



**Marin County, California
Request for Proposals
For
Radio Communications System
RFP # 2617**

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Prepared by

County of Marin

Department of Public Works, Communications Division

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1. Project Overview

1.1 Introduction

Marin County, California, invites proposals for the provision of a 700 MHz APCO Project 25 (P25) radio communications system to support mission critical communications within the County. The proposed communications system shall provide enhanced, two-way wireless communications capabilities to all users.

The proposed system shall be capable of interoperable communications with the counties of the Bay Area. This request for proposals (RFP) represents a component of the Bay Area Regional Interoperable Communications System (BayRICS). Once complete, BayRICS shall be considered a system of interoperable systems throughout the Bay area.

1.2 Background

BayRICS is a collaborative planning effort that includes all 10 San Francisco Bay area counties shown in Figure 1. The Bay Area includes the following counties:

- Alameda County
- Contra Costa County
- Marin County
- Napa County
- City and County of San Francisco
- San Mateo County
- Santa Clara County
- Santa Cruz County
- Solano County
- Sonoma County



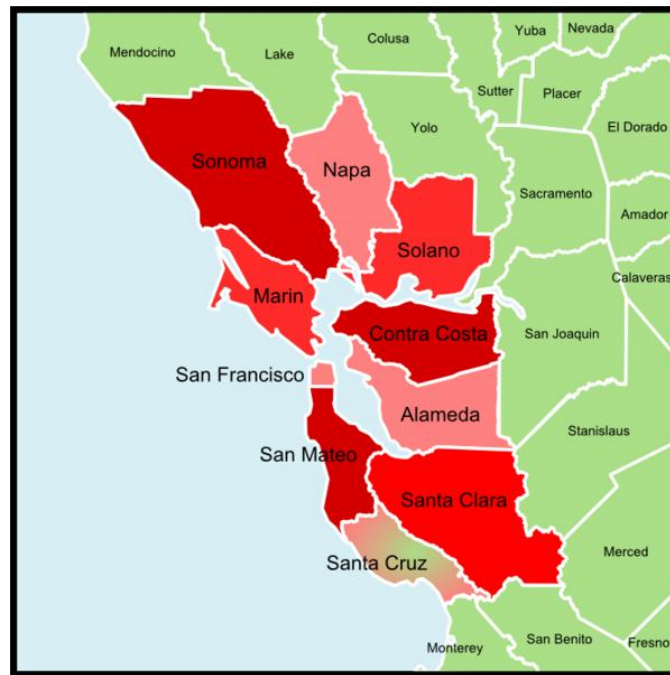


Figure 1 – Map of BayRICS Counties

The goal of the BayRICS project is multi-system interoperability throughout the Bay Area region. The interoperable BayRICS system-of-systems will provide reliable and cost-effective radio-to-radio voice communications for first responders within the region. The systems will be developed such that any radio can communicate with any other radio in the Bay Area, as defined and authorized within the BayRICS rules of use. The BayRICS project includes two key components to accomplish this level of interoperability:

- Development of 700 MHz P25 Phase 1 conventional simulcast systems in the Bay Area
- Development of 700 MHz P25 Phase 2 trunked systems in the Bay Area

The proposed trunked radio systems shall comply with the latest applicable P25 suite of standards adopted as TIA and/or ANSI documents at the time of the proposal submission. The P25 Inter-RF Subsystem Interface (ISSI) will be a key component of BayRICS. Since BayRICS is considered a system-of-systems, the ISSI shall allow each radio communications system to be interconnected into a complete wide-area network of systems. The standards for the ISSI are still under development; therefore, proposals shall describe compliance with completed standards today, as well as how compliance will be achieved when future standards are completed.



1.2.1 Marin County Overview

Located north of San Francisco, Marin County is home to approximately 250,000 people within 28 cities, according to the 2008 estimates by the U.S. Census. Its proximity to San Francisco places Marin County within a major metropolitan center of the state of California. The topography of the county is very rugged and mountainous. These areas are typically heavily wooded and prone to fire hazard during the fire season.

Marin County is a participant in the newly formed North Bay Consortium. The consortium is a combination of Marin, Napa, Solano, and Sonoma Counties forged through Memorandums of Understanding. These agencies require the capability to communicate and exchange information (data) in a variety of methods. The consortium is currently investigating the possible deployment of a shared region-wide 700 MHz P25 trunked system. The goal of the consortium is to attain interoperability using several different approaches and technologies.

- A. The goal of this RFP is to solicit proposals from qualified vendors for interoperable voice communication solutions, in agreement with the BayRICS goals stated above:
 - 1. Proposal for the development of a 700 MHz P25 Phase 1 conventional simulcast system, leveraging the national interoperable channels.
 - 2. Proposal for the development of a 700 MHz P25 Phase 2 trunked system for operable communications within the County, as well as interoperability with other agencies in the Bay Area.
 - 3. Proposal for the migration to a complete 700 MHz P25 Phase 2 trunked system, with a design for an initial 25% loading and a phased approach for gradual implementation of the remaining channels and users.
 - B. This RFP reflects user operational requirements, system requirements, infrastructure requirements and system support requirements for Marin County; this RFP addresses (but is not limited to):
 - 1. Coverage requirements
 - 2. Daily operational communications requirements of Marin County first responders
 - 3. Significant system components and subscriber units
-



4. Minimum and maximum performance specifications for the system and subscriber units based on defined user needs, national standards and industry best practices
 5. Hardware specifications
 6. Agency owned sites
 7. Construction work on towers, shelters and sites
 8. Connectivity with existing Marin microwave systems and interoperability with BayRICS (San Francisco Bay Area Regional Interoperable Communications System) and other North Bay Consortium agencies including Napa, Solano, and Sonoma Counties.
- C. Proposed systems shall leverage existing communications infrastructure to the greatest extent possible, meet the daily coverage and capacity needs, support transparent roaming and interoperability within the region, enhance interoperability within the Greater Bay Area and provide reserve capacity for use during major manmade or natural catastrophic events.

1.2.1.1 Interoperability with Legacy and Adjacent Systems

- A. The County seeks to leverage existing systems to create a multi-tiered regional communications network for both strategic and tactical communication in support of mutual aid and coordination of incident response. System designs and migration plans should acknowledge and integrate interoperability with existing legacy systems within the County which may remain in service depending on which options are selected; these systems include:
1. VHF Low Band systems
 - a. Volunteer Fire Paging System
 - b. California Highway Patrol (Blue and Violet)
 2. VHF High Band Mutual Aid systems
 - a. CLEMARS (California Law Enforcement Mutual Aid Radio System)
 - b. Fire White



- c. Coast Guard
- 3. UHF T-band systems
 - a. MERA Digital Trunked Radio System
 - 1) FIRESCAD
 - (a) FIRESCAD is a fire station ring-down and alerting system which is currently deployed using an analog talkgroup on the MERA trunked network.
 - 2) Knox Boxes
 - (a) Knox Boxes are remotely controlled key boxes that store keys, access cards and other small items for use by fire personnel during an emergency to unlock gates, common areas, etc. such as in an apartment building. The Knox Boxes currently use in Marin County use an analog talkgroup on the MERA trunked network.
- B. Methods of interconnection and interoperability with these systems should be described in detail regarding feature and functional aspects of each solution proposed. IP technologies are preferred. These solutions will be considered in the scoring of proposals received.
- C. Proposed methods for interoperability with adjacent county and state public safety radio systems should be described in detail.

1.2.1.2 Marin County Current Communications Environment/Assets

An agency overview is provided below.

- A. Marin Emergency Radio Authority (MERA)
 - 1. In February 1997, public safety agencies in Marin County formed MERA using a joint-powers-authority (JPA) to begin developing a proposal for a countywide regional communications system. After an extensive process, a new computer-controlled digital radio system was constructed. The radio system is used by member agencies in the law enforcement, fire management, emergency medical, road maintenance, transit, public works, local government, and other county-based entities. The trunked radio system



unifies public safety response, making it possible for members to more effectively and efficiently communicate with each other and within individual departments. The MERA voice radio communications network consists of the Motorola Digital SmartZone, UHF T-band trunked and simulcast communications network. It is designed to allow regional or wide area conversations between dispatch centers and mobile units operating throughout the county.

2. The agencies within Marin County use the MERA Motorola SmartZone 3.0 radio communications network for their radio communications requirements in the T-band frequency band. They include the following:

- | | |
|-----------------------------------|---|
| 1) County of Marin | 13) Town of Ross |
| 2) City of Belvedere | 14) Ross Valley Fire |
| 3) Bolinas Fire Protection Dist. | 15) Town of Tiburon |
| 4) Town of Corte Madera | 16) Town of San Anselmo |
| 5) Town of Fairfax | 17) City of San Rafael |
| 6) Inverness Public Utility Dist. | 18) City of Sausalito |
| 7) Kentfield Fire Dist. | 19) Community College Dist. |
| 8) City of Larkspur | 20) Marin Municipal Water |
| 9) Marin County Transit Dist. | 21) Marin Community Services Dist. |
| 10) City of Mill Valley | 22) Stinson Beach Fire Protection Dist. |
| 11) City of Novato | 23) Southern Marin Fire Protection District |
| 12) Novato Fire Protection Dist. | 24) Skywalker Ranch Fire |

3. The MERA network is made up of five distinct “cells” to cover Marin County. These cells include:



- a. East Simulcast Cell: 101 Corridor, 9 channels and 6 transmit sites
 - b. West Simulcast Cell: West Marin area, 6 channels and 3 transmit sites
 - c. Sonoma IR Cell: Northeast Marin County, 5 channels and 1 site
 - d. Bay Hill IR Cell: Northwest Marin County, 5 channels and 1 site
 - e. Bolinas IR Cell: West Marin and Bolinas Area, 5 channels and 1 site
4. The radio system is currently overloaded with traffic by a factor of approximately 20%. Additional channels are now being added: one channel on the west zone, and two channels for the east zone.

B. Marin County Microwave Network

Marin County maintains a microwave network for MERA that provides connectivity to 17 microwave sites which use a variety of 6 and links.

C. Marin County Mobile Data System

The County mobile data system has 1,500 users and is using AT&T wireless cards. At this time Marin County is not planning on building a private mobile data system; however, options through UASI initiatives and partnerships with others are being explored.

1.3 Overview of this Document

- A. This section provides a high level overview of all sections of this RFP.
1. Section 1, *Project Overview* – This section provides background information and a general overview of the requirements contained in this RFP.
 2. Section 2, *Instructions to Proposers* – This section provides instructions to proposers, including, but not limited to; Proposal due date; pre-proposal conference information; and evaluation criteria.
 3. Section 3, *Radio Communications System Requirements* – This section provides requirements for the desired communications system and options. The County requires procurement of a 700 MHz, narrowband digital, P25 Phase 2 TDMA trunked system and/or a 700 MHz, narrowband P25 Phase 1



- conventional system. This section includes requirements for system configuration, site selection, RF coverage, and site equipment. This section also includes additional details for the 700 MHz P25 Phase 2 trunked system migration proposal.
4. Section 4, *Backhaul Network* – Existing backhaul connectivity shall be used to the greatest extent practical. Where not practical, this section provides requirements for digital microwave backhaul equipment, network management, and engineering.
 5. Section 5, *Dispatch Console* – Existing dispatch console equipment shall be used to the greatest extent practical. Where not practical, this section provides requirements for dispatch console equipment.
 6. Section 6, *Facilities and Infrastructure Development* – Existing facilities shall be used to the greatest extent practical. Where not practical, this section provides requirements for tower construction, site preparation, fencing, equipment shelters, generators, and UPS equipment.
 7. Section 7, *Network Management Systems (NMS)* – This section provides requirements for the network management system, including terminal locations, system alarms, and site alarms.
 8. Section 8, *Subscriber Equipment* – This section provides requirements for portable radios, mobile radios, control stations, and multiband radios.
 9. Section 9, *Training* – This section provides requirements for training programs to be developed by the SELECTED VENDOR.
 10. Section 10, *Warranty, Maintenance and Support* – This section provides requirements for the warranty, extended warranty, maintenance, and support of the proposed system and subsystems.
 11. Section 11, *System Implementation, Test, and Acceptance* – This section provides requirements for system cutover, staging, installation, fleet mapping, coverage testing, and final acceptance.
 12. Section 12, *County Terms and Conditions* – This section provides terms and conditions specified by Marin County.

B. Several appendices are also included with this RFP:



1. Appendix A – Mandatory Submittals
2. Appendix B – Proposal Pricing Forms
3. Appendix C – Compliance Matrix
4. Appendix D – Master Site List
5. Appendix E – Conventional System Site List
6. Appendix F – Existing Microwave Backhaul Information
7. Appendix G – Specific Coverage Area Requirements
8. Appendix H – Site Surveys

1.4 Project Summary

- A. The SELECTED VENDOR shall be responsible for providing the following project components:
 1. Furnishing and installing system equipment and ancillary facilities
 2. Engineering and system design
 3. Project management
 4. Software installation and programming
 5. Training
 6. Acceptance testing, including coverage testing
 7. Cutover plan and execution
 8. Warranty and Maintenance
- B. The SELECTED VENDOR shall be responsible for furnishing complete and fully functional systems:
 1. Radio communications system, including the guarantee of radio coverage
 2. Point-to-point digital microwave backhaul network



3. Radio dispatch consoles
 4. Infrastructure facilities (e.g., towers, shelters, fencing) as required
 5. Network management system
 6. Subscriber equipment
- C. Work shall be planned, coordinated and conducted with minimal interruption of service to existing critical systems.
- D. Proposals shall completely describe the equipment and methods that will be used to implement the system. The intent of this document is to allow RESPONDENT to propose the best equipment, technology, and methods available to provide state-of-the-art public safety communications systems of highest quality and performance.
- E. All equipment shall be provided in new condition and be covered by a full factory and/or manufacturer's warranty of not less than three years. Warranty shall not commence until after full system acceptance as defined in this RFP.
- F. Proposals shall not be accepted that include systems or equipment at the end of their respective equipment production lifecycles. In the event that requirements are stated in more than one section and appear to conflict, the more stringent requirement shall apply.
- G. It should be noted that today's technology, for the most part, is IP controlled. Although it is a core goal of the Marin County project to leverage existing infrastructure, consideration must be given to the cost of interfacing to legacy systems. For example, additional equipment can be added to convert IP traffic to interface to a legacy console, but that cost may justify the upgrade of that console (which may be near the end of its lifecycle) to an IP console. The same can be said for legacy microwave equipment. Therefore, the RESPONDENT shall weigh these factors and provide a cost effective, long-term solution.

1.5 Authorization and Funding

- A. Marin County has authorized this RFP as part of an ongoing effort to enhance mission critical radio communications and interoperability throughout the County and the Bay Area. The BayRICS project is intended to provide specifications and engineering assistance necessary to create an interoperable system-of-systems.



As each of the member agencies implement new communications systems, it is imperative that the new systems comply with certain specifications that will allow them to work as an interoperable component within the 10-county Bay Area.

- B. Funding for the Marin County communications system, as defined in this RFP, has not been secured to date. Therefore, each RESPONDENT shall provide financing options for the complete system offered over 5-, 10-, and 15- year periods. The financing options offered may be lease or term financing.
- C. Upon authorization by Marin County, the SELECTED VENDOR shall offer other agencies or municipalities in the BayRICS region, user equipment and system components at the same or better pricing as that offered to Marin County.

1.6 Proposals Desired

- A. The County desires, but does not require, a complete turnkey solution addressing all project systems, subsystems, and components.
- B. Proposal Options: Requirements described as an “OPTION” or “OPTIONAL” refer to features or equipment which may or may not be purchased by the County, or items whose quantities are not determined yet. It is not the RESPONDENT’s option to respond to these requirements; therefore, RESPONDENTS are required to respond to all OPTIONAL requirements to the greatest extent possible.
- C. Alternate Proposals
 - 1. In the event a RESPONDENT has a technological solution that does not meet the exact requirements in this RFP, RESPONDENT may offer more than one proposal as long as each proposal fully addresses the intent of the requirements set forth in this RFP.
 - 2. Alternate proposals shall be submitted separately, under a different cover from the base proposal and clearly marked “ALTERNATIVE PROPOSAL”.
 - 3. The RESPONDENT shall comply with the same submittal instructions in Section 2.3, *Proposal Format*, below.
- D. Proposals for shared leased systems may be submitted, contingent on the following criteria:



1. The County shall have priority use of all County licensed channels and services.
2. The County shall have complete control of all aspects of monitoring and controlling the channel loading and all operational parameters and use of the system in real time.
3. The system shall accommodate requests for activations, changes, and other requests in real time.
4. The proposal shall include provisions for queue priorities and talkgroup assignment.
5. Shared leased system proposals shall be submitted separately, under a different cover from the base proposal and clearly marked "SHARED LEASED PROPOSAL".
6. The RESPONDENT shall comply with the same submittal instructions in Section 2.3, *Proposal Format*, below.

1.7 Quality Assurance and Coordination

1.7.1 Standards and Guidelines

- A. The SELECTED VENDOR shall comply with the following standards, rules, regulations, and industry guidelines:
 1. American National Standards Institute (ANSI)
 2. National Electrical Manufacturer's Association (NEMA)
 3. Electronics Industry Association (EIA)
 4. Telecommunications Industry Association (TIA)
 5. Telecommunications Distribution Methods Manual (TDMM)
 6. National Electrical Code (NEC)
 7. Institute of Electrical and Electronics Engineers (IEEE)
 8. Federal Communications Commission (FCC)
-



9. Underwriters Laboratories, Inc. (UL)
 10. American Society of Testing Materials (ASTM)
 11. National Fire Protection Association (NFPA) 1221
- B. RESPONDENT shall comply with industry best practices for system installation, grounding, bonding, and transient voltage surge suppression (TVSS), as outlined in the following standards:
1. Motorola R56 – Standards and Guidelines for Communication Sites (latest revision)
 2. M/A-COM Site Grounding and Lightning Protection Guidelines (AE/LZT – 123 4618/1 – latest revision)
 3. Other contractor / industry standard – RESPONDENT shall provide to the County for review and approval prior to contract award.
- C. Equipment mounting (e.g., racks and cabinets) shall conform to full Zone 4 earthquake compliance in accordance with Telcordia (formerly Bellcore) GR-63-CORE Network Equipment Building System (NEBS) requirements. The SELECTED VENDOR shall provide certification that the racks and/or cabinets used meet the Telcordia GR-63-CORE NEBS requirements for Zone 4 in their as-built documentation package.
1. Equipment placement in racks or cabinets shall be such that heavier items are placed lower in the racks while lighter items are placed higher in the racks to minimize the effect of centrifugal forces and swaying during an earthquake.
 2. Bracing must also be applied to equipment during unattended periods of construction.
- D. Governing codes and conflicts: If the requirements of this RFP conflict with those of the governing codes and regulations, then the more stringent of the two shall become applicable.
- E. If the RESPONDENT cannot meet any of the standards or guidelines listed above, the RESPONDENT shall list any and all deviations for approval by the County in their proposal.
-



1.7.2 Frequency Coordination and Licensing

- A. Land Mobile Radio (LMR) licenses -- The County is in the process of securing 700 MHz frequency channels for use in the proposed system. The County shall provide all current licensing information to the SELECTED VENDOR following contract award. Following approval of the preliminary design phase, the SELECTED VENDOR shall provide all modifications and applicable forms to the County for review and approval. The SELECTED VENDOR shall also be responsible for any additional frequency research, support, and preparation if necessary. The County shall sign and submit all forms following approval.
- B. Microwave Licenses -- The SELECTED VENDOR shall be responsible for all microwave frequency research, coordination and preparation of all associated FCC license applications and submittals on behalf of the County. The County shall be responsible for coordination fees and licensing fees, if any and signatures, as applicable.

1.7.3 Federal Aviation Administration (if applicable)

The SELECTED VENDOR shall complete Federal Aviation Administration (FAA) forms as necessary.

1.7.4 Project Management

- A. The RESPONDENT shall provide a Project Management Plan which includes, a detailed Work Breakdown Structure (WBS), project scope, deliverables, schedule, QA/QC processes, and risk management sections.
- B. The plan shall describe how the SELECTED VENDOR intends to monitor and control the installation and deployment of the proposed system and mitigate risks in order to ensure that the system meets the design specifications and is delivered on time.
- C. Regularly scheduled status meetings shall be established between the County Project Team and the SELECTED VENDOR. The SELECTED VENDOR shall provide a schedule for these meetings subject to the approval of the County.



1.7.4.1 Scheduling

- A. The SELECTED VENDOR shall develop and maintain a project schedule including tasks, milestones, start and end dates, task predecessors, and task owners based on an approved WBS.
- B. The schedule shall represent tasks associated with completing work on all items identified in the WBS. The project schedule shall be updated with actual dates as tasks are completed. Any schedule changes must be approved by the County.
- C. The updated schedule shall be provided as an agenda item for all County/SELECTED VENDOR biweekly status meetings.
- D. The schedule shall address the following at a minimum:
 - 1. Site surveys
 - 2. Detailed design review
 - 3. Site preparation
 - 4. Equipment manufacturing
 - 5. Factory acceptance test
 - 6. Equipment delivery
 - 7. System installation
 - 8. System configuration
 - 9. System optimization
 - 10. Acceptance testing
 - 11. Coverage testing
 - 12. User training
 - 13. Fleet map development
 - 14. System cutover



15. System documentation development and delivery
16. System and equipment warranty

1.7.4.2 Project Punch List

- A. The SELECTED VENDOR shall establish and maintain a punch list, as mutually agreed to with the County, for site facilities, equipment, and acceptance tests.
- B. The punch list shall be maintained in real time and published weekly. The punch list shall include the following at a minimum:
 1. Sequential punch list item number
 2. Date identified
 3. Item description
 4. The party responsible for resolution
 5. Expected resolution date
 6. Resolution date
 7. Details about how each punch list item was resolved and tested
 8. Notes about the item
- C. If responsibility for resolving an item is transferred to another person or group, a new entry shall be added to the punch list and the original entry shall be appropriately noted.
- D. The SELECTED VENDOR shall be responsible for reviewing each punch list item, and advising the County of any changes. The status of punch list items shall be updated during each biweekly status meeting.

1.7.4.3 Project Meetings

- A. A project kickoff meeting shall be scheduled prior to the beginning of the project.
 - B. Weekly project status meetings shall be scheduled following contract award and the initial kickoff meeting.
-



C. The SELECTED VENDOR shall be responsible for scheduling the meetings as well as preparing meeting agendas and minutes. In addition to those identified in Section 1.7.4.1, *Scheduling*, above, Meeting agenda items shall include, as a minimum, the following items:

1. Schedule review
2. Status of deliverables
3. Risk items
4. Changes
5. Plans for the next period
6. Action item assignments
7. Punch list review

1.7.4.4 Project Staffing

A. Project staffing shall be managed by the SELECTED VENDOR based on workload and the level of effort throughout the implementation / installation process; however, the positions identified below shall be staffed throughout the duration of the project and shall not be changed without prior approval of the County.

B. SELECTED VENDOR Project Manager:

1. The SELECTED VENDOR's Project Manager shall be the primary point of contact between the County and the SELECTED VENDOR.
2. The SELECTED VENDOR's Project Manager shall bear full responsibility for supervising and coordinating the installation and deployment of the communications system; be responsible for development and acceptance of the Project Management Plan; managing the execution of the project against that plan; and overseeing the day-to-day project activities, deliverables, and milestone completion.
3. The SELECTED VENDOR's Project Manager shall be responsible for coordination of the biweekly status meetings.



C. SELECTED VENDOR Project Engineer:

1. The SELECTED VENDOR's Project Engineer shall have the primary responsibility for managing the system design and ensuring that the system is installed in accordance with the approved system design.
2. Any deviation from the system design shall be subject to project change control procedures and will not be undertaken until approved by the County.
3. The SELECTED VENDOR's Project Engineer shall ensure the development of block diagrams, system level diagrams, and rack diagrams to assist the installation team in completing the system installation.
4. The Project Engineer shall also supervise the development and execution of the Acceptance Test Plan, the Coverage Acceptance Test Plan, and guide the project team through the processes and procedures necessary to prove that the system performs as specified in the contract. No test plan will be executed until approved by the County.

1.7.5 QA/QC Program

- A. The RESPONDENT shall include a Quality Assurance / Quality Control (QA/QC) plan for the Marin County radio communications system project. The QA/QC plan shall be submitted for review during preliminary design as described in this section. The plan shall address all stages of the project, including, but not limited to:
1. Procurement
 2. System design
 3. Installation
 4. Implementation
 5. Testing
 6. Cutover



- B. The QA/QC plan shall specifically describe the plans and procedures that ensure the proposed system is designed in accordance with the standards and requirements described in this RFP.
- C. The QA/QC plan shall be included as part of the Project Management Plan developed by the Project Manager.
- D. The QA/QC plan shall be an integral part of the project and include County personnel as part of the review and approval process for all deliverables and submittals.
- E. The proposed QA/QC plan shall address the following project tasks at a minimum:
 - 1. Design analysis and verification
 - 2. RF coverage analysis and verification
 - 3. Design changes and document control
 - 4. Material shipping, receiving, and storage
 - 5. Site preparation (if required)
 - 6. Field installation and inspection
 - 7. Equipment inventory and tracking
 - 8. System testing and validation
 - 9. Software regression testing
 - 10. Deficiency reporting and correction
 - 11. Implementation and cutover
 - 12. Training and certification

1.8 Project Submittals

Key project deliverables and submittals are outlined below and are described in further detail throughout this RFP.



- A. All project submittals shall be subject to review and approval by the County and its Engineer / Consultant.
- B. All submittals shall be provided in hard copy, properly bound, and in electronic format on CD-ROM. The quantity of hard copies required shall vary for each type of submittal and shall be determined by the County prior to submission.
- C. All submittals shall include a cover letter or letter of transmittal, signed, dated, and fully describing the contents of the submittal.

1.8.1 Proposal

RESPONDENT shall submit their proposal in accordance with the date and time specified in Section 2.1, *Overview*, below. Proposal format and submittal details are provided in Section 2.3, *Proposal Format*, below.

1.8.2 Preliminary Design (45 days after contract award)

The SELECTED VENDOR shall submit the Preliminary Design package 45 days after contract award, which shall include the following:

- A. QA/QC Plan
- B. Detailed project schedule
- C. System block diagrams
- D. Patching schedules and termination details for all cabling necessary for a complete record of the installation
- E. Radio and microwave channel plans
- F. Microwave path engineering report(s)
- G. Equipment room overview drawings
- H. Equipment rack/cabinet elevation drawings
- I. Tower profile drawings indicating antenna mounting locations
- J. Detailed lists of materials for each site



- K. 30-Day Operational Test Plan
- L. Coverage Acceptance Test Plan (CATP)

1.8.3 Final Design (90 days after contract award)

The SELECTED VENDOR shall submit the Final Design package 90 days after contract award, which shall include the following:

- A. Any updates to previously submitted design information
- B. Cutover plan
- C. System operation and maintenance manuals for all equipment
- D. Factory test data
- E. Site installation drawings
- F. Structural analyses and results
- G. The SELECTED VENDOR shall submit a detailed Staging Acceptance Test Plan (SATP), outlining a comprehensive series of tests that will demonstrate proof of performance and readiness for shipment.
- H. The SATP shall be submitted no later than 15 business days before the testing starts, and shall be approved no later than five business days before the testing starts.

1.8.4 System staging, delivery, and installation

- A. System staging must be performed in the United States.
- B. The SELECTED VENDOR shall submit a Bill of Materials / packing list with two copies for each shipment of equipment. The packing list shall include the following information at a minimum for each component included in the packaging:
 - 1. Manufacturer
 - 2. Model



3. Serial number
 4. Unique identification of the package containing the item
- C. All items shipped by the SELECTED VENDOR or their suppliers will include the above information in a barcode format.

