequency allocation following contract award.

2.1.1 Transmitter Identity Code

****

NOTE: For NAVFAC ML and NAVFAC PAC HQ MIDPAC projects, delete the bracketed text in the third sentence and include the bracketed text in the fourth and fifth sentences. For projects in other areas, consult the EFD/EFA Fire Protection Engineer having jurisdiction. It is generally desirable to have the transmitter number the same as the number of the connected or nearest building where this can be done without undue difficulty.

****

Provide transmitters which include a unique identity code as part of each transmission. Setting the code shall be readily accomplishable in the field without the need to exchange or alter circuit boards. [The specific code number for each transmitter shall be as shown on the contract drawings.] [Submit in writing, within 30 calendar days after award, the proposed specific code number for each transmitter.] [Obtain the code numbers from the Federal Fire Department serving the facility.]

2.1.2 Environmental Operating Requirements

****

NOTE: Choose the temperature range most appropriate for the local climate. Avoid specifying minus 40 degrees C unless necessary, as this may add significantly to the cost of the system (special order item from some manufacturers). For areas where lower temperatures can be anticipated, show transmitters indoors, with antennas outdoors.

****

Transmitters not installed within climate-controlled spaces shall be designed for reliable operation in an ambient temperature range of[minus 30 degrees C to plus 60 degrees C minus 22 degrees F to plus 140 degrees F][minus 40 degrees C to plus 60 degrees C minus 40 degrees F to plus 140 degrees F] and under adverse climatic conditions including[161][242] km/h [100][150] mph winds, high humidity, rain, ice, and snow storms.

2.1.3 RF Power Output

Provide Transmitters with power output required for reliable reception, and in no case less than one watt nominal. Power output shall be permitted to be greater than one watt nominal, if required for reliable operation over required distances.

2.1.4 Memory

Provide transmitters with memory capability. Simultaneous or subsequent actuation of zones , including those actuated during "off air" periods,

shall not result in the loss of any messages. All messages shall be stored until they are transmitted.

2.1.5 Transmission Confirmation

Provide transmitters which produce an audible or visual indication that the transmitter is operating and an alarm signal is being sent, whether the transmission is initiated automatically by an alarm condition or manually.

2.1.6 Automatic Test

Provide transmitters which automatically transmit a test signal at least once in each 24 hour period. Transmitters shall also allow manual actuation of test signal by a secured (not publicly accessible) means. Automatic actuation shall be initiated by a solid state programmable electronic device. Stability of the electronic device shall be plus or minus one minute per month or better. Test time(s) shall be programmable without removing the transmitter from the enclosure. For one-way radio systems, the test shall be initiated at the transmitter; for 2-way polling/interrogation systems, the automatic test shall be part of the normal polling/interrogation function.

2.1.7 Battery Monitoring

Provide transmitter with battery monitoring in accordance with NFPA 72.

2.1.8 Inputs/Zone Connections

Except for transmitters shown as "street boxes" on the contract drawings, provide each transmitter with a minimum capacity, including any modules required, of 6 initiating circuit inputs (zones) for connection to protected premises fire alarm and suppression / extinguishing system control units, [and dry-contact initiating devices utilizing Form A dry contacts]. The specific zone connections for each transmitter shall be as shown. When the number of zone connections shown exceeds the maximum zone capacity furnished in a single transmitter, provide additional transmitters at that location to connect to all zones shown.

2.1.8.1 Zone Annunciation

Provide transmitters with separate red alarm and yellow trouble lamps to indicate the status of each initiating zone.

2.1.8.2 Zone Disconnecting Means

Provide transmitters with switches to disconnect individual zone inputs from the transmitter without disconnecting wiring. Disconnecting a zone shall cause a trouble condition which shall initiate transmission of a trouble signal and actuation of local trouble signals as specified in paragraph entitled " Trouble Signals."

2.1.8.3 Monitoring for Integrity

Each transmitter shall monitor the integrity of circuits between the transmitter and the protected premises control unit(s) [and circuits between the transmitter and dry contact initiating devices]. A ground-fault or a break (open condition) in any of the above circuits shall cause a trouble condition at the transmitter which shall initiate

transmission of a trouble message and actuation of local audible and visual trouble signals as specified in paragraph entitled " Trouble Signals."

2.1.9 Trouble Annunciator

Provide transmitters with local audible trouble signal, visual amber trouble lamp(s), and audible signal silencing switch. Lamps shall be light emitting diode (L.E.D.) type. Lamps need not be visible with the access door closed. Upon occurrence of a trouble condition as defined in NFPA 72, transmitter shall transmit a trouble signal, local audible trouble signal shall sound, and trouble lamp shall illuminate. When silencing switch is operated, the audible trouble signal shall silence and the trouble lamp(s) shall remain lit. If the silencing switch is not a momentary-action-self-resetting type, upon correction of the trouble condition(s) the audible signal shall again sound until the silencing switch is returned to its normal position.

2.1.10 Transmitter Power Source

****
NOTE: The available utilization voltage at each building must be verified. If 120-volt service is not available, show transformer on the contract drawings, and include section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.
****

Provide transmitters with power sources which comply with NFPA 72. Provide connection to locally available AC power. Point of connection shall be as shown.[Where indicated, provide manual (street) alarm box transmitters powered by photovoltaic power systems or user power in accordance with NFPA 72.] Provide transmitters with power supply filtering to prevent false message transmissions caused by transient or steady-state electrical disturbances.

2.1.11 Transmitter Enclosure

Provide transmitters with enclosures of corrosion resistant metal, conforming to NEMA ICS 6 classification in accordance with NFPA 70 for the environment in which they are installed [but in no case less than Type 3R] Provide enclosures with conduit entry points(minimum 21 mm 3/4 inch I.D.) at no less than one place near the top of the enclosure and one place near the bottom of the enclosure. Switches and other controls shall not be accessible without the use of a key. Access door(s) shall swing open through at least 2.1 rad 120 degree arc. Enclosure shall be factory painted with a priming coat and not less than two coats of a durable weatherproof gloss enamel. The finish color shall be Fire Engine Red, similar to color number 11105, SAE AMS-STD-595A. except as otherwise specified herein for each individual transmitter configuration. Repaint all surfaces damaged during installation to match existing paint. Securely affix a metallic or rigid plastic engraved code number plate to the front of the enclosure.

2.1.11.1 Security

Switches and internal components shall be protected from tampering by a tamperproof lock on the transmitter enclosure door. Locks for all transmitters of each configuration provided shall be keyed alike.

2.1.12 Antennas and Cables

Provide antennas for radio alarm transmitters of the omnidirectional unity-gain coaxial or directional gain type as required for reliable signal transmission and reception. Provide antennas with driving point impedance matching transmitter output. Antennas and mounting hardware shall be heavy duty, corrosion resistant, and designed to withstand wind velocities of [161] [242] km/h [100] [150] mph. Provide RG8U or RG58U, minimum 95 percent shielded coaxial cables utilizing PL-259 connectors. Connectors shall be protected against moisture. No splices will be permitted in any cable. Crimp-type connectors are not permitted. Run cables alone in separate conduit except where enclosed in a master box or street box pedestal.

