COLUMBIA COUNTY, FLORIDA
REQUEST FOR PROPOSALS
APCO P25 700 MHz Radio System
RFP-2017-O

Sealed responses for turnkey services to implement an Association of Public Safety Communications Officials (APCO) Project 25 (P25) Phase1/Phase 2 compliant trunked communications system and an IP-based microwave radio backhaul network. The new System will be constructed with five (5) simulcast repeater channels in the 700 MHz band and will utilize the County's tower sites, six (6) site microwave backhaul network, nine (9) new dispatch consoles and associated electronics, nine (9) new mobile dispatch radio consoles and radio subscriber equipment. Responses will be received until 2:00 PM on July 31, 2017. Responses should be addressed to the Columbia County Board of County Commissioners, at 135 NE Hernando Avenue, Lake City, FL 32055. Responses received after the time and date specified will be returned unopened to the proposer.

The proposed schedule for this RFP is as follows:

A. Release of RFP: May 25, 2017

B. Pre-Proposal Conference: June 8, 2017

C. Final Questions Due: June 29, 2017

D. Proposals Due: July 31, 2017

E. Selection Committee Meeting August 21, 2017

RFP documents can be down loaded from the County website http://www.columbiacountyfla.com/PurchasingBids.asp

The owner reserves the right to waive any informality or to reject any or all bids.

Columbia County Board of
County Commissioners

_____

Ronald Williams, Chair

APCO P25 700MHz Radio System Project
RFP – 2017 - O

May 25, 2017

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

PROJECT DESCRIPTION AND GENERAL TERMS AND CONDITIONS

1. INTRODUCTION

A. Columbia County, Florida (County) wishes to implement an Association of Public Safety Communications Officials (APCO) Project 25 (P25) Phase1/Phase 2 compliant trunked communications system and an IP-based microwave radio backhaul network, collectively referred to as the "System". The new System will be constructed with five (5) simulcast repeater channels in the 700 MHz band and will utilize the County's tower sites located at the Columbia County Sheriff's Office (CCSO), Lulu, Cumorah Hill, EOC, and Deep Creek.

B. The new 6 GHz microwave loop backhaul network will encompass the five tower sites listed above plus the Franklin Street tower site. The nine (9) new dispatch consoles and associated electronics and backup control station radios will be located at the EOC.

C. The System's primary core site components will be located at the EOC communications room. As an option, the County wants to consider a sixth simulcast "Greenfield" tower site location to provide radio coverage in the north end of the County.

D. The County operates a VHF conventional analog multisite communications system that consists of a combination of (4) transmit and receive sites along with (2) receive-only sites. The County currently has a total of eleven (11) VHF channels which consist of five (5) fire channels, three (3) sheriff channels, and one (1) each for emergency management, public works and County paging.

E. The County currently operates a three (3) site VHF simulcast system to support fire paging. The County's intent is the migration of public safety communications to P25 standards that provide essential interoperability options with surrounding agencies.

F. It is the expectation of the County that the new System will provide highly reliable and interoperable communications with a high degree of redundancy in a fail-safe design.

1.1 General Scope of Work

A. The Contractor's proposed solution shall include the design, engineering, equipment and installation, implementation services, operator and technical training, and continued maintenance services for a state of the art P25 Phase 1/Phase 2, public safety trunked simulcast radio system.

B. The System shall provide all of the components of an APCO Project 25 standards-based digital communications network to meet the current and the foreseeable future needs of the regional public safety community.

C. The Contractor shall provide one (1) conventional National Mutual Aid 8TAC92, 8TAC93 and 8TAC94 channels at each of the following tower sites, Deep Creek, EOC and Cumorah Hill.

D. The Contractor shall assume complete responsibility for the system design, engineering, hardware, software, functionality, radio coverage, licensing, installation, optimization,

testing, training, cutover, and maintenance of a standards-based P25 compliant, digital trunked simulcast communications system based upon the performance specifications, and trunking features contained in this document and in the P25 Standards.

E. The Contractor shall complete and pass all acceptance tests of system components, including hardware, software, radio coverage, reliability, and the required functionality per the requirements of this RFP and the P25 standards.

F. The Contractor shall propose a complete and fully operational system that meets or exceeds the requirements herein.

G. If the Contractor's system as installed, does not meet the contractual technical requirements, all additions or modifications required in meeting those technical requirements to satisfy the communication needs of the County shall be at the sole expense of the Contractor.

1.2 Inspection of Existing and Potential Network Sites

A. The Contractor shall conduct a thorough review and assessment of all sites to be included in the proposed system and identify all of the required services and costs necessary to fully complete the work at each of the sites.