1.8.5 Final System Acceptance

- A. The SELECTED VENDOR shall submit a detailed Final Acceptance Test Plan (FATP), outlining a comprehensive series of tests that will demonstrate proof of performance and readiness for final acceptance by the COUNTY / OWNER.
- B. The FATP shall be submitted no later than 15 business days before the testing starts, and shall be reviewed by County no later than five business days before the testing starts.
- C. The SELECTED VENDOR shall submit three final and complete sets of as-built documentation, including the following:
1. Documentation index
 2. Field test reports
 3. Coverage test reports
 4. Warranty documentation
 5. Detailed list of materials for each site
 6. As-built system block diagrams
 7. As-built site drawings, including all cabling and terminations
 8. Site layout drawings, as appropriate
 9. Tower drawings showing any new installations



2. Instructions to Proposers

2.1 Overview

- A. Proposals must be received by close of business on September 30, 2010, Proposals received after this time will not be considered.
- B. RESPONDENT shall submit a bound original and three bound copies of the proposal to the County. Each package shall also include a copy of the proposal in electronic format on CD-ROM. The front of the package should be marked "Proposal for Marin County Radio Communications System". Proposals shall be addressed to:

Marin County Communications System Proposal - RFP# 2617
Marin County Communications Division
Attn: Shelly Nelson and Richard Chuck
3501 Civic Center Drive, Room 304
San Rafael, CA 94903

2.2 Pre-Proposal Conference

- A. A **mandatory** pre-proposal conference will be held on July 13, 2010, at 9:00 a.m. The conference will be held at the 3501 Civic Center Drive, San Rafael, CA.
- B. RESPONDENT may submit questions to the County, in either written or electronic format (email), prior to 4:00PDT on June 28, 2010. During the conference, the County will provide answers to any questions received and hold an open discussion regarding the project. Oral responses during the conference shall not be binding on the County.
- C. County contact for submission of technical questions:

Shelly Nelson (snelson@co.marin.ca.us)
- D. Following the conference, all attendees will be provided with a copy of the sign-in sheet, questions, and responses.



2.3 Proposal Format

- A. RESPONDENT shall complete all mandatory submittals provided in Appendix A: Mandatory Submittals. Failure to provide any of the mandatory submittals with the proposal may be cause for rejection.
- B. RESPONDENT shall adhere to the proposal format provided below, organized by section:
 - 1. Section 1: Cover letter
 - 2. Section 2: Table of contents
 - 3. Section 3: Executive summary
 - 4. Section 4: Qualifications

All RESPONDENTS shall provide information describing experience and qualifications with similar projects in their proposal, or upon request from the County, including, but not limited to the following:

- a. Descriptions of the RESPONDENT's qualifications
- b. Resumes of key personnel
- c. Supplementary information
- d. A list of five systems of similar size and complexity, successfully completed by the RESPONDENT, including:
 - 1) Name of the system
 - 2) Location
 - 3) Contact person
 - 4) Contact telephone number
- 5. Section 5: Description of the system, including equipment, software, design, and services to be provided
 - a. Radio communications system



- b. Microwave backhaul connectivity
 - c. Radio dispatch console
 - d. Subscriber equipment
 - e. Site infrastructure
 - f. Additional subsystems
 - g. RF coverage predictions
 - h. Detailed equipment specification sheets for all proposed equipment
 - i. System design information shall include a complete detailed description, block diagrams, equipment layouts, and equipment lists necessary to provide a complete and comprehensive description.
- 6. Section 6: Preliminary project schedule with detailed Gantt chart
 - 7. Section 7: Training programs and additional information that is not covered in other sections
 - 8. Section 8: Point-by-point compliance

RESPONDENT shall provide compliance statements for each outline level or bullet point of this RFP. RESPONDENT shall complete the compliance matrix provided in Appendix C – Compliance Matrix. Compliance statements are limited to the following three choices:

- a. COMPLY – The proposal meets or exceeds the specified requirement.
 - b. COMPLY WITH CLARIFICATION – The proposal does not meet the exact stated requirement, however, meets a substantial portion of or meets the intent of the requirement. RESPONDENT must provide a detailed explanation when using this statement.
 - c. EXCEPTION – The proposal does not meet the specified requirements. RESPONDENT must provide a detailed explanation when using this statement.
- 9. Section 9: System, subsystem and subscriber warranty information



10. Section 10: Total proposal cost and detailed pricing breakdown

Respondent shall provide total proposal cost and itemized pricing by using the pricing forms provided in Appendix B – *Proposal Pricing Forms*, to the greatest extent possible. Costs for OPTIONAL items shall also be provided on the forms.

2.4 Evaluation

The County shall evaluate proposals based on a number of criteria, including:

- A. RFP compliance
- B. Coverage guarantee
- C. Vendor experience
- D. Cost of system
- E. Lifecycle costs
- F. Unit costs of subscriber equipment
- G. Capability, features, and functionality of the system
- H. Feasibility of design
- I. Warranty, maintenance, and support

2.5 Addenda to the RFP

During the proposal period, the County may issue written addenda to each person, firm, or corporation who has secured a copy of these specifications, making changes or corrections to the specifications as issued. Such changes or corrections shall be included in the work and/or materials covered by the proposal, and such addenda shall become part of the specifications and contract.



2.6 Award

The County intends to award a contract(s) for the complete system or portions thereof. However, the County specifically reserves the following rights, consistent with procuring a system that best meets the needs of the County and system users:

- A. The County reserves the right to accept or reject any or all proposals or any portion thereof.
- B. The County reserves the right to accept all or part of any proposal depending solely upon the requirements and needs of the County.
- C. The County reserves the right to seek clarifications of any proposal submitted or specific aspects of any proposal prior to the award of the contract. After seeking such clarification, the County will allow the RESPONDENT an opportunity to provide the requested clarification.
- D. The County reserves the right to adjust item quantities and/or reconfigure the communications system in the best interest of the County subsequent to award of the contract.
- E. If multiple contracts are awarded, in lieu of a turnkey contract, the County may either:
 - 1. Negotiate additional scope with one or more of the successful RESPONDENT to assume Prime Contractor status, or
 - 2. Provide system integration or prime contractor services provided the SELECTED VENDOR has submitted a proposal for those services.



3. Radio Communications System Requirements

3.1 Overview

- A. RESPONDENTS shall propose complete 700 MHz, narrowband (12.5 kHz bandwidth) digital radio communications systems as described below. Backhaul shall be delivered to the highest degree practical by existing microwave links without affecting operations of the existing systems. Requirements for each system are described herein and are delineated throughout this RFP according to *conventional* or *trunked* system requirements:
1. **Conventional System Proposal:** P25 Phase 1 -- The system shall be installed in specific communication sites throughout the County as outlined in Appendix E – Conventional System site List. Each site will support one simulcast calling channel and at least one multi-frequency tactical channel using national interoperability frequencies allocated by the Federal Communications Commission (FCC). Channels shall be licensed in accordance with Section 1.7.2, *Frequency Coordination and Licensing*, above.
 2. **Trunked System Proposal:** P25 Phase 2 TDMA -- The system must seamlessly integrate all sites such that end users can freely roam throughout the service areas of Marin County without interruption of service or the need to manually select sites.
 3. **Trunked System Migration Proposal:** P25 Phase 2 TDMA -- The system must ultimately meet all of the requirements specified for the trunked system. However, this proposal should include a system design that handles an initial 25% loading capacity with a migration plan to implement the remaining channels and users on the system at a later time. The proposal should specify the necessary infrastructure and initial capital investment needed to meet the trunked coverage requirements, but initially only support a fourth of the anticipated subscriber unit quantities. The migration plan should outline a phased approach to updating the system on a channel-by-channel basis until all of the subscribers units and talkgroups have been added.
- B. The systems shall provide portable and mobile radio coverage throughout the County as described in Section 3.5, *Coverage*, below.



3.2 Interoperability / Project 25 Statement of Requirements (SoR)

- A. The proposed radio system shall comply with the latest applicable P25 suite of standards adopted as TIA and/or ANSI documents at the time of proposal submission and shown in Table 1 below. These standards establish technical parameters that allow compatibility and interoperability of digital radio equipment from different manufacturers.
- B. By stating compliance with a level two heading in the Statement of Requirements (SoR), the RESPONDENT is claiming compliance with all applicable third level headings (requirements) in the SoR. If a RESPONDENT is not compliant with a requirement, the RESPONDENT shall identify the requirement by number and name, and provide a detailed explanation of why the proposed system does not meet the requirement.
- C. RESPONDENT shall reference the complete P25 SoR for a detailed description of each requirement; the following link is supplied for informational purposes only: <http://www.apcointl.org/frequency/project25/documents/SOR-2009.pdf>

3.2.1 700 MHz P25 Phase 2 Trunked System

Table 1, below contains a list and brief description of second and third level requirement headings of the APCO Project 25 Statement of Requirements¹ (P25 SoR). Each of the requirements in the table is identified as either mandatory or a standard option. In order to confirm compliance with P25, RESPONDENT shall provide point-by-point compliance statements for each of the requirements in Table 1 for Phase 2, 12.5 kHz TDMA systems.

Table 1Table 1: APCO Project 25 Statement of Requirements, Mandatory and Standard Options

¹ APCO P25 SoR, August 15, 2009



First Level Heading Description	Requirement No.	Service, Feature or Capability from the P25 SoR
Project 25 (P25) Overview	1.2.1	Bandwidth Compliance
	1.3.2	ANSI/TIA/EIA
	1.3.3	Subscriber Unit MIL-SPEC Requirements
Detailed Standards Suite Proposed	2.1.1	P25 Common Air Interface (CAI)
	2.1.2	P25 Standard Service Set
	2.2.1	P25 Mobile Data Interface (A Interface)
	2.2.2	P25 Fixed Host Data Interface (E _d)
	2.3	P25 Telephone Interconnect Interface
	2.4	P25 Inter-RF Subsystem Interface (ISSI)
	2.4.1	Multiple P25 RF Subsystem Connectivity
	2.4.2	Operational Modes
	2.4.3	Networking Configurations
	2.4.4	Bearer Media for Interconnection
	2.4.5	Services to be supported
	2.4.6	Interface Requirements
	2.4.7	Control Element
	2.4.8	Traffic Element
	2.4.10	Roaming Subscriber Management
	2.5	P25 Network Management Interface (NMI)
	2.5.1	Network Management
Detailed Standards Suite Proposed - <i>continued</i>	2.5.2	Element Management
	2.6.1	CSSI Applicability
	2.6.2	General CSSI Requirements
	2.6.3	CSSI Requirements for Conventional Services
	2.6.4	CSSI Requirements for Trunked Services
	2.6.5	CSSI Requirements for Mixed Mode Services
	2.6.6	CSSI Requirements Applicable to both Trunking and Conventional
	2.6.7	Miscellaneous CSSI Requirements
	2.7	P25 Fixed/Base Station Subsystem Interface (FSSI)
	2.7.2	Conventional Digital Fixed Station Interface (CDFSI)
	2.7.3	Trunked FSSI
P25 System Overview	3.1.1	Spectral Efficiency
	3.1.2	Channelization
	3.1.3	Roaming Functions of SUs and Mobiles within and among P25 Systems
	3.2.1	System Architectures
	3.2.2	System Connectivity
	3.2.3	ID Structures
	3.2.4	Throughput Delay



First Level Heading Description	Requirement No.	Service, Feature or Capability from the P25 SoR
	3.2.5	Direct Modes of Communications
	3.2.6	Use of Standard Signaling
	3.2.7	Over-The-Air-Programming (OTAP)
	3.3	Support Audible Signaling
	3.3.1	General
	3.3.2	Operational or Systemic
	3.3.3	Operational Signals (Personality Programmed)
	3.3.4	Service and Bearer Channel Interface/Service Set
	3.3.5	Other System Functionalities
	3.3.6	Location Services Via GPS
Encryption	4.1.1	Type 3 Encryption Requirements
	4.1.2	Adopt for Type 1 Encryption:
	4.1.3	Key Fill
	4.1.4	Four Levels of Encryption
	4.1.5	Key Management
Subscriber Equipment	5.1.1	General Requirements
	5.1.2	Phase 1-Specific Requirements
	5.1.3	Phase 2-Specific Requirements
	5.1.4	Other General Requirements
	5.2.1	General VR Capabilities
	5.3.2	Phase 2 Subscriber Units
Interoperability	6.1	Infrastructure
	6.2	Subscriber Units
Migration	7.1.1	General Migration Requirements
	7.3.1	Phase 1 Conventional to Phase 2 Migration Requirements
	7.3.2	Phase 1 Trunked to Phase 2 Migration Requirements

3.2.2 700 MHz P25 Phase 1 Conventional System

Table 2, below, contains a list and brief description of second and third level requirement headings of the APCO Project 25 Statement of Requirements² (P25 SoR). Each of the requirements in the table is identified as either mandatory or a standard option. In order to confirm compliance with P25, RESPONDENT shall provide point-by-

² APCO P25 SoR, August 15, 2009



point compliance statements for each of the requirements in Table 2 for Phase 1, 12.5 kHz FDMA systems.

Table 2: APCO Project 25 Statement of Requirements, Mandatory and Standard Options

First Level Heading Description	Requirement No.	Service, feature or capability from the P25 SOR
Project (P25) Overview	1.2.1	Bandwidth Compliance
	1.3.2	ANSI/TIA/EIA
	1.3.3	Subscriber Unit MIL-SPEC Requirements
	2.1.1	P25 Common Air Interface (CAI)
	2.1.2	P25 Standard Service Set
	2.2.1	P25 Mobile Data Interface (A Interface)
	2.2.2	P25 Fixed Host Data Interface (E _d)
	2.3	P25 Telephone Interconnect Interface
	2.4	P25 Inter-RF Subsystem Interface (ISSI)
	2.4.1	Multiple P25 RF Subsystem Connectivity
	2.4.2	Operational Modes
	2.4.3	Networking Configurations
Project (P25) Overview - continued	2.4.4	Bearer Media for Interconnection
	2.4.5	Services to be Supported
	2.4.6	Interface Requirements
	2.4.7	Control Element
	2.4.8	Traffic Element
	2.4.10	Roaming Subscriber Management
	2.5	P25 Network Management Interface (NMI)
	2.5.1	Network Management
	2.5.2	Element Management
	2.6.1	CSSI Applicability
	2.6.2	General CSSI Requirements
	2.6.3	CSSI Requirements for Conventional Services
	2.6.4	CSSI Requirements for Trunked Services
	2.6.5	CSSI Requirements for Mixed Mode Services
	2.6.6	CSSI Requirements Applicable to both Trunking and Conventional
	2.6.7	Miscellaneous CSSI Requirements
	2.7	P25 Fixed/Base Station Subsystem Interface (FSSI)
	2.7.1	Conventional Analog Fixed Station Interface (CAFSI)
	2.7.2	Conventional Digital Fixed Station Interface (CDFSI)
	2.7.3	Trunked FSSI
P25 System Overview	3.1.1	Spectral Efficiency
	3.1.2	Channelization



First Level Heading Description	Requirement No.	Service, feature or capability from the P25 SOR
	3.1.3	Roaming Functions of Subscriber Units (SUs) and Mobiles within and among P25 Systems
	3.2.1	System Architectures
	3.2.2	System Connectivity
	3.2.3	ID Structures
	3.2.4	Throughput Delay
	3.2.5	Direct Modes of Communications
	3.2.6	Use of Standard Signaling
	3.2.7	Over-The-Air-Programming (OTAP)
	3.3	Support Audible Signaling
	3.3.1	General
	3.3.2	Operational or Systemic
	3.3.3	Operational Signals (Personality Programmed)
	3.3.4	Service and Bearer Channel Interface/Service Set
	3.3.5	Other System Functionalities
	3.3.6	Location Services Via GPS
Encryption	4.1.1	Type 3 Encryption Requirements
	4.1.2	Adopt for Type 1 Encryption:
	4.1.3	Key Fill
	4.1.4	Four Levels of Encryption
	4.1.5	Key Management
Subscriber Equipment	5.1.1	General Requirements
	5.1.2	Phase 1-Specific Requirements
	5.1.4	Other General Requirements
	5.2.1	General VR Capabilities
	5.3.1	Phase 1 Subscriber Units
	5.3.2	Phase 2 Subscriber Units
Interoperability	6.1	Infrastructure
Migration	7.1.1	General Migration Requirements
	7.2.1	Phase 0 to Phase 1 Migration Requirements

3.3 System Configuration

3.3.1 Redundancy and Survivability

- A. The proposed radio communications systems are intended to support mission critical operations; therefore, a high degree of redundancy and survivability is



required. A network topology utilizing fault tolerance shall be incorporated to the greatest extent possible through a distributed and/or redundant architecture.

- B. Redundancy is required for all system elements in which failure would result in a major failure of the system; single points of failure are not acceptable. Such elements include, but are not limited to the following:
 - 1. System controllers and fixed site equipment
 - 2. Backhaul network
 - 3. Power systems
 - 4. Network management system
- C. The trunked system shall include several modes of degraded operation, known as failure modes. The system shall be capable of manual or automatic activation of failure modes in the event of a failure. Additionally, the system shall switchover to a failure mode gracefully. Failure modes shall include the following scenarios at a minimum:
 - 1. Loss of single site
 - 2. Loss of multiple sites
 - 3. Loss of system controller
 - 4. Loss of a frequency channel

3.3.2 Expansion

- A. The systems shall be expandable by adding additional hardware and/or software to increase coverage, capacity, or features. Where possible, RESPONDENT shall propose equipment such that the system can be easily expanded by a minimum factor of 20%. For example if a transmitter combiner requires five ports for the system design, a six-port combiner should be provided for ready expansion.
- B. The trunked system proposed shall be expandable to meet the capacities listed below through the addition of hardware and/or software. Replacement of the



system and site control equipment to meet this requirement shall not be acceptable.

1. Interconnected system and site control equipment (if using a centralized architecture) – 4
2. Total frequency channels – 400
3. Simulcast cells – 20
4. Sites per simulcast cell – 14 or more
5. Unit IDs – 36,000
6. Affiliated Users – 12,000
7. Talkgroups – 12,000
8. Dispatch Positions – 375

3.3.3 Grade of Service (GoS) – Trunked System

- A. The measure of traffic loading capacity for any trunked system is defined by Grade of Service (GoS). Grade of Service is used to measure the probability that a radio call will not gain immediate access to a radio channel, but rather, be placed in a busy queue for later processing when a voice channel becomes available. For example, a 2% GoS represents that 98% of the radio calls attempted on the system get processed immediately, and 2% get placed into the user queue.
- B. The system shall meet a GoS of 1%, with 90% of units that are placed in queue receiving a channel-grant within one second. RESPONDENT shall use the following information in developing their design:
 1. Assume 1.2 calls per unit per hour
 2. Assume six second transmission duration plus a two second hang time for repeater de-key after ending of talkgroup call.
 3. RESPONDENT shall use the unit counts provided below:
 - a. 3,000 Portable Units



- b. 2,000 Mobile Units
 - c. 250 Control Stations
- C. RESPONDENT shall submit traffic engineering studies in their proposal describing how their proposed system design meets this criterion. The traffic engineering study shall describe the methodology used in developing the study along with any assumptions relating to inter and intra cell usage.

3.4 Site Selection

A. Trunked System

1. RESPONDENT shall determine the number and location of sites needed to provide the required coverage. The County has identified a number of preferred sites for use in the proposed system, provided in Appendix D – Master site List.
2. If additional sites are needed, commercial sites for lease or new *greenfield* sites may be proposed. Costs and timelines associated with these sites for development and EIR (Environmental Impact Report) activities must be included in the proposal for consideration.

B. Conventional System

1. The County intends to install a specified number of 700 MHz remote base/mobile relay stations in specific communication sites.
2. The RESPONDENT shall provide coverage maps to describe the coverage performance guaranteed by using the sites specified in Appendix E: Conventional System Site List.

3.5 Coverage

- A. The radio systems shall be designed to serve within the geographical boundaries of the County.
- B. Coverage design, implementation, and testing for the system shall adhere to the Telecommunications Industry Association (TIA) Telecommunications Systems



Bulletin (TSB) #88-C (or latest version), *Wireless Communications Systems Performance in Noise-Limited Situations*³.

C. Channel Performance Criteria (CPC)

RF coverage is defined as the digital Bit Error Rate (BER) that provides a minimum Delivered Audio Quality (DAQ) of 3.4 audio signal for both outbound (talk-out) and inbound (talk-back) communications. The proposal shall include a detailed explanation of how both in-bound and out-bound testing will be accomplished to verify required in-bound and out-bound coverage.

D. Trunked System:

The County envisions the radio system to provide coverage as described below:

1. The system should provide portable radio coverage over 95% of the County's operational area at a 97% reliability level in urban areas and a 95% reliability level in rural areas. Urban areas are considered the land areas within the city or town boundaries of the following list. All other areas are considered rural. The 5% of the County not covered in the 95% specification cannot contain any of the following:
 - a. City of Belvedere
 - b. Town of Corte Madera
 - c. Town of Fairfax
 - d. City of Larkspur
 - e. City of Mill Valley
 - f. City of Novato
 - g. Town of Ross
 - h. Town of Tiburon

³ TIA Telecommunications System Bulletin, TSB-88.1-C, January 2008



- i. Town of San Anselmo
 - j. City of San Rafael
 - k. City of Sausalito
 - l. Town of Kentfield
 - m. Town of Inverness
 - n. All main roads and highways
 - o. All event centers and key points of interest
 - p. All County, City, Town and District facilities
- 2. The system should provide radio coverage along state, county, and federal highways and in cities.
 - 3. The system should provide radio coverage to critical locations identified in Appendix G – Specific Coverage Area Requirements.

E. Conventional System:

RESPONDENT shall provide coverage designs for a system using only sites provided in Appendix D – Master Site List. The system design shall consider all target devices listed in Section 3.5.5, TIA TSB-88 Annex E User Choices.

3.5.1 Coverage Maps

- A. RESPONDENT shall include a detailed description of the propagation models used and the assumptions made in preparation of the maps. A brief description of the methodology the software used to calculate coverage shall also be included in the proposal narrative.
- B. RESPONDENT shall submit both talk-out and talk-back system composite coverage maps for all proposed design configurations. The maps shall be clearly labeled and shall show system gain calculations for each of the following:
 - 1. Mobile radios – Standard dash or trunk mount with antenna mounted in the center of the roof



2. Portable radios – Standard portable radio outdoors:
 - a. Talk-out to a portable radio on hip with swivel belt clip
 - b. Talk-back from a portable radio on hip with swivel belt clip
3. Portable radios – Standard portable radio with 18 dB building penetration margin in urban areas and 10 dB building penetration margin in rural areas:
 - a. Talk-out to a portable radio on hip with swivel belt clip
 - b. Talk-back from a portable radio on hip with swivel belt clip
- C. Coverage shall be depicted using a light transparent color or cross-hatching for those areas that meet or exceed the minimum coverage reliability threshold.
- D. All maps must clearly delineate the difference between areas predicted to be greater than DAQ 3.4 equivalent coverage and areas that do not meet required coverage requirements. RESPONDENT shall include the effects of simulcast interference in all coverage maps (if applicable).
- E. Coverage maps shall be provided in the proposal in two formats:
 1. 11"x17" (minimum) full color hardcopy format
 2. In PDF file format on CD-ROM

3.5.2 Map Criteria

- A. All maps shall include a background layer suitable for County reference (e.g., topographic map, roads, rivers, etc.). Link budgets shall be provided, clearly defining the following minimum information, relating to each map and each site:
 1. Base station / repeater RF power output
 2. Antenna gain
 3. Antenna down tilt (if applicable)
 4. Transmit ERP
 5. Receiver sensitivity



6. Antenna height
 7. Mobile and portable antenna height for talk-out and talk-in
 8. Mobile and portable RF output power
 9. The configuration of field units (for example – talk-out to portable inside 10 dB loss buildings)
 10. Simulcast timing parameters (if applicable)
- B. Thirty meter U.S. Geologic Survey (USGS), NAD-83 terrain elevation data shall be used for coverage simulations. Alternatively, 3 arc-second data may be used where 30 meter data is not available.

3.5.3 Coverage Model

The RESPONDENT shall employ a suitable coverage prediction model using appropriate terrain and land cover data for the Marin County environment. The Anderson 2D radio propagation model, or a model of equal or superior comprehensiveness, is preferred. (Reference TSB 88, latest revision, for guidelines.)

3.5.4 TIA TSB-88 – Annex E User Choices

TSB-88 Annex E User Choices provides a number of guidelines and choices for system design and validation. The user choices for the proposed County system are provided below:

A. E.1 User Choices

1. 700 MHz trunked system
 - a. Minimum of two frequency channels for voice communications
 - b. One frequency channel for control
2. 700 MHz conventional system:
 - a. Frequency channel plan provided in Appendix E – Conventional System Site List



3. P25 compliance

B. E.2 *Service Area*

1. The service area is the defined operational area of the County
2. The target device, usage and location are:
 - a. Mobile radios – Standard dash or trunk mount with proposed antennas and power levels and the antenna mounted in the center of the roof
 - b. Portable radios – Standard portable radio on hip with swivel belt clip:
 - 1) Outbound (talk-out) to a portable radio on hip with swivel belt clip
 - 2) Inbound (talk-back) from a portable radio on hip with swivel belt clip
 - c. Basic network coverage for mobile radios shall be designed to accommodate vehicles traveling at speeds up to 75 miles per hour.
 - d. This criterion is to be applied to the coverage areas defined in Section, 3.5, *Coverage*, above, and coverage maps defined in Section 3.5.2, *Coverage Maps*, above.

C. E.3 *Channel Performance Criterion (CPC)*: Minimum CPC – BER that provides a minimum DAQ 3.4

D. E.4 *Reliability Design Target*: The CPC Reliability Design Target is a service area probability of 97%

E. E.5 *Terrain Profile Extraction Method*: Snap to Grid Method

F. E.6 *Interference Calculation Method*: Monte Carlo Simulation Method

G. E.7 *Metaphors to Describe the Plane of the Service Area*: Tiled Method

H. E.8 *Required Service Area Reliability*: 97%

I. E.9 *Willingness to Accept a Lower Area Reliability in Order to Obtain a Frequency*: The County is not willing to accept lower area reliability in order to obtain a frequency



- J. E.10 *Adjacent Channel Drift Confidence Factor*: Confidence that combined drift due to desired and adjacent channel stations will not cause degradation: 95%
- K. E.11 *Conformance Test Confidence Level*: 99%
- L. E.12 *Sampling Error Allowance*
 - 1. True value error: $\pm 1\%$
 - 2. Number of subsamples: 50
- M. E.13 *Pass/Fail Criterion*: "Greater Than" test
- N. E.14 *Treatment of Inaccessible Grids*: All inaccessible grids will be eliminated from the calculation. Grids accessible on a regular basis by County off road vehicles shall be included. County will provide vehicles for testing these areas if necessary.

3.6 Site Equipment

3.6.1 Overview

All site equipment supplied shall be new, of high quality, and designed to provide high reliability to support mission critical communications. The site equipment, or RF infrastructure, consists of the following components:

- A. System and site control equipment
- B. Simulcast equipment
- C. Receiver voting
- D. Transmitters
- E. Receivers
- F. Combiners/multicouplers
- G. Antenna systems



3.6.2 System and Site Control Equipment

- A. The system and site control equipment shall be capable of controlling all voice and data channels in the proposed system. The control equipment may use a distributed or centralized architecture. All primary control equipment, if used will be located at 3501 Civic Center Drive, San Rafael, Ca, or other site as directed by County.
- B. The control equipment shall fully support APCO P25 functional requirements as outlined in Section 3.1, *Overview*, above, features, and performance objectives, including the Common Air Interface (CAI) and Inter-RF Subsystem Interface (ISSI).
- C. The RESPONDENT shall fully describe the manner in which the proposed system and site controllers function and operate (if used).
- D. Since the system and site control equipment is so critical to the network, and given the region's susceptibility to earthquakes and other natural disasters, placement of the equipment at a secure, highly stable location is of the utmost importance. The County believes that MERA Master Site at 3501 Civic Center Drive, San Rafael, CA, may be suitable for the placement of the equipment. It is anticipated that a new location for this site may be designated in the next year.
- E. This site was chosen due to its central location, proximity to maintenance personnel, condition of facilities, and connectivity to the microwave network employed in the County.