2.1.13 Lightning Protection

Provide lightning arresters for transmitter antennas that do not have integral protection or do not function at ground potential, and for auxiliary connection and power supply wiring. Lightning protection shall be in accordance with NFPA 70. Transmitters shall not exhibit mis-operation or failure when electrical transients of IEEE C62.41.1 and IEEE C62.41.2 Category B are applied to the AC power line.

2.1.14 Moisture Protection

Provide printed circuit boards in transmitters (and interface panels if provided), with a non-nutrient conformal coating for protection against moisture and fungus. The coating shall be suitable for the climate in which the equipment is to operate and shall be applied at the factory in accordance with the coating manufacturer's specifications.

2.2 RADIO MASTER BOXES

****

NOTE: Delete paragraphs for transmitter configurations and options not required. Master boxes are generally used when both an exterior manual alarm box and transmission of alarms from protected premises systems are required. Consult the EFD/EFA Fire Protection Engineer for further guidance.

****

Provide master boxes where shown, configured for both manual actuation by a publicly-accessible lever or pushbutton on the front of each transmitter and for automatic actuation through wired connections to protected premises alarm control units and fire suppression / extinguishing system control units [and dry-contact initiating devices]. Master box transmitters shall comply with paragraph entitled "RADIO ALARM TRANSMITTERS" and the following requirements:

2.2.1 Signal Designations

Provide master boxes capable of transmitting separate signals, individually identifiable by the base station receiving/control networks as to the specific types or causes of transmitter actuation. Required signals are as follows:

2.2.1.1 Tamper

Signal shall be automatically transmitted when a box is tilted over 0.785 rad 45 degrees from vertical.

2.2.1.2 Fire

Signal shall be transmitted upon operation of the publicly accessible "FIRE" lever or pushbutton on the front of the box.

2.2.1.3 Master

Signal shall be transmitted upon automatic actuation of the transmitter through wired connection(s) to protected premises control unit(s) [or dry-contact initiating device(s]). The transmitter zone actuated shall be individually identified as part of this transmission.

[2.2.1.4 Medical Emergency

Signal shall be transmitted upon operation of the publicly-accessible "MEDICAL" lever or pushbutton on the front of the box. This message shall be permitted to be counted as one of the required number of zones specified in the paragraph entitled "Inputs/Zone Connections.

][2.2.1.5 Police Emergency

Signal shall be transmitted upon operation of the publicly-accessible "POLICE" lever or pushbutton on the front of the box. This message shall be permitted to be counted as one of the required number of zones specified in the paragraph entitled "Inputs/Zone Connections.

]2.2.2 Housing (Enclosure)

****

NOTE: Finish color shall be red unless requested otherwise by the Activity and approved by the EFD/EFA Fire Protection Engineer.

****

Provide box with cast metal [cottage] [or] [contemporary rectangular] style housing (enclosure), painted [Fire Engine red, similar to color number 11105,] [Lime Yellow, similar to color number 23793,] SAE AMS-STD-595A. Provide reflective, highly visible labels imprinted with the [word "FIRE" in minimum 50-mm two-inch] [words "FIRE" and "EMERGENCY" in minimum 25mm one-inch] block characters on both side surfaces of the box. Housing (enclosure) shall permit mounting on walls, utility poles, or pedestals.

2.2.2.1 Operating Panel

Provide boxes with operating panel located on the front of the box. Box operating panel shall incorporate pushbutton(s) or pull lever(s) or hook(s) clearly labeled as specified in the paragraph entitled "Message Designations". Appropriate operating instructions shall also be clearly visible. Break-glass mechanisms are not permitted. Operating panels shall be identical in operation on all boxes furnished. Mount box with operating panel not more than 1220mm 48 inches above grade.

2.2.2.2 Interface Device for Master Box Radio Transmitters

All circuitry, switches, and controls necessary for the functions required for Master Box Radio Transmitters shall be contained in one housing, except that circuitry required for interfacing with protected premises alarm and extinguishing system control units [and dry-contact initiating devices] shall be permitted to be contained in a separate enclosure if required by the UL listing or FM approval of the equipment. If two separate housings are provided, all requirements as specified herein for radio master boxes remain in effect, with the exception that only the housing containing the publicly accessible operating panel is required to be cast metal [cottage] [contemporary rectangular] style and labeled "FIRE". [If a separate housing for interfacing circuitry is provided, it shall be mounted adjacent to its associated protected premises control unit.]

2.3 RADIO STREET BOXES

****

NOTE: Delete paragraphs for transmitter configurations and options not required. A street box is generally used where an exterior manual alarm box is required and there are no facilities in the vicinity requiring a master box for transmission of alarms from protected premises systems. Consult the EFD/EFA Fire Protection Engineer for further guidance.

****

Provide radio street boxes configured for manual actuation by a publicly accessible lever or pushbutton on the front of each box. Street boxes shall comply with paragraph entitled "RADIO ALARM TRANSMITTERS," and the following requirements:

2.3.1 Signal Designations

Each transmitter shall transmit separate signals, individually identifiable by the base station receiving/control networks as to the specific causes of transmitter actuation. Required signals are as follows:

2.3.1.1 Tamper

Signal shall be automatically transmitted when a transmitter is tilted over 0.785 rad 45 degrees from vertical.

2.3.1.2 Fire

Signal shall be transmitted upon operation of the publicly accessible "FIRE" lever or pushbutton on the front of the box.

[2.3.1.3 Medical Emergency

Signal shall be transmitted upon operation of the publicly-accessible "MEDICAL" lever or pushbutton on the front of the box.

][2.3.1.4 Police Emergency

Signal shall be transmitted upon operation of the publicly-accessible "POLICE" lever or pushbutton on the front of the box.

]2.3.2 Power Source

****

NOTE: Since street boxes are often not located on or near a building, obtaining 120 VAC power can sometimes be difficult. One acceptable source is a continuously-energized street lighting circuit, although this may require the use of a transformer. If transformers are required, include section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION or section 33 71 01 OVERHEAD TRANSMISSION AND DISTRIBUTION as appropriate. Where connection to an AC power source is impractical, a photovoltaic power system may be specified. Consult the EFD / EFA Fire Protection Engineer for further guidance.

****

AC power shall be obtained as shown for each box, through a lockable fused disconnect switch. [Where drawings indicate AC power is not available, street boxes shall operate from photovoltaic power system.]

[2.3.2.1 Photovoltaic Power System

Provide photovoltaic power system for street boxes without AC power source as shown, in accordance with NFPA 72. System shall include a photovoltaic panel, solid-state voltage regulators, interconnecting cables and necessary supports. Photovoltaic panel shall be capable of sustaining transmitter operation with the battery disconnected, when the light intensity is greater than 50 percent of full sun illumination. Voltage regulator shall prevent overcharging of the battery and reverse current flow from the battery to the charger. Regulator shall be temperature compensated with a control accuracy of plus or minus 0.1 volts and shall provide protection against lightning-induced surges. Mounting supports shall be of the flat plate, fixed tilt angle design, capable of withstanding the same wind loading specified for transmitters and antennas. All materials shall be sealed and weatherproof.

]2.3.3 Housing (Enclosure)

****

NOTE: Finish color shall be red unless requested otherwise by the Activity and approved by the EFD/EFA Fire Protection Engineer.