1.3 Errors and Omissions

A. The Contractor shall assume full responsibility for the acts and omissions of all its agents, servants, and employees, and all subcontractors, their agents, servants, and employees, and all other persons performing any of the work.

1.4 Subcontractors

A. The County requires that a single Awarded Proposer have total turnkey responsibility for the project to assure a single point of contact for all project communications. Therefore, any Proposer that desires to use subcontractors shall include within their proposal response a listing and a description of the qualified subcontractors, the type of work to be performed, and past experience work with the subcontractor.

B. The County may require documentation and references to ensure the qualifications of a subcontractor. The subcontractors cannot be changed after submission of the proposal response except with the written permission from the County. A change in subcontractors shall not provide an extension of time to the Awarded Proposer.

1.5 Sites of Work

A. The sites of work for this Project are as follows:

Site	Tower	Electrical	Shelter Size	Generator	Compound Size
EOC	300-ft SS	200Amp Overhead	12'x12'	35kW Diesel	60'x60'
Deep Creek	300-ft guyed	200Amp Overhead	12'x12'	35kW Diesel	60'x60'
CCSO	155-ft SS	200Amp Overhead	12'x12'	35kW Diesel	60'x60'
Lulu	Existing	200Amp Overhead	12'x12'	35kW Diesel	Existing Modified
Greenfield (Optional)	300-ft SS	200Amp Overhead	12'x12'	35kW Diesel	60'x60'
Cumorah Hill	315-ft guyed	200Amp Overhead	10'x15'	58kW Diesel	60'x60'
Franklin Street	255-ft SS	200Amp Overhead	10'x16'	50kW Diesel	60'x60'

2. RULES GOVERNING PROPOSAL SUBMISSION

2.1 Bonds and Deposits Requirements

2.1.1 Public Construction Bonds

A. Performance and Payment Bonds - These types of bonds are required by the County when entering into formal contracts for new construction, repairs, or renovation on public buildings and/or other public works. These bonds will be provided by the Awarded Proposer in the amount of l00% of the contract amount prior to commencing the work.

2.1.2 Bid Bond – Guaranty of Good Faith Deposit

A. Each proposer shall include with their submitted proposal a Bid Bond in the amount equal to 5% of the total proposed "turnkey" price plus any add alternates.

B. In lieu of a bid bond, the Purchasing Director may, at his discretion, authorize the proposer to submit a certified check, cashier's check, or treasurer's check, on any national or state bank. Such deposits shall be in the same percentage amounts as the required bid bond. The Clerk shall retain such deposits until the County Manager is satisfied that all provisions of the contract have been complied with, cash bid security deposits will not be accepted.

C. Upon award signing of contract, the Purchasing Director shall be responsible for returning the bid bonds and other bid securities to the unsuccessful proposers within fifteen (15) working days.

2.1.3 Surety

A. Surety authorizing the Bid Bonds and Public Construction Bonds must be authorized to do business in the State of Florida.

2.1.4 Letter of Credit

A. An irrevocable Letter of Credit may be accepted by the County in lieu of public construction bonds under conditions that the proposers' provide a financial statement prior to authorization to accept the irrevocable Letter of Credit.

2.1.5 Processing Bonds and Deposits

A. The Awarded Proposer shall be responsible for securing the necessary bond(s). Bonding cost may be included in the contract price.

B. The County Attorney will either accept or reject the bonds and forward them onto the Board of County Commissioners for final review and approval. Once approved the surety bonds will be filed with the official Contact documents with the Clerk of Court.

C. In the event the Awarded Proposer fails to provide acceptable bond(s) when required, within ten (l0) days after notification, the County Attorney will be notified. Upon the recommendation of the County Attorney, the Board of County Commissioners may

declare the Contract null and void and retain in the account of the County any good faith deposits or guaranty which was submitted as liquidated damages.

2.2 Insurance Requirements

A. The Contractor shall demonstrate compliance, and shall maintain the insurance coverage depicted in the County Form in Appendix D.

2.3 Procurement Schedule

A. Release of RFP:	May 25, 2017
B. Pre-Proposal Conference:	June 8, 2017
C. Final Questions Due:	June 29, 2017
D. Proposals Due:	July 31, 2017
E. Selection Committee Meeting	August 21, 2017

2.4 Examination of Request for Proposal

B. The Proposer is required to carefully examine this RFP and the attached documentation to inform themselves of all requirements that may affect the products and services to be delivered under this contract. No allowances will be made because of a lack of knowledge of these conditions.