3.6.3 Simulcast Equipment (if applicable)

- A. The RESPONDENT shall provide all necessary simulcast components and signal processing elements that are required to optimize voice quality in coverage overlap areas.
- B. Non-captured overlap areas with delay spreads in excess of those required to meet the Delivered Audio Quality (DAQ) objective shall be minimized inside the service area. These locations must be shown on coverage maps.
- C. Simulcast systems shall operate without the need for frequent manual optimization and system/subsystem alignment. All alignment and adjustments



shall be automated where possible (e.g., Signal conditioning adjustments for channel banks, signal launch times at sites, etc.).

3.6.4 Receiver Voting

Receiver voting equipment shall monitor all receivers in the simulcast system and select the best signal for processing and rebroadcast through the network.

3.6.5 Base Station Equipment

A. General

1. Base station equipment shall be solid state in design and function with standard site conditions for temperature, altitude, and humidity.
2. Equipment shall have alarm contact, RS-232 and/or IP interfaces to provide status to a separate alarm system to be provided as part of the proposal.
3. The units shall be as compact as possible, with mounting configurations for standard relay rack or cabinets.

B. Base station equipment shall comply with Part 90 of the FCC Rules and Regulations, as well as appropriate EIA and similar agency standards and be FCC type accepted for the 700 MHz frequency band for both P25 Phase 1 and Phase 2 operation.

C. Prior to implementation, the SELECTED VENDOR shall perform the following studies at each site and submit the results to the County for review and approval before the project is implemented. :

1. Intermodulation analysis – The SELECTED VENDOR shall consider equipment from all tenants located at the proposed site, per FCC licensed information.
2. Maximum Permissible Exposure (MPE) study (per latest revision of OET Bulletin 65) – The SELECTED VENDOR shall consider equipment from all tenants located at the proposed site, per FCC licensed information.

D. The SELECTED VENDOR shall resolve all issues predicted during the intermodulation analysis and MPE studies. If an intermodulation problem is identified following implementation, the SELECTED VENDOR shall resolve the



issue without degrading system coverage or performance, for a period of up to 12 months after final acceptance at no cost to the County.

- E. RESPONDENT shall include detailed specification sheets for all proposed equipment.

3.6.6 Antenna Systems

- A. RESPONDENT shall propose all antenna system equipment necessary for a complete design.
- B. Antennas shall be appropriate to provide the required coverage and meet applicable FCC rules and regulations as well as any local regulations.
- C. Transmission line type and length shall be appropriate to provide the required coverage.
- D. Transmit combiner / receiver multicoupler:

RESPONDENT shall fully describe expansion capacity for combiner and multicoupler systems.

- E. RESPONDENT shall include detailed specification sheets for all proposed equipment, including, but not limited to antennas, receiver multicouplers, transmitter combiners, tower top receiver pre-amps (if applicable). Use of tower top receiver pre-amps is discouraged; however, RESPONDENTS recommending the use of tower top pre-amps must provide the reason for such recommendation.



4. Backhaul Network

4.1 Overview

- A. RESPONDENT shall propose a detailed backhaul plan utilizing existing digital microwave links and resources to the highest degree practical. Basic information about existing microwave links for consideration is provided in Appendix F – Existing Microwave Backhaul Information.
- B. RESPONDENT shall be responsible to determine if each applicable existing link in the plan will provide required capacity and reliability. Where existing links will require upgrades or where new links will be required, RESPONDENT shall provide a detailed explanation of the proposed upgrade and the applicable costs on a link-by-link basis. If new links are required, the County prefers implementing IP based solutions to the highest degree practical.
- C. In addition to the proposed backhaul design, RESPONDENT shall also provide unit pricing to engineer, furnish, install and prove performance for the following nominal combinations, including everything required delivering a fully operational, IP based link:
 - 1. L6/U6 GHz band, 50 Mbps capacity, MHSB protected, 6' HP Category A antenna systems (non-diverse)
 - 2. L6/U6 GHz band, 100 Mbps capacity, MHSB protected, 6' HP Category A antenna systems (non-diverse)
 - 3. L6/U6 GHz band, 150 Mbps capacity, MHSB protected, 6' HP Category A antenna systems (non-diverse)
 - 4. 11 GHz band, 50 Mbps capacity, MHSB protected, 4' HP Category A antenna systems (non-diverse)
 - 5. 11 GHz band, 100 Mbps capacity, MHSB protected, 4' HP Category A antenna systems (non-diverse)
 - 6. 11 GHz band, 150 Mbps capacity, MHSB protected, 4' HP Category A antenna systems (non-diverse)



4.2 *Digital Microwave Network*

The digital microwave network consists of the following components:

- A. Point-to-point digital microwave radios
- B. Microwave antennas
- C. Antenna systems
- D. Channel bank (Multiplex) equipment
- E. Alarms
- F. Network management system

4.2.1 Requirements

- A. The digital microwave backhaul network shall consist of, monitored hot standby (MHSB) or ring protected, point-to-point licensed microwave hops.
- B. Microwave terminal equipment shall include transmitter, receiver, modem, power supply, automatic switching device, multiplexer, service channel(s), and all associated interconnections to provide a complete and functional system.
- C. The radio shall deliver two-frequency, full-duplex operation. Space diversity configurations are acceptable if necessary to meet reliability requirements.
- D. Capacity
 - 1. Each hop shall be equipped for the proposed radio network requirements and existing legacy radio system channels as applicable. Respondents shall further provide for a
 - 2. Each hop shall deliver a minimum payload capacity equivalent to four DS1s, or more as required to serve the proposed network. RESPONDENT shall fully describe methodology for equipping radios to full capacity (e.g., software upgrade, additional channel bank equipment, etc.)
- E. Performance Objectives



1. Each microwave hop shall be designed to meet or exceed a one way end-to-end annual reliability (BER = 10^{-3}) of 99.9995% at the required capacity.
2. Each microwave hop shall be designed to meet or exceed a one way end-to-end annual quality performance (BER = 10^{-6}) of 99.999% at the required capacity.
3. The mean time between failures (MTBF) for the proposed MHSB transceiver equipment shall exceed 25 years.

F. Frequency

1. The SELECTED VENDOR shall be responsible for all microwave frequency research, prior coordination and preparation of all associated FCC license applications and submittals on behalf of the County.
2. The County shall be responsible for coordination fees and licensing fees, if any and signatures, if applicable.
3. RESPONDENT shall propose the most appropriate licensed frequency band for each hop based on the requirements and FCC Part 101 regulations.

G. Data Rates

1. DS1 bit rate 1.544 Bellcore GR-499-CORE, Section 9.3, ANSI T1.102-, ITU-T 703
2. DS3 bit rate 44.736 Bellcore GR-499-CORE, ANSI T1.102-, ITU-T 703
3. ANSI T1.106/88 OC-3 Optical
4. STS-3e Electrical Interface
5. ANSI T1.102 DS3 and 1.544 Mb/s Wayside DS1

H. Transmitter

1. RESPONDENT shall provide transmit output power referenced to the antenna port.
 2. Transmit output power shall be software adjustable.
 3. Automatic Transmit Power Control (ATPC) shall be available.
-



4. A switch from main transmitter to standby transmitter shall not result in system outage. RESPONDENT shall describe expected switchover time.
5. Radios shall be equipped with redundant power amplifiers. Switching between power amplifiers shall not result in system outage.

I. Receiver

1. RESPONDENT shall provide guaranteed receiver threshold.
2. RESPONDENT shall provide performance criteria of the proposed radios for the following:
 - a. Co-channel interference
 - b. Adjacent channel interference
 - c. Dispersive fade margin
3. The receiver shall be designed so as to ensure that the receiver with the better performance is operational at any given moment. RESPONDENT shall equip radios with a 10:1 split to prevent frequent switching.
4. Transfer to the backup receiver shall not result in system outage.

J. Antenna System

1. Microwave antennas shall be compatible with the radio frequency bands and conform to applicable FCC requirements. Solid parabolic type, Category A antennas shall be used in accordance with FCC Part 101.115.
2. Pressurized elliptical waveguide shall be used. Connectors shall be standard, premium type, and compatible with the antenna and radio EIA interfaces.
3. All mounting brackets, connectors and other hardware shall be supplied as necessary for a complete installation.
4. An automatic dehydrator / pressurization system shall be provided to maintain at least 5 psig positive pressure of conditioned air in the elliptical waveguide and antenna feed unit. Individual pressure gauges on a distribution manifold shall be provided for each line.



5. All installed antenna/transmission lines shall be purged, pressure tested, and tested for low VSWR using return loss measurements.
6. All RF paths shall be tested to demonstrate proper antenna alignment by measuring the net path loss between sites as measured at the equipment rack interface.

K. Channel Bank:

1. RESPONDENT shall provide digital channel bank equipment. Channel bank equipment shall be capable of drop and insert of individual radio circuits (DS0s) in order to fully utilize DS1s across the entire network.
2. If necessary, RESPONDENT shall provide multiplex equipment (M13 mux) to convert DS3 signals to 28 DS1s. All M13 multiplex equipment shall be capable of drop and insert of individual DS1s in order to fully utilize a DS3 across the entire network.
3. All multiplex equipment shall be equipped with standby switching and alarms. The equipment shall also be capable of remote alarm/control at County maintenance centers.

L. Network Management

1. RESPONDENT shall fully describe alarm, monitor, and control capabilities of the microwave terminal equipment, including capacity for external alarms (e.g., door alarms, generator, etc.).
2. RESPONDENT shall provide a network management terminal in the MERA Master Site at 3501 Civic Center Drive in San Rafael, CA, and at the Communications Division at 4 Peter Behr Drive in San Rafael, CA.
3. RESPONDENT shall provide a single service channel, or order wire, for each microwave terminal. The service channel shall be accessible via a one RS-232C data circuit and provide a single voice circuit..

4.2.1.1 Microwave Engineering

- A. The SELECTED VENDOR shall conduct physical path surveys to assure that all proposed paths meet proper clearance criteria.



- B. The SELECTED VENDOR shall also conduct site visits at all sites and notify the County and the Owner of any site modifications necessary for the microwave hop.
- C. The SELECTED VENDOR shall provide antenna centerline mounting height recommendations, based upon the information gathered during the physical path surveys and site visits.
- D. The RESPONDENT shall include fade margin calculations with the proposal, showing the preliminary antenna sizes, system gains, and system losses.
- E. Radomes shall be provided for each proposed new microwave antenna.
- F. The equipment shall be type accepted for licensing under Part 101 of the FCC Rules and Regulations



5. Dispatch Console

5.1 General Requirements and Features

- A. RESPONDENT shall provide pricing for replacement of all existing consoles with state-of-the-art IP controlled consoles.
- B. As an OPTION, RESPONDENT shall provide pricing for interfacing to existing console equipment, when applicable.
- C. A list of existing console systems and operator positions is provided below. The SELECTED VENDOR shall perform due diligence to verify the systems and quantities outlined below in Table 3:

Table 3: Marin County Dispatch Centers

Dispatch Center	Console Manufacturer	Console Model	Number of Positions
County of Marin Comm Center	Motorola	Gold Elite	10
Novato Fire	Motorola	Gold Elite	2
Master site	Motorola	Gold Elite	1
Jail	Motorola	Gold Elite	1
Radio Shop	Motorola	Gold Elite	1
Novato PD	Motorola	Gold Elite	3
San Rafael PD	Motorola	Gold Elite	4
Twin Cities PD	Motorola	Gold Elite	2
San Anselmo PD	Motorola	Gold Elite	2
County Fire - Woodacre	Motorola	Gold Elite	3
Fairfax PD	Motorola	Gold Elite	1

- D. These console locations are to control the proposed trunked system only. Control of the conventional system will be tied to only one location: the County of Marin Comm Center.
- E. The dispatch console is a critical link for Public Safety personnel. It is here that the dispatch operator must relay critical information from the public to public safety personnel in the field. At times the dispatcher may be in stressful conditions with lives at risk. It is imperative that the dispatch console be laid out in a manner causing the operation of such console to be second nature to the dispatching personnel. The dispatching console should provide the operator with



as much information as necessary without the screen being cluttered and be easily navigated to perform necessary functions. Features of the console shall include, but not be limited to:

1. Dispatch Console Equipment (Operator Positions) shall be designed to be placed on modular workstation furniture and provide operators with an ergonomic design permitting ease of operation over extended periods, typically 8-12 hours for each operator.
2. Console positions shall be able to acoustically cross mute channels in order to eliminate acoustic feedback between operators.
3. The screen display shall be designed so that all dispatching functions shall be operable from one display.
4. The screen display shall be very flexible, allowing authorized personnel the ability to determine which functions are available at each operator position.
5. New features and screen configurations shall be supported through software programming and not reconfiguration of hardware.
6. Capability to program, store, retrieve, and edit multiple, custom operator screens and configurations for each operator position shall be provided.
7. Operator screen configurations and alias database shall be stored locally or on a centrally located server.
8. The dispatch console shall display an alias name on screen when a unit with a radio ID stored in the alias database is transmitting.
9. Operator positions shall have the ability to decrypt and encrypt secure voice communications. Channels shall have a distinctive icon if encryption is being used for that channel.
10. Upon activation of an emergency alarm by field units, dispatch positions shall provide an audible alert, display ID and alias of calling unit, and provide a visual alert of an emergency activation.
11. Operators shall have the ability to utilize a headset or stationary gooseneck type microphone for transmitting audio.



12. The capability to converse on the telephone utilizing the same operator headset that is used for radio conversations shall be provided.
13. An instant recall option shall be provided allowing the operator to verify his or her recent traffic. Playback shall be available on the operator position.
14. Dual headset jacks must be provided for each console position.

5.2 Trunked Requirements

- A. Dispatch consoles shall be compatible with the proposed trunked radio system. Dispatch consoles shall directly interface with single and multi-site trunked system controllers and shall allow interoperability between trunked and non-trunked channels in the system.
- B. Dispatch consoles shall be able to monitor and transmit on all proposed and existing trunked systems.
- C. Dispatch consoles shall be equipped with an instant transmit switch for each talkgroup displayed.
- D. In a trunked system the calling subscriber unit ID of the unit calling shall appear in addition to a call indicator. After the call is completed, the unit ID shall remain displayed until another call is received.
- E. To aid dispatchers in a busy system, a list of the last 15 radio IDs and aliases shall be available in a recent call list.
- F. In order to enhance dispatcher effectiveness in a PTT ID system, the various display modes available shall interact as follows:
 1. An operator shall be capable of setting up (and subsequently knocking down) an emergency call from the dispatch console position.
 2. An option shall be provided to allow private communication between a dispatch console operator and a radio user.
 3. An option shall be provided which assigns priority to associated talkgroups. The dispatcher shall have the choice between normal preset priority and tactical priority, with tactical being the second highest priority for a talkgroup in a system.



- G. In the cases of multi-talkgroup transmit or talkgroup patch, the use of more than one trunked repeater shall not be allowed; the talkgroups shall be merged onto a single repeater in order to conserve repeaters.
- H. It shall be possible to temporarily mute unselected talkgroups. The unselected audio will un-mute automatically after a programmable preset time. Mute shall be 20 dB minimum.
- I. Dispatch consoles shall have the capability to patch two or more talkgroups together so users may communicate directly.
- J. If the dispatcher attempts to make a call on a trunked radio system connected to the dispatch consoles and all trunked channels are busy, a visual and audible alert will be initiated at the dispatch consoles.

5.3 Conventional Requirements

- A. Dispatch equipment shall include an instant transmit switch for each conventional repeater channel and/or base station.
- B. On conventional resources capable of operating on multiple frequencies / modes, a control / indicator shall be provided to select the desired transmit frequency / mode (Select Channel). The select channel function shall cause the associated channel to switch channels / modes by emitting an EIA function tone/guard tone sequence for tone remote controlled stations. Once a channel has been selected the operator shall be able to transmit on this channel by pressing the footswitch or transmit button.
- C. A transmit audio level meter shall be provided showing the level of transmitted voice. This meter should also indicate the level of receive audio present on the selected channel.
- D. Operator positions shall have the ability to independently set each channel's volume level. Minimum audio levels should be capable of being set to avoid missed calls.
- E. A control / indicator shall be provided to allow the operator to mute or unmute audio from unselected channels. Selected audio and unselected audio shall be audible from separate speakers.



- F. A control / indicator shall be provided allowing the operator to select multiple channels allowing the dispatcher the ability to broadcast to several channels at once.
- G. Operators shall have the ability to patch two or more conventional repeaters and/or base stations together so users may communicate directly. Operator positions shall be equipped such that a minimum of eight simultaneous patches shall be available.

5.4 *Paging Requirements*

- A. The console shall support the following paging formats:
 - 1. Quick Call I
 - 2. Quick Call II
 - 3. Dual Tone Multi-Frequency (DTMF)
 - 4. MDC1200 selective call
 - 5. Trunking Call Alert
- B. Preprogrammed pages and groups shall be created and modified using a system database program.
- C. A manual page feature shall be provided.
- D. A visible indication shall be given when each page ends.
- E. Standard list pages shall be created allowing the operator to select or stack pages to be sent to multiple recipients.
- F. An instant page feature should allow operators to send multiple pages with the single press of a button.
- G. Consoles shall be capable of transmitting at least three distinctive alert tones indicating to field units the priority or type of dispatch to follow.



5.5 Voice Logger Output

Logging recorder outputs shall be provided for each dispatched channel as well as mixed selected receive audio and the operator's transmit audio. The outputs from the console equipment shall be capable of being connected to the agency's current recording equipment, and shall terminate to a wall mounted punch block.

5.6 Operator Position Equipment

- A. All equipment supplied for use by the dispatch operators will be capable of withstanding the 24 hours a day, 7 days a week environment of today's dispatch centers.
- B. Operator position display monitors will be a 19 inch LCD, touchscreen, with resolution of 1024 x 768 or better.
- C. Keyboards shall be a standard 101- key keyboard.
- D. Operator functions shall be executed by positioning a screen pointer (cursor) over the appropriate icon and pressing the mouse button or by touching the monitor screen.
- E. A high quality gooseneck microphone shall be provided for each operator position.
- F. Dual headset jacks and headsets shall be provided allowing the operator to hear select audio via a headset and allow the operator to respond via a microphone attached to the headset. The headset plug inserted into the jack shall automatically disconnect the console's microphone and mute the select speakers.
- G. A heavy duty footswitch shall be provided to allow the operator to key the selected channel hands free.
- H. PCs supplied shall be capable of providing a Graphical User Interface (GUI) using the Microsoft® Vista or Windows® 7 Operating system, capable of Local Area Network (LAN) client-server architecture for network access, capable of supporting multiple Microsoft® Vista or Windows® 7 compliant applications.
- I. PCs supplied shall be based on present state of the art PC technology.



5.7 Common Electronics Equipment (if used)

- A. The common electronics equipment shall contain all equipment necessary to route audio and control signals between the dispatch operator positions and the proposed P25 trunked system.
- B. The common electronics equipment shall be capable of controlling the proposed Project 25 trunked system.
- C. The common electronics equipment should be capable of controlling a minimum of 50 channels.
- D. The common electronics equipment should not have a single point of failure. Redundant cards and power supplies shall be used when feasible.
- E. The common electronics equipment shall be connected to the radio system directly; RF control stations will not be used as primary connection to the radio system.
- F. The common electronics equipment shall be capable of receiving alarm information from distant communications sites and displaying this information on the dispatch screen.
- G. The common electronics equipment shall allow for a remote dispatch position. This remote dispatch position shall be connected via a LAN/WAN connection.



6. Facilities and Infrastructure Development

6.1 General

- A. RESPONDENT shall use existing infrastructure to the greatest extent possible.
- B. RESPONDENT shall identify and propose any additional work necessary, including, but not limited to:
 - 1. Towers
 - 2. Shelters
 - 3. Backup power
 - 4. Site preparation
 - 5. Fencing
 - 6. EIS and EIR Preparation
- C. During preliminary design, the SELECTED VENDOR shall provide detailed drawings including all structures and foundations, sealed by a professional engineer registered in the state of California.
 - 1. Detailed dimensioned drawings showing all system components and locations.
 - 2. Drawings and/or specifications shall describe any auxiliary equipment.
 - 3. Manufacturer slick sheets of all equipment used shall also be provided.
- D. Code Compliance
 - 1. Installation of all electrical equipment, power distribution, lighting assemblies and associated wiring shall comply with the most recent edition of the National Electric Code (NEC) and Occupational Safety and Health Administration (OSHA) regulations.
 - 2. All electrical equipment shall be listed or approved by Underwriters Laboratories (UL).



3. The SELECTED VENDOR and any contractor employed by the SELECTED VENDOR shall comply with all local codes and industry best practices and guidelines stipulated in Section 1.7.1, Standards and Guidelines.
- E. The SELECTED VENDOR shall assume total responsibility for maintaining liability insurance covering the following items:
1. Project design
 2. Implementation
 3. Licenses
 4. Shipping
 5. Receiving
 6. All site work required
 7. Any items required for the SELECTED VENDOR or any required sub-vendors or subcontractors.
- F. Prior to any excavations, the SELECTED VENDOR or subcontractor shall follow appropriate procedures outlined at the following website: www.call811.com.
- G. The SELECTED VENDOR will coordinate with utility companies for all utility related items, such as electrical service hookups and disconnects.
- H. Concrete
1. For all foundations and concrete work, the SELECTED VENDOR or subcontractor will provide to the Project Engineer a test sample of each mix of concrete demonstrating that it has been tested for compliance with the foundation specifications set forth by the requisite site engineer. Written reports certifying the strength of the concrete are to accompany each test cylinder.
 2. If any concrete used in the foundation does not meet specifications, the SELECTED VENDOR or subcontractor will be required to remove the foundation and pour a new foundation using compliant materials, at no expense to the owner.



- I. All control functions and alarms from towers, shelters and backup power shall be interfaced to the NMS detailed herein, for remote control and monitoring.

6.2 Towers

A. General

1. If the RESPONDENT determines additional towers are required or existing towers must be replaced, the RESPONDENT shall propose a self supporting tower.
2. Any tower manufacturer supplying a tower(s) for this system will guarantee structural integrity of the tower for a period of not less than 20 years from the date of acceptance.

B. Tower Loading

1. The tower and foundation shall be designed for all proposed equipment, legacy equipment, appurtenances, ancillary equipment, initial antenna loading plus 100% future antenna system growth, without addition to or modification of the finished tower or foundation.
2. The proposed tower structure shall be designed and installed in accordance with latest revision of the ANSI/EIA-222 standard.

C. Proposed towers shall include the following:

1. Ice bridge – A horizontal transmission line ice bridge, extending from the tower cable ladder to the equipment building entry port, shall be provided.
2. Transmission Line Support- A vertical transmission line support system shall be provided to securely attach the antenna transmission lines. Holes shall be provided in the tower support members, tower hanger adapter plates or separate ladder structures to allow installation of snap-in cable hangers and bolt-in cable hangers at maximum 3-foot intervals. The mounting holes shall be precision punched or drilled and sufficiently separated to accommodate the snap-in or bolt-in hangers.
3. Climbing Access- A ladder, beginning at a point at least 10 feet off the ground, shall be provided as an integral part of the tower to permit access by authorized personnel. The tower shall be equipped with an OSHA approved



anti-fall safety device in accordance with EIA-222. This device must not interfere with the climber's ease of reach by hand or foot from one rung of the ladder to the next, either going up or coming down. Two safety climbing belts shall be supplied with each new tower.

4. Lighting

- a. Tower lighting shall be supplied as required by the applicable determination as issued by the FAA for this project and fully compliant with FAA AC 70/7460-1K or latest revision.
 - b. The system control circuitry shall provide synchronization and intensity control of the obstruction lighting system and shall monitor the overall integrity of the lighting system for component failures or improper operation.
 - c. The SELECTED VENDOR or subcontractor shall wire all alarms to a contractor provided Type 66 block located in the communications shelter or equipment room. All alarms shall be clearly labeled.
5. A lightning ground rod shall be installed at the very top of the tower to extend at least two feet above the top of the tower or lighting fixture.
6. Labeling shall be clearly provided near the base of all new towers for the following:
- a. Make
 - b. Model
 - c. Serial number
 - d. Tower height
 - e. Latitude and longitude
 - f. FAA and FCC identification numbers (if applicable)

D. Construction:

1. All welding must be done in the factory prior to the galvanizing process. Field welding is not acceptable.



2. The tower shall be constructed of high-strength steel. All components and hardware being hot dip galvanized with zinc coating per EIA standards after fabrication. A zinc coating shall be permanently fused to the steel, both inside and outside, so all surfaces are protected and no painting is required for rust protection.
 3. Prior to galvanization, each and every piece of steel and every weld is to be deburred and smooth finished.
- E. Final Testing and Acceptance -- Upon completion of the work, documentation detailing final inspection and testing shall be submitted, documenting the following:
1. Steel structure:
 - a. Vertical alignment and plumbness
 - b. All bolts tight and torqued to specification
 - c. No damaged or missing structural members
 - d. All surface scratches and damage to the galvanization will be repaired
 - e. No signs of stress or vibration
 - f. All climbing ladders, and other devices installed correctly
 - g. Labels and tags
 2. Foundation:
 - a. Concrete finish / lack of cracks / blemishes
 - b. Grouting, if used, will have drain holes if the tower uses hollow leg construction or monopole design
 - c. Backfilling and grading
 3. Grounding:
 - a. Verify lugs and CADWELD[®]s
 - b. Ground resistance test and record
-



- c. Ground lightning rod installed at top of tower
- 4. Ice Bridge: Installed per specification
- 5. Lighting and controls:
 - a. Inspect conduit and wiring installation
 - b. Verify proper lamp operation
 - c. Verify alarm contact operation
 - d. Verify labeling
- 6. Photographs
 - a. Overall structure from N, E, S, W
 - b. Footers
 - c. Grounding

6.3 Shelters

A. General

- 1. RESPONDENT shall propose a new equipment shelter at new site locations and when existing shelters are deemed inadequate.
- 2. The shelter shall be a prefabricated, preassembled shelter. The shelter can be constructed from concrete, fiberglass and/or aggregate materials. Any new shelter, or modification to existing shelters, must incorporate all EIR dictated requirements.

B. Size

- 1. Shelter dimensions shall be determined by the SELECTED VENDOR dependent upon final design. Legacy and proposed systems may use up to 60% of the floor space, allowing for a minimum of 40% additional space for future expansion.
 - 2. Foundation- The foundation for the shelter shall consist of concrete piers or a poured concrete slab constructed by the SELECTED VENDOR or
-



subcontractor that properly supports and secures the shelter. Foundation drawings recommended by the shelter manufacturer shall be the criteria by which the foundation is constructed.

C. Flooring

1. RESPONDENTS are to propose a structure whose floor or solid foundation features a minimum uniform load rating of 200 pounds per square foot with no more than 3,000 pounds over any four-square-foot area. This rating shall be increased in sections as necessary to support heavy weight equipment. If delivered assembled with floor, the floor shall exhibit a minimum 90 pounds per square foot uniform live load capacity while the building is being lifted.
2. Floors shall be insulated to a minimum R-11 rating. Insulation shall be secured in place to prevent shifting during construction and transportation.
3. Exterior covering of the floor shall be included to prevent rodent penetration.
4. The floor shall be covered by a high quality, industrial / commercial grade asphalt or vinyl tile. All edges shall be covered by wall molding.