****

Provide box with cast metal [cottage] [or] [contemporary rectangular] style NEMA 3R housing (enclosure)per NEMA ICS 6, painted [Fire Engine red, similar to color number 11105,] [Lime Yellow, similar to color number 23793,] SAE AMS-STD-595A. Provide reflective, highly visible labels imprinted with the [word "FIRE" in minimum 50-mm two-inch] [words "FIRE" and "EMERGENCY" in minimum 25mm one-inch] block characters on both side surfaces of the box. block characters on both side surfaces of the box. Housing (enclosure) shall permit mounting on walls, utility poles, or pedestals.

2.3.3.1 Operating Panel

Provide boxes with operating panel located on the front of the box. Box

operating panel shall incorporate pushbutton(s) or pull lever(s) or hook(s) clearly labeled as specified in the paragraph entitled "Signal Designations". Appropriate operating instructions shall also be clearly visible. Break-glass mechanisms are not permitted. Operating panels shall be identical in operation on all boxes furnished. Mount box with operating panel not more than 1220mm 48 inches above grade.

[2.4 MANUAL FIRE ALARM BOXES

Provide manual fire alarm boxes (pull stations) where shown. Provide box with cast metal [cottage] [or] [contemporary rectangular] style NEMA 3R housing (enclosure), painted [Fire Engine red, similar to color number 11105,] [Lime Yellow, similar to color number 23793,] SAE AMS-STD-595A. Provide reflective, highly visible labels imprinted with the [word "FIRE" in minimum 50-mm two-inch] [words "FIRE" and "EMERGENCY" in minimum 25mm one-inch] block characters on both side surfaces of the box. Housing (enclosure) shall permit mounting on walls, utility poles, or pedestals. Connect box to its own separate zone on the nearest radio alarm transmitter as shown. Mount box with manual operating device not more than 1220mm 48 inches above grade.

]2.5 BOX LOCATION LIGHT

****
NOTE: Specify box locations lights when master boxes, street boxes, or manual fire alarm boxes are required and AC power is available. Consult the EFD / EFA Fire Protection Engineer for further guidance. Choose the appropriate lamp type and voltage(s).
****

Provide each box with a vapor-tight, light fixture with a cast aluminum housing with screw-on die-cast lens guard, and heat resistant, unbreakable threaded ruby globe. The light shall be supported with minimum 16 mm 1/2 inch galvanized rigid steel conduit, and located approximately 305 mm one foot above the box. Lamp shall be [incandescent, 25 watt, [130] [240] volt AC] [compact fluorescent] extended service type. Power source shall be [the AC power to the box.] [or] [a dedicated circuit as indicated] Mount light fixture with lamp in vertical position.

[2.5.1 Box Location Marker (Non-Electric)

****
NOTE: Use this paragraph only when street boxes are required and AC power is not available. Otherwise, delete entire paragraph. Choose wall mounting configuration(s) best suited for visibility.
****

For street boxes provided where AC power is not available, provide reflective red and white markers located with the bottom edge a minimum of 244 mm 8 ft above grade. For pole- or pedestal -mounted boxes, provide marker around entire circumference of pole or pedestal. For wall-mounted boxes, provide minimum of 95 mm 24 in. square marker sign with red letters on white reflective background mounted [on] [perpendicular to] wall surface above box [as shown]. Markers/signs shall be minimum2.03 mm 0.080 in. thick aluminum, covered with reflective sheeting, complying with MUTCD.

]2.6 BASE STATION RECEIVING OR CONTROL EQUIPMENT

Provide redundant radio alarm base station receiving or control networks in the emergency communication center operations room as shown. [Also provide single network[s] in [_____] as shown.] Provide component equipment completely assembled, wired, and tested at the factory, and delivered ready for installation and operation. Each base station network shall perform the receipt, processing, and display of emergency and non-emergency signals transmitted by the radio alarm transmitters specified herein, independently of the other network. Provide each network as a complete and independent receiving system consisting of: a receiver (or transmitter and receiver for polling (interrogation) type systems), decoder, audio devices, visual display, digital clock, printer, primary and emergency power supplies, power supply monitors, memory devices, interconnecting cables, and antenna. If the automatic transmitter tests specified under paragraph entitled "Automatic Transmitted Test" are initiated by a polling (interrogation) device located at the base station, then each of the two required networks at the communication center shall have its own polling device. One such device shall always be active, with the other in standby status. Failure of the active device shall automatically cause the other polling device to take over the interrogation (polling) function. Provide equipment in [desk-top console] [vertical rack] configuration.

2.6.1 Display

****

NOTE: Delete medical and police message designations if these options were not selected under the paragraph entitled "Master Box" or "Street Box".

****

Each network shall display incoming signals in alphanumeric message format, using a light emitting diode, illuminated dot matrix, cathode ray tube, or equivalent display. The display shall indicate the identity code number assigned to the originating transmitter, which shall be a minimum of 4 digits, 0001-9999. The display shall also include the following message designations:

FIRE	MASTER(1) (Zone #)	[MEDICAL]
TAMPER	SUPERVISORY(2) (Zone #)	[POLICE]
TEST	LOW BATTERY / LOW POWER(3)	
TROUBLE	POWER FAILURE(3)	

Note (1): "Auxiliary" or other wording which clearly distinguishes between automatic remote actuation and manual actuation at the transmitter is acceptable in lieu of "MASTER."

Note (2): "Supervisory" shall be displayed when the automatic remote cause of the transmitter actuation is a supervisory signal as defined by NFPA 72.

Note (3): Low battery, low power, and power failure messages shall be displayed as required by NFPA 72.

Each network shall include a means for the operator to manually reset

(clear) its display. If the display is not reset at the time additional alarm(s) or supervisory signal(s) are received, the additional alarm(s) and supervisory signal(s) shall be retained in the memory and a distinctive audible or visual indication given to the operator that additional messages are waiting to be acknowledged. A minimum of 16 such messages shall be retained for display and acknowledgement. Alarms shall be printed immediately upon receipt. Supervisory signals shall have priority over trouble signals and shall be clearly distinguishable in compliance with NFPA 72 on the visual display and printout.

2.6.2 Memory

Provide each network with a programmable non-volatile memory capable of retaining 500 transmitter codes together with their specific messages, total number of zones possible, and related information associated with each of 500 transmitters. Memory shall be used in comparing received signals with pre-programmed "legitimate" transmitter codes, and shall cause the rejection of any signal containing a code not programmed into memory. Memory shall also maintain an account of automatic transmitter testing and transmitter trouble and low battery/low power/power failure transmissions as required by NFPA 72. Access into the memory for the purpose of making additions or deletions shall be restricted to the system administrator by the use of a key switch or access code to prevent unauthorized changes. Stored information shall not be lost in the event of a total loss of primary and emergency power supplies.

2.6.2.1 Memory Readout

Upon manual activation by the operator, the each network shall print a summary of transmitters which have transmitted a trouble (or low battery/low power/power fail as required by NFPA 72)signal, or which have failed to transmit a signal during the previous 24-hour test period. Any legitimate incoming transmitter signal shall preempt the memory read function, and take control of each network.

