UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

SECTION 28 31 33

FIRE ALARM REPORTING SYSTEM, RADIO TYPE

08/23

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SECTION 28 31 33

FIRE ALARM REPORTING SYSTEM, RADIO TYPE
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****
NOTE: This guide specification covers the requirements for radio transmitted fire alarm reporting systems.

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).

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.

In 2022, discussions were held regarding which UFGS template specification sections should be developed or maintained related to fire alarm reporting systems. As a result of these discussions, the Department of Defense Fire Protection Engineering Working Group (FPEWG) determined that the technologies represented in Section 28 31 32 FIRE ALARM REPORTING SYSTEM, DIGITAL COMMUNICATOR TYPE and Section 28 31 33 FIRE ALARM REPORTING SYSTEM,

RADIO TYPE were the most appropriate technologies for which to maintain template specification sections. Based on the rate at which the fire alarm reporting system industry is changing, the FPEWG decided that it was prudent to hold off on developing an additional UFGS section for other technologies (such as internet protocol type systems) until more evidence-based requirements can be developed based on real-world system experience and advancement of NFPA 72 to include more prescriptive guidance on systems using other communication technologies. This is not intended to convey that use of other technologies is discouraged or prohibited. If the Qualified Fire Protection Engineer editing this specification, in consultation with the Designated Fire Protection Engineer, determines that another communication technology is best suited to meet the needs of the project, it is recommended that he or she choose one of the two existing UFGS sections and edit that section to include all pertinent information related to the chosen alternative technology.
****

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.

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-22 (2022) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2023) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM B695	(2021) Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

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)

NEMA ICS 6	(1993; R 2016) Industrial Control and Systems: Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 11	(2021; TIA 21-1; TIA 21-2) Standard for Low-, Medium- and High- Expansion Foam
NFPA 12	(2022) Standard on Carbon Dioxide Extinguishing Systems
NFPA 12A	(2022) Standard on Halon 1301 Fire Extinguishing Systems
NFPA 13	(2022; ERTA 3 2022) Standard for the Installation of Sprinkler Systems
NFPA 17	(2024) Standard for Dry Chemical Extinguishing Systems
NFPA 17A	(2024) Standard for Wet Chemical Extinguishing Systems
NFPA 20	(2022;TIA 21-1; TIA 21-2) Standard for the Installation of Stationary Pumps for Fire Protection
NFPA 70	(2023) National Electrical Code

NFPA 72	(2022; ERTA 22-1) National Fire Alarm and Signaling Code
NFPA 111	(2022) Standard on Stored Electrical Energy Emergency and Standby Power Systems
NFPA 170	(2021) Standard for Fire Safety and Emergency Symbols
NFPA 780	(2023) Standard for the Installation of Lightning Protection Systems
NFPA 1225	(2021) Standard for Emergency Services Communications
NFPA 2001	(2022) 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. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 15	Radio Frequency Devices

UNDERWRITERS LABORATORIES (UL)

UL 6	(2022) UL Standard for Safety Electrical Rigid Metal Conduit-Steel
UL 96	(2016; May 2023) UL Standard for Safety Lightning Protection Components
UL 96A	(2016; Reprint Oct 2022) UL Standard for Safety Installation Requirements for Lightning Protection Systems
UL 467	(2022) UL Standard for Safety Grounding and Bonding Equipment
UL 497B	(2004; Reprint Feb 2022) UL Standard for Safety Protectors for Data Communications and Fire Alarm Circuits
UL 514A	(2013; Reprint Jun 2022) UL Standard for Safety Metallic Outlet Boxes
UL 514B	(2012; Reprint May 2020) Conduit, Tubing and Cable Fittings

UL 797	(2007; Reprint Apr 2023) UL Standard for Safety Electrical Metallic Tubing -- Steel
UL 1242	(2006; Reprint Apr 2022) UL Standard for Safety Electrical Intermediate Metal Conduit -- Steel
UL 1449	(2021; Reprint Dec 2022) UL Standard for Safety Surge Protective Devices
UL Fire Prot Dir	(2012) Fire Protection Equipment Directory

1.2 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.
****
****
NOTE: Tailoring tags are used to add information specific to CAD systems when applicable.
****

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

Qualified Fire Protection Engineer's Qualifications; G[, [_____]]

Installer's Qualifications; G[, [_____]]

Supervisor's Qualifications; G[, [_____]]

Designer's Qualifications; G[, [_____]]

Structural Engineer's Qualifications; G[, [_____]]

SD-02 Shop Drawings

Shop Drawings; G[, [_____]]

SD-03 Product Data

Radio Fire Alarm Transmitter (Transceiver); G[, [_____]]

Transmitter Antenna; G[, [_____]]

Transmitter Antenna Cable; G[, [_____]]

Transmitter Interface Device; G[, [_____]]

Supervising Station Radio Fire Alarm Receiver (Transceiver); G[, [_____]]

Supervising Station Radio Fire Alarm Receiver (Transceiver) Antenna System; G[, [_____]]

Supervising Station Radio Fire Alarm Receiver (Transceiver) Antenna Supporting Structure; G[, [_____]]

Supervising Station Terminal; G[, [_____]]

Supervising Station Printer; G[, [_____]]

Uninterruptible Power Supply (UPS); G[, [_____]]

Fire Alarm Reporting System Peripheral Equipment; G[, [_____]]

Computer-Aided Dispatch (CAD) System; G[, [_____]]

SD-05 Design Data

Battery Calculations; G[, [_____]]

Foundation Data; G[, [_____]]

SD-06 Test Reports

Site Observation Report(s)

Test Procedures; G[, [_____]]

Request for Formal Inspection and Tests; G[, [_____]]

Final Test Report; G[, [_____]]

SD-07 Certificates

Current Listings or Approvals

SD-10 Operation and Maintenance Data

Operation And Maintenance Instructions; G[, [_____]]

SD-11 Closeout Submittals

Special Tools

Spare Parts Data

Spare Parts

As-Built Drawings; G[, [_____]]

Final QFPE Certification Letter

Training Certificates

Recordings

1.3 SUBMITTAL REQUIREMENTS

****

NOTE: Review Section 01 33 00 SUBMITTAL PROCEDURES (or the particular specification section for submittal procedures in this project) to ensure specific quantities and formats of submittals are included as desired. Coordinate with DFPE and Contracting Officer on required quantities and formats to be provided.

****

Provide submittals in quantities, formats, and transmission means as dictated by Section 01 33 00 SUBMITTAL PROCEDURES. Draw floor plans to a scale no less than 1:100 1/8 inch equals 1 foot. Utilize NFPA 170 compliant symbols.

Submit Shop Drawings (SD-02), Product Data (SD-03), and Calculations (SD-05) simultaneously. Submit all Product Data as a single combined package. Partial submittals; SD-02, SD-03, and SD-05 submittals not submitted simultaneously; and submittals not fully complying with the requirements of applicable NFPA standards and this specification; are not acceptable and may be returned without review at the discretion of the Contracting Officer.

1.3.1 Submittal Schedule

Submit all Preconstruction Submittals (SD-01) within [14][_____] days following Notice to Proceed and before any other classification of submittal. Provide submittals for SD-02, SD-03,[SD-04,] and SD-05 no

less than [21][_____] days prior to the proposed start of construction on the subject system. Provide other submittals as specified in other sections of this specification.

1.3.2 Shop Drawings

Provide shop drawings compliant with the Shop Drawings section of NFPA 72 and the following. Submit plan views showing system layout, including transmitting equipment, receiving equipment, interfacing equipment, terminal cabinet locations, junction boxes, other related equipment, raceway routing, wire color coding, wire counts, pathway identification in each raceway, pathway layouts, and end-of-line supervisory devices. Ensure drawings reflect the actual proposed wire and raceway routing as it will be installed in the field. Submit detailed point-to-point wiring diagrams showing all points of connection. Include connections between system devices, appliances, control panels, supervised devices, and all equipment that is activated or controlled by the panel in the diagrams. Provide mounting details for each type of transmitter and antenna. Show a single-line system riser diagram. Provide each transmitter and receiver on the riser with an identification number indicating its building number. Indicate connection of equipment by pathway runs or raceway runs.

Show data essential for proper installation of each system. Show details, plan views, elevations and sections of the systems. Submit plan view and cross-section of supervising station operations room, showing all [new and retained existing]equipment and furnishings, drawn in 1:50 1/4 inch equals 1 foot or larger scale.

1.3.3 Product Data

Provide manufacturer's product data sheets for each system component to be provided, including at least each item specified herein. Annotate product data sheets to indicate precise equipment that is to be provided, including an indication of all options selected.

1.3.4 Design Data

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

Submit foundation data to substantiate that the foundation designs for supervising station radio fire alarm receiver (transceiver) antenna support structures are adequate to withstand the anticipated environmental conditions and equipment loads.

1.3.5 Test Reports

Submit reports for inspections and tests specified under paragraphs titled "INTERIM CONSTRUCTION OBSERVATION VISIT[S]" and "TESTING". Submit test reports in booklet form showing field tests performed to prove compliance with the specified performance criteria upon completion and testing of the installed system. Document readings, test results, and the final position of controls on each test report.

1.3.6 Certificates

Submit copies of current listings or approvals for all equipment furnished. Submit listing or approval documentation from a nationally

recognized testing laboratory for transmitters, interface equipment, and receiving and control equipment showing that such equipment is listed or approved for use together as an integrated system.

1.3.7 Operation and Maintenance Data (O&M)

Submit the Operation and Maintenance Instructions indexed and in booklet form as a single volume or in separate volumes. Inscribe the following identification on the cover: the words "FIRE ALARM REPORTING OPERATION AND MAINTENANCE MANUAL", the location of the building, the name of the Contractor, the system manufacturer, and the contract number. Provide instructions that are legible and easily read, with large sheets of drawings folded in. Provide submittals for SD-10 at least [21][_____] days prior to the proposed start of training. Do not provide training prior to approval of SD-10 submittals. Include the following in the Operation and Maintenance Instructions:

a. "Data Package Five" as specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA.

b. Operating manual outlining step-by-step procedures required for system startup, operation, and shutdown. Include the manufacturer's name, model number, service manual, parts list, and complete description of equipment and its basic operating features in each manual.

c. Maintenance manual listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guide. Include raceway layout, equipment layout, and simplified wiring and control diagrams of the system as installed in each manual.

d. A list of parts and tools that should be kept in stock by the owner for routine maintenance, including the name of a local supplier and recommended service organization (including address and telephone number) for each item of equipment. Ensure that each service organization submitted is capable of providing [four-hour][[_____]-hour] on-site response to a service call on an emergency basis.

e. Complete procedures for system revision and expansion, detailing both equipment and software requirements.

f. Software for this project on CD or DVD media.

g. Printouts of configuration settings for all devices and appliances.