D. Walls

1. Walls shall be constructed to a minimum 120 MPH wind loading, including overturning moments.
2. Bullet Proof: Walls shall withstand the effects of bullets or other projectiles equivalent to a 30.06 high power rifle load fired from a distance of 50 feet with no penetration to the inner cavity of the wall. No interior damage shall be sustained including insulation, interior walls, etc.
3. The outside walls shall be finished concrete or an aggregate composition.
4. A wall feed-through with 12 each, 4-inch openings shall be provided on the tower side of the building to accommodate elliptical waveguide and coaxial transmission lines. The openings shall be properly booted to provide a good weather seal. The wall feed-through shall be bonded to the site ground system per guidelines specified in Section 1.7.1, *Standards and Guidelines*.
5. The inside walls shall be finished with minimum 5/8-inch plywood (or equivalent) trimmed with coordinated molding to allow mounting of panels, blocks, etc.



6. High performance insulation shall provide a minimum insulation factor of R-11.

E. Roof

1. The building roof shall support a minimum 100 pounds per square foot uniform live load.
2. The roof is to be pitched to facilitate run-off of water.
3. The shelter roof shall withstand the impact of ice falling from the adjacent tower without suffering any damage or shall otherwise be protected from such damage. RESPONDENTS are to describe in their proposal how this requirement will be met.
4. High performance insulation shall provide a minimum insulation factor of R-19.

F. Door:

1. Shelter shall have one 42" x 84" insulated door, with three stainless steel tamper-proof hinges, passage style lever handle, deadbolt lockset and fiberglass weather hood or awning. The door shall be equipped with a hydraulic door closer.
2. The exterior door shall be of aluminum or steel (stainless or galvanized) construction with a finish to match the building finish.
3. The door shall withstand the effects of bullets or other projectiles equivalent to a 30.06 high power rifle load fired from a distance of 50 feet with no penetration to the inner cavity of the door. No interior damage shall be sustained including insulation, interior walls, etc.
4. The door sill shall be of stepped construction so as to prevent rain water from entering the shelter at the bottom of the door or from around the door frame. The door frame shall have a weather seal around the door to limit air and water intrusion.

G. Finishing:



1. The interior and exterior finishes shall be described by the RESPONDENT. Color and finishes shall be selected by the County from samples provided by the SELECTED VENDOR or subcontractor.
2. All joints shall be sealed with a compressible, resilient sealant.

H. AC Power System:

1. The Contractor shall deliver the building complete with a 200 ampere capacity, 240 volts, single phase electrical panel box with a ground bar.
2. This panel shall be equipped with a 200 ampere capacity main circuit breaker used to supply power for all electrical functions related to the site.
3. Overall panel size shall be determined by the need to provide the number of individual breakers required plus a reserve of at least six 240 Volt slots.
4. Breakers for shelter air conditioning will be of the bolt-down, not snap-in type.
5. Receptacles:
 - a. Each radio equipment unit (or rack) shall be supplied with two 20 Amp circuits, each terminated at a typical NEMA 5-20 receptacle. Receptacles shall be mounted to the side of the overhead cable tray.
 - b. Service receptacles shall be mounted on the walls at six-foot intervals or less.
 - c. One weatherproof GFI exterior power receptacle shall be provided with each shelter, to be mounted near air conditioning units.
 - d. Each receptacle shall be fed from an individual breaker. The feeding breaker shall be identified at the receptacle and the receptacle shall be identified at the breaker. All breakers or circuits shall be 20 Amp, unless otherwise noted.

I. Power Line Surge Suppression:

1. AC surge protector shall be provided and installed inside the shelter.



2. An acceptable unit shall be an in-line type such as the AC Data Systems "integrated load center". An alternate unit must meet or exceed all of the capabilities of this model unit.
3. Minimum surge protector requirements:
 - a. Built-in redundancy of dual stages per phase with filtering
 - b. Surge energy shunted to ground, not to neutral
 - c. Front panel indicator lamps.
 - d. Remote / local status contacts
 - e. Fusible link protected so as not to interrupt power
 - f. Field replacement protection blocks, fuses, if needed
 - g. UL listed components
 - h. 45 KA per phase ANSI C62.1 8/20 waveform
 - i. EMI/RFI filtering per Mil-STD-220
 - j. The unit shall be capable of handling the full 240 Volt, 200 Amp capacity of the electrical system.

J. Wiring Methods:

1. All wiring noted on the site drawings or otherwise included by the SELECETED VENDOR shall be installed in conduit or ductwork. Where no protection method is specified, conduit shall be used.
2. All conduits and ducts shall be securely surface mounted and supported by approved clamps, brackets, or straps as applicable and held in place with properly selected screws. No wiring shall be imbedded inside any walls, floor or ceiling. Entrance power, outside light, air conditioning outlet and Telco are the only wiring that may penetrate shelter walls or floor.
3. All wire raceway, conduit, etc., is to be mechanically joined and secured.
4. Flexible steel conduit or armored cable shall protect wiring connected to motors, fans, etc., and other short runs where rigid conduit is not practical.



5. Unless otherwise specified, all power wiring shall be a minimum 12 AWG size solid copper conductors with insulation rated for 600 Volts alternating current (AC).

K. Light Fixtures

1. Ceiling mounted four-foot fluorescent light fixtures (two 40 watt bulbs per fixture) with RFI ballasts shall be supplied for the equipment shelters. A sufficient quantity of light fixtures shall be supplied to provide a uniform light level throughout the building of 150 foot candles at four feet above the floor.
2. Light fixtures shall be fed as a gang from a common breaker and controlled by an on/off switch near the door.

L. Outdoor Lighting:

1. An exterior fluorescent wall mounted motion sensor light shall be mounted on the front entrance of the shelter.
2. The exterior lighting system shall be fed from a separate, appropriately rated breaker and light switch by the door.

M. Heating, Ventilation, and Air Conditioning (HVAC):

1. RESPONDENT shall provide an HVAC system for each shelter proposed. RESPONDENT shall propose dual air conditioning units with lead lag controller. Each unit shall be sized for 100 percent of the buildings required cooling capacity, as determined by the BTU analysis.
 2. SELECTED VENDOR shall perform BTU analysis (heat load calculations) for all shelter equipment during preliminary design to verify HVAC system size. All calculations shall include a 50% expansion factor, and all assumptions regarding power consumption, duty factor, and heat loading shall be thoroughly explained.
 3. Each unit shall be capable of maintaining an inside ambient temperature range between 65 and 85 degrees F. Each unit shall be sized to maintain temperatures inside the shelter at 70 degrees F when exterior temperatures go as high as 100 degrees F.
 4. The HVAC system shall be controlled by a wall mounted thermostat. The thermostat shall turn the heater on when the temperature inside the shelter
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- drops to 65 degrees F and off when it rises to 68 degrees F. It shall turn on the air conditioner when the interior temperature reaches 78 degrees F and off when the temperature drops below 75 degrees F. Thermostat control shall be adjustable within the range of 45 to 85 degrees F.
- N. Antenna Cable Conduit Entry -- A bulkhead panel shall be supplied to accommodate coaxial transmission lines between 1/2-inch and 1 5/8-inch diameter elliptical waveguides. A minimum of 12 transmission lines shall be accommodated with 4-inch openings. The building manufacturer shall seal the conduits into the wall to assure that they are watertight.
- O. Cable Tray- All new shelters will be equipped with cable trays. The Contractor shall install a minimum 18-inch wide cable tray system above the equipment.
- P. Shelters shall be supplied with at least one 10 pound CO₂ fire extinguisher, an approved eye wash station and first aid kit.

6.4 Generator and Automatic Transfer Switch (ATS)

- A. The SELECTED VENDOR shall provide an emergency generator system at each new radio communications site for backup power.
- B. This section provides specifications and requirements for standby power systems to supply electrical power in the event of failure of normal supply, consisting of a liquid cooled engine, an AC alternator and system controls with all necessary accessories for a complete operating system, including but not limited to the items as specified.
- C. RESPONDENT shall perform electrical loading analysis for shelter equipment, including HVAC subsystems, during preliminary design to verify generator size and fuel tank capacity. All electrical loading calculations shall include a 50% expansion factor, and all assumptions regarding power consumption and duty factor shall be thoroughly explained.
1. For the purpose of the proposal, RESPONDENT shall assume the following:
- 50 kW
 - Single phase
 - 60 Hz



- d. 0.8 Power factor
 - e. Propane fuel
 - f. Minimum 72 hour run time under full load
- D. In the event of a commercial power outage, the emergency generator shall provide power to the entire shelter without system outage.
- E. Quality Assurance- The system shall be supplied by a manufacturer who has been regularly engaged in the production of engine-alternator sets, automatic transfer switches, and associated controls for a minimum of ten years, thereby identifying one source of supply and responsibility.
- F. The generator system and all accessories and ancillary equipment shall comply with the following standards:
- 1. NFPA 37 Flammable and Combustible Liquids Code
 - 2. NFPA 55 Standard for the Storage and Handling of Compressed Gases
 - 3. NFPA 70 with particular attention to Article 700, "Emergency Systems"
 - 4. NFPA 110 Requirements for Level 1 Emergency Power Supply System
 - 5. NFPA 101 - Code for Safety to Life From Fire in Buildings and Structures
 - 6. ANSI/NEMA MG 1 - Motor and Generators
 - 7. ANSI/NEMA AB 1 - Molded Case Circuit Breakers
 - 8. ANSI/NEMA 250 - Enclosures for Electrical Equipment (1000 volts maximum)
- G. Labeling and Identification- All wiring harnesses and connectors shall be clearly identified by number and function according to the associated schematic diagrams and documentation provided by the vendor.
- H. Factory Testing:
- 1. Before shipment of the equipment, the generator set shall be tested under rated load for performance and proper functioning of control and interfacing circuits. Tests shall include:
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- a. Verification of all safety shutdowns are functioning properly
 - b. Verification of single step load pick-up per NFPA 110-1996, Paragraph 5-13.2.6
 - c. Verification of transient and voltage dip responses and steady state voltage and speed (frequency) checks
 - d. Full load test for a minimum of one hour
2. Complete report(s) of all testing performed
- I. Startup and Checkout:
- 1. The supplier of the electric generating plant and associated items covered herein shall provide factory trained technicians to check out the completed installation and to perform an initial startup inspection to include:
 - a. Ensuring the engine starts (both hot and cold) within the specified time.
 - b. Verification of engine parameters within specification
 - c. Verification that no load frequency and voltage, adjusting if required
 - d. Test all automatic shutdowns of the generator
 - e. Perform a simulation of power failure to test generator start up and ATS to pick up building load correctly.
 - f. Return to commercial power and test generator and ATS to demonstrate correct cycling to normal commercial power.
 - g. Perform a load test of the generator, to ensure full load frequency and voltage is within specification by using building load. This test shall be run for a minimum of one hour.
 - h. Test and verify all remote indicators and controls.
 - 2. The **SELECTED VENDOR** shall provide complete report(s) of all testing performed.
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6.4.1 Propane Generator

- A. The prime mover shall be a liquid cooled, propane and or natural gas fueled, naturally aspirated engine of 4-cycle design.
- B. The engine shall have sufficient horse power rating to drive the generator to full output power without a gear box between the engine and generator.
- C. The engine shall have a battery charging DC alternator with a solid state voltage regulator.
- D. The generator shall meet temperature rise standards for Class "H" insulation, operating within Class "F" standards for extended life.
- E. The alternator shall be protected by internal thermal overload protection and an automatic reset field circuit breaker.
- F. One step load acceptance shall be 100% of generator set nameplate rating and meet the requirements of NFPA 110 paragraph 5-13.2.6.
- G. The electric plant shall be mounted with vibration isolators on a welded steel base that shall permit suitable mounting to any level surface.
- H. A main line output circuit breaker carrying the UL mark shall be factory installed.
 - 1. Form C auxiliary contacts rated at 250 VAC/10 amps shall be provided to allow remote sensing of breaker status.
 - 2. A system utilizing manual reset field circuit breakers and current transformers is unacceptable.
- I. An alternator strip heater shall be installed to prevent moisture condensation from forming on the alternator windings.
- J. Controls:
 - 1. All engine alternator controls and instrumentation shall be designed, built, wired, tested and shock mounted in a NEMA 1 enclosure mounted to the generator set by the manufacturer. It shall contain panel lighting, a fused DC circuit to protect the controls and a +/-5% voltage adjusting control.



2. The generator set shall contain a complete 2 wire automatic engine start-stop control which starts the engine on closing contacts and stop the engine on opening contacts.
3. A programmable cyclic cranking limiter shall be provided to open the starting circuit after four attempts if the engine has not started within that time. Engine control modules must be solid state plug-in type for high reliability and easy service.
4. The panel shall include;
 - a. Analog meters to monitor
 - 1) AC voltage
 - 2) AC current
 - 3) AC frequency
 - b. A phase selector switch
 - c. Emergency stop switch
 - d. Audible alarm
 - e. Battery charger fuse
 - f. Programmable engine control
 - g. Monitoring module
5. The programmable module shall include:
 - a. Manual OFF / AUTO switch
 - b. Four LED's to indicate
 - 1) Not In Auto
 - 2) Alarm Active
 - 3) Generator Running



4) Generator Ready

6. The module shall display all pertinent unit parameters including:

a. Generator Status – ON/OFF/AUTO

b. Instrumentation - Real-time readouts of the following engine and alternator analog values:

1) Oil pressure

2) Coolant temperature

3) Fuel level (where applicable)

4) DC battery voltage

5) Run time hours

c. Alarm Status - Current alarm(s) condition of:

1) High or low AC voltage

2) High or low battery voltage

3) High or low frequency

4) Low or pre-low oil pressure

5) Low water level

6) Low water temperature

7) High and pre-high engine temperature

8) High, low and critical low fuel levels (where applicable)

9) Over crank

10) Over speed

11) Unit not in "Automatic Mode"

K. Unit Accessories:



1. Weather protective enclosure:
 - a. The generator set shall be factory enclosed in a heavy gauge steel enclosure constructed with 12 gauge corner posts, uprights and headers.
 - b. The enclosure shall be coated with electrostatically applied powder paint, baked and finished to manufacturer's specifications.
 - c. The enclosure is to have large, hinged doors to allow access to the engine, alternator and control panel.
2. The exhaust silencer(s) shall be provided of the size recommended by the manufacturer and shall be of critical grade. Additional silencers may be necessary to meet EIR requirements.
3. The generator set shall include an automatic dual rate battery charger manufactured by the generator set supplier. The battery charger is to be factory installed on the generator set. Due to line voltage drop concerns, a battery charger mounted in the transfer switch will be unacceptable.
4. A heavy duty, lead acid 12 VDC battery shall be provided by the generator set manufacturer. The generator set shall have a frame suitable for mounting the battery and include all connecting battery cables.

6.4.2 Automatic Transfer Switch (ATS)

- A. The automatic transfer switch shall be compatible with the set so as to maintain system compatibility and local service responsibility for the complete emergency power system.
- B. Representative production samples of the transfer switch supplied shall have demonstrated through tests the ability to withstand at least 10,000 mechanical operation cycles. One operation cycle is defined as the electrically operated transfer from normal to emergency and back to normal.
- C. Wiring must comply with NEC table 373-6(b). The manufacturer shall furnish schematic and wiring diagrams for the particular automatic transfer switch and a typical wiring diagram for the entire system.
- D. Ratings and Performance



1. The ATS shall be adequately sized to match the generator and shelter electrical systems.
2. The automatic transfer switch shall be a 2-pole design rated for 600 VAC 200 amps continuous operation in ambient temperatures of -20 degrees Fahrenheit (-30 degrees Celsius) to +140 degrees Fahrenheit (+60 degrees Celsius).
3. The operating mechanism will be a single operating coil design, electrically operated and mechanically held in position.
4. A provision will be supplied to be able to manually operate the switch in the event of logic or electrical coil failure.

E. Controls:

1. A solid state under-voltage sensor shall monitor all phases of the normal source and provide adjustable ranges for field adjustments for specific application needs.
 - a. Pick-up and drop-out settings shall be adjustable from a minimum of 70% to a maximum of 95% of nominal voltage.
 - b. A utility sensing interface shall be used, stepping down system voltage of 120/240 VAC 1 phase to 24VAC, helping to protect the printed circuit board from voltage spikes and increasing personnel safety when troubleshooting.
2. Controls shall signal the generator set to start in the event of a power interruption.
 - a. A solid state time delay start, adjustable, 0.1 to 10 seconds, shall delay this signal to avoid nuisance start-ups on momentary voltage dips or power outages.
3. Controls shall transfer the load to the generator set after it reaches proper voltage
 - a. Adjustable from 70-90% of system voltage, and frequency
 - b. Adjustable from 80-90% of system frequency.



- c. A solid state time delay, adjustable from five seconds to three minutes, shall delay this transfer to allow the generator to warm up before application of load.
 - d. There shall be a switch to bypass this warm up timer when immediate transfer is required.
- 4. Controls shall retransfer the load to the line after normal power restoration.
 - a. A return to utility timer, adjustable from 1-30 minutes, shall delay this transfer to avoid short term normal power restoration.
- 5. The operating power for transfer and retransfer shall be obtained from the source to which the load is being transferred.
- 6. Controls shall signal the generator to stop after the load retransfers to normal.
 - a. A solid state engine cool down timer, adjustable from 1-30 minutes, shall permit the engine to run unloaded to cool down before shutdown.
 - b. Should the utility power fail during this time, the switch will immediately transfer back to the generator.
- 7. The transfer switch shall have a time delay neutral feature to provide a time delay, adjustable from 0.1-10 seconds, during the transfer in either direction, during which time the load is isolated from both power sources. This allows residual voltage components of motors or other inductive loads (such as transformers) to decay before completing the switching cycle.
- 8. A switch will be provided to bypass all transition features when immediate transfer is required.
- 9. The transfer switch shall have an in-phase monitor which allows the switch to transfer between live sources if their voltage waveforms become synchronous within 20 electrical degrees within 10 seconds of transfer initiation signal.
 - a. If the in-phase monitor will not allow such a transfer, the control must default to time delay neutral operation.
- 10. Front mounted controls shall include a selector switch to provide for a NORMAL TEST mode with full use of time delays, FAST TEST mode which



bypasses all time delays to allow for testing the entire system in less than one minute, or AUTOMATIC mode to set the system for normal operation.

- a. The controls shall provide bright lamps to indicate the transfer switch position in either UTILITY (white) or EMERGENCY (red). A third lamp is needed to indicate STANDBY OPERATING (amber). These lights must be energized from utility or the generator set.
- b. The controls shall provide a manually operated handle to allow for manual transfer. This handle must be mounted inside the lockable enclosure and accessible only by authorized personnel.
- c. The controls shall provide a safety disconnect switch to prevent load transfer and automatic engine start while performing maintenance. This switch will also be used for manual transfer switch operation.
- d. The controls shall provide LED status lights to give a visual readout of the operating sequence including:
 - 1) Utility on
 - 2) Engine warm-up
 - 3) Standby ready
 - 4) Transfer to standby
 - 5) In-phase monitor
 - 6) Time delay neutral
 - 7) Return to utility
 - 8) Engine cool down
 - 9) Engine minimum run

6.4.3 Propane Fuel System

- A. The SELECTED VENDOR shall provide a complete fuel system including tank(s) and all associated piping, valves, controls, etc.



- B. Above ground tanks shall be bullet proof or protected.
- C. Tank and fuel system components shall be sized to provide a minimum of 72 hours of run time at full load.
- D. Fuel tank(s) shall be located a minimum of 10 feet from the generator and building.
- E. Clear access shall be provided for refueling.
- F. Above ground tanks shall be protected by block walls and/or bollards.
- G. Tanks
 - 1. Steel and polyurethane construction
 - 2. UL labeled in accordance with UL 644 and stamped in accordance with ASME Section VIII Division 1
 - 3. Rated for a minimum of 250 psig
 - 4. All tanks to be secured to an adequately sized concrete foundation
- H. Fuel System Construction:
 - 1. No copper pipe will be allowed for any part of the underground fuel line system.
 - 2. No bare black iron pipe will be used for any part of fuel system.
 - 3. Any underground steel pipe will be epoxy coated and all joints wrapped to prevent corrosion.
 - 4. All underground pipes will be at least 18 inches below the surface.
 - 5. Fuel lines will be protected with a concrete filled sleeve both entering and leaving the ground for at least 12 inches into the ground and 6 inches above the ground.
 - 6. Fuel lines crossing a driveway will be protected from damage by being installed in a larger pipe sleeve or covered with a concrete barrier of sufficient strength.



7. All above ground pipe will be supported at least every 36 inches.

I. Controls and Monitoring Equipment:

1. Gas capacity gage with low fuel level alarm contact closure
2. Multi-valve for filling, pressure relief and gauging

6.5 *Uninterruptable Power Supply (UPS)*

A. RESPONDENT shall provide single phase, online, double conversion, static type, uninterruptible power supply (UPS) at each shelter with the following features:

1. Surge suppression
 2. Input harmonics reduction
 3. Rectifier / charger
 4. Inverter
 5. Static bypass transfer switch
 6. Battery and battery disconnect device
 7. Internal maintenance bypass / isolation switch
 8. Output isolation transformer
 9. Remote UPS monitoring provisions
 10. Battery monitoring
 11. Remote monitoring
- B. RESPONDENT shall perform electrical loading analysis for shelter equipment, excluding HVAC subsystems, during preliminary design to verify UPS size required. All electrical loading calculations shall include a 50% expansion factor, and all assumptions regarding power consumption and duty factor shall be thoroughly explained.

C. For the purpose of the proposal, RESPONDENT shall assume the following:



1. 10 kVA output
2. Single phase
3. 60 Hz
4. 0.8 Power Factor
5. Minimum two hour run time

D. Quality Assurance:

1. Electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. UL compliance shall be listed and labeled under UL 1778 by an NRTL.
3. NFPA Compliance shall identify UPS components as suitable for installation in computer rooms according to NFPA 75.

E. Operational Requirements

1. Automatic operation includes the following:
 - a. Normal Conditions -- Load is supplied with power flowing from the normal power input terminals, through the rectifier-charger and inverter, with the battery connected in parallel with the rectifier-charger output.
 - b. Abnormal Supply Conditions -- If normal supply deviates from specified and adjustable voltage, voltage waveform, or frequency limits, the battery supplies energy to maintain constant, regulated inverter power output to the load without switching or disturbance.
 - c. If normal power fails, energy supplied by the battery through the inverter continues supply-regulated power to the load without switching or disturbance.
 - d. When power is restored at the normal supply terminals of the system, controls automatically synchronize the inverter with the external source before transferring the load. The rectifier-charger then supplies power to the load through the inverter and simultaneously recharges the battery.



- e. If the battery becomes discharged and normal supply is available, the rectifier-charger charges the battery. On reaching full charge, the rectifier-charger automatically shifts to float-charge mode.
 - f. If any element of the UPS system fails and power is available at the normal supply terminals of the system, the static bypass transfer switch switches the load to the normal AC supply circuit without disturbance or interruption.
 - g. If a fault occurs in the system supplied by the UPS, and current flows in excess of the overload rating of the UPS system, the static bypass transfer switch operates to bypass the fault current to the normal AC supply circuit for fault clearing.
 - h. When the fault has cleared, the static bypass transfer switch returns the load to the UPS system.
 - i. If the battery is disconnected, the UPS continues to supply power to the load with no degradation of its regulation of voltage and frequency of the output bus.
2. Manual operation includes the following:
- a. Turning the inverter off causes the static bypass transfer switch to transfer the load directly to the normal AC supply circuit without disturbance or interruption.
 - b. Turning the inverter on causes the static bypass transfer switch to transfer the load to the inverter.
3. Controls and Indications: Basic system controls shall be accessible on a common control panel on front of UPS enclosure.
- F. Performance Requirements:
- 1. Input:
 - a. Single phase, three-wire
 - b. Voltage: 120/240V Nominal
 - c. Frequency: 50/60 Hz +/- 3 Hz



2. Output:
 - a. Capacity: to be determined by SELECTED VENDOR during preliminary design
 - b. Voltage: 120/240V
 - c. Frequency: 60 Hz, +/- 3 Hz
 - d. Maximum Voltage Distortion: 5% at full load
3. Minimum Duration of Supply -- If the battery is the sole energy source supplying rated full UPS load current at 80 percent power factor, duration of the supply is 30 minutes.
4. Minimum Overload Capacity of UPS at Rated Voltage -- 125 percent of rated full load for 10 minutes, and 150 percent for 30 seconds in all operating modes.
5. EMI Emissions -- Comply with FCC Rules and Regulations and with 47 CFR 15 for Class A equipment.
6. Electronic Equipment -- Solid-state devices using hermetically sealed, semiconductor elements. Devices include rectifier-charger, inverter, and system controls.
7. Surge Suppression -- Protect internal UPS components from surges that enter at each AC power input connection and protect rectifier-charger, inverter, controls, and output components.
 - a. Use factory-installed surge suppressors tested according to IEEE C62.41.1 and IEEE C62.41.2.
 - b. Additional Surge Protection -- Protect internal UPS components from low-frequency, high-energy voltage surges described in IEEE C62.41.1 and IEEE C62.41.2. Circuits connecting with external power sources and select circuit elements, conductors, conventional surge suppressors, and rectifier components and controls shall be designed so input assemblies will have adequate mechanical strength and thermal and current-carrying capacity to withstand stresses imposed by 40-Hz, 180 percent voltage surges described in IEEE C62.41.1 and IEEE C62.41.2.



8. Rectifier-Charger

- a. Capacity -- Adequate to supply the inverter during rated full output load conditions and simultaneously recharge the battery from fully discharged condition to 95 percent of full charge within 10 times the rated discharge time for the duration of the supply under battery power at full load.
- b. Output Ripple -- Limited by output filtration to less than 0.5 percent of rated current, peak to peak.
- c. Battery Float-Charging Conditions -- Comply with battery manufacturer's written instructions for battery terminal voltage and charging current required for maximum battery life.

9. Inverter -- Pulse-width modulated, with sinusoidal output.

G. Tests and Inspections

- 1. Comply with manufacturer's written instructions
- 2. Inspect interiors of enclosures, including the following:
 - a. Integrity of mechanical and electrical connections
 - b. Component type and labeling verification
 - c. Ratings of installed components
- 3. Test manual and automatic operational features and system protective and alarm functions.
- 4. Load the system using a variable-load bank to simulate kilovolt amperes, kilowatts, and power factor of loads for the unit's rating.
 - a. Simulate malfunctions to verify protective device operation.
 - b. Test duration of supply on emergency, low-battery voltage shutdown, and transfers and restoration due to normal source failure.
 - c. Test harmonic content of input and output current less than 25, 50, and 100 percent of rated loads.
 - d. Test output voltage under specified transient-load conditions.



- e. Test efficiency at 50, 75, and 100 percent of rated loads.
- 5. Inspection reports.
- H. Demonstration: Train County's maintenance personnel to adjust, operate, and maintain the UPS.