2.6.3 Digital Clock

Provide each network with an electronic digital clock. The clock shall display the current time expressed in 24-hour time and date (day and month) and shall transmit to each interconnected decoder and printer the time and date that signals are received. Provide a means for resetting the clock.

2.6.4 Printer

Provide printers of high speed, computer compatible, low noise design, which are capable of printing messages associated with all incoming signals, with no messages being lost. Upon reception of an alarm, each printer shall print the required visually displayed data, including the date and time received. Paper for recording messages shall be standard size, and commercially available printer (computer) or adding machine, continuous feed type. Paper take-up devices for storing print-out shall be included. Alarms shall be printed in a manner to make them readily distinguishable from acknowledgements and routine messages, by use of a different color, typeface, type size, or similar means.

2.6.5 Audible Annunciation

Provide each network with audible device(s) mounted in the console to

indicate the receipt of emergency, supervisory, and trouble signals. Devices shall produce a distinct sound to annunciate emergency signals. The same sound may be used to annunciate receipt of both supervisory and trouble signals, as defined by NFPA 72, however supervisory signals shall have priority over trouble signals and shall be clearly distinguishable on the visual display and printout.

2.6.6 Receivers

Provide each network with solid state radio receiver of standard design. Provide both receiver and transmitter for polling (interrogation)-type systems. Provide an audio amplifier with loudspeaker connected to the demodulated output of the receiver. Signal receivers shall be completely solid state, narrow band.

2.6.7 Decoders

Provide signal decoders which are fully solid state, utilizing rack-type construction and plug-in type printed circuit cards, for decoding of incoming messages or signals.

2.6.8 Primary Power Source

****
NOTE: Design power supply circuits to comply with NFPA 1221 Chapter 2 paragraph entitled "Power".
****

Provide primary power for each network [through a connection into the line side of the building's regular AC service circuit] [from the building emergency service circuit as shown] through a lockable fused disconnect switch. Provide a separate disconnect switch for each network.

2.6.9 Emergency Power Source

****
NOTE: Select 24 hours or more unless an emergency generator complying with NFPA 1221 Chapter 2 , capable of continuous operation for at least 24 hours is provided.
****

Provide emergency backup battery power supply. Provide batteries of sufficient capacity to operate all functions of the network for [8] [24] [60] hours. Mount batteries on racks designed for that purpose. Provide a termination block for each battery rack. Locate batteries [in the communication center] [where shown]. Do not locate vented wet-cell batteries in normally-occupied rooms. For batteries located remote from the control equipment, provide fuses on positive and negative leads at the battery rack.

2.6.9.1 Emergency Power Switchover

In the event of a primary power supply failure, the network shall automatically without interruption switch to emergency battery power and indicate the failure within 15 seconds. When primary power is restored, transfer back to operation from primary power shall also be automatic.

2.6.10 Network Battery Charger

Battery chargers shall be self-regulating. Each charger shall have the capacity to completely recharge its associated batteries from full discharge within 48 hours with the network fully operational on primary AC power. The network shall remain operational on AC power with the batteries removed.

2.6.11 Monitoring for Network Integrity

Provide base station receiving/control equipment which continually monitors itself for integrity. Provide individual visual trouble indicators for each major component. An audible signal shall activate in the event of failure of any monitored component. Provide a trouble silencing switch which when operated, will silence the audible signal while the trouble lamp(s) shall remain lit. If the silencing switch is not a momentary-action-self-resetting type, upon correction of the trouble condition(s) the audible signal shall again sound until the silencing switch is returned to its normal position .

2.6.11.1 Receiver Monitoring for Integrity

The base station receiving/control equipment shall provide constant monitoring of the operating condition of the signal receivers, and shall indicate visually and audibly a trouble condition when sustained carrier (RF) in excess of 15 seconds is detected.

2.6.11.2 Power Monitoring for Integrity

Each network shall continuously monitor its primary and emergency power supplies. Any malfunction shall be indicated visually and audibly. An "open" in the battery circuit, or standby battery voltage below the level capable of sustaining network operations shall cause activation of network trouble signals.

2.6.11.3 Meters

Provide voltage and amperage indicators to monitor the status of the emergency DC power supply. When the battery rack is within clear sight of the operator's work station, a voltmeter and ammeter mounted at the battery rack will satisfy this requirement.

2.6.12 Component Connections

Provide receiving/control equipment with modular components to allow interchange of components for maintenance purposes. All interconnecting cables and connectors shall be compatible with computer quality signal data transmission.

2.6.13 Protective Finish

Provide factory finish on chassis, frames, and brackets associated with, or part of, network components.

2.6.14 Base Station Receiving or Control Network Antennas

Provide the required antenna system for each network including grounded lightning-protected, omnidirectional, coaxial antenna, together with all necessary mounting brackets and supports for installation; line static

arrester, and interconnecting cable in the necessary length for each receiver. Provide antennas for the dual networks with maximum separation at the emergency communication center. Antenna supporting structures shall comply with TIA-222. Provide antennas tuned to the operating frequency and designed to withstand destruction by natural elements under normal operating conditions. The complete antenna assemblies shall be corrosion resistant and designed for reliable operation under adverse climatic conditions including [161] [242] km/h [100] [150] mph winds, rain, ice, and snow storms. Antenna cable(s) shall be minimum 95 percent shielded type. Run antenna cables in galvanized rigid steel conduit.

2.6.15 Lightning Protection

Provide lightning arresters for base station antennas in accordance with NFPA 70. Base stations shall not exhibit mis-operation or failure when electrical transients of IEEE C62.41.1 and IEEE C62.41.2 Category B are applied to the AC power line. [Provide Metal Oxide Varistor (MOV) protection on all primary power circuits in accordance with IEEE C62.11.]

2.6.16 Field Programming Capability

Furnish field programming capability, including: Interconnecting cables, software, firmware, hardware, and manufacturer's licenses and passwords necessary to permit revisions to data stored in memory as follows: Addition or deletion of transmitters, changes in zone numbers and identification, changes in alarm level and displayed message (alarm vs. supervisory), alphanumeric label changes, and password changes, to be made by the Government after contract completion.

2.7 COMPUTER-AIDED DISPATCH (CAD) SYSTEM

****

NOTE: Except for larger consolidated communication centers, select the single CAD system option. If a new CAD system is not desired, delete these paragraphs. Consult the Federal Fire Chief to determine the requirement for a CAD system and the historical and anticipated daily (average and peak) call loading.

****

In the communication center emergency operations room, provide [one] [two] Class 3 CAD system[s] in compliance with NFPA 1221. Provide hardware, firmware, and software required for a complete and useable system. Provide IBMâ-compatible computer[s] with minimum 4 gigabyte hard drive, 100 megabyte or larger removable drive, 3.5" floppy disc drive, CD ROM drive, 56 Kbps modem, monitor, keyboard, and printer. Provide standard, commercially-available software loaded on the computer hard drive, and backed up on CD ROM. System shall be capable of accommodating an average load of [___] calls per 24 hour day and a peak load of [___] calls per hour.

2.7.1 Interconnection to Alarm System

Provide interconnection between CAD system[s] and radio alarm receiving/decoding networks [,and] [existing wired box circuits] [,and Enhanced 9-1-1 telephone system] so that alarms are automatically displayed on the CAD monitor screen and printed on the CAD printer as they are received.