****

NOTE: Ensure that all data on routine maintenance checklist (devices, appliances, testing frequencies, etc.) complies with UFC 3-601-02: FIRE PROTECTION SYSTEMS INSPECTION, TESTING, AND MAINTENANCE.

****

h. Routine maintenance checklist arranged in a columnar format. List all installed devices and appliances in the first column, state the maintenance activity or state no maintenance required in the second column, state the frequency of the maintenance activity in the third column, and provide a fourth column for additional comments or reference.

1.3.8 As-Built Drawings

Show the system as installed, including deviations from both the Contract Drawings and the approved shop drawings. Ensure the accuracy of the as-built drawings is plus or minus 150 mm 6 inches for all device, appliance, and equipment locations, and plus or minus 300 mm 12 inches for all raceway and wire runs.

a. Prepare the drawings in the same format, size, and layout as the approved shop drawings.

b. Include complete wiring diagrams showing connections between devices, appliances, and equipment, both factory and field wired.

c. Include a riser diagram and drawings showing the as-built location of devices, appliances, and equipment.

1.4 SPECIAL TOOLS AND SPARE PARTS

Furnish special tools necessary for the maintenance of the equipment. Submit spare parts data for each different item of material and equipment specified, after approval of shop drawings, and not later than [60][_____] days prior to the anticipated date of beneficial occupancy. Include a complete list of parts and supplies with the current unit prices and source of supply and a list of the parts recommended by the manufacturer to be replaced after [one][_____] year[s] of service.

Provide the following spare parts:

****
NOTE: Edit this list as desired by the contracting organization. Generally, spare parts are discouraged by UFC 1-300-02: UNIFIED FACILITIES GUIDE SPECIFICATIONS (UFGS) FORMAT STANDARD, but some hard to replace or easily lost items may be warranted for inclusion.
****

a. [Two][_____] radio transmitters of each configuration provided.

b. [Two][_____] radio receivers of each configuration provided.

c. [Two][_____] radio transmitter interface devices of each configuration provided.

d. [Two][_____] radio transmitter antennas of each type provided.

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

f. [Five][_____] lamps of each type provided.

g. [16][_____] reams of permanent record printing paper.

h. [10][_____] complete sets of system keys.

1.5 QUALITY ASSURANCE

1.5.1 Materials

[Provide materials and workmanship conforming 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 radio fire alarm reporting system.

****
NOTE: For OCONUS projects, use the blank brackets to insert local certification organizations that are considered equivalent to United States (U.S.) Nationally Recognized Testing Laboratories (NRTLs) for your project.
****

Ensure all devices, appliances, and equipment for fire alarm service are listed by [a Nationally Recognized Testing Laboratory (NRTL)][_____] for their intended purpose.

1.5.2 Codes, Standards, and Manufacturer's Literature

Provide the system in accordance with NFPA 70, NFPA 72,[NFPA 1225,] and as specified herein. Interpret reference to "authority having jurisdiction" to mean the Contracting Officer.

Follow all recommended installation and start-up practices stated in the manufacturer's literature or documentation.

1.5.3 Qualifications

1.5.3.1 Qualified Fire Protection Engineer (QFPE)

****
NOTE: For large and complex projects, it is advisable for the QFPE to be directly hired by the General Contractor as an integral part of the General Contractor's team for identifying and incorporating all of the fire protection and life safety requirements for the project. The General Contractor should clearly identify a single firm (or individual) designated as the QFPE for the project. The General Contractor should not separate the responsibilities of the QFPE, as established in UFC 3-600-01: FIRE PROTECTION ENGINEERING FOR FACILITIES, among multiple subcontractors.
****
****
NOTE: It is strongly recommended that the specification writer coordinate closely with the Government's Designated Fire Protection Engineer (DFPE) regarding QFPE expectations to be included in this specification.
****

Provide the services of a Qualified Fire Protection Engineer (QFPE). A QFPE is an individual who is a licensed Professional Engineer (P.E.), who

has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveying (NCEES) and has relevant fire protection engineering experience. Ensure that the QFPE is an integral part of the construction team and is involved in every aspect of the system's submittals, installation, and testing. Submit the Qualified Fire Protection Engineer's Qualifications, including the name and documentation of qualifications of the proposed QFPE.

Ensure that the QFPE:

****
NOTE: UFC 3-600-01: FIRE PROTECTION ENGINEERING FOR FACILITIES requires that shop drawings, calculations, and material data sheets bear the Review Stamp of the QFPE prior to submission to the Government for approval. For Army projects, the QFPE is also required to apply their Professional Engineer seal and signature to the shop drawings, calculations, and material data sheets prior to submission to the Government for approval.
****

a. Reviews all required shop drawings, material data, calculations, qualifications, test procedures, test reports, as-built drawings, and O&M manuals for completeness and compliance with the provisions of this Contract prior to submitting them to the Government. Ensure that construction (shop) drawings and calculations are prepared by, or prepared under the immediate supervision of, the QFPE. Affix the QFPE's [review stamp][and][Professional Engineer seal with signature] to the shop drawings, calculations, and material data sheets, indicating approval prior to submitting them to the Government.

b. Provides a letter documenting that the SD-02, SD-03, and SD-05 submittal package has been reviewed and note any outstanding comments.

c. Performs in-progress construction surveillance prior to installation of ceilings (rough-in inspection)[or closure of trenches]. Performs at least [one][_____] interim site observation visit[s] prior to completion of installation, separate from the preliminary testing, to confirm that all systems are being installed in accordance with the Contract.

d. Witnesses and approves all preliminary and final functional performance testing and performs a final installation review.

e. Signs all certificates under SD-07.

f. Attends training sessions presented as a part of this project to answer questions that may arise.

1.5.3.2 Installer

****
NOTE: Consult with the DFPE for guidance on when to include the UL certification requirements for the Installer.
****

Provide an Installer that is qualified as required by the Personnel Qualifications section of NFPA 72 and the following. Submit the Installer's Qualifications including written certificate demonstrating that the radio fire alarm reporting system Installer has been regularly engaged in the installation of radio fire alarm reporting systems meeting NFPA standards for a minimum of three years immediately preceding commencement of this contract. Include proof of satisfactory performance on at least three projects similar to that required by these specifications, including the names and telephone numbers of using agency points of contact for each of these projects. Indicate the type of each system installed and include a written certification that each system has performed satisfactorily in the manner specified for a period of not less than 18 months following completion.[Listing of the Installer under "Protective Signaling Services - Local, Auxiliary, Remote Station Proprietary (UUJS)" or under "Protective Signaling Services - Central Station (UUFX)" of the UL Fire Prot Dir will be accepted as equivalent proof of compliance with the stated experience requirements.][Ensure that the installer is UL certified for the installation and testing of the fire alarm systems. Provide proof of this listing. Provide a list of installer's personnel as part of the submittal package under the subparagraph titled "Certificates".] Ensure Installer is able to provide service within 24 hours.

1.5.3.3 Supervisor

Provide the services of a qualified technician, factory trained, certified, and 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.

Submit the Supervisor's Qualifications including name(s) of the Supervisor(s) who will oversee 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).

1.5.3.4 Designer

Provide a Designer that is qualified as required by the Personnel Qualifications section of NFPA 72 and the following. Prepare shop drawings, product data, design data, O&M manual(s), and as-built drawings by, or under the supervision of, a qualified technician. A qualified technician is 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][IV] certification in fire alarm systems, or holds an equivalent certification and training acceptable to the Contracting Officer. Submit the Designer's Qualifications including the name and documentation of certification of the proposed Designer.

[1.5.3.5 Structural Engineer

Provide a registered professional Structural Engineer to design the supervising station radio fire alarm receiver (transceiver) antenna supporting structure to resist all environmental loads, including site-specific wind and seismic forces. Include the engineer's name, signature, and Professional Engineer number on all final design documents. Submit the Structural Engineer's Qualifications including the

name and documentation of qualifications of the proposed Structural Engineer.

]1.6 DELIVERY, STORAGE, AND HANDLING

Protect equipment delivered and placed in storage from the weather, humidity and temperature variations, dirt, dust, and other contaminants.[Do not store poles on ground. Support poles so they are at least 300 mm 12 inches above ground level and growing vegetation. Do not remove factory-applied pole wrappings until just before installing the pole.]

[1.7 CONTINUITY OF PROTECTION

Ensure no loss of function of the existing Installation fire alarm reporting system, or of the protected premises alarm[and fire suppression or fire extinguishing] system[s] connected thereto occurs during installation of this system. Ensure that transfer of protected premises system connections from the existing Installation fire alarm reporting system does not result in loss of signal transmitting or receiving capability. Temporary interruption of individual protected premises systems connections, not to exceed eight hours in duration, will be permitted with the approval of the Contracting Officer. No interruption of alarm or communications functions at the supervising station will be permitted.

][1.8 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.
****

1.8.1 Interconnection to Fire Alarm Reporting System

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

]PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide a complete, supervised, radio-based fire alarm reporting system complying with NFPA 70, NFPA 72,[NFPA 1225,] and this specification, consisting of remote radio alarm transmitters connected to each building fire alarm control unit and a radio alarm receiver system at a supervising station. Provide spare radio alarm receivers at the supervising station in accordance with NFPA 72. Provide system connections to protected premises fire alarm system[and fire suppression or fire extinguishing system] control units.[New protected premises fire alarm systems are specified in Section [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].] System is 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, interpret the term "transmitter" as used in this section to mean "transmitter and receiver" or "transceiver".

2.1.1 Operation

Ensure the receiving system is activated into the active signal mode when an abnormal condition occurs in any building fire alarm system. Ensure the receiving system remains in the active signal mode until the active signal is acknowledged and reset by the operator. Configure the fire alarm reporting system in accordance with NFPA 72. Ensure the transmitting equipment is compatible with receiving equipment.

2.1.2 Active Signal Functions

****

NOTE: Coordinate with the local fire department or other authority responsible for the fire alarm reporting system to determine which signal or signals are required to be transmitted to the supervising station.

****

Ensure that an alarm, trouble, or supervisory condition in any building which reports to the supervising station automatically initiates the following functions:

a. Transmission of a signal by the radio alarm transmitter. Ensure the radio alarm transmitter establishes or maintains communication pathways with the radio alarm receiver at the supervising station, and transmits the message associated with the active signal.[Ensure that upon failure to connect with the radio alarm receiver using the primary communication pathway, the radio alarm transmitter attempts to connect via the secondary communication pathway.]

b. Ensure that upon receipt of the signal at the supervising station the signal is decoded and status information is displayed on the supervising station visual display indicating the nature of the status change.

c. Sound an audible signal at the supervising station until the signal is acknowledged.