6.6 Site Preparation

- A. RESPONDENT shall perform all site preparation for site improvements as necessary. Work includes, but is not limited to the following:
 - 1. Protecting existing plants and grass to remain
 - 2. Removing existing plants and grass as necessary
 - 3. Clearing and grubbing
 - 4. Stripping and stockpiling topsoil
 - 5. Removing above- and below-grade site improvements
 - 6. Disconnecting, capping or sealing, and removing site utilities
 - 7. Temporary erosion and sedimentation control measures
 - 8. Access road development
- B. The following Construction Specifications Institute (CSI) standard sections are referenced but not included in this RFP:
 - 1. Division 1 Section, *Temporary Facilities and Controls*, for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and temporary erosion and sedimentation control procedures
 - 2. Division 1 Section, *Execution Requirements*, for verifying utility locations and for recording field measurements
 - 3. Division 1 Section, *Selective Demolition*, for partial demolition of buildings or structures undergoing alterations



4. Division 2 Section, *Building Demolition*, for demolition of buildings, structures, and site improvements
 5. Division 2 Section, *Tree Protection and Trimming*, for protecting trees remaining on-site that are affected by site operations
 6. Division 2 Section, *Earthwork*, for soil materials, excavating, backfilling, and site grading
 7. Division 2 Section, *Lawns and Grasses*, for finish grading including preparing and placing planting soil mixes and testing of topsoil material
- C. The SELECTED VENDOR or subcontractor shall comply with Department of Environmental Resources and Bureau of Water and Soil Conservation guidelines for Erosion and Sedimentation (E&S) Control.
- D. RESPONDENT shall carefully examine and study existing conditions, difficulties and utilities affecting execution of work. Later claims for additional compensation due to additional labor, equipment or materials required due to difficulties encountered or underground water conditions will not be considered.
- E. The SELECTED VENDOR shall verify that existing plant life to remain and clearing limits are clearly tagged, identified and marked in such a manner as to insure their safety throughout construction operations.
- F. Protection
1. The SELECTED VENDOR shall protect and maintain bench mark, monument, property corner, and other reference points; re-establishing them by Registered Professional Surveyor if disturbed or destroyed, at no cost to the County.
 2. The SELECTED VENDOR shall locate and identify existing utilities that are to remain and protect them from damage; re-establishing them if disturbed or destroyed, at no cost to the County.
 3. The SELECTED VENDOR shall protect trees, plant growth and features to remain as final landscape. Branches or roots of any trees, which are to remain, shall not be disturbed. Adequate guards, fences, lighting, warning signs and similar items shall be provided and maintained as required.
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4. The SELECTED VENDOR shall install protection such as fencing, boxing of tree trunks, or other measures as approved by the Project Engineer.
5. The SELECTED VENDOR shall conduct operations with minimum interference to public or private accesses and facilities; maintain ingress and egress at all times; and clean or sweep any roadways daily or as required by the governing authority. At such times as deemed necessary by the County, dust control shall be provided with water sprinkling systems or equipment provided by the SELECTED VENDOR or subcontractor.
6. When appropriate, the SELECTED VENDOR shall provide traffic control as required, in accordance with the Contract Documents, the U.S. Department of Transportation "Manual of Uniform Traffic Control Devices" and the California State Department of Transportation requirements.

G. Clearing

1. The SELECTED VENDOR shall clear areas required for access to the site and execution of work.
2. Unless otherwise indicated, the SELECTED VENDOR shall remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with the installation of new construction. Removal includes digging out stumps, roots and root material. Depressions caused by clearing and grubbing operations are to be filled to sub-grade elevation to avoid water pooling. Satisfactory fill material shall be placed in horizontal layers not exceeding 8" loose depth, and thoroughly compacted per fill requirements of this section and CSI Division 2-Site Construction-Section 02200.
3. The SELECTED VENDOR shall remove grass, trees, plant life, stumps and all other construction debris from the site to a location that is suitable for handling such material according to state laws and regulations.

H. Demolition: The SELECTED VENDOR shall remove existing pavement, utilities, curbing and shrubbery as necessary for construction of improvements.

I. Topsoil Excavation:

1. The SELECTED VENDOR shall strip topsoil from areas that are to be filled, excavated, landscaped or re-graded to such a depth that it prevents intermingling with underlying subsoil or questionable material.



2. The SELECTED VENDOR shall stockpile topsoil in storage piles in areas not scheduled for construction, job trailer location, or equipment lay-down areas, or where directed by the Project Engineer. Storage piles shall be constructed to freely drain surface water. Storage piles shall be covered as required to prevent windblown dust. Unsuitable soil shall be disposed of as specified for waste material, unless otherwise desired by the County. Excess topsoil shall be removed from the site by the SELECTED VENDOR or subcontractor.
3. Final topsoil coatings shall consist of organic soil found in depth of not less than 6". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones and other objects over 2" in diameter, weeds, roots, and other objectionable material.

J. Access Roads

1. A 12 foot wide access road shall be provided to the fence gate at new sites.
2. Road beds shall be prepared, rolled and provided with six inches of aggregate base course.
3. Roads shall be graded appropriately for proper drainage and minimal erosion.

6.7 Fencing

- A. RESPONDENT shall provide chain-link fencing around the perimeter of all new proposed sites.
- B. Framework: Type I or Type II Steel Pipe.
1. Type I -- Schedule 40 steel pipe with 1.8 ounces of zinc coating per square foot of surface area conforming to Standard Specification ASTM (American Society for Testing and Materials) F-1083; or,
 2. Type II - Pipe manufactured from steel conforming to ASTM A569. External surface triple coated per ASTM F-1234. Type II pipe shall demonstrate the ability to resist 1,000 hours of exposure to salt spray with a maximum of 5% red rust in a test conducted in accordance with ASTM B-117.
 3. All coatings are to be applied inside and out after welding.
 4. Unless otherwise noted, Type II framework shall be provided.



5. Pipe shall be straight, true to section and conform to the following weights:

Table 4: Type I and Type II Steel Pipe Specifications

Pipe Size Outside Diameter	Type I Weight Lb./Ft.	Type II Weight Lbs./ Ft.
1 5/8"	2.27	1.84
2"	2.72	2.28
2 1/2"	3.65	3.12
3"	5.79	4.64
3 1/2"	7.58	5.71
4"	9.11	6.56
6.58"	18.97	

C. Fabric:

1. Aluminized fabric shall be manufactured in accordance with ASTM A-491 and coated before weaving with a minimum of 0.4 ounces of aluminum per square foot of surface area. The steel wire and coating shall conform to ASTM A-817. Fabric shall be 9-gauge woven in a 2-inch diamond mesh. The top selvage shall be twisted and barbed. The bottom selvage shall be knuckled.
2. Zinc-coated fabric shall be galvanized after weaving with a minimum 1.2 ounces of zinc per square foot of surface area and conform to ASTM A-392, Class I. Fabric shall be 9-gauge wire woven in a 2-inch diamond mesh. The top selvage shall be twisted and barbed. The bottom selvage shall be knuckled.

D. Fence Posts

Table 5: Fence Post Specifications

Fence Posts TYPE I - II		
Fabric Height	Line Post O.D.	Terminal Post O.D.
Under 6'	2"	2 1/2"
6'-9'	2 1/2"	3"
9'-12'	3"	4"

E. Gate Posts

Table 6: Gate Posts Specifications



Gate Posts Type II		
Single Gate Width	Double Gate Width	Post O.D. Type II
Up to 6'	Up to 12'	3"
7'to 12'	13' to 25'	4"

F. Rails and Braces: 1 $\frac{5}{8}$ " O.D.

G. Gates: Frame assembly of 2" O.D. pipe Type I or Type II with welded joints. Weld areas shall be repaired with zinc-rich coating applied per manufacturer's directions. The fence fabric shall match the fence posts, gate posts and gates. Gate accessories, hinges, latches, center stops, keepers and necessary hardware shall be of a quality required for industrial and commercial application. Latches shall permit padlocking. The SELECTED VENDOR shall provide one padlock for each gate with three keys for each padlock. All padlocks shall be keyed alike.

H. Installation

1. General -- Fence installation shall conform to ASTM F-567, *Standard Practice for Installation of Chain-Link Fence*.
2. Height -- Fence height shall be as indicated on contract drawings. If no height is indicated, the fence shall be 7 ft. high, plus 1-ft. for barbed wire.
3. Post Spacing -- Line posts shall be uniformly spaced between angle points at intervals not exceeding 10 feet.
4. Bracing -- Gate and terminal posts shall be braced back to adjacent line posts with horizontal brace rails and diagonal truss rods
5. Top Rail -- The top rail shall be installed through the line post loop caps connecting sections with sleeves to form a continuous rail between terminal posts.
6. Fencing shall have a bottom rail instead of a tension wire.
7. Fabric -- The fabric shall be pulled taut with the bottom selvage 2-inches above grade. The fabric shall be fastened to the terminal posts with tension bars threaded through mesh and secured with tension bands at maximum 15-inch intervals. The fabric shall be tied to the line posts and top rails with tie



- wires spaced at a maximum of 12-inches on posts and 24-inches on rails. The fabric shall be attached to the bottom rail with top rings at maximum 24-inch intervals.
8. Barbed Wire -- Barbed wire shall be anchored to the terminal extension arms, pulled taut and firmly installed in the slots of the line post extension arms.
 9. Valleys -- Should the fence cross a ditch or drainage swell, 3/8" diameter aluminum alloy rods shall be driven vertically 18" into the ground on 4-inch centers, woven through the fence fabric to provide security for these areas.
 10. Vegetation Stop and aggregate shall be applied to the entire compound area (the area inside the fencing) and 6" beyond the fencing. Vegetation Stop shall be constructed with weed barrier geotextile and aggregate shall be applied 3" in depth and consist of AASHTO#10 coarse aggregate.



7. Network Management System (NMS)

This section provides specifications and requirements for an integrated monitoring and control system for local and remote site facilities and equipment. The system is used to provide remote indication of status, alarms, and analog values, and to provide remote control relay operations.

- A. System Alarms: The system shall acquire, process and display information in an integrated and uniform fashion for a variety of critical systems including:
 - 1. Trunked and conventional radio systems
 - 2. Local and remote site facilities
 - 3. Primary and backup power systems
 - 4. Microwave, leased line and data networks
- B. Site Alarms: Any change in state of site equipment shall induce an alarmed state. Equipment monitored shall include, but not be limited to the following:
 - 1. Surge arrestors
 - 2. Transfer switch (normal or bypass state)
 - 3. Power fail
 - 4. HVAC
 - 5. Smoke detector
 - 6. Intrusion detection
 - 7. High temperature
 - 8. Low temperature
 - 9. High humidity
 - 10. UPS fail
 - 11. UPS state (normal or bypass)



12. Generator (including generator run, low fuel, high temp, fail, etc.)
13. Generator not in auto
14. In an effort to reduce false alarms, all alarm contacts shall be normally closed when no alarm is present.

C. NMS components include:

1. Network Management Terminals (NMT)
2. Remote Terminal Units (RTU)

7.1 Network Management Terminals (NMT)

- A. The NMT shall provide primary processing, display, and control of information to and from a variety of RTU locations. System status and alarm conditions shall be displayed. The system shall provide the ability to remotely access the system to check the operational status of the system and view alarms.
- B. An NMT shall be provided at the following locations:
 1. MERA Master Site at 3501 Civic Center Drive in San Rafael, CA
 2. Marin County Communications at 4 Peter Behr Drive in San Rafael, CA
- C. The NMT shall meet the following general requirements:
 1. Expandable software and hardware architecture shall be easily updated by adding software modules and hardware boards.
 2. Hardware and software platform shall be PC based using current versions of hardware and software.
 3. Both graphic and tabular displays shall provide instantaneous and comprehensive network status information.
 4. The NMT shall provide full archiving and control functions.
 5. Multiple alarm protocols for higher level network management systems shall be mediated by the NMT.



6. The NMT shall be designed to monitor a large cross section of equipment so that it can consolidate multiple alarm systems rather than just poll alarms from RTU locations.
7. The NMT must perform full management functions with a local terminal.
8. The NMT shall provide email notification of alarms.
9. The NMT shall provide alarm filtration and consolidation.
10. Web browser interface shall be provided for common management functions.
11. Secure web browser interface shall be provided to monitor alarms and perform control and management functions via Intranet or Internet.

D. NMT/RTU Communications Protocol(s) supported:

1. RESPONDENT shall fully describe all protocols used or supported.
2. RESPONDENT shall identify which of the following protocols are supported, either standard or as an OPTION:
 - a. TBOS
 - b. DCP
 - c. DCPF
 - d. DCM
 - e. MDLC
 - f. TRIP
 - g. TELTRAC
 - h. TL-1
 - i. ASCII
 - j. TABS
 - k. dataLOK



- I. SNMP
 - m. Operator
 - 3. Proprietary protocols may be acceptable, so long as all requirements are met.
- E. Standard Features:
- 1. Shall provide programmable display screens including the following:
 - a. System Summary -- High level screen summary window with links to other screens
 - b. Change of State -- summary of points that have changed state from alarm to normal or normal to alarm
 - c. Standing Alarms -- summary of all points in alarm condition
 - d. Programmable Alarm Windows -- allowing logical grouping of alarms such as by type or site.
 - 2. Shall provide for the graphic depiction of the network allowing annunciation and point selection via icons:
 - a. Nested tree depiction of the network with drill down capability
 - b. Capability to drive external display devices
 - 3. Programmable console environment including:
 - a. Database definition
 - b. Screen colors
 - c. Alarm summary formats
 - d. Blink attributes
 - e. Pager alarm formats
 - f. Audible alert formats
 - 4. Status Points – the following status types shall be supported:
-



- a. Simple status – contact open or closed
 - b. Change detect – simple status plus change detect since last scan
5. Control Points- the following relay control types shall be supported:
 - a. Direct control
 - b. Select before operate
 - c. Batch – control multiple relays with a single operation
6. Analog points -- display the value of a monitored quantity such as temperature, fuel level, VSWR, etc.
7. Time stamp indicating date and time of message within 0.5 seconds
8. Conditional assignable text messages (minimum 256 characters) for each point to be issued on a change of state or alarm
9. Alarm qualification -- on a point basis, programmable delay before alarm is issued
10. Alarm deactivation – on a point basis, the ability for the operator to deactivate an alarm to inhibit additional annunciation
11. Alarm history:
 - a. Logging of all alarms to disk and printer (selectable)
 - b. Minimum history log of 500,000 entries
12. Email support -- text message of alarm sent to email lists
13. Ping interrogator – to confirm that servers, routers, and IP based equipment are physically present on the network
14. Editor -- providing point configuration utilities to create and edit point databases
15. Security – multiple levels of user name and password protection to all for flexible system management



7.2 Remote Terminal Units (RTU)

- A. RTU shall be provided in sufficient quantities to monitor the entire network including:
 - 1. Trunked and conventional radio network components
 - 2. Site facilities including shelter, tower, lighting, power, generator
 - 3. Microwave radios, channel banks, etc.
 - 4. Data network equipment including routers, switches, etc.
 - 5. Other miscellaneous equipment
- B. RTUs shall be fully compatible with the NMT supplied and provide complementary functionality wherever necessary to provide a complete working system.
- C. RTUs shall support the following points:
 - 1. Status/alarms – 48 minimum expandable to 256 points
 - 2. Control outputs – 8 minimum expandable to 32
 - 3. Analog inputs – 8 minimum expandable to 16 (optional)
- D. RTUs shall support time stamp and system time synchronization.
- E. Terminations for all points shall be provided on suitable terminal blocks providing ease of installation, testing, and maintenance.



8. Subscriber Equipment

8.1 Overview

- A. Subscriber equipment includes all 700/800 MHz non-fixed user equipment, such as:
 - 1. Portable radios
 - 2. Mobile radios
 - 3. Control stations
- B. RESPONDENT shall provide unit pricing for all user subscriber equipment and accessories. All subscriber equipment shall be listed as OPTIONAL.

8.2 General Requirements

- A. All subscriber equipment is expected to be of high quality and intended to provide high reliability under heavy use in severe environments. Equipment must be FCC type accepted in accordance with FCC Part 90 rules and regulations.
- B. All subscriber equipment shall meet MIL-STD-810 C, D, E, and F.
- C. All subscriber equipment shall be software programmable.
- D. All subscriber equipment shall support the following operating modes:
 - 1. Conventional analog FM network
 - 2. Conventional analog FM off-network
 - 3. Conventional P25 Phase 1 network
 - 4. Conventional P25 Phase 1 off-network
 - 5. Trunked P25 Phase 1 network
 - 6. Trunked P25 Phase 2 network
- E. All equipment shall be programmed for proposed and existing legacy radio channels (within the appropriate frequency band).



8.2.1 Portable Radios

- A. RESPONDENT shall provide pricing with the assumption that a minimum of 2,500 portable radios will be purchased for the conventional or trunked system.
- B. As an OPTION, RESPONDENT shall propose radios certified as intrinsically safe.
- C. RESPONDENT shall provide the highest tier product available, highly reliable and intended for mission critical operations. Pricing shall be provided for a minimum of three models:
 - 1. Model 1: Basic model, typically identified with no keypad or display
 - 2. Model 2: Mid model, typically identified with limited keypad and display
 - 3. Model 3: Advanced model, typically identified with full keypad and display
- D. Features:
 - 1. Full compliance with P25 features and operation
 - 2. PTT button
 - 3. Top-mounted on/off volume knob
 - 4. Talkgroup/channel selector
 - 5. Emergency button, protected from inadvertent activation
 - 6. Alphanumeric display (on applicable models), minimum of eight characters
 - 7. Transmit indicator
- E. Battery
 - 1. RESPONDENT shall provide batteries without cadmium. Pricing shall be provided for the following:
 - a. Nickel-Metal Hydride (NiMH)
 - b. Lithium-ion



2. As an OPTION, RESPONDENT shall propose batteries certified as intrinsically safe.
 3. Batteries shall provide a minimum operational use of eight hours based on a 5-5-90 duty cycle.
 4. Recharge time to full capacity shall not exceed one hour.
 5. RESPONDENT shall provide detailed specifications for all batteries proposed, including the following at a minimum:
 - a. Battery life
 - b. Total battery life-cycle expectancy
 - c. Recharge time
 - d. Dimensions
 - e. Weight
 - f. Warranty
- F. Accessories: RESPONDENT shall provide OPTIONAL pricing for all accessories, including the following at a minimum:
1. Encryption
 2. Data cables
 3. Battery chargers
 - a. Single-bay battery charger
 - b. Multiple-bay battery charger
 - c. Vehicular charger
 4. Alternate antennas
 5. Remote speaker microphone
 6. Remote speaker microphone with antenna
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7. Headset
 - a. Wired
 - b. Wireless/Bluetooth
 8. Carrying cases/belt clips
- G. RESPONDENT shall provide detailed equipment specifications for all proposed portables and accessories, including the following information:
1. Radio dimensions
 2. Radio weight with battery
 3. Antenna type
 4. Frequency channel capacity
 5. General features, Transmit/Receive parameters, and mechanical specs
- H. Multiband portable radios
1. As an OPTION, RESPONDENT shall provide multiband portable radios capable of operating in the following frequency bands:
 - a. VHF: 136 – 174 MHz
 - b. UHF: 380 – 520 MHz
 - c. 700/800 MHz: 762 – 870 MHz
 2. RESPONDENT shall provide detailed specifications for radios and all accessories.

8.2.2 Mobile Radios/Control Stations

- A. RESPONDENT shall provide pricing with the assumption that a minimum of 2,000 mobile radios and 250 control stations will be purchased for the conventional or trunked system.
- B. RESPONDENT shall provide pricing for a minimum of three tiers.



- C. Mobile radios shall be supplied complete with microphone, external speaker, cables, fusing, mounting hardware, coaxial cable and antennas to provide for a complete installation.
- D. Control station radios shall be supplied complete with desk microphone, speaker, cables, coaxial cable and antennas to provide for a complete working package.
- E. RESPONDENT shall provide pricing for dash mounted units and remote mounted units.
- F. Features:
 - 1. Full compliance with P25 features and operation
 - 2. Remote speaker microphones
 - 3. Front-mounted on/off volume knob
 - 4. Talkgroup/channel selector
 - 5. Emergency button, protected from inadvertent activation
 - 6. Alphanumeric display
 - 7. Transmit indicator
- G. Accessories: RESPONDENT shall provide OPTIONAL pricing for all accessories, including the following at a minimum:
 - 1. Encryption
 - 2. Cables:
 - a. Data cables
 - b. Extension cables
 - c. Adapters
 - d. Power cables
 - 3. Antennas



4. External Speakers
 5. Public address kits
 6. Remote speaker microphones
 7. Desktop microphone (control stations only)
- H. RESPONDENT shall provide detailed equipment specifications for all proposed mobiles and accessories, including the following information:
1. Radio dimensions
 2. Radio weight with battery
 3. Antenna type
 4. Frequency channel capacity
 5. General features, transmit/receive parameters, and mechanical specifications
- I. Multiband mobile radios
1. As an OPTION, RESPONDENT shall provide multiband mobile radios capable of operating in the following frequency bands:
 - a. VHF: 136 – 174 MHz
 - b. UHF: 380 – 520 MHz
 - c. 700/800 MHz: 762 – 870 MHz
 2. RESPONDENT shall provide detailed specifications for radios and all accessories.



9. Training

- A. The SELECTED VENDOR shall develop and conduct training programs to allow county personnel to become knowledgeable with the system, subsystems, and individual equipment.
- B. The SELECTED VENDOR shall provide:
 - 1. Operator training:
 - a. The SELECTED VENDOR shall provide complete and comprehensive operational training covering features, operation, and special care associated with the equipment supplied. Operator training shall include the following categories:
 - 1) Portable Unit Operation (structured as Train-the-Trainer)
 - 2) Mobile Unit Operation (structured as Train-the-Trainer)
 - 3) Dispatch Console Operation
- C. Technical/System Management training.
 - 1. The SELECTED VENDOR shall provide complete and comprehensive technical training in the theory, maintenance, and repair of each type of equipment and system provided for the project. This training shall include, as a minimum, system theory, troubleshooting, repair, and servicing techniques as applicable to the selected system. Technical training shall include the following categories:
 - a. Infrastructure Maintenance and Troubleshooting
 - b. Subscriber Unit Maintenance and Troubleshooting
 - c. Microwave Network Maintenance, and Troubleshooting
 - 2. The SELECTED VENDOR shall provide complete and comprehensive technical training for County technical staff charged with managing the system. This training shall include, but is not limited to:
 - a. Planning and setting up the system and network



- b. Building and implementing system and network profiles and configurations
 - c. Performing database management functions
 - d. Monitoring and managing the system's performance
 - e. Writing and printing system reports.
3. System Management training shall include the following categories:
- a. Network Management System (NMS) Operation and Control
 - b. Fleet mapping and Radio Programming
 - c. Microwave Network Management
- D. RESPONDENT shall fully describe all proposed training programs detailing how the RESPONDENT intends to provide training. The training description shall include the following:
- 1. A list of all subjects with a description of each
 - 2. Class material to be provided by the SELECTED VENDOR
 - 3. Number of classes
 - 4. Class duration
 - 5. Need for recurring training
 - 6. Class size
 - 7. Class cost
- E. All training shall be conducted at the Marin County Civic Center training room and/or the Marin Communications Division training room. The SELECTED VENDOR shall coordinate with the County regarding number of attendees and schedule.
- F. Classes shall be scheduled as near to system cutover as possible.



- G. The SELECTED VENDOR shall train the county employees or designated individuals. In some cases, a Train-the-Trainer approach will be used to train other users.
- H. The SELECTED VENDOR shall provide all instructional material, including printed manuals, audio, video, interactive self-paced personal computer programs, and complete equipment operating instructions for all technical and operational training classes. Actual and or exact model and series of equipment being delivered shall be made available for hands-on use and operation during training. All instructional material shall be subject to the approval of the County and shall become property of the County.



10. Warranty, Maintenance, and Support

10.1 Warranty

- A. The proposed communications system shall have a warranty period of three years. The three year warranty period shall commence upon Final Acceptance.
- B. The SELECTED VENDOR shall provide a single toll-free telephone number that answers 24 hours a day, seven days a week, 365 days a year, for service requests and warranty claims.
- C. The RESPONDENT shall state in the proposal the name, address, and capabilities of the service station(s) providing warranty service.
- D. The following procedures shall be followed during the warranty period:
 - 1. Warranty Maintenance shall be performed 24 hours a day with no additional charges for work on critical infrastructure outside of normal 8 a.m. to 5 p.m. business hours.
 - 2. The service facility shall provide prompt repair service, with service personnel arriving onsite within two hours after a service request by the County and returning the system to service within four hours after a service request by the County. All warranty maintenance must be performed by factory certified technicians only. Proof of recent factory training must be provided upon request.
 - 3. The County shall be provided with written documentation indicating the cause of the service outage, the resolution, and all post repair testing procedures to ensure proper operation. In the event County owned spares are used to complete the repair, the model and serial number of both the defective unit and the spare shall be noted in the documentation.
 - 4. For all equipment needing factory or depot repairs, a comprehensive tracking system shall be put in place by the SELECTED VENDOR to track units to and from the factory/depot.

10.2 Extended Warranty

- A. As an OPTION, the RESPONDENT shall propose an extended warranty for years 4-7, renewable on an annual basis.
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- B. The RESPONDENT shall fully describe the terms and conditions of the extended warranty in the Proposal.

10.3 Maintenance

The SELECTED VENDOR shall maintain and repair all systems, equipment, hardware and software throughout the implementation / migration and warranty periods. The vendor shall maintain all equipment with the latest software revision including spares. Software licensing should reflect this requirement.

The County reserves the right to have technical staff onsite to witness, and if desired, assist in the maintenance and troubleshooting procedures. This does not relieve the SELECTED VENDOR from warranty and maintenance responsibility as defined in this RFP.

10.3.1 General Requirements:

- A. The approach to maintenance of this system shall be one of preventive maintenance.
- B. Comprehensive maintenance services shall be proposed for each system.
- C. RESPONDENTS shall provide a list of maintenance plans available. Plans should be based on the quantities of equipment included in the proposed system. Plans should have options for one, two, or three years. These plans shall include:
 - 1. Subscriber unit repair;
 - 2. Fixed equipment onsite service;
 - a. 2-hour response time
 - b. 4-hour response time
 - c. 8-hour response time
 - d. Next day response time
 - e. Full time onsite technician
 - 3. Fixed equipment mail-in board repair;



- a. Normal response - 7 day
 - b. Emergency response - Next day
- 4. All fixed equipment maintenance plans shall provide 24-hour system support where users can dial one toll free number to report problems and/or receive technical support.
 - 5. Additionally for fixed onsite maintenance, the SELECTED VENDOR's staff will then dispatch the proper technician in the prescribed response time to resolve the problem, if the SELECTED VENDOR is unable to resolve the problem through telephone consultation.

10.3.2 Maintenance Standards

- A. Replacement parts used in repairs shall be equal in quality and ratings as the original parts.
- B. Equipment shall be maintained in a clean condition. Oil, dust and other foreign substances shall be removed on a routine basis.
- C. Equipment and system performance shall be maintained at the level initially described in these equipment and systems specifications. The service organization shall maintain records to confirm this has been done at intervals defined by the County.
- D. The SELECTED VENDOR shall provide only factory trained and authorized maintenance personnel.
- E. If fixed equipment or a fixed equipment module fails more than twice during the acceptance test or twice during the first year, the SELECTED VENDOR shall meet with the County to discuss and explain such failures. If, in the opinion of the County, these failures indicate that the equipment is potentially prone to continuing failures, the SELECTED VENDOR shall replace it at no cost to the County.

10.4 Parts Availability

- A. From the date of final acceptance to the seventh anniversary of the date of final acceptance, the SELECTED VENDOR shall maintain replacement parts for all delivered equipment.
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- B. In the event the SELECTED VENDOR plans to discontinue stocking any part required for maintenance after the seventh anniversary of acceptance, the SELECTED VENDOR shall send written notice to the County 24 months prior to the date of discontinuance to allow for last-time buys and replenishment.
- C. All parts, ordered on a priority basis, shall be delivered within 24 hours after placing an order. The SELECTED VENDOR shall provide year around, 24 hour ordering facilities via telephone, internet, e-mail, and fax service.