C. The County reserves the right to disqualify any proposal that does not meet the requirements of the RFP.

2.5 Proposal Submission

A. Proposers shall submit six (6) bound copies, one (1) unbound original and one (1) soft copy in a searchable single file Adobe PDF format on a thumb drive of their proposal.

B. Proposers shall submit their pricing worksheets with their technical proposal but in a separate sealed envelope. The Proposer shall not include any pricing information in their technical proposal.

C. Proposals will be received by the County until 2:00 PM EDT July 31, 2017. All copies of the proposals shall be sealed and clearly marked as "APCO P25 700 MHz Radio System Project, RFP-2017-O".

Proposals shall be delivered or mailed to:

Board of County Commissioners
135 N.E. Hernando Avenue
Lake City, FL. 32055

D. Facsimile or email transmissions of proposals will not be considered.

2.6 Question Submittal

A. All questions pertaining to this RFP shall be submitted in writing, via email, or fax to:

Lawrence Wilson
lwilson@columbiacountyfla.com.
or
Ray Hill
ray_hill@columbiacountyfla.com
Fax Number: 386-758-1386

2.7 Clarification of Proposal Documents

A. Responses to questions received for this RFP will be provided in writing to all proposers that have received the original RFP and posted on the County's website procurement page.

2.8 Proposal Acceptance and Contract Award

A. The County reserves the right to accept or reject any or all proposals or sections thereof, negotiate terms, waive technicalities, and award in the best interest of the County. Furthermore, the County reserves the right to award without further discussion.

2.9 Preparation Costs

A. The County shall not be responsible for any proposal preparation costs, nor for costs, including attorney fees associated with any challenge (administrative, judicial, or otherwise) to the determination of the highest ranked Proposer and/or award of contract and/or rejection of proposal. By submitting a proposal, each Proposer agrees to be bound in this respect and waives all claims to such costs and fees.

2.10 Withdrawal of Proposals before Opening

A. Proposers may withdraw their proposal prior to the proposal due date. Proposals or withdrawal requests received after the proposal due date will be void, regardless of when they were mailed.

2.11 Holding of Proposals

A. Proposals may be held by the County for a period not to exceed forty-five (45) days from the proposal due date for the purpose of reviewing the proposals and investigating the qualifications of the proposers prior to awarding of the contract.

2.12 Proposer's Responsibility

A. Proposers shall fully acquaint themselves with conditions relating to the scope and restrictions attending the execution of the work under the conditions of this RFP.

B. The failure or omission of proposers to acquaint themselves with existing conditions shall in no way relieve them of any obligation with respect to this RFP or to the contract.

2.13 Disqualification of Proposals

A. The County will disqualify any proposal that does not meet the requirements of the RFP. If the County proposes to disqualify any Proposer because such Proposer is not a responsible Proposer, the County shall give written notice of the proposed disqualification to such Proposer and include in the written notice, all reasons for the proposed disqualification.

B. The disqualified Proposer will be given the opportunity to be heard at an informal hearing at which such Proposer will be afforded the opportunity to refute the reasons given by the County for disqualification.

2.14 Cone of Silence

A. Contractor nor Contractor's representatives shall communicate with any County personnel starting on March 25, 2017 through August 22, 2017.

B. Breach of this "Cone of Silence" may result in the disqualification of the Contractors proposal to the County.

2.15 Late Proposals

C. It shall be the sole responsibility of the Proposer to see that their proposal is received by the proposal due date. The County does not assume any financial responsibility for late deliveries by the U.S. Postal System or any other delivery service.

D. Late proposals will not be accepted and once documented, will be returned to the Proposer unopened.

2.16 Pre-Bid Conference

A. The County will conduct a pre-bid conference on June 8, 2017. Each Proposer will be limited to four (4) attendees. The meeting will begin at the County's current EOC/Combined Communication Center, which is located at:

263 NW Lake City Avenue
Lake City, FL 32055

B. The meeting will begin promptly at 10 AM with a short presentation along with a question and answer secession. The County will then escort all attendees to the six (6) sites of work so that each potential Proposer can examine them.

C. Each Proposer shall send its intention to attend the pre-bid meeting at least 3 days prior to the meeting along with a list of attendees to one of the contacts listed in Section 2.6 of this RFP.

2.17 Proposal Format Instructions

A. The County will follow the evaluation process and selection criteria described in the instructions for this solicitation so in order to provide each proposing firm an equal opportunity for consideration, adherence to a standardized proposal format is required.

B. The County is not responsible for failure to locate, consider, and evaluate qualification factors presented outside of this format.