[d. Print the signal information on the system printer at the supervising station.

]2.2 STANDARD PRODUCTS

Provide radio transmitting, receiving, and decoding equipment that are the current products of one manufacturer regularly engaged in production of such equipment and that essentially duplicate items that have been in satisfactory use for at least two years prior to contract award. Provide all other materials and equipment that are the current products of one or more manufacturers regularly engaged in production of such materials and equipment. Provide solid state electronics. Provide equipment used to

interconnect the fire alarm reporting system with protected premises fire alarm system [and fire suppression or fire extinguishing system]control units that is [NRTL][_____] listed for that service; or provide all equipment that is [NRTL][_____] listed as a Supervising Station Fire Alarm System. Ensure that radio transmitters and receivers comply with all requirements for Federal Communications Commission (FCC) Type Acceptance, except that they must be capable of operation in the military frequency bandwidths and at the power output specified herein. Supervise and operate the radio communication link in accordance with NFPA 72. Provide electrical supervision for all pathways and for all components critical for system operation.

2.3 NAMEPLATES

Provide the manufacturer's name, address, type or style, voltage and current rating, and catalog number on a corrosion-proof and non-heat-sensitive plate which is securely attached to all major components of equipment.[Provide the English translation on each label provided in any language other than English.]

2.4 RADIO FIRE ALARM TRANSMITTER (TRANSCEIVER)

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NOTE: The requirement to provide printed circuit boards with a non-nutrient conformal coating should be considered based on the anticipated ambient conditions to which the circuit boards will be exposed. Consider whether these environmental conditions may be more easily offset by the use of a more robust enclosure. Historically, Navy and Marine Corps preference was to provide such coatings on all installations. Consult with the DFPE for project specific requirements.

****

Provide Radio Fire Alarm Transmitters that are compatible with the Supervising Station Radio Fire Alarm Receiver (Transceiver). Ensure each transmitter is the manufacturer's recognized commercial product, completely assembled, wired, factory tested, and delivered ready for installation and operation. Provide transmitters in accordance with applicable portions of NFPA 72 and FCC 47 CFR 15. Ensure transmitter electronics modules are contained within the physical housing as an integral, removable assembly.[At the Contractor's option, and if listed, the transmitter may be housed in the same enclosure as the fire alarm control unit.][Provide printed circuit boards in transmitters with a non-nutrient conformal coating for protection against moisture and fungus. Ensure that the coating is suitable for the climate in which the equipment is to operate and apply it at the factory in accordance with the coating manufacturer's specifications.][Provide interface device for DACT to be compatible with existing system.]

2.4.1 Frequency

****

NOTE: Department of Defense (DoD) Instructions require the submission of a DD Form 1494, APPLICATION FOR FREQUENCY ALLOCATION, and assignment of an operating frequency(ies) to be completed by the Government. This process is required to be

completed prior to solicitation of a project for construction, and is preferred to have been completed during the planning phase of the project (prior to design). Each Agency has their own process for submitting this form and obtaining frequency assignment(s). The editor of this specification must coordinate with the Contracting Officer to obtain this information.

****

NOTE: In the U.S., the 138-150 MHz eight 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.

****

NOTE: Do not assume that an existing system's frequency assignment will automatically carry over to a new system being installed. It is possible that an existing system is permitted to continue using a given frequency that has been traded away by the DoD as a legacy system, but the same Installation will not be permitted to use that same frequency for a new system.

****

NOTE: For Installations outside U.S. territory, compliance with host nation requirements is also mandatory.

****

Provide a narrowband radio transmitter with FCC certification for narrowband operation that meets the requirements of the National Telecommunications and Information Administration (NTIA) Manual of Regulations for Federal Radiofrequency Spectrum Management (MRPFRFM). Ensure transmitters operate on any frequency within the [138-150.8 or 162-174 MHz][406-420 MHz][_____] band and are operable within a 12.5 kHz channel. The specific frequency must be [[_____] MHz][as directed by the Contracting Officer, within [90][_____] days following submission of completed application for frequency allocation following contract award]. If two-way transmitter and receivers are provided to fulfill the requirements as specified herein for radio fire alarm transmitters, ensure they transmit and receive on separate frequencies. The second frequency must be [[_____] MHz][as directed by the Contracting Officer, within [90][_____] days following submission of completed application for frequency allocation following contract award].

2.4.2 RF Power Output

Provide transmitters with radio frequency (RF) power output required for reliable reception or one watt, whichever is greater.

2.4.3 Primary Power

****

NOTE: The voltage available at each building must be verified. If [100-120][200-240] VAC [60][50] Hz service is not available at certain buildings, the need for transformers must be noted on the Contract Drawings.

****

Operate each transmitter from [100-120][200-240] Volt (V) Alternating Current (AC) [60][50] Hertz (Hz) power. In the event of [100-120][200-240] VAC power loss, automatically switch the transmitter to battery operation. Accomplish switchover with no interruption of protective service and automatically transmit a trouble message. Transmit a trouble message in no less than 200 seconds following loss of AC power for a duration longer than 60 seconds. Upon restoration of AC power, automatically transfer back to normal AC power supply and recharge the battery. Ensure the battery charger is capable of restoring the batteries from full discharge to full charge within [48][_____] hours while the transmitter is operating under normal conditions. Install the converter or battery charger within the transmitter housing. Power supply transient voltage surge suppression must be provided. Provide transmitters with power supply filtering to prevent false message transmissions caused by transient or steady-state electrical disturbances.

2.4.4 Battery Power

Provide transmitter standby battery capacity sufficient to operate the transmitter[and interface device] in a normal standby status for a minimum of [48][_____] hours and be capable of transmitting signals during that period. Provide maintenance-free, [valve-regulated lead-acid][_____] type batteries. Submit substantiating battery calculations for supervisory and alarm power requirements. Include the ampere-hour requirements for each system component, each panel component, and the battery recharging period. Ensure that each fire alarm transmitter constantly monitors and supervises its own battery power supply. Report a low-battery condition when battery voltage falls below the minimum voltage prescribed by the manufacturer, or 85 percent of the rated voltage, whichever is higher.

2.4.5 Environmental Operating Requirements

****

NOTE: Check local conditions for design wind gust and ice loading. Lowest design wind speed is 160 km/hour 100 mph; typical design wind speed is 201 km/hour 125 mph.

****

Design transmitters not installed within climate-controlled spaces for reliable operation in an ambient temperature range of [-30][-40][_____] to [60][_____] degrees C [-22][-40][_____] to [140][_____] degrees F, a maximum ambient humidity of at least [85][_____] percent at [30][_____] degrees C [86][_____] degrees F, and under adverse climatic conditions including [161][201][_____] km per hour [100][125][_____] mph winds, ice, rain, and snow storms.

2.4.6 Housing

****

NOTE: NEMA 1 enclosures should provide the necessary protection for most indoor applications. Upgrading to NEMA 3R, 4, or 4X should only be required if warranted based on anticipated exposed conditions. If locations are deemed to require a NEMA type other than NEMA 1, they must be shown on the Contract Drawings.

****

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 as indicated on the Contract Drawings. If no NEMA type is indicated on the Contract Drawings, provide NEMA Type 1 enclosures. Design transmitter housings for universal mounting on walls, poles, or pedestals. Utilize [lag bolts][,][or][anchor bolts][,][or][stainless steel banding][,][or][mounting brackets][,][or][a shackle and bolt combination] for mounting. Provide enclosures with raceway 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.[Protect internal components from vandalism by a tamper-proof lock on the transmitter housing.] Key locks for all transmitters of each configuration provided alike. Ensure that the housing allows access to all internal components for testing, servicing, and replacement at the installation site. Ensure access door(s) swing open through at least a 2.1 rad 120 degree arc. Factory paint the enclosure with a priming coat and not less than two coats of a durable weatherproof enamel or factory powder coat the enclosure. Ensure the finish color is Fire Engine Red, similar to color number 11105 under 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.][Monitor the housing for tampering and automatically transmit a tamper message when a tamper switch is tripped in the transmitter housing.]

2.4.7 Communication

a. Provide transmitters that are capable of being connected to and receiving signal inputs from[existing][and][new] fire alarm control units.

b. Provide transmitters that are a standard design which allows the immediate transmission of all initiated signals.

c. Provide transmitters with memory capability to store at least [50][_____] discrete events automatically in non-volatile memory such that multiple, simultaneous signals do not result in the loss of any messages. Store messages until they are transmitted.

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

****

NOTE: The quantity of transmitters or transceivers

permitted to be connected to the receiving system is based on the Type of system as classified under NFPA 72.

****

e. Ensure each transmitter transmits a distinct identity code as part of all signals emanating from the transmitter. Provide identity codes that support no less than [512][128][_____] transmitters per frequency in use. Ensure that setting the code is readily accomplishable in the field without the need to exchange or alter circuit boards.[Program the specific code for each transmitter as shown on the Contract Drawings.][Submit in writing, [with the shop drawing submittal][within 30 calendar days after award], the proposed specific code for each transmitter.][Obtain the code for each transmitter from the Federal Fire Department serving the Installation.]

f. Transmit messages upon automatic actuation of the transmitter. Individually identify the building and zone causing actuation as part of this transmission. Ensure that the transmitter is capable of identifying and transmitting a minimum of the following status messages, as applicable for each respective building:

****

NOTE: The required list of signals that the system must be capable of sending should be edited to match the specific requirements of each project. There may be more or less detail required. The intent of this list is not to define how to program each of these devices or signals, but merely to list all of the messages that may need to be transmitted by the equipment.