10.5 Spare Equipment

- A. RESPONDENT shall propose to the County as an OPTION, recommended spare parts for the system, subsystems, and individual equipment.
- B. The list of spare parts shall include, but is not limited to:
 - 1. Any vendor identified Field Replaceable Units (FRUs)
 - 2. Any infrastructure component, which does not have FRUs that can cause a critical failure if it were to fail. Examples could include base station antennas and other non-modular components.
 - 3. Power supplies
 - 4. Test measurement, calibration and repair kits
 - 5. Diagnostic equipment to support county maintenance activities
 - 6. Spares for less critical items shall also be enumerated
- C. The list shall include items that will rapidly and completely restore all critical system functionality with the least amount of effort, e.g., board replacement instead of troubleshooting to component level when a critical unit has failed.
- D. The quantities of spares in the list shall be appropriately sized to accommodate equipment quantities in the system.
- E. The list shall define the primary equipment category each spare kit supports, e.g., transceiver board for a repeater, interface board for a console, etc.



- F. The system engineering design documentation shall include a narrative on the RESPONDENT's ability to replace failed units from stock and the process and timing to repair, replace, and return failed units delivered for repair.
- G. System engineering design documentation shall also include the life cycle of equipment, parts, and other maintenance support for the system.



11. System Implementation, Test, and Acceptance

11.1 General

- A. The SELECTED VENDOR shall attend bi-weekly project and construction meetings as deemed necessary by the County prior to and during installation. Additional meetings may be scheduled at the discretion of the County.
- B. If any changes in the overall timeline occur, the SELECTED VENDOR shall update the project schedule for discussion during these project meetings.
- C. The SELECTED VENDOR shall provide written minutes of all meetings no later than five business days after the meeting.

11.2 Cutover Plan

- A. The SELECTED VENDOR shall be responsible for planning and coordinating the implementation of all equipment, subsystems, and the overall system.
- B. Execution of the cutover plan shall ensure that new systems are brought online with minimum interruption to all existing systems and communications.
- C. During final design, the SELECTED VENDOR shall deliver a preliminary cutover plan describing how the radio system will be phased over into a fully operational system.
 - 1. The SELECTED VENDOR shall successfully complete all tests and training prior to the actual cutover of systems.
 - 2. The SELECTED VENDOR shall provide the necessary labor to cutover from existing systems to the proposed system.
 - 3. The plan shall include the schedule and procedures associated with the transition of each operational user group. The plan shall specifically address how the existing users will begin using the new system with minimal operational impact.
 - 4. The plan shall provide detailed component or subsystem cutover plans, and specifically delineate between systems that affect and do not affect ongoing operations.



5. The County reserves the right to approve and change the cutover plan as it relates to any or all system components.

11.3 Staging

- A. Each individual assembly or equipment unit shall undergo factory testing prior to shipment.
- B. Standard factory test documentation, documenting the tests performed and indicating successful completion of testing shall be submitted to the County.
- C. System Staging:
 1. The complete system shall be staged and tested at the factory, in the United States, to the greatest extent practical. The intent of the staging tests is to demonstrate to the County that the system is ready for shipment and installation.
 2. The SELECTED VENDOR shall provide all necessary technical personnel, and test equipment to conduct staging tests. All deviations, anomalies, and test failures shall be resolved at the Vendor's expense.
 3. The SELECTED VENDOR shall use an approved Staging Acceptance Test Plan (SATP). It is expected that the SATP has been performed and all tests have been successful before the County witnesses the official SATP. The SATP shall be signed and dated by the Vendor and County Representatives following completion of all tests. All tests in the SATP shall be marked as either pass, fail, or pass qualify.
 4. Failed tests shall be documented, corrected, and retested. All defective components shall be replaced and retested. Defective components that cannot be corrected shall be replaced at the expense of the Vendor.
 5. Retest of individual failed SATP tests or the entire plan shall be at the County's discretion.
 6. The fully executed and completed SATP document shall be provided to the County.



11.4 System Installation

- A. Installation shall include a complete, tested, system to include placement of associated cabling, appropriate system layout and terminal connections. The SELECTED VENDOR shall provide associated power supplies and any other hardware, adapters and or connections to deliver a complete operable system to the County at the time of acceptance.
- B. All installations shall be performed by factory authorized or SELECTED VENDOR affiliated service shops. Other shops or installers may be used upon mutual agreement between the County and the SELECTED VENDOR. Qualified, adequately trained personnel familiar with this type of work shall perform all installations. Vendors shall provide the names of the service shops, a summary of their experience and a list of five references (minimum) for each proposed shop.
- C. Prior to the start of the system installation the SELECTED VENDOR shall participate in a mandatory project site survey with the County or County's representative to confirm actual equipment location within each space. At that time the exact equipment locations will be determined and documented by the SELECTED VENDOR.
- D. The INSTALLATION CONTRACTOR shall coordinate with others, as appropriate, to confirm that any prep work that affects the installation of the base station equipment, such as tower work, coring, bracing, conduit, electrical, etc., is complete before final inspection.
- E. The SELECTED VENDOR shall provide and pay for all materials necessary for the execution and completion of all work. Unless otherwise specified, all materials incorporated into the permanent work shall be new and shall meet the requirements of this RFP. All materials furnished and work completed shall be subject to inspection by the County or the County's Engineer.
- F. Equipment supplied as spare equipment may not be used for installation of the proposed system. All spare equipment must be supplied in an unused condition and maintained with the latest software revisions throughout the warranty period.
- G. All equipment and devices shall be cleaned internally and externally, and all damaged finishes shall be repaired.



- H. Worksites shall be left neat and broom swept upon completion of work each day. All shelter floors will be thoroughly cleaned and all scuff marks and abrasions will be removed prior to acceptance. All trash shall be removed weekly.
- I. Inspection:
 - 1. The County shall conduct an inspection of the installations upon substantial completion. Any deficiencies shall be documented on a single punch list and provided to the SELECTED VENDOR for resolution.
 - 2. Final acceptance testing shall not commence until all punch list items are resolved.

11.5 Fleet Mapping

- A. The Bay Area UASI is in the process of developing a regional fleet map outlining various shared interoperability talkgroups. The SELECTED VENDOR shall develop the fleet map in coordination with the individual agencies of the County while also addressing regional fleet mapping and template development efforts.
- B. The SELECTED VENDOR shall develop the fleet map template with input and direction from the County. The fleet map shall contain at a minimum:
 - 1. Talkgroup ID
 - 2. Agency
 - 3. Emergency Actions
 - 4. Encryption Capability
 - 5. Roaming Capability
 - 6. Priority
- C. The SELECTED VENDOR shall also develop subscriber programming templates. These templates shall have the basic features and functions defined for a particular subscriber and user type. Templates shall be developed on a per agency basis.
- D. Once the fleet map and templates are approved and completed the SELECTED VENDOR shall use these for installation of subscribers and for further



configuration of the system. The contractor shall submit these with the final as-built documentation.

11.6 Coverage Testing

A. RESPONDENT shall submit a preliminary Coverage Acceptance Test Plan (CATP) with the Proposal. The final CATP shall be submitted during the Final Design stage of the project.

B. CATP:

1. The CATP shall be consistent with the procedures and guidelines outlined in TSB-88C latest revision.
2. Coverage testing shall commence only after the radio system is fully tested and aligned. Significant changes to the system will require retesting of coverage at the County's discretion.

3. The SELECTED VENDOR shall perform two types of coverage testing:

- a. Automated objective mobile drive testing
- b. Non-automated subjective DAQ testing (intelligibility testing)

Automated and intelligibility testing shall be complementary and serve to fully verify that coverage requirements are met both technically and operationally.

4. Test Configurations:

- a. Testing configurations for automated and intelligibility testing shall represent typical operating configurations to the greatest extent possible, using portable and mobile radio equipment to be used with the system.

b. Automated Objective Mobile Drive Testing:

- 1) The SELECTED VENDOR shall test both the signal level and BER, as applicable, at a statistically significant number of test locations throughout the County utilizing automated test equipment such as an STI-9400 or equivalent.



- 2) For testing purposes, the County shall be divided into 1/4-square mile bins ($\frac{1}{2}$ -mile x $\frac{1}{2}$ -mile). The SELECTED VENDOR or Contractor may subdivide grids if necessary.
 - 3) Inaccessible grids shall not count as either a pass or fail in the statistical analysis.
 - 4) Any failed grids shall be corrected and retested.
- c. Non-Automated Subjective DAQ Testing:
- 1) Non-Automated subjective DAQ coverage testing shall be conducted using typical portable radios supplied with the system.
 - 2) Talk-out and talk-in performance shall be documented.
 - 3) The SELECTED VENDOR shall provide a standardized test form for testing.
- d. The SELECTED VENDOR shall coordinate with the County to establish pass/fail criteria as well as correlation between the subjective and objective test results.

11.7 45-Day Operational Test

- A. The contractor shall perform a 45 calendar day operational test of the system to ensure that all hardware and software defects have been corrected prior to entering final proof of performance testing. The full integrated operation of the system, including all individual subsystems, shall be demonstrated during these tests. The tests shall be designed to demonstrate the reliability, long-term stability, and maintainability of the systems. A failure of any critical component of the system during this test will cause the test to restart after the repair is completed. The SELECTED VENDOR and the County will agree on what constitutes a *critical failure* prior to commencing this test.
- B. The SELECTED VENDOR shall provide a 45-day operational test plan during the preliminary design phase.



11.8 Final Acceptance Testing

- A. Prior to final acceptance testing, the SELECTED VENDOR shall verify and document that all equipment, hardware, and software, including spares are upgraded to the latest factory revision. Multiple revision levels among similar equipment are not acceptable. The County shall be given two weeks written notice that the system is ready for final acceptance testing.
- B. Final Acceptance Test Plan (FATP):
 - 1. The SELECTED VENDOR shall use the completed and approved Final Acceptance Test Plan (FATP). It is expected that the FATP has been performed and all tests have been successful before the County witnesses the official FATP. The FATP shall be signed and dated by the SELECTED VENDOR and County Representatives following completion of all tests. All tests in the FATP shall be marked as either pass, fail, or pass qualify.
 - 2. The SELECTED VENDOR shall provide all necessary technical personnel, and test equipment to conduct FATP tests. All deviations, anomalies, and test failures shall be resolved at the Vendor's expense.
 - 3. Failed tests shall be documented, corrected, and retested. All defective components shall be replaced and retested. Defective components that cannot be corrected shall be replaced at the expense of the Vendor.
 - 4. Retest of individual failed FATP tests or the entire plan shall be at the County's discretion.
 - 5. The fully executed and completed FATP document shall be provided to the County.

11.9 As-Built Documentation

At the completion of the installation phase, the Contractor shall provide complete as-built documentation as outlined below:

- A. Equipment provided
- B. Plan and elevation drawings of all equipment including antennas on towers
- C. Cabling and terminations



- D. Block and level diagrams
- E. Fleet mapping and programming
- F. Setup and alignment information
- G. Successfully completed, signed, and dated SATP

11.10 System Acceptance

The County shall deem the system ready for final acceptance following successful completion and approval of the following:

- A. Final Design submittals
- B. Staging Acceptance Test Plan (SATP)
- C. System installation
- D. Final inspection and punch list resolution
- E. As-built documentation
- F. Final Acceptance Test Plan (FATP), including Coverage Acceptance Test Plan (CATP)
- G. 45 day operational test completion
- H. Training



12. County Terms and Conditions

MARIN COUNTY TERMS AND CONDITIONS

1. SUBCONTRACTORS

- A. Each portion of the work shall be performed by an organization experienced to do work in that particular field and no portion of the work shall be reserved by the Contractor to perform unless the Contractor is equipped and experienced to handle it properly. Contractor shall include a complete list of subcontractors proposed for the work.
- B. No portion of contracts or subcontracts shall be assigned, transferred or sublet without the consent of the County.
- C. If the Contractor fails to specify a subcontractor for any portion of the work, they shall be deemed to have agreed to perform such portion themselves. They shall not be permitted to subcontract that portion of the work except in cases of public emergency or necessity and then only after the finding of the awarding authority has been publicly recorded.
- D. If Contractor hires a subcontractor under this Agreement, Contractor shall require subcontractor to provide and maintain insurance coverage(s) identical to what is required of Contractor under this Agreement and shall require subcontractor to name Contractor as additional insured under this Agreement. It shall be Contractor's responsibility to collect and maintain current evidence of insurance provided by its subcontractors and shall forward to the County evidence of same.

2. ASSIGNMENT AND SUBCONTRACTING

The Contractor shall have no right, authority or power to sell, mortgage, or assign the resulting purchase order, or any interest herein, nor any right, power of authority to allow, or permit any other person or persons or organizations to have any interest in or use any part of the rights or obligations granted there under for any purpose whatsoever without the prior written consent of the County of Marin. Neither the purchase order, nor any interest created thereby, shall pass by operation of law to any trustee or receiver in bankruptcy or to any other receiver or assignee for the benefit of creditors or any claim there under to any other party or parties, except as expressly authorized by the County of Marin.



3. INDEMNIFICATION

Contractor agrees to release, indemnify, defend, and hold County, its employees, officers, and agents, harmless from any and all liabilities including, but not limited to, litigation costs and attorney's fees arising from any and all claims and losses to anyone who may be injured or damaged by reason of Contractor's negligence, recklessness or willful misconduct in the performance of this contract.

4. INSURANCE

Contractor shall maintain a commercial general liability insurance policy in the amount of one million dollars (\$1,000,000.00). Where the services to be provided under this Contract involve or require the use of any type of vehicle by Contractor in order to perform said services, Contractor shall also provide comprehensive business or commercial automobile liability coverage including non-owned and hired automobile liability in the amount of one million dollars (\$1,000,000.00). Said policies shall remain in force through the life of this Contract and shall be payable on a "per occurrence" basis unless County specifically consents to a "claims made" basis. The County of Marin shall be named as additionally insured on the commercial general liability policy. The insurer shall supply a certificate of insurance with an additional insured endorsement signed by the insurer evidencing such insurance to County prior to commencement of work, and said certificate with endorsement shall provide for ten (10) day advance notice to County of any termination or reduction in coverage.

_____ **By initialing in the space provided, Contractor warrants that the services to be provided under this Contract do not require the use of any type of vehicle by Contractor.**

Nothing herein shall be construed as a limitation of Contractor's liability, and County agrees to give timely notice to Contractor of any negligence claim.

Failure to provide and maintain the insurance required by this contract will constitute a material breach of the agreement. In addition to any other available remedies, County may suspend payment to the Contractor for any services provided during any time that insurance was not in effect and until such time as the Contractor provides adequate evidence that Contractor has obtained the required coverage.



5. WORKERS' COMPENSATION

Contractor acknowledges that it is aware of the provisions of the Labor Code of the State of California which require every employer to be insured against liability for worker's compensation or to undertake self-insurance in accordance with the provisions of that Code, and it certifies that it will comply with such provisions before commencing the performance of the work of this Contract. If Contractor has employees, a copy of the certificates evidencing such insurance shall be provided to county prior to commencement of work.

_____ By initialing in the space provided Contractor warrants that no employees will be used in providing the services under this Contract.

6. NONDISCRIMINATORY EMPLOYMENT

Contractor shall not unlawfully discriminate against any individual based on race, color, religion, nationality, sex, sexual orientation, age or condition of disability. Contractor and/or any permitted subcontractor understands and agrees that Contractor is bound by and will comply with the nondiscrimination mandates of all Federal, State and local statutes, regulations and ordinances

7. LICENSING AND PERMITS

The Contractor shall maintain the appropriate licenses through the life of this Contract. Contractor shall also obtain any and all permits which might be required by the work to be performed herein.

8. CONFORMITY WITH LAW AND SAFETY

A. Contractor shall observe and comply with all applicable laws, ordinances, codes and regulations of governmental agencies, including federal, state, municipal and local governing bodies having jurisdiction over the scope of services or any part hereof, including all provisions of the Occupation Safety and Health Act of 1979 and all amendments thereto, and applicable federal, state and local government safety regulations. All services performed by Contractor must be in accordance with these laws, ordinances, codes and regulations. Contractor shall indemnify and save County harmless from any and all liabilities, fines, penalties and consequences arising from any non-compliance of violations of such laws, ordinances, codes and regulations.



B. Accidents: If a death, serious personal injury, or substantial property damage occurs in connection with the performance of this agreement, Contractor shall immediately notify the County by telephone. Contractor shall promptly submit to County a written report, in such form as may be required by County, of all accidents which occur in connection with this agreement. This report must include all of the following information:

- 1) Name and address of the injured or deceased person;
- 2) Name and address of Contractor's subcontractor (if any);
- 3) Name and address of Contractor's Liability Insurance Carrier; and
- 4) A detailed description of accident and whether any of County's equipment, tools, or material were involved.

9. ADMENDMENT

This contract may be amended or modified only by written agreement of all parties.

10. JURISDICTION AND VENUE

This contract shall be construed in accordance with the laws of the State of California and the parties hereto agree that venue shall be in Marin County, California.

11. ATTORNEYS FEES

If any action at law or inequity is brought to enforce or interrupt the provisions of this agreement, the prevailing party shall be entitled to reasonable attorney's fees in addition to any other relief to which it may be entitled.

12. RIGHT TO AUDIT

County shall have the right of audit and inspection of the Contractor's business records at any time during the term of this agreement. Contractor shall have readily available all records related to the performance of the agreement and shall provide office space as may be required for County to audit these records.



13. NUCLEAR FREE ZONE

The County of Marin is a Nuclear Free Zone in which work on nuclear weapons and/or the storage or transportation of weapons, related components, and nuclear material is prohibited or restricted. Further, the County of Marin is prohibited or restricted from contracting for services or products with, or investing County funds in, any Nuclear Weapons Contractor.

14. TERMINATION FOR DEFAULT – TIME EXTENSION FOR DELAY

If the Contractor fails or refuses to prosecute the work, or any separable part therefore, as to insure that the services specified will not be completed and/or delivered within the time specified in the purchase order, the County of Marin, may by written notice to the Contractor, terminate its right to proceed with the work or such part of the work to which there has been a delay. The Contractor and its sureties shall be liable to the County of Marin for liquidated damages, or if no liquidated damages are so provided, then for any damages to the County of Marin resulting from the Contractor's failure or refusal to complete/deliver the items within the specified time.

Time extension for delay may be allowed the Contractor by the County of Marin for any delay in the completion/delivery of specified services which arises from enforceable causes beyond the control of the Contractor and without fault or negligence of the Contractor, including but not restricted to such causes as the act or negligence of the County of Marin, stormy or inclement weather in which specified work cannot be done, strikes, boycotts, acts of God, acts of the public enemy, acts of government, fire, flood, epidemics, freight embargo, or delays of suppliers which arise from unforeseeable causes beyond the control and without the fault or negligence of the Contractor.

15. CANCELLATION OF THE CONTRACT

Without cause, the County of Marin may cancel this contract at any time with thirty-(30) days' written notice to any supplier/contractor. With cause, the County of Marin may cancel this contract at any time with ten-(10) days' written notice to the Contractor. Cancellation for cause shall be at the discretion of the County of Marin and shall be but is not limited to, failure to supply the materials, equipment or service specified within the time allowed or within the terms, conditions or provisions of this contract. The Contractor may not cancel this contract without prior written consent of the Purchasing Agent.



16. INDEPENDENT CONTRACTOR

The Contractor agrees and certifies that they or any of their agents, servants, or employees is not an agent or employee of the County of Marin. The Contractor is an independent solely responsible for Contractor's acts. The resulting purchase order shall not be construed as an agreement for employment with the County.

17. NON-APPROPRIATION OF FUNDS

The County of Marin warrants that it has funds available to remit payments on the resulting County purchase order at the time the purchase order is executed. Should appropriated funds during the term of the purchase order become unavailable for the purpose of the purchase order, the County may cancel the purchase order by providing the Contractor with written notice. Such notice shall release both the County and Contractor from all obligations under the purchase order, and Proposer shall refund the County the balance of any advance payment made for orders of goods and/or services which are outstanding or which have not been received by the County.

18. LIQUIDATED DAMAGES

An authorized management representative of the County shall insure that all services are provided in a timely professional manner as required by the scope of work. Such authorized management representative shall notify the Vendor of all discrepancies and request Vendor to respond in a specified time to correct discrepancies. Failure by the Vendor to respond to correct a discrepancy shall be cause for a pro-rate deduction from the invoice.

When the Vendor fails to respond to either a verbal or written request to correct discrepancies to be corrected within a specific time limit established, an "outside" Vendor or County employee(s) may be requested and dispatched to the site to provide the required services or corrective work in accordance with instructions furnished by the authorized management representative. The Vendor who failed to respond shall incur the total cost per the "outside" Vendor's invoice or the total hourly cost, including benefits, of the County employee(s).

Alternately, liquidated damages in the amount of one hundred dollars (\$100.00) for each and every day that the Vendor fails to perform may be assessed to cover damages sustained by the County by reason of such failure. Such amount(s) shall be deducted from the Vendor's invoice. Additionally, the County



reserves the right to withhold from any payment due there under sufficient funds to discharge any delinquent accounts of the Vendor resulting from work under this contract.

19. NUCLEAR FREE ZONE

The County of Marin is a Nuclear Free Zone in which work on nuclear weapons and/or the storage or transportation of weapons, related components, and nuclear material is prohibited or restricted. Further, the County of Marin is prohibited or restricted from contracting for services or products with, or investing County funds in, any Nuclear Weapons Contractor.

20. GOVERNING LAWS

This Request for Proposal and the resulting purchase order shall be governed by all applicable federal, state, and local laws, codes, ordinances, and regulations including, but not limited to, those promulgated by CAL-OSHA, FED-OSHA, EPA, EEOC, DFEH, the California State Department of Health Services. This contract shall be in accordance with the substantive and procedural laws of the State of California.

21. INDEPENDENT CONTRACTOR

The vendor agrees and certifies that they or any of their agents, servants, or employees is not an agent or employee of the County. The vendor is an independent solely responsible for Vendor's acts. The resulting Purchase Order shall not be construed as an agreement for employment with the County.

22. NON-APPROPRIATION OF FUNDS

The County warrants that it has funds available to remit payments on the resulting County Purchase Order at the time the purchase order is executed. Should appropriated funds during the term of the Purchase order become unavailable for the purpose of the Purchase Order, the County may cancel the Purchase Order by providing the Vendor with written notice. Such notice shall release both the County and Vendor from all obligations under the Purchase Order, and Vendor shall refund the County the balance of any advance payment made for orders of goods and/or services which are outstanding or which have not been received by the County.



23. COOPERATIVE AGREEMENT

School Districts, special Districts or other governmental units in the County of Marin shall be capable of purchasing the items specified on this Request for Proposal. The Vendor shall provide firm fixed pricing for all items or services, as specified herein, and allow the agencies described herein to purchase said goods or services at any time during the effective period of the resulting County of Marin purchase order.

24. LIVING WAGE

This contract is subject to the County of Marin Living Wage Ordinance. The Ordinance requires the payment of a living wage to all covered employees engaged in providing services pursuant to a service contract as defined in Section 2.50.030(F). Vendor specifically agrees that should the County investigate allegations of non-compliance with the Living Wage Ordinance, Vendor shall make available for audit its books and records relating to the service contract, as well as the books and records of its Subcontractors, and Vendor will make available employees so that the County can interview such employees in furtherance of its investigation. Misrepresentation during the procurement or contracting process in order to secure the contract will disqualify a Vendor or contractor from further consideration in the procurement or contracting process. Failure to comply once a contract has been awarded will constitute a material breach of the contract and may result, among other things, in the suspension or termination of the affected contract and debarment from future County contracting opportunities for a period not to exceed three years.

25. CHANGE ORDERS

The County may at any time, without notice to any sureties, by written change order, make any change in the work specified in the resulting Purchase Order, including but not limited to changes:

- A. In the general/special provisions and terms and conditions of the Purchase Order.
- B. In the written scope of work

No Order, Statement or Conduct, Written or Oral, Shall Be Treated as a Change Order Unless in Writing and Signed by Both the County and Vendor.



26. PAYING OF PREVAILING WAGES

The Board of Supervisors has been provided with a determination of the prevailing rates of wages applicable to this project, which is on file in the Office of the County Clerk, copies of which may be obtained from the Department of Public Works. Said rates are based on an eight (8) hour day, forty (40) hour week, except as otherwise noted and currently in effect. Existing agreements between the Building Trades and Construction Industry groups relate to wages, overtime, holidays and other special provisions shall be strictly observed. In compliance with the provisions of Section 1776 of the Labor Code of the State of California, as amended, the Contractor and each of his Subcontractors shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice or worker employed by them in connection with the project. Said records shall be available for inspection at all reasonable hours, and copies shall be made available to the employee or his authorized representative, the State Division of Labor Standards Enforcement, the State Division of Apprenticeship Standards, and the County.

27. LOCAL BUSINESS PREFERENCE

In accordance with County of Marin Ordinance #89-2993, whenever the County acquires services or supplies by purchase or contract, the Purchasing Agent, in evaluating the price or bid, shall award a five percent (5%) preference on the price submitted by a local County business.

28. WITHDRAWAL OF PROPOSAL

No proposals submitted may be withdrawn within sixty - (60) calendar days after the submittal deadline. Proposals submitted prior to the submittal deadline may be withdrawn only by written request of the vendor.

29. ADDENDUM

Any changes, additions, deletions or clarifications to this proposal package, including the general/special provisions and specifications, shall be made by written addendum to the Request for Proposal. Such addendum shall be issued by the Purchasing Department and will be made to all prospective vendors in possession of the proposal package. Addendum issued within five (5) calendar



days of the proposal opening date/time may be cause for extension of the proposal in order to allow prospective vendor's sufficient time to prepare their proposals.

30. FORCE MAJEURE

Time extension for delay may be allowed the vendor by the County of Marin for any delay in the completion/delivery of specified items which arises from unforeseeable causes beyond the control of the vendor and without fault or negligence of the vendor, including but not restricted to such causes as the act or negligence of the County of Marin, stormy or inclement weather in which specified work cannot be done, strikes, boycotts, acts of God, acts of the public enemy, acts of government, fire, flood, epidemics, freight embargo, delays of suppliers which arise from unforeseeable causes beyond the control and without the fault or negligence of both the vendor and supplier.

31. TERMINATION FOR CONVENIENCE

The County reserves the right to terminate the contract at any time, for the convenience of the County of Marin, without penalty or recourse, by giving written notice to the Contractor at least thirty (30) calendar days prior to the effective date of such termination. The Contractor shall be entitled to receive just and equitable compensation for services and/or supplies delivered to and accepted by the County pursuant to the contract prior to the effective date of termination. Termination compensation cannot exceed the monthly service fee, and the termination nullifies the remaining months of the contract.

- A. Termination for lack of funding: The County reserves the right to terminate any contract in any user agency if said agency loses funding during the term of the contract.
- B. Termination for non-performance: The County may terminate the contract in whole or in part if delivery or performance is repeatedly unsatisfactory. Unsatisfactory performance includes but is not limited to:
 - 1) Repeated failure to respond within requested time-frame
 - 2) Failure to perform services when promised or expected
 - 3) Inability to reach Contractor contact; lack of customer service



32. CANCELLATION OF CONTRACT

The County may cancel this contract WITHOUT CAUSE at any time by giving thirty- (30) days' written notice to the supplier/contractor. The County may cancel this contract WITH CAUSE at any time by giving ten- (10) days' written notice to the supplier/contractor. Cancellation for cause shall be at the discretion of the County and shall be, but is not limited to, failure to supply the materials, equipment or service specified within the time allowed or within the terms, conditions or provisions of this contract. Upon termination, the County shall pay the Vendor the allowable costs incurred to date of termination. The successful Proposer may not cancel this contract without prior written consent of the Purchasing Agent.