2.7.2 Monitor and Keyboard

Provide color monitor, [___]mm inch or larger with [___] by [___] resolution. Provide ergonomically-designed soft-touch computer keyboard with wrist support.

2.7.3 Printer

Provide color laser printer, capable of printing [6] [_____] pages per minute in text mode. Printer shall use standard 216mm x 279 mm 8.5 in. x 11 in. [tractor-feed] [or][loose-leaf] paper.

2.7.4 Automatic Display

Upon automatic receipt of an alarm, system shall display and print the following:

Box number

Zone number (when applicable)

Type of alarm (fire, medical emergency, water flow, supervisory, etc.)

Building name or number

Street address

Nearest street intersection

Emergency response unit assignments by unit type and number for first, second, third, and subsequent alarms, including substitute unit(s) for normally-assigned unit(s) previously entered into the system by the telecommunicator as being in a status which makes them not available to respond.

Pre-Incident Planning Information/Special instructions for first-arriving units.

2.7.5 Manual Alarm Entry Capability

Provide system with manual alarm entry capability. The system shall enable the telecommunicator to enter alarm locations by any of the following: Building number, phantom box number, street address, nearest street intersection. When an alarm is manually entered, the system shall display and print information specified in paragraph entitled "Automatic Display".

2.7.6 Unit Status Tracking Capability

Provide system with unit status tracking capability . The system shall enable the telecommunicator to record changes in individual unit status (in-station, responding, on-scene, etc.) with no more than two keystrokes (not counting unit number) or mouse clicks.

2.7.7 Pre-Incident Plan Retrieval

Provide system with pre-incident planning storage and retrieval capability. The system shall enable the telecommunicator to access

pre-incident plans. For displayed alarm location, access to the pre-incident plan shall not require more than two keystrokes or mouse clicks.

2.7.8 Hazardous Materials Data Retrieval

Provide system with hazardous materials data storage and retrieval capability. The system shall enable the telecommunicator to access stored hazardous material database information.

2.7.9 Power Source

Provide power for CAD system [through a connection into the line side of the building's regular AC service circuit] [from the communication center emergency service circuit] through a dedicated lockable fused disconnect switch.

2.7.9.1 Uninterruptible Power Supply (UPS)

****

NOTE: Specify class of SEPSS based on requirements of NFPA 1221 Chapter 2 and NFPA 72 Chapter 1. A Class 0.25 SEPSS will provide power for 15 minutes, and is the minimum allowable. A Class 4.0 SEPSS will provide power for 4 hours, and is the minimum recommended at locations not provided with emergency generator backup power.

****

Provide a Type U, Level 1, Class [0.25] [4.0] [_____] Stored Emergency Power Supply System (SEPSS) in compliance with NFPA 111. SEPSS shall provide power for operation of CAD computer and monitor, and printer in the event of loss of power on the line side of the SEPSS.

[2.8 INTERCONNECTION WITH EXISTING COMPUTER-AIDED DISPATCH (CAD) SYSTEM

****

NOTE: Use this paragraph if there is an existing CAD system which is to be retained. Describe the existing system as precisely as possible. Otherwise, delete this paragraph.

****

2.8.1 Interconnection to Alarm Reporting System

Provide interconnection of radio alarm receiving/decoding networks with existing CAD system so that alarms are automatically processed by the CAD system, displayed on the CAD monitor screen, and printed on the CAD printer as they are received. Existing CAD system utilizes [_____] software, version [_____], and operates on a [_____] computer with [_____] MHz processor, [_____] hard drive, [_____] RAM, [_____] floppy disc drive[, and [_____] CD ROM drive. [[_____] ports are available for this connection.]]

][2.9 SURGE SUPPRESSION

****

NOTE: Specify surge suppression for projects administered by NAVFAC SE and for all areas with

high potential for lightning damage. Consult the EFD/EFA Fire Protection Engineer if additional guidance is needed.
****

Provide line voltage [and low voltage] surge suppression devices to suppress all voltage transients which might damage system transmitter[, CAD,] and receiving/control network components. Mount suppressors in separate enclosures adjacent to each transmitter[, computer,] and receiving/control network unless suppressors are specifically UL listed or FM approved for mounting inside the transmitter and receiving /control network enclosures and approved for such use by the radio system manufacturer. Provide line voltage suppressors which are UL 1449 listed having a maximum 330 volt clamping level and a maximum response time of 5 nanoseconds. Suppressors shall also meet IEEE C62.41.1 and IEEE C62.41.2 Category B tests for surge capacity. Suppressors shall be multi-stage type which include inductors and silicon avalanche zener diodes. Provide suppressors with long-life indicating lamp (light emitting diode or neon lamp) which extinguishes upon failure of the protection components. Fuses shall be externally accessible. Wire in series with the incoming power source ahead of the protected equipment, using screw terminations.

[Provide low voltage surge suppressors for all wired circuits which leave the building shell. When circuits connect two or more buildings, provide a suppressor at each circuit entrance to each building. Suppressors shall be UL 497B listed with a maximum 30 volt clamping level and a maximum response time of 5 nanoseconds and multi-stage construction having both differential and common-mode protection.]

]2.10 RADIO ALARM TRANSMITTER BATTERY CONDITIONER

Provide a battery conditioner for use in discharging and recharging batteries which have been removed from battery-powered radio alarm transmitters in accordance with the transmitter manufacturer's recommended maintenance procedures. Unit shall be self-regulating.

2.10.1 Capacity

The conditioner shall have the capacity to simultaneously recharge a minimum of five batteries from full discharge to full charge within 72 hours. The unit shall operate from 120 VAC, 60 Hz power.

2.10.2 Meter

The battery conditioner shall include a meter and selector switch for monitoring the voltage of any battery attached.

2.11 RADIO ALARM TRANSMITTER BATTERY LOAD TESTER

Provide a load tester capable of applying a load to a radio alarm transmitter battery sufficient to determine whether or not the battery has the capacity to operate a transmitter. The load tester shall have a receptacle for connecting radio alarm transmitter battery and shall include all meters and controls required. The load tester shall be permitted to be part of the radio alarm transmitter battery conditioner specified above.

2.12 SAFETY DISCONNECT SWITCH

Provide properly fused, safety-type disconnect switch and box with provision for locking the cover and operating handle in the "power on" position. Paint switch box "Fire Engine Red" and locate near the service panel. Affix a permanent label reading "Fire Alarm Power" to each box. Provide padlocks for locking the box cover and operating handle. Locks provided shall be keyed alike. Switch boxes installed outdoors shall be NEMA 3R type.

2.13 PROTECTED PREMISES CONTROL UNITS

****

NOTE: Survey each control unit to ensure that the necessary "dry" electrical contacts are available for connection to the radio transmitter; if not, the control unit must be modified in accordance with the recommendations of its manufacturer or replaced. Indicate on drawings which units require modification or replacement under this contract and include Section 28 31 60 INTERIOR FIRE ALARM SYSTEM, NON-ADDRESSABLE, Section 28 31 66 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, NON-ADDRESSABLE, Section 28 31 70 INTERIOR FIRE ALARM SYSTEM, ADDRESSABLE, [and] [or] Section 28 31 76 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, ADDRESSABLE as appropriate. Consult the EFD/EFA Fire Protection Engineer for additional guidance as needed.