****

(1) Primary Power Failure

(2) Primary Power Restoration

(3) Battery Fault

(4) Battery Restoration

(5) Communication Failure

(6) Communication Restoration

[(7) Manual Pull Station Alarm

][(8) General Smoke Sensor Alarm

][(9) Duct Type Smoke Sensor Supervisory

][(10) Damper Control Smoke Sensor Supervisory

][(11) Door Hold Open Release Smoke Sensor Supervisory

][(12) Sleeping Room Smoke Sensor Supervisory

][(13) Waterflow Switch Alarm

][(14) Carbon Monoxide Sensor Alarm

][(15) Gas Sensor Alarm

][(16) Aspirating Smoke Sensor Alert

(17) Aspirating Smoke Sensor Fire 1 Alarm

(18) Aspirating Smoke Sensor Fire 2 Alarm

(19) Aspirating Smoke Sensor Trouble

][(20) Fire Pump Running

(21) Fire Pump System Supervisory

][(22) Water Tank Low Level Supervisory

][(23) Water Tank Low Temperature Supervisory

][(24) Kitchen Hood Suppression System Activation Alarm

(25) Kitchen Hood Suppression System Trouble

][(26) Mass Notification Message Activated with Active Fire Alarm

][(27) Fire Suppression Containment Supervisory

][(28) Foam System Supervisory

(29) Foam System Disabled Supervisory

[(30) Manual Foam Release Start Station Alarm

][(31) Optical Flame Detector Alarm

][(32) Optical Flame Detector Inhibited Supervisory

][(33) Foam System Flow Switch Alarm

][(34) Foam Stop Station Active Supervisory

] (35) Foam System Trouble

(36) Foam System Release Alarm

][(37) Clean Agent System Alarm

(38) Clean Agent System Supervisory

(39) Clean Agent System Trouble

[(40) Clean Agent System Stop Station Active Supervisory

][(41) Clean Agent System Release Disabled Supervisory

][(42) Clean Agent System Release Alarm

]][(43) Smoke Control System Active

(44) Smoke Control System Fault

][(45) Valve Supervisory Switch Supervisory

] (46) General Alarm

(47) General Supervisory

(48) General Trouble

(49) Any Additional Signals Called for on the Contract Drawings

[(50) [_____]

] 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.

g. Provide transmitters with clearly distinguishable red alarm and amber trouble illuminating indicators to indicate the status of each initiating zone.

h. Supervise transmitter communications in accordance with NFPA 72. Provide supervision to ensure that all status changes, including communication channel failures, are transmitted within 200 seconds. Ensure that interface wiring is such that a trouble indication on the fire alarm control unit will not disrupt the transmission capability of alarm or supervisory messages. Ensure that status changes on monitoring zones occur within 60 seconds of fire alarm control unit activation. Ensure that all signals transmitted from the transmitter are received and recorded at the receiving station within 90 seconds.

****

NOTE: Test signals should be sent at least once every hour for single communication path systems. Systems that use multiple communication paths may extend their time period between test signals to once every six hours per NFPA 72.

****

i. Provide transmitters which automatically transmit a test signal at least once in each [one][six]-hour period. Provide transmitters that also allow manual actuation of a test signal by a secured (not publicly accessible) means. Initiate automatic actuation by a solid state programmable electronic device. Ensure that stability of the electronic device is plus or minus one minute per month or better. Ensure that test time(s) are programmable without removing the transmitter from the enclosure. Ensure that the test is initiated at the transmitter for one-way radio systems; and that the automatic test is part of the normal polling and interrogation function for two-way polling and interrogation systems.

j. Ensure that each transmitter monitors the integrity of pathways between the transmitter and the protected premises control unit(s). Ensure that a ground-fault or a break (open condition) in any of the above pathways causes a trouble condition at the transmitter. Provide transmitters capable of supporting [Class A][,][and][Class X][,][and][Class B] pathway arrangements. Ensure that pathway

connections to the transmitter utilize manufacturer installed terminations. Do not field modify pathway terminals.

k. Provide transmitters with local audible trouble signal, visual amber trouble signal(s), and audible signal silencing switch. Ensure that lamps are the light emitting diode type. Lamps need not be visible with the access door closed. Upon occurrence of a trouble condition as defined in NFPA 72, ensure that the transmitter transmits a trouble signal, a local audible trouble signal sounds, and a visual trouble signal illuminates. When silencing switch is operated, silence the audible trouble signal, and ensure that the visual trouble signal(s) remain(s) lit. If the silencing switch is not a momentary-action-self-resetting type, upon correction of the trouble condition(s) sound the audible signal again until the silencing switch is returned to its normal position.

l. Ensure that alarm messages take precedence over supervisory messages.

m. Ensure that supervisory messages take precedence over trouble messages.

[2.4.8 Zone Disconnecting Means

Provide transmitters with switches to disconnect individual zone inputs from the transmitter without disconnecting wiring. Ensure that disconnecting a zone causes a trouble condition which initiates transmission of a trouble signal and actuates local audible and visual trouble signals.

]2.5 TRANSMITTER ANTENNA

Provide [omnidirectional, coaxial, halfwave dipole antennas][_____] for radio fire alarm transmitters with a driving point impedance to match transmitter output. Provide corrosion resistant antenna and antenna mounts designed to withstand wind velocities of [161][201][_____] km per hour [100][125][_____] mph. Do not mount antennas to any portion of the building roofing system. Protect the antenna from physical damage.

2.6 TRANSMITTER ANTENNA CABLE

Provide RG8U or RG58U, minimum 95 percent shielded coaxial cables utilizing PL-259 connectors, unless required otherwise by the manufacturer's written recommendations. Protect connectors against moisture. Provide no splices in any cable. Do not use crimp-type connectors. Run fire alarm reporting system cables alone in separate raceway from cable for other systems.

[2.7 TRANSMITTER INTERFACE DEVICE

When direct connection between the building fire alarm control unit and the transmitter is not possible, provide a means of converting the signals available from the local control equipment into a form that is compatible with the transmitter inputs, while still maintaining electrical supervision of the entire system. Provide interface devices that are completely assembled, wired, tested at the factory, and delivered ready for installation and operation.

2.7.1 Enclosure

When furnished as an independent self-contained device, incorporate the

interface device into an enclosure conforming to NEMA ICS 6 or other national standard as required by its location.

2.7.2 Indicators

Provide red alarm and amber trouble illuminating indicators to indicate alarm and trouble conditions. Ensure the indicators are visible during daylight hours and clearly indicate the reporting zone.

2.7.3 Access

Ensure that switches and other controls are not accessible without the use of a key. Provide access to controls by unlocking and opening a panel or door.

2.7.4 Mounting

Design interface housings for universal mounting on walls, poles, or pedestals. Utilize [lag bolts][,][or][anchor bolts][,][or][stainless steel banding][,][or][mounting brackets][,][or][a shackle and bolt combination] for mounting.

2.7.5 Inputs and Outputs

Provide at least the number of signal pathway inputs and outputs necessary to ensure a functional system in accordance with the Contract Documents at each interface panel. Arrange each input pathway so that the alarm signals override the supervisory and trouble signals.

]2.8 SUPERVISING STATION RADIO FIRE ALARM RECEIVER (TRANSCEIVER)

Provide [two][_____] identical master radio fire alarm transceiver systems compatible with transmitter frequency.[Install [both][_____] transceivers at the main supervising station.][Install [one][_____] transceiver at the primary supervising station and [the other][_____] at the alternate supervising station.] Ensure that the systems are completely assembled, wired, tested at the factory, and delivered ready for installation and operation.

2.8.1 Design

Provide solid-state transceiver that uses frequency modulation.[Ensure that the transceiver is a single integrated unit.][The transceiver may be a single integrated unit, or it may consist of separate transmitter and receiver modules with a common power supply, amplifier, and control unit.] Ensure that each supervising station radio fire alarm receiving system performs the receipt, processing, and display of emergency and non-emergency signals transmitted by the radio fire alarm transmitters specified herein, independently of the other system. Provide each system as a complete and independent receiving system consisting of: a receiver (or transmitter and receiver for polling (interrogation) type systems), decoder, audible signaling appliances, audible signal silence switch, visual display, alarm reset switch, digital clock, printer connection, primary and emergency power supplies, power supply monitors, memory devices, personal computer connection, interconnecting cables, and antenna. Provide equipment in [desk-top console][vertical rack] configuration.

[If the radio fire alarm transmitters are polled by the radio fire alarm

receiver, provide each of the required systems at the supervising station with its own polling device. Ensure that one such device is always active, with the other(s) in standby status. Ensure that failure of the active device automatically causes another polling device to take over the interrogation (polling) function, and initiates a trouble signal. Ensure this switch occurs within [30][_____] seconds of detection of failure of the active unit.

]2.8.2 Transmitter Section

Provide transmitter that operates on a frequency [of [_____] MHz][as directed by the Contracting Officer, within [90][_____] days following submission of completed application for frequency allocation following contract award]. Ensure frequency stability is within 1/100000 0.00025 percent over the operating temperature range. Provide transmitter designed to work into a 50-ohm load. Ensure frequency deviation is less than or equal to 5 kHz. Ensure audio response is within plus 1 dB and minus 3 dB over the 300 Hz to 3000 Hz range.

2.8.3 Receiver Section

Ensure the receiver antenna input impedance is 50 ohms. Tune the receiver to a frequency assignment [of [_____] MHz][as directed by the Contracting Officer, within [90][_____] days following submission of completed application for frequency allocation following contract award]. Ensure receiver has no more than five percent audio distortion measured at 1000 Hz. Ensure receiver has a noise level not greater than 50 dB below the signal level. Ensure receiver output is compatible with the associated device.

2.8.4 Transceiver Supervision

Ensure the supervisory system provides constant supervision and display of the operating condition of the radio transceiver and indicates an abnormal condition when a fire alarm transceiver carrier lasting more than 15 seconds is detected. Test the transceiver's ability to properly receive and decode an incoming signal at least once every five minutes.

2.8.5 Display

****

NOTE: Current industry trends are moving towards omitting displays on the actual receivers and utilizing a supervising station terminal to display received signals. If a supervising station terminal is provided as a part of the project, consider removing the requirement for a local display on the transceiver. Status indicator lights should still be required on the transceiver regardless of whether a local display is included or not.

****

Configure each transceiver to do the following:

a. Display incoming signals in alphanumeric format, by means of a[light emitting diode (LED)][or][liquid crystal display (LCD)] screen.

(1) Indicate the originating transmitter identity code, originating building name, originating building number, time, date, and type

of signal. Ensure the transceiver is capable of displaying at least the following signal designations:

****

NOTE: The required list of signals that the system must be capable of receiving should be edited to match the specific requirements of each project. There may be more or less detail required. The intent of this list is not to define how to program each of these devices or signals, but merely to list all of the messages that may need to be received by the equipment.