33. GENUINE PROPOSAL

The Undersigned hereby certifies that this cost proposal is genuine and not sham or collusive, or made in the interest or on behalf of any person or business not herein named, and that he has not directly or indirectly induced or solicited any other proposer to furnish a sham proposal, or any other person or business to refrain from providing a cost proposal, and that he has not in any manner sought by collusion to secure himself an advantage over any other proposer.

Contractor has read and understands the foregoing and agrees to be bound by all of the foregoing terms and conditions.

Contractor (Firm Name)

Signature

Date



Glossary of Terms and Acronyms

AC	Alternating Current
agency	Term that applies generically to any local, state, federal entity or organization, such as; a department, division, city/town, or bureau. Includes: government, quasi-government and private groups.
ANI	Automatic Number Identification
ANS	American National Standard
ANSI	American National Standards Institute
APCO	Association of Public-Safety Communications Officials International
ASCII	American Standard Code for Information Interchange
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATP	Acceptance Test Plan
ATPC	Automatic Transmit Power Control
ATS	Automatic Transfer Switch
AWG	American Wire Gauge
b	bit
b/s	Bits per
B	byte
backhaul	The transporting of radio communications traffic between distributed sites (typically access points) and more centralized points of presence.
bandwidth (BW)	The capacity of a channel to carry signals. The amount of spectrum required to transmit a signal without distortion or loss of information.



BayRICS	Bay Area Regional Interoperability Communications System
BER	Bit Error Rate – A measure of the number of errors in received transmissions when compared to the original transmission, frequently expressed as a percentage.
bit	Binary digit
BR	Bit rate
bps	Bits per second.
CAI	Common Air Interfaces
CATP	Coverage Acceptance Test Plan
channel	The route through which a message is sent. A connection between initiating and terminating nodes of a circuit. A single path provided by a transmission medium via an electrical separation, such as by frequency or frequency pairs.
CLEMARS	California Law Enforcement Mutual Aid Radio System
coax	Coaxial cable
collocation	Placement of multiple antennas or radio equipment at a common physical site or building.
communications	Information transfer among or between users. In public safety communications, the ability of public safety agencies to talk across agencies.
connectivity	The complete path between two terminals.
conventional	A radio system with dedicated, single-purpose channels (can be shared between several users with different operational needs; e.g., fire and police). A user must select the specific channel to be used.
coverage	The geographic area included within the range of a wireless radio system.
CPC	Channel Performance Criterion



CSI	Construction Specifications Institute
CSSI	Console Subsystem Interface
DAQ	Delivered Audio Quality
DataLOK	Network management protocol developed by DataLOK
dB	Decibel
dBm	Decibel referenced to one milliwatt. (zero dBm)
dBw	Decibel referenced to one watt. Zero dBw equals one watt.
DC	Direct Current
DCM	Digital Content Manager
DCP	Distributed Computing Platform
DCPF	A network management protocol
digital	Radio transmission method that replaces analog systems and transmits its signal in binary 1's and 0's the same as a computer. One major difference is that digital signals do not degrade gradually the way analog does as the distance between the transmitter and receiver increases.
DS0	A basic digital signaling rate of 64 kbit/s, corresponding to the capacity of one voice-frequency-equivalent channel. The DS0 rate, and its equivalents E0 and J0, form the basis for the digital multiplex transmission hierarchy in telecommunications systems used in North America.
DTMF	Dual Tone Multi-Frequency
EIA	Electronic Industries Alliance (publisher of standards)
EMI	Electromagnetic Interference
encryption	The reversible transformation of data from the original (plain text) format to a difficult to interpret format as a mechanism for protecting its confidentiality, integrity and sometimes its authenticity. Encryption



uses an encryption algorithm and one or more encryption keys.

ERP Effective Radiated Power

FAA Federal Aviation Administration

FAT Factory Acceptance Test

FATP Factory Acceptance Test Plan

FCC Federal Communications Commission

FDMA Frequency Division Multiple Access

FIRESCAD Motorola fire station alerting system

first responders The first professionals called to an incident or emergency who provide immediate support services during prevention, response, and recovery operations.

frequency The number of cycles or events of a periodic process in a unit of time.

frequency bands The spectrum of transmission space where mobile radio systems operate in the United States. They are (from low to high):

High HF 25-29.99 MHz

Low VHF 30-50 MHz

High VHF 150-174 MHz

Low UHF 450-470 MHz

UHF TV Sharing 470-512 MHz

700 MHz 764-776 & 7940806 MHz

800 MHz 806-869 MHz

2.4 GHz



4.9 GHz

FRU Field Replaceable Unit

gateway A device that can transparently interconnect radio audio paths so that agencies can patch into each other's radio channels in real time. This can be done at the baseband level or using IP. A gateway provides interconnection between two networks with different communications protocols.

GFI Ground Fault Interrupt

GHz gigahertz (1 billion hertz)

GoS Grade of Service

GPS Global Positioning System, a U.S. satellite system that lets persons or systems determine their position with extreme accuracy using GPS receivers.

GUI Graphical User Interface

HVAC Heating Ventilation and Air Conditioning

Hz Hertz (same as cycles per second)

ID Identification

IEEE Institute of Electrical and Electronic Engineers

IM Intermodulation

infrastructure Dedicated telecommunications networks; the hardware and software needed to complete and maintain a public safety communications system

interference Extraneous energy, from natural or man-made sources, that impedes the reception of desired RF signals.

interoperability The ability of diverse systems and organizations to work together (inter-operate). In public safety, the ability of personnel to exchange voice and data communications with staff from other agencies, on



	demand and in real time.
intranet	A private computer network that uses Internet technologies to share an organization's information or operational systems with its employees in a secure manner.
IP	Internet Protocol
ISSI	Inter-RF Subsystem Interface
JPA	Joint Powers Authority
jurisdiction	The geographic territory where authority and operations are exercised.
kHz	kilo Hertz (1000 Hertz)
kW	Kilowatts
LAN	Local Area Network
LMR	Land Mobile Radio – A public or private radio service providing two-way communication, service paging and radio signaling on land.
Mbps	Mega bit per second (1 million bits per second)
MDLC	Motorola Data Link Communication Protocol
NERA	Marin Emergency Radio Authority
MHSB	Monitored Hot Standby
MHz	Megahertz (1,000,000 Hz)
modem	An acronym for modulator/demodulator, which is a device that translates digital signals coming from a computer into analog signals that can be transmitted over standard telephone lines. The modem also translates the analog signals back into digital signals that a computer can understand.
MOU	Memorandum of Understanding



MPE	Maximum Permissible Exposure
MTBF	Mean Time Between Failures
mutual aid	Generally describes a situation where a major emergency or incident requires a large number of agencies, including agencies from remote locations, working together to mitigate the crisis.
mutual aid channel	A radio channel specifically allocated for use during emergency mutual aid situations.
MW	Megawatt
narrowband	In LMR systems, the FCC has mandated the reduction of channel bandwidths from 25 kHz to 12.5 kHz, doubling the number of available channels. All systems operating on 25 kHz bandwidth must be operating on narrowband by January 1, 2013, when all public safety users must cease operation of wideband equipment on or before that date. The FCC has further mandated narrowbanding to 6.25 kHz or equivalent by a date yet to be determined.
NEBS	Network Equipment Building System
NEC	National Electric Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NMI	Network Management Interface
NMS	Network Management System
NMT	Network Management Terminal
NRTL	Nationally Recognized Testing Laboratory
NTIA	National Telecommunications and Information Administration (part of Department of Commerce - coordinates use of the federal government frequency spectrum).
OET	Office of Engineering Technology



OSHA	Occupational Safety and Health Administration
PD	Police Department
Project 25 (P25) or APCO-25	A suite of standards for digital radio communications for use by federal, state/province and local public safety agencies in North America to enable them to communicate with other agencies and mutual aid response teams in emergencies.
PTT	Push-to-Talk
Public Safety spectrum	<p>Specific bands of frequencies set aside by the FCC for use by public safety agencies. They are:</p> <p>Low Band (25-50 MHz)</p> <p>VHF High Band (150-174 MHz)</p> <p>220 Band (220-222 MHz)</p> <p>UHF Band (450-470 MHz)</p> <p>700 Band (764-776 and 794-806 MHz)</p> <p>800 Band (806-824 and 851-869 MHz)</p> <p>4.9 GHz Band</p>
QA/QC	Quality Assurance/Quality Control
R56	Motorola Installation Standards and Guidelines for Communication Systems
receiver	The component(s) of a radio device that converts the radio waves into audible signals.
repeater	A special receiver/transmitter combination that receives a signal on one frequency and retransmits a new signal on another frequency, usually within the same frequency band, sometimes referred to as a relay station.



RESPONDENT	Any individual or entity bidding on the right to supply products and services in response to this RFP.
RF	Radio Frequency
RFI	Radio Frequency Interference
RFP	Request For Proposal
RTU	Remote Terminal Unit
RX	Receive
SATP	Staging Acceptance Test Plan
SELECTED VENDOR	Any individual or entity selected from among all RESPONDENTS to supply products and services in response to this RFP.
SNMP	Simple Network Management Protocol
spectrum	The range of electromagnetic radio frequencies that can be decomposed into frequency components, used in the transmission of sound, data and television.
STS-1	Synchronous Transport Signal Level 1 (45 Mbps)
subscriber	User, customer on a network.
subscriber unit	User's equipment (usually a mobile or portable radio).
TABS	A network management protocol
talkgroup	Radio system users assigned to a specific group of users who regularly communicate with each other.
TBOS	Telemetry Byte Oriented Serial protocol
TDM	Time-division multiplexing
TDMA	Time-division multiple access
TELTRAC	Telecommunications Voice Data Security protocol



TIA	Telecommunications Industry Association
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TL-1	Transaction Language-1; a simple network management protocol
TRIP	Token Ring Interface Processor
trunked	A radio system with a group of channels available and assigned as needed to specific “groups” or operations. The channels are programmed for automatic system assignment while in-use, and then released for other users. A trunked system maximizes channel utilization.
turnkey	Entire system with hardware and software assembled and installed by a vendor and sold as a package.
TVSS	Transient Voltage Surge Suppression
TX	Transmit
UASI	Urban Area Security Initiative
UHF	Ultra High Frequency
UL	Underwriters Laboratory
UPS	Uninterruptible Power Supply
USGS	U.S. Geological Survey
VAC	Volts Alternating Current
VDC	Volts Direct Current
VHF	Very High Frequency
Vocoder	A device that breaks speech patterns into components, allowing them to be re-transmitted efficiently over a narrow bandwidth.
Voting receiver	Multiple remote receivers tied together through a comparator device at a transmitter site to improve portable coverage, signal strength is



compared from each receiver, and the best receiver becomes the receiver during a specific transmission.

VSWR Voltage Standing Wave Ratio

WAN Wide area network

WBS Work Breakdown Structure



Appendix A: Sample Contract

The following pages of this Appendix A contain a sample of the County of Marin Professional Services Contract – 2010 Edition.



CAO Contract Log # _____

COUNTY OF MARIN
PROFESSIONAL SERVICES CONTRACT
2010 - Edition 1

THIS AGREEMENT is made and entered into this _____ day of _____, 2010 by and between the COUNTY OF MARIN, hereinafter referred to as "County" and _____, hereinafter referred to as "Contractor."

RECITALS:

WHEREAS, County desires to retain a person or firm to provide the following services: _____; and

WHEREAS, Contractor warrants that it is qualified and competent to render the aforesaid services;

NOW, THEREFORE, for and in consideration of the agreement made, and the payments to be made by County, the parties agree to the following:

1. SCOPE OF SERVICES:

Contractor agrees to provide all of the services described in **Exhibit "A"** attached hereto and by this reference made a part hereof.

2. FURNISHED SERVICES:

The County agrees to:

- A. Guarantee access to and make provisions for the Contractor to enter upon public and private lands as required to perform their work.
- B. Make available all pertinent data and records for review.
- C. Provide general bid and contract forms and special provisions format when needed.

3. FEES AND PAYMENT SCHEDULE:

The fees and payment schedule for furnishing services under this Contract shall be based on the rate schedule which is attached hereto as **Exhibit "B"** and by this reference incorporated herein. Said fees shall remain in effect for the entire term of the Contract. Contractor shall provide County with his/her/its Federal Tax I.D. number prior to submitting the first invoice.

4. MAXIMUM COST TO COUNTY:

In no event will the cost to County for the services to be provided herein exceed the maximum sum of \$ _____ including direct non-salary expenses. As set forth in paragraph 14 of this Contract, should the funding source for this contract be reduced, Contractor agrees that this maximum cost to County may be amended by written notice from County to reflect that reduction.

5. TIME OF AGREEMENT:

This Agreement shall commence on _____, and shall terminate on _____. Certificate(s) of Insurance must be current on day Contract commences and if scheduled to lapse prior to termination date, must be automatically updated before final payment may be made to Contractor. The final invoice must be submitted within 30 days of completion of the stated scope of services.

6. INSURANCE:

All required insurance coverages shall be substantiated with a certificate of insurance and must be signed by the insurer or its representative evidencing such insurance to County. The general liability policy shall be endorsed naming the County of Marin as an additional insured. The certificate(s) of insurance and required endorsement shall be furnished to the County prior to commencement of work. Each certificate shall provide for thirty (30) days advance notice to County of any cancellation in coverage. Said policies shall remain in force through the life of this Contract and shall be payable on a per occurrence basis only, except those required by paragraph 6.4 which may be provided on a claims-made basis consistent with the criteria noted therein.

Nothing herein shall be construed as a limitation of Contractor's liability, and Contractor shall indemnify and hold the County, its employees, officers, and agents, harmless and defend the County against any and all claims, damages, losses and expense that may arise by reason of the Contractor's negligent actions or omissions. County agrees to timely notify Contractor of any negligence claim.

Failure to provide and maintain the insurance required by this Contract will constitute a material breach of the agreement. In addition to any other available remedies, County may suspend payment to the Contractor for any services provided during any time that insurance was not in effect and until such time as the Contractor provides adequate evidence that Contractor has obtained the required coverage.

A request for a waiver of any of the following insurance requirements must be set forth on **Exhibit "C"** attached hereto. A waiver must address reduced amounts of coverage or the type of coverage waived entirely.



6.1 GENERAL LIABILITY

The Contractor shall maintain a commercial general liability insurance policy in an amount of no less than one million dollars (\$5,000,000.00) with a two million dollar (\$10,000,000.00) aggregate limit. The County shall be named as an additional insured on the commercial general liability policy and the Certificate of Insurance shall include an additional endorsement page. (see sample form: ISO - CG 20 10 11 85).

☐ Insurance Reduction or Waiver of Coverage Requested (Exhibit "C")

6.2 AUTO LIABILITY

Where the services to be provided under this Contract involve or require the use of any type of vehicle by Contractor in order to perform said services, Contractor shall also provide comprehensive business or commercial automobile liability coverage including non-owned and hired automobile liability in the amount of one million dollars combined single limit (\$1,000,000.00).

☐ Insurance Reduction or Waiver of Coverage Requested (Exhibit "C")

6.3 WORKERS' COMPENSATION

The Contractor acknowledges the State of California requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of the Labor Code. If Contractor has employees, a copy of the certificate evidencing such insurance or a copy of the Certificate of Consent to Self-Insure shall be provided to County prior to commencement of work.

☐ Insurance Reduction or Waiver of Coverage Requested (Exhibit "C")

6.4 PROFESSIONAL LIABILITY INSURANCE

Coverages required by this paragraph may be provided on a claims-made basis with a "Retroactive Date" either prior to the date of the Contract or the beginning of the contract work. If the policy is on a claims-made basis, coverage must extend to a minimum of twelve (12) months beyond completion of contract work. If coverage is cancelled or non-renewed, and not replaced with another claims made policy form with a "retroactive date" prior to the Contract effective date, the contractor must purchase "extended reporting" coverage for a minimum of twelve (12) months after completion of contract work. Contractor shall maintain a policy limit of not less than \$1,000,000 per incident. The amount of the policy deductible or self-insured retention must be declared on Exhibit "C" only if it exceeds \$100,000. If the deductible or self-insured retention amount exceeds \$100,000, the County may ask for evidence that contractor has segregated amounts in a special insurance reserve fund or contractor's general insurance reserves are adequate to provide the necessary coverage and the County of Marin may conclusively rely thereon.

Contractor's Professional Liability Insurance may be provided, in part, by self-insurance or large deductible as long as contractor provides: (1) evidence to the County that contractor has segregated amounts in a special insurance reserve fund meeting the contract's insurance requirements and restricted specifically to this project or (2) contractor's general insurance reserves are adequate to provide the necessary coverage and the County of Marin may conclusively rely thereon.

Amount of professional liability deductible if under \$100,000 = \$

☐ Insurance Reduction or Waiver of Coverage Requested (Exhibit "C")

7. ANTI DISCRIMINATION AND ANTI HARASSMENT:

Contractor and/or any subcontractor shall not unlawfully discriminate against or harass any individual including, but not limited to, any employee or volunteer of the County of Marin based on race, color, religion, nationality, sex, sexual orientation, age or condition of disability. Contractor and/or any subcontractor understands and agrees that Contractor and/or any subcontractor is bound by and will comply with the anti discrimination and anti harassment mandates of all Federal, State and local statutes, regulations and ordinances including, but not limited to, County of Marin Personnel Management Regulation (PMR) 21.

8. SUBCONTRACTING:

The Contractor shall not subcontract nor assign any portion of the work required by this Contract without prior written approval of the County except for any subcontract work identified herein. If Contractor hires a subcontractor under this Agreement, Contractor shall require subcontractor to provide and maintain insurance coverage(s) identical to what is required of Contractor under this Agreement and shall require subcontractor to name Contractor as additional insured under this Agreement. It shall be Contractor's responsibility to collect and maintain current evidence of insurance provided by its subcontractors and shall forward to the County evidence of same.

9. ASSIGNMENT:

The rights, responsibilities and duties under this Contract are personal to the Contractor and may not be transferred or assigned without the express prior written consent of the County.



10. LICENSING AND PERMITS:

The Contractor shall maintain the appropriate licenses throughout the life of this Contract. Contractor shall also obtain any and all permits which might be required by the work to be performed herein.

11. BOOKS OF RECORD AND AUDIT PROVISION:

Contractor shall maintain on a current basis complete books and records relating to this Contract. Such records shall include, but not be limited to, documents supporting all bids, all income and all expenditures. The books and records shall be original entry books with a general ledger itemizing all debits and credits for the work on this Contract. In addition, Contractor shall maintain detailed payroll records including all subsistence, travel and field expenses, and canceled checks, receipts and invoices for all items. These documents and records shall be retained for at least five years from the completion of this Contract. Contractor will permit County to audit all books, accounts or records relating to this Contract or all books, accounts or records of any business entities controlled by Contractor who participated in this Contract in any way. Any audit may be conducted on Contractor's premises or, at County's option, Contractor shall provide all books and records within a maximum of fifteen (15) days upon receipt of written notice from County. Contractor shall refund any monies erroneously charged.

12. WORK PRODUCT/PRE-EXISTING WORK PRODUCT OF CONSULTANT:

Any and all work product resulting from this agreement is commissioned by the County of Marin as a work for hire. The County of Marin shall be considered, for all purposes, the author of the work product and shall have all rights of authorship to the work, including, but not limited to, the exclusive right to use, publish, reproduce, copy and make derivative use of, the work product or otherwise grant others limited rights to use the work product.

To the extent Consultant incorporates into the work product any pre-existing work product owned by Consultant, Consultant hereby acknowledges and agrees that ownership of such work product shall be transferred to the County of Marin.

13. TERMINATION:

- A. If the Contractor fails to provide in any manner the services required under this Contract or otherwise fails to comply with the terms of this Contract or violates any ordinance, regulation or other law which applies to its performance herein, the County may terminate this Contract by giving five (5) calendar days written notice to the party involved.
- B. The Contractor shall be excused for failure to perform services herein if such services are prevented by acts of God, strikes, labor disputes or other forces over which the Contractor has no control.
- C. Either party hereto may terminate this Contract for any reason by giving thirty (30) calendar days written notice to the other parties. Notice of termination shall be by written notice to the other parties and be sent by registered mail.
- D. In the event of termination not the fault of the Contractor, the Contractor shall be paid for services performed to the date of termination in accordance with the terms of this Contract so long as proof of required insurance is provided for the periods covered in the Contract or Amendment(s).

14. APPROPRIATIONS:

The County's performance and obligation to pay under this contract is contingent upon an annual appropriation by the Marin County Board of Supervisors, the State of California or other third party. Should the funds not be appropriated County may terminate this agreement with respect to those payments for which such funds are not appropriated. County will give Contractor thirty (30) days' written notice of such termination. All obligations of County to make payments after the termination date will cease.

Where the funding source for this Agreement is contingent upon an annual appropriation or grant from the Marin County Board of Supervisors, the State of California or other third party, County's performance and obligation to pay under this Agreement is limited by the availability of those funds. Should the funding source for this Agreement be eliminated or reduced, upon written notice to Contractor, County may reduce the Maximum Cost to County identified in Paragraph 4 to reflect that elimination or reduction.

15. RELATIONSHIP BETWEEN THE PARTIES:

It is expressly understood that in the performances of the services herein, the Contractor, and the agents and employees thereof, shall act in an independent capacity and as an independent contractor and not as officers, employees or agents of the County. Contractor shall be solely responsible to pay all required taxes, including but not limited to, all withholding social security, and workers' compensation.

16. AMENDMENT:

This Contract may be amended or modified only by written agreement of all parties.

17. ASSIGNMENT OF PERSONNEL:

The Contractor shall not substitute any personnel for those specifically named in its proposal unless personnel with substantially equal or better qualifications and experience are provided, acceptable to County, as is evidenced in writing.



18. JURISDICTION AND VENUE:

This Contract shall be construed in accordance with the laws of the State of California and the parties hereto agree that venue shall be in Marin County, California.

19. INDEMNIFICATION:

Contractor agrees to indemnify, defend, and hold County, its employees, officers, and agents, harmless from any and all liabilities including, but not limited to, litigation costs and attorney's fees arising from any and all claims and losses to anyone who may be injured or damaged by reason of Contractor's negligence, recklessness or willful misconduct in the performance of this contract.

20. COMPLIANCE WITH APPLICABLE LAWS:

The Contractor shall comply with any and all Federal, State and local laws and resolutions (including, but not limited to the County of Marin Nuclear Free Zone, Living Wage Ordinance, and Resolution #2005-97 of the Board of Supervisors prohibiting the off-shoring of professional services involving employee/retiree medical and financial data) affecting services covered by this Contract. Copies of any of the above-referenced local laws and resolutions may be secured from the County's contact person referenced in paragraph 20. NOTICES below.

21. NOTICES:

This Contract shall be managed and administered on County's behalf by the Department Contract Manager named below. All invoices shall be submitted and approved by this Department and all notices shall be given to County at the following location:

Contract Manager: _____
 Dept./Location: Department of Public Works
 P. O. Box 4186
 San Rafael, CA 94913-4186
 Telephone No.: _____

Notices shall be given to Contractor at the following address:

Contractor: _____
 Address: _____
 Telephone No.: _____

22. ACKNOWLEDGEMENT OF EXHIBITS

	<input checked="" type="checkbox"/>	<u>Check applicable Exhibits</u>	<u>CONTRACTOR'S INITIALS</u>
<u>EXHIBIT A</u>	<input type="checkbox"/>	<u>Scope of Services</u>	_____
<u>EXHIBIT B</u>	<input type="checkbox"/>	<u>Fees and Payment</u>	_____
<u>EXHIBIT C</u>	<input type="checkbox"/>	<u>Insurance Reduction/Waiver</u>	_____
<u>EXHIBIT D</u>	<input type="checkbox"/>	<u>Notice to Bidders/Proposers- Disadvantaged Business Enterprise Information</u>	_____
<u>EXHIBIT E</u>	<input type="checkbox"/>	<u>Standard Agreement for Subcontractor/DBE Participation</u>	_____
<u>EXHIBIT F</u>	<input type="checkbox"/>	<u>Covenant Against Contingent Fees</u>	_____
<u>EXHIBIT G</u>	<input type="checkbox"/>	<u>Nonlobbying Certification</u>	_____

IN WITNESS WHEREOF, the parties have executed this Contract on the date first above written.

**APPROVED BY
COUNTY OF MARIN:**

By: _____
 President, Board of Supervisors

CONTRACTOR:

By: _____
 Name: _____
 Telephone No.: _____
 Page 4 of 18



COUNTY COUNSEL REVIEW AND APPROVAL (Only required if any of the noted reason(s) applies)

REASON(S) REVIEW:

- ☐ Standard Short Form Content Has Been Modified
- ☐ Optional Review by County Counsel at Department's Request

County Counsel: _____

Date: _____



EXHIBIT "A"

SCOPE OF SERVICES (required)

Consultant shall ensure that the format and content of all technical reports and National Environmental Policy Act (NEPA) documents are consistent with the guidance set forth in the Standard Environmental Reference (SER) in the Local Assistance Procedures Manual.



EXHIBIT "B"

FEES AND PAYMENT SCHEDULE (required)



EXHIBIT "C"**INSURANCE REDUCTION/WAIVER (if applicable)**CONTRACTOR: *Insert name*CONTRACT TITLE: *Insert title*

This statement shall accompany all requests for a reduction/waiver of insurance requirements. Please check the box if a waiver is requested or fill in the reduced coverage(s) where indicated below:

	<i>Check Where Applicable</i>	<i>Requested Limit Amount</i>	<i>CAO Use Only</i>
General Liability Insurance	<input type="checkbox"/>	\$	
Automobile Liability Insurance	<input type="checkbox"/>	\$	
Workers' Compensation Insurance	<input type="checkbox"/>	\$	
Professional Liability Deductible	<input type="checkbox"/>	\$	

Please set forth the reasons for the requested reductions or waiver.

Contract Manager Signature: _____

Date: _____

Extension: _____

Approved by Risk Manager: _____

Date: _____



EXHIBIT "D"

**NOTICE TO BIDDERS/PROPOSERS
DISADVANTAGED BUSINESS ENTERPRISE INFORMATION****REQUIREMENTS AND INSTRUCTIONS****1. TERMS AS USED IN THIS DOCUMENT**

- The term "Disadvantaged Business Enterprise" or "DBE" means a for-profit small business concern owned and controlled by a socially and economically disadvantaged person(s) as defined in Title 49, Part 26.5, Code of Federal Regulations (CFR).
- The term "Underutilized Disadvantaged Business Enterprise" or "UDBE" is a firm meeting the definition of a DBE as specified in 49 CFR and is one of the following groups:
 - Black American
 - Asian-Pacific American
 - Native American
 - Women
- The term "bidder" also means "proposer" or "offerer."
- The term "Agreement" also means "Contract."
- Agency also means the local entity entering into this contract with the Contractor or Consultant.
- The term "Small Business" or "SB" is as defined in 49 CFR 26.65.

2. AUTHORITY AND RESPONSIBILITY

- A. DBEs and other small businesses are strongly encouraged to participate in the performance of Agreements financed in whole or in part with federal funds (See 49 CFR 26, "Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs"). The Contractor should ensure that DBEs and other small businesses have the opportunity to participate in the performance of the work that is the subject of this solicitation and should take all necessary and reasonable steps for this assurance. The bidder/proposer shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of subcontracts.
- B. Bidders/Proposers are encouraged to use services offered by financial institutions owned and controlled by DBEs.

3. SUBMISSION OF UDBE AND DBE INFORMATION

If there is a UDBE goal on the contract, a "Local Agency Bidder/Proposer-UDBE (Consultant Contract) Commitment" (Exhibit 10-0(1)) form shall be included in the Request for Proposal. In order for a bidder/proposer to be considered responsible and responsive, the bidder must make good faith efforts to meet the goal established for the contract. If the goal is not met, the bidder/proposer must document adequate good faith efforts. Only UDBE participation will be counted towards the contract goal; however, all DBE participation shall be collected and reported.