****

****

NOTE: Edit the following section to provide connection to fire alarm control units (panels), suppression system control units, extinguishing system control units, and fire pump controllers, as appropriate. If all suppression and extinguishing system control units are connected to fire alarm systems in compliance with the applicable NFPA standards, separate connections between the suppression/extinguishing system and the radio transmitter are not required. If fire pump controllers are connected to fire alarm systems in such a way that the three separate alarm signals required by NFPA 20 can be transmitted to the fire/emergency communication center, separate connections between the radio transmitter and pump controller are not required.

****

****

NOTE: Indicate on the drawings the location of each control unit, how many separate signals (circuits) are to be connected to the radio transmitter, and the designation of each circuit as it should be annunciated at the communication center.

****

Fire alarm [and fire suppression/extinguishing system] control units [and fire pump controller] alarm and supervisory contacts are [existing] [or]

[specified in other sections.]

2.13.1 Fire Alarm Control Units

Provide connection to protected premises fire alarm control units as indicated in accordance with NFPA 72 and as specified herein. Provide separate alarm and supervisory circuits between radio transmitter and control unit. Actuation of control unit alarm contact shall cause transmission of a distinctly identifiable signal which shall be displayed and annunciated by the receiving networks specified herein as a protected premises alarm. Actuation of control unit common trouble contact shall cause transmission of a distinctly identifiable signal which shall be displayed and annunciated by the receiving networks specified herein as a supervisory signal.

[2.13.2 Fire Suppression/Extinguishing System Control Units

****

NOTE: Select the NFPA standard(s) applicable to the systems to which direct connections from the radio transmitters are to be made; delete standards not applicable. If all suppression and extinguishing system control units are connected to fire alarm control panels in compliance with the applicable NFPA codes and standards, separate connections between the suppression/extinguishing system and the radio transmitter are not required. If all connections are through building fire alarm systems, delete entire paragraph.

****

Provide connection to protected premises fire suppression/extinguishing system control units as indicated in accordance with [NFPA 12,] [NFPA 12A,] [NFPA 13,] [NFPA 17,] [NFPA 17A,] NFPA 72, [NFPA 2001,] and as specified herein. Provide separate alarm and supervisory circuits between radio transmitter and control unit. Actuation of control unit alarm contact shall cause transmission of a distinctly identifiable signal which shall be displayed and annunciated by the receiving networks specified herein as a protected premises alarm. Actuation of control unit common trouble contact shall cause transmission of a distinctly identifiable signal which shall be displayed and annunciated by the receiving networks specified herein as a supervisory signal.

][2.13.3 Fire Pump Control Units

****

NOTE: NFPA 20 requires the pump running alarm and two supervisory signals to be transmitted to a "constantly attended" location, which is usually the fire/emergency communication center at Navy and Marine Corps installations. If direct connections are to be provided from pump controller to radio transmitter, consult the controller wiring diagram for availability of "remote alarm" contacts; if all connections are through building fire alarm systems, delete this paragraph.

****

Provide connection to fire pump controllers as indicated in accordance

with NFPA 20, NFPA 72, and as specified herein. Provide separate alarm and supervisory circuits between radio transmitter and controller. Actuation of controller "pump running" contact shall cause transmission of a distinctly identifiable signal which shall be displayed and annunciated by the receiving networks specified herein as an alarm. Actuation of other controller remote alarm contacts required by NFPA 20 shall cause transmission of distinctly identifiable signals which shall be displayed and annunciated by the receiving networks specified herein as supervisory signals.

]2.14 DRY CONTACT INITIATING DEVICES

****

NOTE: Use the following paragraphs when new initiating devices must be provided for direct connection (not through a protected premises control unit) to radio transmitters, and there is no other need for inclusion of extinguishing system technical specification sections in the contract. Edit as appropriate for the project.

****

Provide connections from dry contact initiating devices to radio transmitters as indicated, in accordance with NFPA 72 and as specified herein. As used herein, the term "dry contact initiating device" shall be interpreted to mean a non-powered, contact-transfer initiating device, connected directly to a radio alarm transmitter specified herein in lieu of being connected to a protected premises system control unit. Such devices include, but are not limited to the following: Manual fire alarm boxes, sprinkler waterflow alarm initiating devices, fire extinguishing system discharge alarm initiating devices, valve position supervisory signal initiating devices, pressure supervisory signal initiating devices, water level supervisory signal initiating devices, and temperature supervisory signal initiating devices. Except as indicated, dry contact initiating devices are [existing where shown] [or] [specified in other sections].

[2.14.1 Sprinkler Waterflow Alarm Initiating Devices

Provide in accordance with NFPA 13, NFPA 25, NFPA 72, UL 346, and as specified herein. [Provide vane(paddle)-type water flow detectors mounted on wet system risers above system check valves where indicated. Provide device with adjustable mechanical diaphragm-controlled retard device.] [Provide pressure switches without retard device which respond to pressure increase on the water-motor alarm lines of dry pipe, preaction, and deluge valves where indicated; install switch on system side of alarm shutoff valve.] [Provide pressure switches with mechanical diaphragm-controlled retard device which respond to pressure increase on water motor alarm lines of wet pipe alarm check valves; install switch on the system side of the alarm shutoff valve.] Retard devices shall be adjustable from 0-90 seconds, and shall instantly recycle when pressure or flow is removed. Activation of device shall cause transmission of a distinctly identifiable signal which shall be displayed and annunciated by the receiving networks specified herein as an alarm. Provide devices with tamper-resistant covers.

]2.14.2 Fire Extinguishing System Discharge Alarm Initiating Devices

[Provide pressure sensing devices without retard mechanism on [gaseous,]

[wet chemical,] [dry chemical,] [and] [clean agent] fire extinguishing systems in accordance with [NFPA 12,] [NFPA 12A,][NFPA 17,] [NFPA 17A,] NFPA 72, [NFPA 2001] and extinguishing system manufacturer's instructions. Actuation of device shall cause transmission of a distinctly identifiable signal which shall be displayed and annunciated by the receiving networks specified herein as an alarm. Provide devices with tamper-resistant covers.]

[2.14.3 Valve Position Supervisory Initiating Devices

Provide where indicated in accordance with NFPA 13, NFPA 25, NFPA 72, UL 346, and as specified herein. Device contacts shall transfer from the normal position to the off-normal position during the first two revolutions of the hand wheel or when the valve stem has moved not more than one-fifth the distance from its normal position. Actuation of device shall cause transmission of a distinctly identifiable signal, which shall be displayed by the receiving networks specified herein as a supervisory signal. Provide devices with tamper-resistant covers.

][2.14.4 Pressure Supervisory Initiating Devices

Provide where indicated in accordance with NFPA 13, NFPA 25, NFPA 72, UL 346, and as specified herein. [Provide a combination shutoff/bleeder valve in the line ahead of the device for testing operation of the device. The valve shall be normally open. Closing the valve shall shut off the pressure supply to the device and exhaust the pressure between the switch and the valve. Actuation of device upon decrease of pressure below low set point [and increase of pressure above high set point] shall cause transmission of a distinctly identifiable signal which shall be displayed by the receiving networks specified herein as a supervisory signal. Provide devices with tamper-resistant covers.]