****

a. Primary Power Failure

b. Primary Power Restoration

c. Battery Fault

d. Battery Restoration

e. Communication Failure

f. Communication Restoration

g. Manual Pull Station Alarm

h. General Smoke Sensor Alarm

i. Duct Type Smoke Sensor Supervisory

j. Damper Control Smoke Sensor Supervisory

k. Door Hold Open Release Smoke Sensor Supervisory

l. Sleeping Room Smoke Sensor Supervisory

m. Waterflow Switch Alarm

n. Carbon Monoxide Sensor Alarm

o. Gas Sensor Alarm

[p. Aspirating Smoke Sensor Alert

q. Aspirating Smoke Sensor Fire 1 Alarm

r. Aspirating Smoke Sensor Fire 2 Alarm

s. Aspirating Smoke Sensor Trouble

][t. Fire Pump Running

u. Fire Pump System Supervisory

][v. Water Tank Low Level Supervisory

w. Water Tank Low Temperature Supervisory

][x. Kitchen Hood Suppression System Activation Alarm

y. Kitchen Hood Suppression System Trouble

] z. Mass Notification Message Activated with Active Fire Alarm

[aa. Optical Flame Detector Alarm

bb. Optical Flame Detector Inhibited Supervisory

][cc. Fire Suppression Containment Supervisory

][dd. Manual Foam Release Start Station Alarm

ee. Foam System Supervisory

ff. Foam System Disabled Supervisory

gg. Foam System Flow Switch Alarm

hh. Foam Stop Station Active Supervisory

ii. Foam System Trouble

jj. Foam System Release Alarm

][kk. Clean Agent System Alarm

ll. Clean Agent System Supervisory

mm. Clean Agent System Trouble

nn. Clean Agent System Stop Station Active Supervisory

oo. Clean Agent System Release Disabled Supervisory

pp. Clean Agent System Release Alarm

][qq. Valve Supervisory Switch Supervisory

][rr. Smoke Control System Active

ss. Smoke Control System Fault

] tt. General Alarm

uu. General Supervisory

vv. General Trouble

ww. Any Additional Signals Called for on the Contract Drawings

[xx. [_____]

] (2) Include a message of a minimum of three lines of 20 characters each for each transmission. Ensure the message is operator-programmable into the memory through a provided keyboard.

(3) Configure the transceiver to annunciate an error message any time a message is received that does not match the programmed transmitter codes.

b. Include a means to manually clear and reset the display. If the display is not reset at the time additional alarms are received, retain the additional alarms in memory and activate a distinctive audible or visual indication to alert the operator that additional alarms are waiting to be acknowledged.

c. Ensure that the transceiver will display and print a summary of transmitters that have transmitted a low-battery or trouble message or failed to transmit a message during the previous [six][one]-hour test period upon command. Ensure that any incoming transmitter signal pre-empts the command display and printout function, and is processed and displayed.

2.8.6 Memory

Provide each transceiver with a programmable memory capable of retaining at least [500][_____] transmitter codes, together with specific messages, total number of zones possible, and related information associated with each of the transmitters. If memory is operator-programmable, restrict access into the memory for the purpose of making additions or deletions by the use of a user specific access code to prevent unauthorized changes, and permanently record any such actions in this history log. Do not purge memory and ensure it is always current and available. Ensure memory is not lost in the event of a total loss of primary and emergency power supplies.

2.8.7 Digital Clock

Incorporate an electronic digital clock into each transceiver. Ensure the clock displays the current time (expressed in 24-hour format) and date, and transmits to each interconnected printer the time and date that signals are received. Provide a manual means of resetting the clock.

[2.8.8 Self-Contained Printer

Provide the transceiver with a self-contained printer that will output a minimum of 32 characters per line and record all displayed transaction information including time and date.

]2.8.9 Audible Appliance

Provide an audible appliance that produces a sound distinct from other audible signals to indicate the receipt of signals. Internally mount the appliance in the transceiver and activate it upon receipt of an alarm, supervisory, or trouble signal. Ensure the audible sounds used to indicate trouble and supervisory signals are separate and distinct from the sound used to denote receipt of alarm signals. Ensure that the audible appliance continues to sound until acknowledged with the silence switch by the operator.

2.8.10 Primary Power

Operate each transceiver from [100-120][200-240] VAC [60][50] Hz power. Provide the primary power supply for each transceiver [through a single dedicated circuit from the building's electric service][through a single

connection into the line side of the building's regular AC service circuit][through a single connection into the building's emergency service circuit] with a lockable [breaker][fused disconnect switch] that is red in color and labeled "FIRE REPORTING". Provide a separate [breaker][disconnect switch] for each transceiver. In the event of [100-120][200-240] VAC power loss, automatically switch the transceiver to battery operation. Accomplish switchover with no interruption of protective service. Upon restoration of AC power, automatically transfer back to normal AC power supply and recharge the battery. Install the converter or battery charger within the transceiver housing. Provide power supply transient voltage surge suppression. Provide transceivers with power supply filtering to prevent false message transmissions caused by transient or steady-state electrical disturbances.

2.8.11 Battery Power

****

NOTE: Ensure that the supervising station is provided with appropriate primary and secondary power according to its application. Edit the required UPS capacity period based upon the level of backup power provided to the supervising station.

****

Provide transceiver standby battery capacity sufficient to operate the transceiver in a normal standby status for a minimum of [four][24][_____] hours and be capable of transmitting signals during that period. Provide maintenance-free, [valve-regulated lead-acid][_____] type batteries. Submit substantiating battery calculations for supervisory and alarm power requirements. Include the ampere-hour requirements for each system component, each panel component, and the battery recharging period. Ensure that each transceiver constantly monitors and supervises its own battery power supply. Report a low-battery condition when battery voltage falls below the minimum voltage recommended by the manufacturer, or 85 percent of the rated voltage, whichever is higher.[Mount batteries on rack(s) designed for that purpose. Provide a termination cabinet as a part of the rack. Locate battery rack(s) where shown on the Contract Drawings.]

2.8.12 Manual Battery Test

Provide a self-contained or externally mounted switch to accommodate manually placing the transceiver on emergency battery power for test purposes.

2.8.13 Battery Charger

Provide self-regulating battery chargers with the capacity to completely recharge its associated batteries from full discharge within [48][_____] hours with the transceiver fully operational on primary AC power. Ensure the transceiver remains operational on AC power with the batteries removed.

2.8.14 Transceiver Supervision

Ensure supervisory controls provide constant supervision of the operating condition of the transceiver. Provide individual indicators for each major component, and produce an audible signal in the event of failure of any major component. Ensure this audible signal is distinctly different from the signal used to annunciate alarms. Provide a switch to silence

the audible signal.

2.8.15 Electrical Connections

Provide transceivers designed with modular components to allow interchange of components for maintenance purposes. Provide primary power cables that incorporate positive twist-lock connections. Provide interconnecting cables and connectors that are compatible with computer quality signal data transmission.

2.8.16 Field Programming Capability

Provide 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 signal type and displayed message, alphanumeric label changes, and password changes, to be made by the Government after contract completion.

2.9 SUPERVISING STATION RADIO FIRE ALARM RECEIVER (TRANSCEIVER) ANTENNA SYSTEM

****
NOTE: Refer to Article 810 of NFPA 70 (2023 edition). The antennas for dual transmitters and receivers must be installed with maximum vertical separation. The designer must check local conditions for design wind speed. Minimum design wind speed is 160 km per hour 100 mph; typical design wind speed is 201 km per hour 125 mph. This antenna is usually more robust than the individual building transmitter antennas provided.
****

Provide one antenna system for each radio fire alarm reporting system receiver, including all necessary components for proper operation. Mount antenna on TIA-222 compliant support structure. Provide either omni-directional or shaped-coverage antenna, selected based on the topography and anticipated coverage area. Ensure the antenna is capable of withstanding the environmental conditions of [201][_____] km per hour [125][_____] mph wind, and [13][_____] mm [1/2][_____] inch radial ice without failure. Provide lightning protection in accordance with NFPA 70, NFPA 780, and the manufacturer's instructions. Provide antenna cables in rigid conduit and protect from damage. Seal all conduits where they penetrate exterior walls. Ensure that antenna cables and ground wires are rated for the environmental conditions they will be exposed to.

2.9.1 Grounding Conductors

Provide antenna grounding conductors that are a minimum 32-strand, 10 square mm No. 8 AWG copper.

2.9.2 Surge Protection

Provide lightning arresters for supervising station radio fire alarm receiver (transceiver) antennas in accordance with NFPA 70. Ensure that supervising station radio fire alarm receivers (transceivers) do 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.]

2.9.3 Communication Links

Provide transmission line between the transceiver and the antenna that is 50-ohm impedance rated for the transceiver output power. As a minimum, ensure cable exhibits an attenuation not exceeding 110 dB per 30500 mm 100 feet at 200 MHz.

2.10 SUPERVISING STATION RADIO FIRE ALARM RECEIVER (TRANSCEIVER) ANTENNA SUPPORTING STRUCTURE

Design the supporting structure for the structural loads listed in ASCE 7-22 and specified wind and seismic criteria. Size the supporting structure to accommodate the static and dynamic loads produced by the antenna system and all attachments.

****
NOTE: The following information should be provided by the project's Structural Engineer.
****

Design system for a three-second wind speed of [60][_____] meters per second [135][_____] mph; Exposure [C][_____]. Use the following seismic criteria: Ss = [_____]g; S1 = [_____]g; Soil Site Class [_____]; Seismic Design Category [_____]; IE = [1.25][_____].

[2.10.1 Poles

Provide poles designed for specified wind and seismic criteria while supporting antenna and all other appurtenances indicated. Provide anchor-base type poles designed for use with underground supply conductors. Provide poles with oval-shaped handholes having a minimum clear opening of 100 mm by 300 mm 4 inches by 12 inches. Secure handhole cover by stainless steel captive screws. Provide metal poles with an internal grounding connection accessible from the handhole near the bottom of each pole.

Provide steel poles that are externally and internally galvanized. Ensure exposed carbon steel is hot dip galvanized per ASTM A123/A123M. Ensure exposed hardware and fasteners are stainless steel of 18-8 grade or better, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153/A153M (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). Enclose all wiring within the pole or electrical components enclosures. Provide a pole grounding connection designed to prevent electrolysis when used with copper ground wire. Fit tops of shafts with a round or tapered cover. Provide base that is anchor bolt mounted and machined to receive the lower end of the shaft. Weld the joint between the shaft and the base. Provide unpainted pole and bracket for antenna with a uniform satin finish.

]2.10.2 Lightning Grounding

Provide lightning grounding as defined by NFPA 70 and NFPA 780. Ensure grounding is [NRTL][_____] listed per UL 96 and UL 96A. Integrate

grounding via concrete encased electrode grounding system, or supply grounding electrodes, copper down conductors, and exothermic weld kits from the manufacturer. Size electrodes and conductors as required by NFPA 70 and NFPA 780.[Integrate new antenna lightning protection with existing building lightning protection system and ensure antenna does not go above the existing lightning protection system.][Coordinate antenna support structure grounding with Specification 26 41 00 LIGHTNING PROTECTION SYSTEM.]

[2.10.3 Aircraft Obstruction Lights

Provide obstruction marker luminaires for all antenna support structures as required by the Federal Aviation Administration (FAA) and in accordance with Section 26 56 20 AIRFIELD AND HELIPORT LIGHTING AND VISUAL NAVIGATION AIDS.