A "Local Agency Proposer/Bidder-DBE (Consultant Contract)-Information" (Exhibit 10-0(2)) form shall be included with the Request for Proposal. The purpose of the form is to collect data required under 49 CFR 26. For contracts with UDBE goals, this form collects DBE participation by DBEs owned by Hispanic American and Subcontinent Asian Americans. For contracts with no goals, this form collects information on all DBEs, including UDBEs. Even if no DBE participation will be reported, the successful bidder must execute and return the form.

4. DBE PARTICIPATION GENERAL INFORMATION

It is the bidder's responsibility to be fully informed regarding the requirements of 49 CFR, Part 26, and the Department's DBE program developed pursuant to the regulations. Particular attention is directed to the following:

- A. A DBE must be a small business firm defined pursuant to 13 CFR 121 and be certified through the California Unified Certification Program (CUCP).



- B. A certified DBE may participate as a prime contractor, subcontractor, joint venture partner, as a vendor of material or supplies, or as a trucking company.
- C. A UDBE bidder, not bidding as a joint venture with a non-DBE, will be required to document one or a combination of the following:
 - 1. The bidder is a UDBE and will meet the goal by performing work with its own forces.
 - 2. The bidder will meet the goal through work performed by UDBE subcontractors, suppliers or trucking companies.
 - 3. The bidder, prior to bidding, made adequate good faith efforts to meet the goal.
- D. A DBE joint venture partner must be responsible for specific contract items of work or clearly defined portions thereof. Responsibility means actually performing, managing and supervising the work with its own forces. The DBE joint venture partner must share in the capital contribution, control, management, risks and profits of the joint venture commensurate with its ownership interest.
- E. A DBE must perform a commercially useful function pursuant to 49 CFR 26.55; that is, a DBE firm must be responsible for the execution of a distinct element of the work and must carry out its responsibility by actually performing, managing and supervising the work.
- F. The bidder (prime contractor) shall list only one subcontractor for each portion of work as defined in their bid/proposal and all DBE subcontractors should be listed in the bid/cost proposal list of subcontractors.
- G. A prime contractor who is a certified DBE is eligible to claim all of the work in the Agreement toward the DBE participation except that portion of the work to be performed by non-DBE subcontractors.

5. RESOURCES

- A. The CUCP database includes the certified DBEs from all certifying agencies participating in the CUCP. If you believe a firm is certified that cannot be located on the database, please contact the Caltrans Office of Certification toll free number 1-866-810-6346 for assistance. Bidder/Proposer may call (916) 440-0539 for web or download assistance.
- B. Access the CUCP database from the Department of Transportation, Civil Rights, Business Enterprise Program website at: <http://www.dot.ca.gov/hq/bep/>.
 - Click on the link in the left menu titled Find a Certified Firm
 - Click on Query Form link, located in the first sentence
 - Click on Certified DBE's (UCP) located on the first line in the center of the page
 - Click on Click To Access DBE Query Form
 - Searches can be performed by one or more criteria
 - Follow instructions on the screen
 - "Start Search," "Requery," "Civil Rights Home," and "Caltrans Home" links are located at the bottom of the query form
- C. How to Obtain a List of Certified DBEs without Internet Access
DBE Directory: If you do not have Internet access, Caltrans also publishes a directory of certified DBE firms extracted from the on-line database. A copy of the directory of certified DBEs may be ordered from the Caltrans Division of Procurement and Contracts/Material and Distribution Branch/Publication Unit, 1900 Royal Oaks Drive, Sacramento, CA 95815, Telephone: (916) 445-3520.

6. MATERIALS OR SUPPLIES PURCHASED FROM DBEs COUNT TOWARDS DBE CREDIT, AND IF A DBE IS ALSO A UDBE, PURCHASES WILL COUNT TOWARDS THE UDBE GOAL UNDER THE FOLLOWING CONDITIONS:

- A. If the materials or supplies are obtained from a DBE manufacturer, count one hundred percent of the cost of the materials or supplies. A DBE manufacturer is a firm that operates or maintains a factory, or establishment that produces on the premises, the materials, supplies, articles, or equipment required under the Agreement and of the general character described by the specifications.



- B. If the materials or supplies purchased from a DBE regular dealer, count sixty percent of the cost of the materials or supplies. A DBE regular dealer is a firm that owns, operates or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the Agreement are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a DBE regular dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question. A person may be a DBE regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone or asphalt without owning, operating or maintaining a place of business provided in this section.
- C. If the person both owns and operates distribution equipment for the products, any supplementing of regular dealers' own distribution equipment shall be by a long-term lease agreement and not an ad hoc or Agreement-by-Agreement basis. Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not UDBE regular dealers within the meaning of this section.
- D. Materials or supplies purchased from a DBE, which is neither a manufacturer nor a regular dealer, will be limited to the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on the job site, provided the fees are reasonable and not excessive as compared with fees charged for similar services.

ADD THE FOLLOWING IF TRUCKING IS REQUIRED:

- 7. FOR DBE TRUCKING COMPANIES: CREDIT FOR DBES WILL COUNT TOWARDS DBE CREDIT, AND IF A DBE IS A UDBE, CREDIT WILL COUNT TOWARDS THE UDBE GOAL, UNDER THE FOLLOWING CONDITIONS:**
- A. The DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular Agreement, and there cannot be a contrived arrangement for the purpose of meeting the UDBE goal.
 - B. The DBE must itself own and operate at least one fully licensed, insured and operational truck used on the Agreement.
 - C. The DBE receives credit for the total value of the transportation services it provides on the Agreement using trucks it owns, insures, and operates using drivers it employs.
 - D. The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the Agreement.
 - E. The DBE may also lease trucks from a non-DBE firm, including an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement. The DBE does not receive credit for the total value of the transportation services provided by the lessee, since these services are not provided by the DBE.
 - F. For the purposes of this Section D, a lease must indicate that the DBE has exclusive use and control over the truck. This does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, as long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the name and identification number of the DBE.



EXHIBIT "E"**STANDARD AGREEMENT FOR SUBCONTRACTOR/DBE PARTICIPATION****1. Subcontractors**

- A. Nothing contained in this Agreement or otherwise, shall create any contractual relation between the Agency and any subcontractors, and no subcontract shall relieve the Contractor of his/her responsibilities and obligations hereunder. The Contractor agrees to be as fully responsible to the Agency for the acts and omissions of its subcontractors and of persons either directly or indirectly employed by any of them as it is for the acts and omissions of persons directly employed by the Contractor. The Contractor's obligation to pay its subcontractors is an independent obligation from the Agency's obligation to make payments to the Contractor.
- B. Any subcontract in excess of \$25,000, entered into as a result of this Agreement, shall contain all the provisions stipulated in this Agreement to be applicable to subcontractors.
- C. Contractor shall pay its subcontractors within ten (10) calendar days from receipt of each payment made to the Contractor by the Agency.
- D. Any substitution of subcontractors must be approved in writing by the Agency's Contract Manager in advance of assigning work to a substitute subcontractor.

2. Disadvantaged Business Enterprise (DBE) Participation

- A. This Agreement is subject to 49 CFR, Part 26 entitled "Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs." Bidders who obtain DBE participation on this contract will assist Caltrans in meeting its federally mandated statewide overall DBE goal.
- B. If the contract has an under-utilized DBE (UDBE) goal, the Contractor must meet the UDBE goal by using UDBEs as subcontractor or document a good faith effort to meet the goal. If a UDBE subcontractor is unable to perform, the Contractor must make a good faith effort to replace him/her with another UDBE subcontractor if the goal is not otherwise met. A UDBE is a firm meeting the definition of a DBE as specified in 49 CFR and is one of the following groups:
 - 1. Black American
 - 2. Asian-Pacific American
 - 3. Native American
 - 4. Women
- C. DBE and other small businesses, as defined in 49 CFR, Part 26 are encouraged to participate in the performance of agreements financed in whole or in part with federal funds. The Contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Agreement. The Contractor shall carry out applicable requirements of 49 CFR, Part 26 in the award and administration of US DOT-assisted agreements. Failure by the Contractor to carry out these requirements is a material breach of this Agreement, which may result in the termination of this Agreement or such other remedy as the recipient deems appropriate.
- D. Any subcontract entered into as a result of this Agreement shall contain all of the provisions of this section.

3. Performance of DBE Contractors and other DBE Subcontractors/Suppliers

A DBE performs a commercially useful function when it is responsible for execution of the work of the Agreement and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a commercially useful function, the DBE must also be responsible with respect to materials and supplies used on the Agreement, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself. To determine whether a DBE is performing a commercially useful function, evaluate the amount of work subcontracted, industry practices; whether the amount



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3. Performance of DBE Contractors and other DBE Subcontractors/Suppliers

A DBE performs a commercially useful function when it is responsible for execution of the work of the Agreement and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a commercially useful function, the DBE must also be responsible with respect to materials and supplies used on the Agreement, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself. To determine whether a DBE is performing a commercially useful function, evaluate the amount of work subcontracted, industry practices; whether the amount



the firm is to be paid under the Agreement is commensurate with the work it is actually performing, and other relevant factors.

A DBE does not perform a commercially useful function if its role is limited to that of an extra participant in a transaction, Agreement, or project through which funds are passed in order to obtain the appearance of DBE participation. In determining whether a DBE is such an extra participant, examine similar transactions, particularly those in which DBEs do not participate.

If a DBE does not perform or exercise responsibility for at least thirty percent of the total cost of its Agreement with its own work force, or the DBE subcontracts a greater portion of the work of the Agreement than would be expected on the basis of normal industry practice for the type of work involved, it will be presumed that it is not performing a commercially useful function.

4. Prompt Payment of Funds Withheld to Subcontractors

The Agency shall hold retainage from the prime contractor and shall make prompt and regular incremental acceptances of portions, as determined by the agency, of the contract work, and pay retainage to the prime contractor based on these acceptances. The prime contractor, or subcontractor, shall return all monies withheld in retention from a subcontractor within 30 days after receiving payment for work satisfactorily completed and accepted including incremental acceptances of portions of the contract work by the agency. Federal law (49CFR26.29) requires that any delay or postponement of payment over 30-days may take place only for good cause and with the agency's prior written approval. Any violation of this provision shall subject the violating prime contractor or subcontractor to the penalties, sanctions and other remedies specified in Section 7108.5 of the Business and Professions Code. These requirements shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the prime contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the prime contractor, deficient subcontract performance, or noncompliance by a subcontractor. This provision applies to both DBE and non-DBE prime contractors and subcontractors.

Any subcontract entered into as a result of this Agreement shall contain all of the provisions of this section.

5. DBE Records

- A. The Contractor shall maintain records of materials purchased and/or supplied from all subcontracts entered into with certified DBEs. The records shall show the name and business address of each DBE or vendor and the total dollar amount actually paid each DBE or vendor, regardless of tier. The records shall show the date of payment and the total dollar figure paid to all firms. DBE prime Contractors shall also show the date of work performed by their own forces along with the corresponding dollar value of the work.
- B. Upon completion of the Agreement, a summary of these records shall be prepared and submitted on the form entitled, "Final Report-Utilization of Disadvantaged Business Enterprises (DBE) First-Tier Subcontractors," CEM-2402F (Exhibit 17-F in Chapter 17 of the LAP), certified correct by the Contractor or the Contractor's authorized representative and shall be furnished to the Contract Manager with the final invoice. Failure to provide the summary of DBE payments with the final invoice will result in twenty-five percent (25%) of the dollar value of the invoice being withheld from payment until the form is submitted. The amount will be returned to the Contractor when a satisfactory "Final Report Utilization of Disadvantaged Business Enterprises (DBE) First-Tier Subcontractors" is submitted to the Contract Manager.
 - 1) Prior to the fifteenth of each month, the Contractor shall submit documentation to the Agency's Contract Manager showing the amount paid to DBE trucking companies. The Contractor shall also obtain and submit documentation to the Agency's Contract Manager showing the amount paid by DBE trucking companies to all firms, including owner-operators, for the leasing of trucks. If the DBE leases trucks from a non-DBE, the Contractor may count only the fee or commission the DBE receives as a result of the lease arrangement.
 - (2) The Contractor shall also submit to the Agency's Contract Manager documentation showing the truck number, name of owner, California Highway Patrol CA number, and if applicable, the DBE certification number of the truck owner for all trucks used during that month. This documentation shall be submitted on the Caltrans



Monthly DBE Trucking Verification, CEM-2404(F) form provided to the Contractor by the Agency's Contract Manager.

6. DBE Certification and De-certification Status

If a DBE subcontractor is decertified during the life of the Agreement, the decertified subcontractor shall notify the Contractor in writing with the date of de-certification. If a subcontractor becomes a certified DBE during the life of the Agreement, the subcontractor shall notify the Contractor in writing with the date of certification. Any changes should be reported to the Agency's Contract Manager within 30 days.

Materials or supplies purchased from DBEs will count towards DBE credit, and if a DBE is also a UDBE, purchases will count towards the UDBE goal under the following conditions:

- A. If the materials or supplies are obtained from a DBE manufacturer, 100 % of the cost of the materials or supplies will count toward the DBE participation. A DBE manufacturer is a firm that operates or maintains a factory or establishment that produces on the premises, the materials, supplies, articles, or equipment required under the Agreement and of the general character described by the specifications.
- B. If the materials or supplies purchased from a DBE regular dealer, count 60 % of the cost of the materials or supplies toward DBE goals. A regular dealer is a firm that owns, operates or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the Agreement, are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a regular dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question. A person may be a regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone or asphalt without owning, operating or maintaining a place of business provided in this section.
- C. If the person both owns and operates distribution equipment for the products, any supplementing of regular dealers' own distribution equipment, shall be by a long-term lease agreement and not an ad hoc or Agreement-by-Agreement basis. Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not regular dealers within the meaning of this section.

Materials or supplies purchased from a DBE, which is neither a manufacturer nor a regular dealer, will be limited to the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on the job site, provided the fees are reasonable and not excessive as compared with fees charged for similar services.

(Add the following to contracts which require trucking)

For DBE trucking companies: credit for DBEs will count towards DBE credit, and if a DBE is also a UDBE, credit will count towards the UDBE goal under the following conditions:

- A. The DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible.
- B. The DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the Agreement.
- C. The DBE receives credit for the total value of the transportation services it provides on the Agreement using trucks it owns, insures, and operates using drivers it employs.
- D. The DBE may lease trucks from another DBE firm including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the Agreement.
- E. The DBE may also lease trucks from a non-DBE firm, including an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result



of the lease arrangement. The DBE does not receive credit for the total value of the transportation services provided by the lessee, since these services are not provided by the DBE.

- F. For the purposes of this section, a lease must indicate that the DBE has exclusive use and control over the truck. This does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, as long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the name and identification number of the DBE.



EXHIBIT "F"**COVENANT AGAINST CONTINGENCY FEES**

The Consultant warrants that he/she has not employed or retained any company or person, other than a bona fide employee working for the consultant; to solicit or secure this agreement; and that he/she has not paid or agreed to pay any company or person other than a bona fide employee, any fee, commission, percentage, brokerage fee, gift, or any other consideration, contingent upon or resulting from the award, or formation of this agreement. For breach or violation of this warranty, the local agency shall have the right annul this agreement without liability, or at its discretion; to deduct from the agreement price or consideration, or otherwise recover the full amount of such fee, commission, percentage, brokerage fee, gift, or contingent fee.



EXHIBIT "G"**NONLOBBYING CERTIFICATION
FOR FEDERAL-AID CONTRACTS**

The prospective participant certifies by signing and submitting this bid or proposal to the best of his or her knowledge and belief that:

- (1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower-tier subcontracts, which exceed \$100,000 and that all such subrecipients shall certify and disclose accordingly.

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Appendix B: Proposal Pricing Forms

Refer to file "*Appendix B - Proposal Pricing Forms 20100319.xlsx*" supplied electronically.



Appendix C: Compliance Matrix

Refer to file “*Appendix C - Compliance Matrix 20100319.xlsx*” supplied electronically.



Appendix D: Master Site List

Site Name	County	Latitude (decimal)	Longitude (decimal)	Site Status
Barnabe	Marin	38.02672222	-122.7163889	Existing
Big Rock	Marin	38.05919444	-122.6042778	Existing
Burdell	Marin	38.14494444	-122.5940556	Existing
Dollar Hill	Marin	37.98044444	-122.5292778	Existing
Forbes Hill	Marin	37.97911111	-122.5468333	Existing
Mill Valley City Hall	Marin	37.907367	-122.547869	Existing
Mt. Tamalpais	Marin	37.92880556	-122.5874722	Existing
Mt. Tiburon	Marin	37.890482	-122.46476	Existing
Novato PO	Marin	38.106481	-122.569538	Existing
Point Reyes Hill	Marin	38.08002778	-122.8672222	Existing
San Pedro	Marin	37.99016667	-122.50025	Existing
Sonoma Mt.	Marin	38.34819444	-122.5778333	Existing
Stewart Point (Bollinas)	Marin	37.93047222	-122.7201944	Existing



Appendix E: Conventional System Site List

Site Name	Latitude (Decimal)	Longitude (Decimal)	Antenna Centerline Height (meters AGL)	Frequency Channel Plan
Barnabe	38.02672	-122.71639	22	7TAC63
Big Rock	38.05919	-122.60428	36	7TAC63
Bodega	38.34179	-123.02043	33.53	7TAC63
Mt Tamalpias	37.92881	-122.58747	19	7TAC63
Point Reyes Hill	38.08003	-122.86722	5	7TAC63
San Pedro	37.99017	-122.50025	30	7TAC63
Sonoma Mountain	38.34819	-122.57783	60	7TAC63
Stewart Point (Bolinas)	37.93047	-122.72019	35	7TAC63
Tomalas	38.26106	-122.90339	24.4	7TAC63



Appendix F: Existing Microwave Backhaul Information

Emission	Traffic (Mbps)	Traffic (Ch)	Modulation	Call Sign (a)	Site Name (a)	Longitude (a)	Latitude (a)	Elev. (a)	Call Sign (b)	Site Name (b)	Longitude (b)	Latitude (b)	Elev. (b)
3M75D7W	13.8	192	QAM	WBH353	Barnabe	38-1-36.2	122-42-59	1460.955	1WNT295	Fire HQ PAS	38-0-23.7	122-37-38.9	880
10M0F8W		600	FM	WBH353	Barnabe	38-1-36.2	122-42-59	1460.955	1WNT295	Fire HQ PR	38-0-23.7	122-37-38.9	879.9195
10M0D7W	47	672	QAM	BARNAB	Barnabe	38-1-36.2	122-42-59	1461	MTTAMA	Mt. Tamalpais	37-55-44.4	122-35-13.5	2500
10M0F8W		600	FM	RWPJF432	Barnabe	38-1-36.2	122-42-59	1460.955	WPJF432	Point Reyes Hill	38-4-48.1	122-52-2	1318.895
3M75D7W	13.8	192	QAM	BARNAB	Barnabe	38-1-36.2	122-42-59	1461	PTREYE	Point Reyes Hill	38-4-48.1	122-52-2	1318.9
3M75D7W	13.8	192	QAM	WBH353	Barnabe	38-1-36.2	122-42-59	1460.955	WPJF432	Point Reyes Hill	38-4-48.1	122-52-2	1318.9
10M0D7W	47	672	QAM	WBH353	Barnabe	38-1-36.2	122-42-59	1460.955	WBM345	Tamalpais	37-55-44	122-35-15	2520.008
10M0F8W		600	FM	WBH353	Barnabe	38-1-36.2	122-42-59	1460.955	WBM345	Tamalpais	37-55-44	122-35-15	2520.008
10M0F9W		600	FM	WPRV998	Bay Hill Rd.	38-20-30.7	123-1-12.8	736.8752	WBM363	Sonoma Mt.	38-20-53.5	122-34-40.2	2465.021
30M0D7W	172.56	2016	TCM	WPRV998	Bay Hill Rd.	38-20-30.7	123-1-12.8	736.9	WBM363	Sonoma Mt.	38-20-53.5	122-34-40.9	2465
10M0F8W		600	FM	WBH352	Big Rock	38-3-39.7	122-36-20.9	1879.917	WBH353	Barnabe	38-1-36.2	122-42-59	1460.955
10M0D7W	47	672	QAM	WEH629	Big Rock	38-3-33.1	122-36-15.4	1888.12	WBH353	Barnabe	38-1-36.2	122-42-59	1460.955
3M75D7W	13.8	192	QAM	WEH629	Big Rock	38-3-33.1	122-36-15.4	1888.12	WPQY875	Burdell	38-8-41.8	122-35-38.6	1499.997
10M0F8W		600	VIDEO	WEH629	Big Rock	38-3-33.1	122-36-15.4	1888.12	WEH630	Marin Gen.	37-56-48.73	122-32-9.91	38
30M0D7W	179.446	2016	QAM	WEH629	Big Rock	38-3-33	122-36-15	1889.1	WBM345	Mt. Tamalpais	37-55-44	122-35-15	2520
30M0D7W	179.446	2016	QAM	WEH629	Big Rock	38-3-33	122-36-15	1889.1	WBM345	Mt. Tamalpais	37-55-44	122-35-15	2520
10M0F7W	14.271	192	FSK	WEH629	Big Rock	38-3-33.1	122-36-15.4	1888.12	WPUW934	Novato PD	38-6-24	122-34-6	20
10M0F8E		600	0	WEH629	Big Rock	38-3-33.1	122-36-15.4	1888.12	RWEH629	Sonoma Mt.	38-20-53.6	122-34-40.9	2465
5M00F8W		132	FM	WBH352	Big Rock Rd.	38-3-39.7	122-36-20.9	1879.917	WEH630	Marin Gen.	37-56-48.73	122-32-9.91	38
10M0F8W		780	FM	WBH352	Big Rock Rd.	38-3-39.7	122-36-20.9	1879.917	WBM363	Sonoma Mt.	38-20-53.69	122-34-40.94	2465
10M0F8W		600	FM	WBM348	Civic Center	37-59-56.6	122-31-52.7	69.88175	WBH352	Big Rock	38-3-39.7	122-36-20.9	1879.917
10M0D7W	47	672	QAM	WBM348	Civic Center	37-59-56.6	122-31-52.7	69.9	WEH629	Big Rock	38-3-33.1	122-36-15.4	1888.12
40M0D7W	179.447	2016	QAM	WBM348	Civic Center	37-59-56.6	122-31-52.7	69.9	WBM345	Mt. Tamalpais	37-55-44	122-35-15	2520
25K0F9W		1	0	WNTV725	College	37-57-23.7	122-32-52.9	32	WEH630	Marin G H	37-56-48.73	122-32-9.91	38
3M75D7W	13.8	192	QAM	DOLLAR	Dollar Hill	37-58-49.6	122-31-45.4	651.9	SANPED	San Pedro	37-59-24.6	122-30-0.9	1049.9
3M75D7W	13.8	192	QAM	WPQY888	Dollar Hill	37-58-49.6	122-31-45.4	651.9016	WBM347	San Pedro	37-59-24.6	122-30-0.9	1049.9
3M75D7W	13.8	192	QAM	1WBH353	Fire HQ PAS	38-0-23.7	122-37-38.9	880	WNT295	Woodacre	38-0-24.7	122-38-5.9	430
3M75D7W	13.8	192	QAM	WBM349	Forbes	37-58-44.8	122-32-48.6	256.9	WPQY888	Dollar Hill	37-58-49.6	122-31-45.4	651.9016



Emission	Traffic (Mbps)	Traffic (Ch)	Modulation	Call Sign (a)	Site Name (a)	Longitude (a)	Latitude (a)	Elev. (a)	Call Sign (b)	Site Name (b)	Longitude (b)	Latitude (b)	Elev. (b)
10M0F8W		600	FM	WBM345	Mt. Tamalpais	37-55-44	122-35-15	2520.1	WPNN336	Mill Valley	37-53-47.4	122-31-20.1	19
10M0D7W	47	672	QAM	MTTAMA	Mt. Tamalpais	37-55-44.4	122-35-13.5	2500	CIVICC	Civic Center	37-59-56.6	122-31-52.7	69.9
3M75D7W	13.8	192	QAM	MTTAMA	Mt. Tamalpais	37-55-44.4	122-35-13.5	2500	FORBES	Forbes	37-58-44.8	122-32-48.6	256.9
3M75D7W	13.8	192	QAM	WBM345	Mt. Tamalpais	37-55-44	122-35-15	2520.008	WPNN336	Mill Valley	37-53-47.4	122-31-20.1	19
3M75D7W	13.8	192	QAM	WBM345	Mt. Tamalpais	37-55-44	122-35-15	2520	WQHP628	Stewart Point	37-55-49.7	122-43-12.7	731
30M0D7W	179.446	2016	QAM	WBM345	Mt. Tamalpais	37-55-44	122-35-15	2520	WPOP328	Twin Peaks 3	37-45-15	122-26-47	850.0639
3M75D7W	13.8	192	QAM	WPQY891	Mt. Tiburon	37-53-25.4	122-27-54.2	509.8	WEH629	Big Rock	38-3-33.1	122-36-15.4	1888.12
10M0F8W		600	FM	WPJF432	Pt. Reyes Hill	38-4-48.1	122-52-2	1318.895	WBM345	Mt. Tamalpais	37-55-43.7	122-35-14.9	2500
3M75D7W	13.8	192	QAM	WBM347	San Pedro	37-59-24.6	122-30-0.9	1049.867	WEH629	Big Rock	38-3-33.1	122-36-15.4	1888.12
3M75D7W	13.8	192	QAM	WBM347	San Pedro	37-59-24.6	122-30-0.9	1049.9	WPQY891	Mt. Tiburon	37-53-25.4	122-27-54.2	509.8
10M0F8W		600	FM	WEH629	San Rafael	38-3-33.1	122-36-15.4	1888.12	WBM364	Novato F SST	38-5-58.71	122-34-2.93	17
30M0D7W	179.446	2016	QAM	KND97	Sonoma	38-20-54.4	122-34-41.4	2441.6	WEH629	Big Rock	38-3-33	122-36-15	1889.1
30M0D7W	179.446	2016	QAM	KND97	Sonoma	38-20-54.4	122-34-41.4	2441.6	WEH629	Big Rock	38-3-33	122-36-15	1889.1
30M0D7W	179.446	2016	QAM	KND97	Sonoma	38-20-54.4	122-34-41.4	2441.6	WEH629	Big Rock	38-3-33	122-36-15	1889.1
3M75D7W	13.8	215	QAM	WBM363	Sonoma Mt.	38-20-53.5	122-34-40.9	2465	WEH629	Big Rock	38-3-33.1	122-36-15.4	1888.12
10M0D7W	47	672	QAM	WBM345	Tamalpais	37-55-44	122-35-15	2520.008	WBM348	Civic Center	37-59-56.6	122-31-52.7	69.88175
10M0F8W		600	FM	WBM345	Tamalpais	37-55-44	122-35-15	2520.008	WBM348	Civic Center	37-59-56.6	122-31-52.7	69.88175
10M0F8W		600	FM	WBM345	Tamalpais	37-55-44	122-35-15	2520.008	WBM349	Forbes	37-58-44.8	122-32-48.6	256.8893
3M75D7W	13.8	192	QAM	WBM345	Tamalpais	37-55-44	122-35-15	2520.008	WBM349	Forbes	37-58-44.8	122-32-48.6	256.8893
10M0F8W		600	FM	WBM345	Tamalpais	37-55-44	122-35-15	2520.008	WBM347	San Pedro	37-59-24.6	122-30-0.9	1049.867
800KF9W		48	FM	WBM345	Tamalpais	37-55-44	122-35-15	2520.008	KVM62	Twin Peaks	37-45-16.7	122-26-49.9	857.9379



Appendix G: Specific Coverage Area Requirements



Appendix H: Site Surveys