][2.14.5 Temperature Supervisory Signal Initiating Devices

Provide where indicated in accordance with [NFPA 22, NFPA 25] NFPA 72, UL 346, and as specified herein. Provide [air] [and][water] temperature supervisory devices with concealed set point, and tamper-resistant cover. Omit temperature indicator or conceal indicator within cover. Device shall not be adjustable below 8 degrees C 40 degrees F. Device shall be activated by temperature drop below set point. Actuation of device shall cause transmission of a distinctly identifiable signal, which shall be displayed by the receiving networks specified herein as a supervisory signal. [Mount air temperature device 1.5 m 5 feet above finished floor; provide insulating sub-base when mounting on exterior wall.]

][2.14.6 Water Level Supervisory Signal Initiating Devices

Provide where indicated in accordance with NFPA 13, NFPA 22, NFPA 25, NFPA 72, UL 346, and as specified herein. Device shall be activated by decrease in storage tank water level below [90] [_____] percent full. Actuation of device shall cause transmission of a distinctly identifiable signal, which shall be displayed by the receiving networks specified herein as a supervisory signal. Provide devices with tamper resistant covers.

]2.15 CONDUIT

2.15.1 Rigid Steel Conduit

ANSI C80.1

2.15.2 Intermediate Metal Conduit (IMC)

UL 1242, zinc-coated steel.

2.15.3 Electrical Metallic Tubing (EMT)

ANSI C80.3, zinc-coated steel.

[2.15.4 Surface Metal Raceway and Fittings

****
NOTE: Specify surface raceway only for retrofit applications where concealment of wire is impractical and raceway will not be subject to abuse or physical damage.
****

UL 5, two-piece painted steel, totally enclosed snap-cover type.

]2.16 OUTLET BOXES

UL 514A, zinc-coated steel.

2.17 FITTINGS FOR CONDUIT AND OUTLET BOXES

UL 514B, zinc-coated steel.

2.18 WIRING

****
NOTE: Do not allow stranded wire for projects under cognizance of Engineering Field Activity Northeast.
****

Provide in accordance with NFPA 70 and NFPA 72, and as specified herein. Wire for 120V circuits shall be No. 12 AWG minimum solid copper. Wire for low voltage DC circuits shall be No. [14] [16] AWG minimum [solid] [or] [stranded] copper. Insulation shall be 75 degrees C167 degrees Fminimum with nylon jacket. Color code all wiring.

2.19 GROUND RODS

UL 467. Provide ground rod for each radio alarm transmitter in accordance with the manufacturer's instructions. Rods shall be the sectional type, copper-encased steel, with a minimum diameter of 19 mm 3/4 inch and a minimum length of 3050 mm 10 feet. The rods shall have a hard, clean, smooth, continuous copper surface, and the proportion of copper shall be uniform throughout the length of the rod. The copper shall have a minimum wall thickness of 0.33 mm 0.013 inch at any point on the rod.

2.20 SPARE PARTS

Furnish the following spare parts:

a. [5] [_____] radio alarm transmitter batteries.

b. [5] [_____] interface device batteries (if separate interface devices are provided).

c. [2] [_____] transmitter antennas of each type provided.

d. [10] [_____] sets of fuses of each type and size provided.

e. 100 rolls or 16 reams of permanent record printing paper.

f. [2] [_____] radio alarm transmitters of each configuration required by this specification.

g. [10] [ ]complete sets of system keys.

PART 3 EXECUTION

3.1 RADIO FREQUENCY ASSIGNMENT

****

NOTE: OPNAV INSTRUCTION 2410.11H requires that funds shall not be obligated for procurement of radio equipment until radio frequency allocation authority has been obtained. Contact the Area Radio Frequency Coordinator to determine the availability of radio frequencies and to ensure that the using activity submits a DD Form 1494, APPLICATION FOR FREQUENCY ALLOCATION, for a Stage 1 ("Conceptual Development" allocation (See DD Form 1494 Preparation Guide) . Stage 1 allocation authority (i.e. approval) must be obtained prior to advertisement of the contract.

In the U.S., the 138-150.8 band is the preferred range since specific frequencies in this range are reserved for DOD use. Frequencies in the 162-174 MHz and 406-420 MHz bands are shared with other users on a first-come, first-served basis. Also the effectiveness of the 406-420 MHz band is limited to relatively short, line-of-sight transmissions, limiting its practicality at geographically larger installations. In order to avoid potential contract delays, the frequency assignment should be included in the specification when possible. In some cases it may be necessary for the designer to perform the analyses of available frequencies and then monitor the selected frequency using automatic recording equipment to verify that the selected frequency is clear. For additional information, contact the facility Communications Officer or the Naval Electronics System Command Code 08H.

****

****

NOTE: For installations outside U.S. territory, compliance with host nation's requirements is also required.

****

The Contractor shall provide technical assistance to the Area Radio Frequency Coordinator in completing DD Form 1494, APPLICATION FOR FREQUENCY ALLOCATION, for a Stage 4 allocation. Upon approval of this application by the Naval Electromagnetic Spectrum Center, a permanent operating frequency assignment will be made.

3.2 INSTALLATION

****

NOTE: Do not allow stranded wire for projects under cognizance of Engineering Field Activity Northeast.

****

Installation shall be in accordance with the requirements of NFPA 70, and NFPA 72. Unless indicated otherwise, provide all wiring and conduit new. Dress out all transmitters, and interface panels where provided, and new wiring in existing panels, in a professional manner with all wires running in a vertical or horizontal plane, cut to exact length, making all turns at 90 degree angles, and tightly bundled and tie wrapped. Make all terminations under screw terminals; pigtail or "T"-tap connections are prohibited. Use of crimped connectors is prohibited[, except where stranded wire is used, use of crimped connectors at termination points is required].

3.2.1 Conductor Identification

Distinctively color code each conductor used for the same specific function; each function color code shall remain consistent throughout. Use colors as directed by the Contracting Officer to match the existing base fire alarm color coding scheme. Identify conductors at every termination, junction, and splice by means of plastic coated self-sticking printed markers or by heat-shrink type sleeves. Attach markers in a manner that will prevent accidental detachment. Furnish a printed schedule of conductor markings identifying each wire marker, and the purpose, the origin, and the termination of each conductor; also include this information on the as-built drawings.

3.2.2 Conduit Installation

Run wiring in rigid steel conduit, steel intermediate metal conduit or steel electrical metallic tubing[, except surface mounted wiring shall be permitted in surface metal raceway in finished areas where indicated].

Do not run alarm circuits in the same conduit with non-alarm circuits. Do not run AC circuits in the same conduit with DC circuits. Run antenna cables alone in separate galvanized rigid steel conduit. Paint all junction box covers red and provide them with permanent rigid engraved labels reading "fire alarm circuit".

[3.2.3 Additional Installation Requirements

****

NOTE: Include this paragraph for all projects under the cognizance of NAVFAC SE.