]2.10.4 Foundations

Provide reinforced concrete foundations designed by a Professional Engineer to suit the reactions from the specified loading and in accordance with manufacturer's recommendations. Submit Foundation Data in accordance with referenced standards in this section.

Provide concrete as specified in Division 03 - CONCRETE. Ensure anchor bolts are steel rod having a minimum yield strength of 344500 kPa 49,965.5 psi. Galvanize the top 300 mm 12 inches of the rod in accordance with ASTM A153/A153M.

2.11 SUPERVISING STATION TERMINAL

****

NOTE: Cybersecurity provisions must comply with the requirements of UFC 4-010-06: CYBERSECURITY OF FACILITY-RELATED CONTROL SYSTEMS and DAFGM2022-32-01: CIVIL ENGINEER CONTROL SYSTEMS CYBERSECURITY (if applicable).

****

2.11.1 Terminal Configuration

Provide a personal computer based supervising station terminal provided with an applications program to allow it to be connected to the receiving equipment.[Provide provisions for floor mounting of the central processing unit.][Extend the keyboard, monitors, mouse, and audible indicating appliance from the rack to the operator workstation.] Ensure that the hardware, software, and firmware are all compatible with the receiving equipment, and permit the site specific configurations prescribed herein. Configure the terminal to display additional information about the building from which a signal is received, detailed description of the current signal, and signal histories. Provide operator interface with the Fire Alarm Reporting System at the Installation, including with [new][and][existing]individual building fire alarm systems, through the terminal via wired QWERTY keyboard and wired mouse equipped with a scroll wheel.[Ensure that operation of the new terminal does not disrupt operation of, and works in conjunction with, the existing terminal.] Provide system capable of being backed-up and restored using a reliable media acceptable to the Government.

2.11.2 Terminal Cybersecurity

Ensure the system meets current requirements for cybersecurity as dictated by Section 25 05 11 CYBERSECURITY FOR FACILITY-RELATED CONTROL SYSTEMS.

2.11.3 Terminal Functions

****
NOTE: Determine if the Installation requires additional functionality out of the terminal and edit the specification accordingly. Also consider whether the terminal must be capable of serving multiple systems, such as the wide area mass notification system or computer aided dispatch system, and edit the specifications for each respective system consistently to convey the requirement for a multifunctional terminal. Alternatively, consider relocating the terminal requirements into a stand-alone specification section if the terminal is intended to serve multiple systems.
****

Provide all hardware and software required to permit an operator at the terminal to perform the following functions:

a. Signal acknowledgement, signal silence, and system reset.

b. Manual activation, de-activation, enabling, or disabling individual fire alarm system points.

c. Query building fire alarm system status.

d. Query building fire alarm system maintenance and sensitivity reports for devices.

e. Query building fire alarm system event history.

Configure terminal to initiate an audible notification to the operator any time a signal is received.

2.11.4 Terminal Display

Provide [liquid crystal display][_____] flat panel monitors no less than[480 mm 19 inch][584 mm 23 inch][686 mm 27 inch][813 mm 32 inch][[_____] mm [_____] inch]. Provide monitors capable of being[wall][or][desktop] mounted with manufacturer furnished hardware.

Provide displays capable of being manipulated to show four separate quadrants reflecting the following information:

a. List of Events: Display the address of the active device, device type, device description, and time of the event in a prioritized color-coded event list. Configure system such that operator selection of an independent event automatically displays a building floor plan zoomed to the location of the device.

b. Floor Plan: Display a color graphical view of the floor plan, zoomed to the location of the signal initiating device. Provide the operator

with the ability to zoom in or zoom out of the floor plan via operation of the mouse scroll wheel. Do not use pre-set zoom levels.

c. Event Action: Display a customized set of written operator instructions for the active event. Configure system to add subsequent events to create a list of active signals. Provide the operator with the ability to scroll through all active signals via mouse or keyboard control. Ensure all events and operator actions are logged and time stamped in the receiving system history file.

d. Image: Display a stored image of the active device, such as that provided in the manufacturer's product data sheet.

2.12 SUPERVISING STATION PRINTER

****

NOTE: Consideration should be given to whether a supervising station printer is warranted based on system size and use.

****

Provide a supervising station printer of high speed, computer compatible, low noise design, that is [compatible with the supervising station terminal and]capable of printing all transaction information and history reports. Provide a printer that is a type and size compatible and listed with the receiving station.[Arrange the printer to print on paper the required visually displayed data, including the date and time received, upon reception of an alarm, trouble, or supervisory signal.] Provide standard size paper compatible with the printer for recording messages. Ensure the paper is commercially available from three or more manufacturers[and continuous feed].[Include paper take-up devices for storing printouts.] Print alarm, trouble, and supervisory signals in a manner to make them readily distinguishable from acknowledgments and routing messages by use of a different color, typeface, type size, or other distinguishable means.

2.13 SUPERVISING STATION POWER SUPPLIES

****

NOTE: Ensure that the supervising station is provided with appropriate primary and secondary power according to its application. Edit the required UPS capacity period based upon the level of backup power provided to the supervising station.

****

Provide each component of supervising station equipment with a self-contained power supply. Provide primary power from a dedicated 20A circuit. If a dedicated fire protection subpanel is provided, ensure the circuit originates from that panel. Ensure the dedicated breaker is red in color, lockable, and labeled "FIRE REPORTING".[Directly wire terminal and all associated components into the primary power circuit. Do not provide equipment with plug-in type power cords.] Provide an uninterruptible power supply (UPS) for equipment which does not have a self-contained battery backup, such as the terminal[and printer]. Ensure the UPS provides all power requirements for the connected equipment for a period of [four][24][_____] hours under maximum normal load. Provide UPS with a bypass switch for maintenance purposes. Provide self-regulating battery chargers with the capacity to completely recharge its associated

batteries from full discharge within [48][_____] hours with the system fully operational on primary AC power. Ensure the system remains operational on AC power with the batteries removed.[Ensure the UPS is in accordance with Section 26 33 53 STATIC UNINTERRUPTIBLE POWER SUPPLY (UPS).]

2.14 FIRE ALARM REPORTING SYSTEM PERIPHERAL EQUIPMENT

****

NOTE: Check the terrain and distances to determine if a repeater(s) will be needed to transmit signals from a remote location to the main radio fire alarm receiver.

****

2.14.1 Repeaters

Provide repeaters where indicated on the Contract Drawings or required to meet system requirements. Ensure the repeater receives on [[_____] MHz][a frequency as directed by the Contracting Officer, within [90][_____] days following submission of completed application for frequency allocation following contract award] and transmits on [[_____] MHz][a frequency as directed by the Contracting Officer, within [90][_____] days following submission of completed application for frequency allocation following contract award]. Provide receiver and transmitter sections conforming to the requirements specified for transceivers. Relay two-way data transmission between the supervising station radio fire alarm receiver (transceiver) and remote stations. Provide repeater(s) that utilize(s) a bandpass-type duplexer and one antenna, or multiple-bandpass cavity filters and multiple antennas. Ensure the duplexer or filter cavities isolate the receiver from transmitter spurious noise and prevent receiver desensitization. Ensure the duplexer or filter cavities are rated to handle the output power of the transmitter. Key the repeater with tone-encoded control pathway. Provide a transmitter time-out pathway to prevent system lockup.

2.14.2 Raceway and Fittings

Provide raceway that complies with UL 6, UL 797, or UL 1242 and is no less than [13][19] mm [1/2][3/4] inch in diameter.

Provide outlet boxes and fittings that comply with UL 514A or UL 514B.

2.14.3 Ground Rods

****

NOTE: Designer must determine the size, type, and number of ground rods to be used based on local conditions, earth resistivity data, and the size and type of the electrical installation. Copper-clad steel rods should be specified for normal conditions. In high resistivity soils, 3048 mm 10 foot sectional rods may be used to obtain the required resistance to ground. Where rock is encountered, additional rods, a counterpoise, or ground grid may be necessary. Coordinate and standardize rod selection for individual facilities with other specification sections.

****

Provide grounding to building ground. Ensure maximum impedance to ground is [25][_____] ohms. If the maximum impedance to ground exceeds [25][_____] ohms, provide driven ground rods. If used, provide ground rods that conform to UL 467 and are of [copper-clad steel][solid copper][_____] not less than [19][_____] mm [3/4][_____] inch in diameter by [3048][_____] mm [10][_____] feet in length[and of the sectional type].

2.14.4 Wiring

Provide wiring in accordance with NFPA 70 and NFPA 72, and as specified herein. Ensure conductor for [100-120][200-240] VAC circuits is 4 square mm No. 12 AWG minimum solid copper. Ensure conductor for low voltage direct-current (DC) circuits is [1.5][2.5] square mm No. [14][16] AWG minimum [solid][or][stranded] copper. Provide 75 degrees C 167 degrees F minimum insulation with nylon jacket. Color code all wiring.

[2.14.5 Surge Suppression

****
NOTE: Specify surge suppression for projects administered by NAVFAC Southeast and for all areas with high potential for lightning damage. Consult DFPE if additional guidance is needed.
****
****
NOTE: Tailoring tags have been used to automatically add requirements related to CAD systems when applicable.
****

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

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

]][2.14.6 Protected Premises Control Units

****

NOTE: Survey each control unit to ensure that the necessary "dry" electrical contacts are available for connection to the radio fire alarm transmitter; if not, the control unit must be modified in accordance with the recommendations of its manufacturer or replaced. Indicate on the Contract 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, or Section 28 31 76 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM, ADDRESSABLE, as appropriate. Consult the DFPE for additional guidance as needed.

****
****

NOTE: Edit the following section to provide connection to fire alarm control units, 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 or extinguishing system and the radio fire alarm 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: STANDARD FOR THE INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION can be transmitted to the supervising station, separate connections between the radio fire alarm transmitter and pump controller are not required.

****
****

NOTE: Indicate on the Contract Drawings the location of each control unit, how many separate signals (pathways) are to be connected to the radio fire alarm transmitter, and the designation of each pathway as it should be annunciated at the supervising station.

****

Fire alarm[and fire suppression or fire extinguishing system] control unit[and fire pump controller] alarm, trouble, and supervisory contacts are [existing][or][specified in other sections].

]2.15 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.

****
****
NOTE: Cybersecurity provisions must comply with the requirements of UFC 4-010-06: CYBERSECURITY OF FACILITY-RELATED CONTROL SYSTEMS and DAFGM2022-32-01: CIVIL ENGINEER CONTROL SYSTEMS CYBERSECURITY (if applicable).
****

In the supervising station, provide [one][two] CAD system[s] in compliance with NFPA 1225. Provide hardware, firmware, and software required for a complete, code compliant, and useable system. Ensure the system meets current requirements for cybersecurity as dictated by Section 25 05 11 CYBERSECURITY FOR FACILITY-RELATED CONTROL SYSTEMS.[Ensure that operation of the new system does not disrupt operation of, and works in conjunction with, the existing system.] Provide a computer that utilizes a [Windows10][Windows11][_____] based operating system and has hard drive disk space sufficient to maintain records for no less than two years. Provide a keyboard, dual monitors, mouse, and audible indicating appliance.[Extend the keyboard, monitors, mouse, and audible indicating appliance from the rack to the operator workstation.] Provide monitors no less than[480 mm 19 inch][584 mm 23 inch][686 mm 27 inch][813 mm 32 inch][[_____] mm [_____] inch]. Provide system capable of being backed-up and restored using a reliable media acceptable to the Government. Provide standard, commercially available software loaded on the computer hard drive. Provide a system that is capable of accommodating an average load of [_____] calls per 24-hour day and a peak load of [_____] calls per hour.

2.15.1 Interconnection to Alarm System

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

2.15.2 Printer

Provide color laser printer, capable of printing [six][_____] pages per minute in text mode, that utilizes standard 216 mm by 279 mm 8.5 inches by 11 inches[tractor-feed][or][loose-leaf] paper.

2.15.3 Automatic Display

Ensure the system displays[and prints] the following upon automatic receipt of a signal:

a. Transmitter number.

b. Zone number (when applicable).

c. Type of signal (alarm, supervisory, trouble).

d. Building name and number.

e. Street address.

f. Nearest street intersection.

g. 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.

h. Pre-Incident Planning Information and special instructions for first-arriving units.

2.15.4 Manual Alarm Entry Capability

Provide system with manual alarm entry capability to enable the telecommunicator to enter alarm locations by any of the following: building name or number, transmitter number, street address, or nearest street intersection. When an alarm is manually entered, ensure the system displays[and prints] the information specified in paragraph entitled "Automatic Display".

2.15.5 Unit Status Tracking Capability

****

NOTE: Consult the Federal Fire Chief to determine the number of units that the system should be capable of tracking. Ensure anticipated department growth over the expected life of the system is factored into this quantity.

****

Provide system with unit status tracking capability to enable the telecommunicator to record changes in individual unit status (such as in-quarters, responding, on-scene) with no more than two keystrokes (not counting unit number) or mouse clicks. Ensure system is capable of tracking status of at least [_____] units simultaneously.

2.15.6 Pre-Incident Plan Retrieval

Provide system with pre-incident planning storage and retrieval capability to enable the telecommunicator to access pre-incident plans. For displayed alarm location, ensure that access to the pre-incident plan does not require more than two keystrokes or mouse clicks.

2.15.7 Hazardous Materials Data Retrieval

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

2.15.8 Power Source

Provide primary power for CAD system [through a connection into the line side of the building's regular AC service circuit][from the supervising station's emergency service circuit] through a dedicated, lockable, 20A breaker that is red in color and labeled "CAD".

2.15.8.1 Uninterruptible Power Supply (UPS)

****

NOTE: Specify type and class of Stored Emergency

Power Supply System (SEPSS) based on requirements of NFPA 1225: STANDARD FOR EMERGENCY SERVICES COMMUNICATIONS and NFPA 72: NATIONAL FIRE ALARM AND SIGNALING CODE. A Type U SEPSS is primarily fed by utility power but instantly switches to UPS power upon utility power loss. A Type O SEPSS is constantly powered through the UPS batteries. A Class 1 SEPSS will provide power for 60 minutes, and is the minimum allowable.
****

Provide a Type [U][O], Level 1, Class [1][4][_____] Stored Emergency Power Supply System (SEPSS) in compliance with NFPA 111 to provide power for operation of the CAD computer(s), monitors, and printer in the event of loss of power on the line side of the SEPSS.

PART 3 EXECUTION

3.1 EXAMINATION

After becoming familiar with all details of the work, verify all dimensions in the field and advise the Contracting Officer of any discrepancy before performing the work.

3.2 INSTALLATION

Provide installation in accordance with the requirements of NFPA 70, NFPA 72, and the manufacturer's instructions, unless otherwise specified. Provide all necessary interconnections, services, and adjustments required for a complete and operational system. Unless indicated otherwise on the Contract Drawings, provide all new wiring and raceway. Dress out all transmitters[,][and] receivers[,][and][interface panels][,][and new wiring in existing panels,] in a neat manner with all wires running in a vertical or horizontal plane, cut to exact length, making all turns at 1.57 rad 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 that use of crimped connectors at termination points is required where stranded wire is used].

3.2.1 Wiring for Systems

Provide wiring for systems in rigid conduit, intermediate metallic conduit, or electric metallic tubing[, except surface mounted wiring in surface metal raceway in finished areas is permitted where indicated on the Contract Drawings]. Do not install the conductors for the radio fire alarm reporting system in conduits, junction boxes, or outlet boxes with conductors of lighting and power systems. Ensure that the sum of the cross-sectional areas of individual conductors does not exceed 40 percent of the interior cross-sectional area of the raceway. Provide raceway in compliance with NFPA 70. Provide ample gutter space to accommodate necessary wiring. 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 REPORTING".

Install no more than one conductor under any screw terminal. Connect each pathway conductor entering or leaving any mounting box, outlet box enclosure, or cabinet to screw terminals with each terminal marked in accordance with the wiring diagram. Ensure that wiring within control

equipment is readily accessible without removing component parts.

3.2.1.1 Conductor Identification

Distinctively color code each conductor used for the same specific function; ensure that each function color code remains consistent throughout.[Use colors as directed by the Contracting Officer to match the existing Installation fire alarm conductor 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.

3.2.1.2 Additional Installation Requirements

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. Route raceway such that it does not enter the top of a transmitter, receiver, control panel, or interface panel. Provide raceway seals for all raceways terminating at a transmitter, receiver, control panel, or interface panel.

3.2.2 Overvoltage and Surge Protection

Protect equipment connected to alternating current circuits from surges in accordance with IEEE C62.41.1, IEEE C62.41.2, and NFPA 70. Provide cables and conductors which serve as communications links, except fiber optics, with surge protection devices installed at each end. Do not use fuses for surge protection.[Install additional triple electrode gas surge protectors, rated for the applications, on each wireline circuit within 910 mm 3 feet of the building entrance.]

[3.2.3 Poles

Provide pole foundations with galvanized steel anchor bolts, threaded at the top end and bent 1.57 rad 90 degrees at the bottom end. Provide ornamental covers to match pole, and galvanized nuts and washers for anchor bolts. Provide concrete for anchor bases, polyvinyl chloride (PVC) conduit ells, and ground rods as specified in Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION and Section 33 71 02 UNDERGROUND COMMUNICATION SYSTEM. Thoroughly compact backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath and the end of conduit ell. Adjust poles as necessary to provide a permanent vertical position with the bracket arm in proper position for antenna location. Do not install scratched, stained, chipped, or dented poles.

]3.2.4 Grounding

Ground non-current-carrying parts of equipment including antenna, mounting arms, brackets, and metallic enclosures [in accordance with NFPA 70][as specified in Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION]. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

Ensure that ground rods do not protrude more than 150 mm 6 inches above grade. Ensure that non-current-carrying metallic parts associated with radio fire alarm reporting equipment have a maximum resistance to solid

"earth" ground not to exceed [25][_____] ohms.

[3.2.5 Foundations

Construct foundations in accordance with approved design submittals and in accordance with Division 03 and Division 31 specifications.

][3.2.6 Protected Premises Control Units

3.2.6.1 Fire Alarm Control Units

Provide connection to protected premises fire alarm control units in accordance with NFPA 72 and as specified herein. Provide separate alarm, supervisory, and trouble pathways between radio fire alarm transmitter and fire alarm control unit. Ensure that actuation of control unit alarm contact causes transmission of a distinctly identifiable signal that is displayed and annunciated by the receiving systems specified herein as an alarm signal. Ensure that actuation of control unit common supervisory contact causes transmission of a distinctly identifiable signal that is displayed and annunciated by the receiving systems specified herein as a supervisory signal. Ensure that actuation of control unit common trouble contact causes transmission of a distinctly identifiable signal that is displayed and annunciated by the receiving systems specified herein as a trouble signal.

[3.2.6.2 Fire Suppression or Fire Extinguishing System Control Units

****

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

****

Provide connection to protected premises fire suppression or fire extinguishing system control units in accordance with[NFPA 11,][NFPA 12,][NFPA 12A,][NFPA 13,][NFPA 17,][NFPA 17A,] NFPA 72,[NFPA 2001,] and as specified herein. Provide separate alarm, supervisory, and trouble pathways between radio fire alarm transmitter and control unit. Ensure that actuation of control unit alarm contact causes transmission of a distinctly identifiable signal that is displayed and annunciated by the receiving systems specified herein as an alarm signal. Ensure that actuation of control unit common supervisory contact causes transmission of a distinctly identifiable signal that is displayed and annunciated by the receiving systems specified herein as a supervisory signal. Ensure that actuation of control unit common trouble contact causes transmission of a distinctly identifiable signal that is displayed and annunciated by the receiving systems specified herein as a trouble signal.

][3.2.6.3 Fire Pump Controllers

****

NOTE: NFPA 20: STANDARD FOR THE INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION requires the pump running alarm and two supervisory signals to be transmitted to a "constantly attended" location, which is usually the supervising station. If direct connections are to be provided from a pump controller to a radio fire alarm 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 in accordance with NFPA 20, NFPA 72, and as specified herein. Provide separate alarm and supervisory pathways between radio fire alarm transmitter and pump controller. Ensure that actuation of controller "pump running" contact causes transmission of a distinctly identifiable signal that is displayed and annunciated by the receiving systems specified herein as an alarm signal. Ensure that actuation of other controller remote alarm contacts required by NFPA 20 cause transmission of distinctly identifiable signals that are displayed and annunciated by the receiving systems specified herein as supervisory signals.

]][3.3 DISCONNECTION AND REMOVAL OF EXISTING SYSTEM

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NOTE: Contact the Contracting Officer, Installation Fire Prevention Office, and Installation Maintenance Personnel to determine what action is appropriate for the salvaging of existing fire alarm reporting equipment.