****

Pull all conductors splice-free. Provide insulated barrier type terminal

strips at junction points. Use of wire nuts, crimped connectors, or twisting of conductors together is prohibited. Conduit shall not enter the top of a transmitter, control panel, or interface panel; provide conduit seals for all conduit terminating at a transmitter, control panel, or interface panel.

]3.3 PROGRAMMING

****
NOTE: Delete references to programming of CAD when no CAD system is specified.
****

Field program each receiving/control network with all system transmitter identity code numbers, zones on each transmitter, and appropriate message and audible alerting tone associated with each active zone, e.g. Box 1234; Zone 1- Water Flow (alarm tone), Zone 2 - Pump Running (alarm tone), Zone 3 - Pump Failure (alarm tone), Zone 4 - Pump Trouble (supervisory tone), Zone 5 - Valve Supervisory (supervisory tone), etc. Program transmitter automatic test times so that at least one test signal is received at the receiving/control network at not exceeding 60-minute intervals. [Field program each CAD computer with all data required for proper operation of CAD system as specified in the paragraph entitled "Computer-Aided Dispatch (CAD) System; obtain emergency response unit type/number and pre-incident plan information for each location and box number from the Federal Fire Chief .]

3.3.1 Programming Revisions During Preliminary Testing

During preliminary testing, if any programmed information is found to be incorrect, confusing, or misleading, revise programming to the satisfaction of the Fire Chief and the Contracting Officer.

3.3.2 Programming Revisions During the Final Acceptance Stage

During final acceptance testing, if any programmed information is found to be incorrect, confusing, or misleading, revise programming to the satisfaction of the Naval Facilities Engineering Command EFD/EFA Fire Protection Engineer.

3.4 FIELD TESTING

3.4.1 Tests During Installation

Conduct the following tests during installation of wiring and system components. Operational tests of powered system components shall be conducted both with normal power on and with emergency (battery) power on and normal power off. Correct any deficiencies found prior to requesting scheduling of final acceptance test.

a. Ground resistance: The resistance of each connection to ground shall be measured and shall not exceed 5 ohms.

b. Each antenna assembly and cable shall be checked at the transmitter or receiver connection for continuity, shorts, and grounds on the conductor and on the shield prior to connection to equipment. Assemblies failing these tests shall not be connected to equipment.

c. Radio emission frequency and band width of each transmitter shall be

tested to ensure proper operation on the assigned frequency.

d. Operation of each radio alarm transmitter function.

e. Operation of each interface panel zone (where interface panels are provided).

f. Operation of each protected premises control unit zone.

g. Operation of each initiating device circuit connected directly to a transmitter.

h. Operation of all supervisory features.

i. Operation of all features of each base receiving/control network.

j. Test all functions of the computer-aided dispatch (CAD) system to verify proper programming and operation.

3.4.2 Final Acceptance Test

The system shall have been in service for at least 30 days prior to the final inspection. Notify the Contracting Officer in writing when the system is ready for final acceptance tests. Notification shall be at least 15 days prior to the requested date of the final acceptance test. The system shall be considered ready for such testing only after all necessary preliminary tests have been made, all deficiencies found have been corrected to the satisfaction of the equipment manufacturer's technical representative, and written certification to that effect from the manufacturer's technical representative has been submitted to the Contracting Officer. The system shall be tested for approval in the presence of representatives of the manufacturer, the Contracting Officer, and the [EFD] [EFA] Fire Protection Engineer. Furnish all instruments, labor, and materials required for the tests. The technician and electrician who supervised the installation shall be present throughout the tests. Any deficiencies found shall be corrected and the system retested at no cost to the Government. All operational tests specified in paragraph entitled "Tests During Installation" shall be repeated as directed by the [EFD] [EFA] Fire Protection Engineer during conduct of final acceptance tests. Furnish all necessary appliances, equipment, instruments, devices, and personnel for this test. Furnish a minimum of three portable two-way radios operating on the same non-Government frequency .

3.5 ADDITIONAL TESTS

When deficiencies, defects or malfunctions develop during the tests required, all further testing of the system shall be suspended until proper adjustments, corrections or revisions have been made to assure proper performance of the system. If these adjustments, corrections or revisions require more than a nominal delay, the Contracting Officer shall be notified when the additional work has been completed to arrange a new final inspection and test of the fire alarm system. All tests required shall be repeated prior to final acceptance, unless directed otherwise. The Contractor shall bear full financial responsibility to the Government for all costs incurred by the Government as a result of reinspection and retesting of the system.

3.6 INSTRUCTION OF GOVERNMENT PERSONNEL

3.6.1 Instruction of Operating Personnel

****

NOTE: Consult the Federal Fire Chief regarding the number of shifts and number of personnel to be trained.

****

Train personnel who receive, process, and retransmit alarms at each communication center and emergency response facility which houses a radio alarm receiving/control network [or computer-aided dispatch system workstation] provided under this contract. This instruction shall be provided for [2] [3] alternating shifts, minimum of [8] [16] hours per shift, and shall include overview of functions of individual system components and the system as a whole; proper responses to the various types of messages which can be displayed; procedures for startup, operation, and shutdown of receiving/control network and CAD system; procedures for diagnosing and correcting operator-correctable malfunctions; procedures for restarting system after total power (primary and backup) power failure, and procedures for manually initiating system tests. In addition, train supervisory personnel on each shift, as designated by the Contracting Officer, in procedures for adding and deleting transmitters and related information from memory, [and] changing zone-specific messages[, and loading CAD data]. Training shall be performed by the manufacturer's technical representative(s) on-site using the equipment provided under this contract. At the conclusion of this training, certify by name and rank that each operator trained is qualified to operate the radio fire alarm receiving/control equipment[and the computer-aided dispatch system] provided under this contract.

3.6.2 Instruction of Maintenance Personnel

Instruct Government-designated maintenance personnel for a minimum of 16 total hours in the theory of operation, procedures for start-up, operation, and shutdown of each item of equipment; maintenance instructions; safety precautions; test procedures; field troubleshooting/diagnostic procedures; and repair procedures for field repairs that can be made by replacing plug-in components, covering the following:

a. Radio alarm transmitters

b. Radio alarm transmitter interface units, if not integral with transmitters.

c. Radio alarm receiving/decoding/control equipment.

d. All electronic assemblies which are part of the radio fire alarm system provided by the Contractor but not covered above.

Instruction shall be given by the manufacturer's technical representative using the documents specified in the paragraph entitled "Operation and Maintenance Manuals", and shall take place at the project site.

[3.6.3 Advanced Maintenance Training

Within one year of contract completion, provide [1] [2]

Government-designated maintenance personnel assigned to the site a complete technical repair training session of 40 hours covering repair of the radio alarm system equipment. The training shall include an in-depth explanation and review of the theory of operation, function, description, and trouble-shooting of all equipment provided down to the component level. Training shall include a review of manuals, drawings and parts lists , together with any clarifications required. At least one period of eight hours shall be spent trouble-shooting equipment with actual faults being introduced for training purposes. The instructional personnel providing training shall be certified by the related equipment manufacturer to provide technical instruction services. If the training is provided at the manufacturer's premises, the Government will furnish transportation, lodging, and meals for Government personnel.

] -- End of Section --