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Maintain existing fire alarm reporting equipment fully operational until the new equipment has been tested and accepted by the Contracting Officer. As new equipment is installed, label it "NOT IN SERVICE" until the new equipment is accepted. Once the new system is completed, tested, and accepted by the Government, place it in service and connect it to the supervising station. Remove tags from new equipment and tag the existing equipment "NOT IN SERVICE" until removed from the building.

a. After acceptance of the new system by the Contracting Officer, remove existing equipment not connected to the new system, remove unused exposed raceway, and restore damaged surfaces. Remove the material from the site and dispose of it properly.

b. Disconnect and remove the existing fire alarm reporting systems where indicated.

c. Turn over disconnected and removed control units, devices, and appliances to the Contracting Officer.

d. Properly dispose of outlet and junction boxes, wiring, raceway, supports, and other such items.

]3.4 PROGRAMMING

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NOTE: Tailoring tags are used to add information specific to CAD systems when applicable.
****

Field program each receiving and control system with all system transmitter identity codes, zones on each transmitter, and appropriate message and audible alerting tone associated with each active zone (for example: Transmitter 1234; Zone One - Waterflow (alarm tone), Zone Two - Pump Running (alarm tone), Zone Three - Valve Supervisory (supervisory tone), Zone Four - System Trouble (trouble tone)). Program transmitter automatic test times so that at least one test signal is received at the receiving and control system at not exceeding [five-minute][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 or number and pre-incident plan information for each location and transmitter number from the Federal Fire Chief.

3.5 FIELD QUALITY CONTROL

3.5.1 Interim Construction Observation Visit[s]

Perform interim construction observation visit[s] when construction is[sufficiently underway to provide sufficient evidence of installation practices being followed, but not so far along as to cause major schedule delays to correct any deficiencies observed][approximately[25 percent][,][50 percent][,][and][75 percent] complete]. Document each site observation visit with a separate site observation report documenting what was observed and any corrective actions required as a result of the visit. Submit site observation report(s) within [14][_____] days of conclusion of respective site observation visit.

3.5.2 Test Procedures

Submit detailed test procedures at least [30][_____] days prior to proposed start of performing system tests. List all components of the installed system such as batteries, transmitting and receiving equipment, power sources and supply, interface equipment, and transient voltage (surge) suppressors. Include sequence of testing, time estimate for each test, and sample test data forms. Provide test data forms in a check-off format (pass or fail with space to add applicable test data; similar to the format in NFPA 72) and use them for the preliminary testing and the final testing. Provide test data forms that record the test results and:

a. Identify each test required by NFPA 72 Test Methods and herein to be performed on each component, and describe how each test must be performed.

b. Identify each component and pathway as to type, location within the facility, and unique identity within the installed system. Provide necessary floor plan and site plan sheets showing each component location, test location, and alphanumeric identity.

c. Identify all test equipment and personnel required to perform each test.

d. Provide space to identify the date and time of each test. Provide space to identify the names and signatures of the individuals conducting and witnessing each test.

3.5.3 Test Stages

3.5.3.1 Preliminary Testing

Conduct preliminary tests to ensure that equipment and pathways are functioning properly. Meet the requirements of paragraph entitled "Minimum System Tests". If deficiencies are found, make corrections and retest the system to ensure that they are resolved. After preliminary testing is complete, provide a letter certifying that the installation is complete and fully operable with the Request for Formal Inspection and Tests. State in the letter that panel functions were tested and operated properly. Provide a print-out of the system history log from the testing performed as an attachment to the letter. Include the names and titles of the witnesses to the preliminary tests in the letter. Ensure that the QFPE, as well as the Supervisor, are in attendance at the preliminary testing and sign off on the letter. Submit request for final test at least [30][_____] days prior to the proposed test date.

3.5.3.2 Final Testing

Conduct final tests to ensure that equipment and pathways are functioning properly. Meet the requirements of paragraph entitled "Minimum System Tests". If deficiencies are found, make corrections and retest the system to ensure that they are resolved. Costs for witnessing of retesting incurred by the Government and their representatives may be charged to the Contractor at the discretion of the Contracting Officer. Ensure that the final tests are witnessed by the Government's Designated Fire Protection Engineer (DFPE) and the QFPE. At this time, repeat any and all required tests at their discretion.

Do not schedule final testing until the following are provided at the job site:

a. Marked-up red line drawings of the system as actually installed.

b. Complete program printout including input and output addresses.

3.5.3.2.1 Final Test Report

Provide a letter certifying that the system is complete and fully operable with the Final Test Report. State in the letter that panel functions were tested and operated properly. Provide a print-out of the system history log from the testing performed as an attachment to the letter. Include the names and titles of the witnesses to the final tests in the letter. Ensure that the QFPE, as well as the Supervisor, are in attendance at the final testing and sign off on the letter.

3.5.3.3 System Acceptance

Following acceptance of the system, deliver as-built drawings and operation and maintenance instructions (O&M Manuals) to the Contracting Officer for review and acceptance. Submit the drawings within [two][_____] weeks after the final testing of the system. Provide at least one set of as-built (marked-up) drawings at the time of, or prior

to, the final testing.

3.5.4 Minimum System Tests

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NOTE: Tailoring tags are used to add information specific to CAD systems when applicable.
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Test the system in accordance with the procedures outlined in NFPA 72. Include at least the following tests:

a. Test to ensure there are no grounded, shorted, or open pathways. Measure the resistance of each connection to ground and ensure it does not exceed five ohms.

b. Check each antenna assembly and cable at the transmitter or receiver connection for continuity, shorts, and grounds on the conductor and on the shield prior to connection to equipment. Do not connect assemblies failing these tests to equipment.

c. Test radio emission frequency and band width of each transmitter to ensure proper operation on the assigned frequency.

d. Test the system for specified functions in accordance with the Contract Drawings, specifications, and the manufacturer's O&M manual.

e. Test both primary power and secondary power. Verify, by test, the secondary power system is capable of operating the system for the time period and in the manner specified.

f. Test all functions of each radio fire alarm transmitter.

[g. Test operation of each interface device.

] h. Test operation of each protected premises control unit zone.

i. Test operation of supervisory features.

j. Test operation of all features of each supervising station radio fire alarm receiving and control system component and each supervising station radio fire alarm receiving and control system as a whole.

k. Test both primary power and secondary power. Verify, by test, the secondary power system is capable of operating the system for the time period and in the manner specified.

l. Determine that the system is operable under trouble conditions as specified.

m. Visually inspect wiring.

n. Test the battery charger and batteries.

o. Verify that red-lined as-built drawings are accurate.

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

3.6 CLOSEOUT ACTIVITIES

[3.6.1 Final QFPE Certification Letter

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NOTE: The final QFPE Certification Letter is intended to be provided when a single QFPE has been hired to oversee all fire protection and life safety components of a given project. The letter should not be submitted until all fire protection and life safety systems have been completely installed and tested, not just the fire alarm reporting system. This paragraph is likely more appropriate to place in a division 01 specification section rather than each individual fire protection or life safety component section.
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Following successful completion of all acceptance testing, including resolution of all punch list items, provide a certification letter from the QFPE, bearing his or her Professional Engineer seal and signature, attesting to the proper installation and successful testing of all fire protection and life safety systems in the [building][project]. Submit the Final QFPE Certification Letter no later than [seven][_____] days after the successful completion of final acceptance testing and resolution of all punch list items.

]3.6.2 Training

3.6.2.1 Instruction of Operating Personnel

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NOTE: Consult the Federal Fire Chief regarding the number of shifts and number of personnel to be trained.
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NOTE: Tailoring tags are used to add information specific to CAD systems when applicable.
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Train personnel who receive, process, and retransmit signals at each supervising station and emergency response facility which houses a radio fire alarm receiving and control system provided under this Contract. Train personnel who receive, process, and retransmit alarms at each supervising station and emergency response facility which houses a computer-aided dispatch system workstation provided under this Contract. Provide this instruction for [two][three] alternating shifts, a minimum of [four][eight][_____] hours per shift, and include at least the following:

a. Overview of functions of individual system components and the system as a whole.

b. Proper responses to the various types of messages which can be displayed.

c. Procedures for start-up, operation, and shutdown of transmitting, receiving and control system.

d. Procedures for startup, operation, and shutdown of CAD system.

e. Procedures for diagnosing and correcting operator-correctable malfunctions.

f. Procedures for restarting system after total power (primary and backup) failure.

g. Procedures for manually initiating system tests.

h. Train supervisory personnel on each shift, as designated by the Contracting Officer, in procedures for adding and deleting transmitters and changing zone-specific messages.

i. Train supervisory personnel on each shift, as designated by the Contracting Officer, in procedures for loading CAD data.

Perform training by the manufacturer's technical representative(s) on-site using the equipment provided under this Contract. At the conclusion of this training, provide training certificates to certify by name that each operator trained is qualified to operate the radio fire alarm receiving and control equipment provided under this Contract. At the conclusion of this training, provide training certificates to certify by name that each operator trained is qualified to operate the CAD system provided under this Contract.

3.6.2.2 Instruction of Maintenance Personnel

Instruct Government-designated maintenance personnel for a minimum of [16][_____] total hours covering at least the following for all items of equipment provided under this Contract:

a. Theory of operation.

b. Procedures for start-up, operation, and shutdown of each item of equipment.

c. Maintenance instructions.

d. Safety precautions.

e. Test procedures.

f. Field troubleshooting and diagnostic procedures.

g. Repair procedures for field repairs that can be made by replacing plug-in components.

Provide instruction by the manufacturer's technical representative at the project site using the documents specified in the paragraph entitled "Operation and Maintenance (O&M) Instructions".

3.6.2.3 Recording

Record all training presented on-site utilizing recording equipment acceptable to the Contracting Officer. Perform recording such that all visual aids are clearly visible and all discussion is clearly understandable. Provide record copies of the recordings to the Contracting Officer within [14][_____] days following completion of

training.

[3.6.2.4 Advanced Maintenance Training

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NOTE: Advanced Maintenance Training is intended for those installations where the government personnel are going to be responsible for making programming changes to the equipment or installing new equipment without the involvement of a manufacturer's representative. This training is intended to provide those individuals with manufacturer's certification level training to enable them to be competent to make such changes.
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Within one year of contract completion, provide [one][two][_____] Government-designated maintenance personnel assigned to the site a complete technical repair training session of [40][_____] hours covering repair of the radio fire alarm reporting system equipment. Include in the training an in-depth explanation and review of the theory of operation, function, description, and troubleshooting of all equipment provided down to the component level. Include a review of manuals, drawings, and parts lists, together with any clarifications required. Ensure that at least one period of eight hours is spent troubleshooting equipment with actual faults being introduced for training purposes. Provide instructional personnel that are certified by the related equipment manufacturer to provide technical instruction services. Transportation, lodging, and meals for Government personnel attending this off-site training is not the responsibility of the Contractor.

] -- End of Section --