C. The format of each proposal must contain the following elements organized into separate chapters and sections, as the Contractor may deem appropriate:

   a. Point by Point Response to RFP Requirements

   b. Project Management Plan, Implementation Schedule and Cutover Plan

   c. The Firm's technical approach and proposed solution, adherence to P25 Standards, system redundancy, resiliency, the guaranteed radio coverage

   d. Service and Maintenance Plan

   e. Firm Project Team

   f. Firm Qualifications, Capabilities and Experience with similar size P25 public safety systems

   g. Project References for similar size P25 public safety systems

   h. Cost Proposal

2.18 Point by Point Response to RFP Requirements

A. The Contractor is required to respond to each section or sub-section with one of the following responses:

   a. Fully Compliant

   b. Partially Compliant

   c. Non-Compliant

B. The Contractor shall provide a summary compliance matrix to this RFP in Microsoft Excel format to aid with the evaluation process.

C. The Contractor shall confirm their understanding of the requirements of this RFP and the project, and shall clearly outline the scope and objectives of the proposal response as it relates to the scope and objectives of the project and the project deliverables.

2.19 Project Management Plan, Implementation Schedule and Cutover Plan

A. This section shall describe the Contractor's approach and provide a detailed project management plan regarding the assistance to be provided.

B. The Contractor should clearly distinguish tasks that the Contractor will undertake as distinguished from those that are the responsibility of the County; absence of this distinction will assume that the Contractor is fully assuming the responsibility for all tasks.

C. The project management plan must discuss the staffing levels required to complete each task, as well as the relative effort that each member of the proposed project team will devote to the project.

D. The project management plan shall discuss documentation and/or authorizations that will be required from the County, the anticipated problem areas, and the proposed solutions to the problem areas.

E. The project management plan steps shall be supported by the proposed hours the Contractor agrees to commit to assist the County plus the hours and resources required by the County staff to assist.

F. The Contractor shall clearly specify who has primary responsibility for each plan element; the Contractor or the County staff.

G. The Contractor shall present a plan that clearly explains how it will manage and control all proposed activities and the resulting timetable.

H. The Contractor shall explain how the management and administrative processes will ensure that appropriate levels of attention are given so that work is properly performed and that milestones are met on a timely basis as proposed.

I. The implementation schedule shall set forth beginning and ending dates, deliverables, and major milestones for a proposed timetable that coincides with the proposed project management plan.

   a. The implementation schedule shall be provided to the County in Microsoft Project and in Adobe PDF formats.

   b. The Contractor shall include a detailed preliminary cutover plan in its submittal.

      i. The proposed radio system shall be implemented, tested and cutover in a manner that minimizes the impact on the existing systems and its users.

      ii. The Contractor's cutover plan shall provide sufficient details to relay an understanding of existing operations, technical issues, available frequency resources, available physical space, and the schedule to accomplish cutover to the new System.

2.20 Technical Approach and Proposed Solution

A. The Contractor shall provide a detailed description of their proposed technical solutions and approach to their system design and equipment selection and their adherence to the P25 Standards.

B. The Contractor shall provide a detailed description of their proposed and proposed solutions for system redundancy and resiliency.

C. The Contractor shall provide a detailed description and definition of their guaranteed radio coverage.

2.21 Service and Maintenance Plan

A. The Contractor shall provide a detailed warranty, service and maintenance plan in accordance with the requirements of this RFP.

B. The service and maintenance plan shall describe in detail how the Contractor will provide warranty, service, and maintenance for the system and its components.

C. The plan shall provide the qualifications of its service personnel, the physical locations for depot service for subscribers and infrastructure components, any existing local service assets, and any planned future service assets in response to this RFP.

D. The service and maintenance plan shall provide the recommended service level and schedule for the proposed system and its sub-components.

2.22 Firm Project Team, Qualifications, Experience and Capabilities

A. This section shall include the qualifications of the staff assigned to this project and at a minimum, the proposal shall:

   a. Designate a Project Manager

   b. Include the organization, functional discipline, and responsibilities of the proposed project team members

B. Provide a complete resume or description of each team member's education, professional experience, length of time employed by the Contractor and/or a subcontractor

C. The personnel named in the proposal shall remain assigned to the project throughout the period of the contract and no diversion or replacement may be made without submission of a resume of the proposed replacement and the final approval of the County.

D. The Contractor shall clearly state if it proposes to subcontract any of the work herein.

   a. The names of subcontractors shall be provided, and by proposing such firm(s) or individuals, the Contractor assumes full liability for the subcontractor's performance

E. The Contractor shall provide the County with an overview description of the Contractor's firm and the Contractor's commitment to the services set forth in this RFP including the following:

   a. Summarize the organizational structure and size of the company, the date of organization, and the current principal place of business

   b. Outline and briefly discuss the scope of services provided and the approximate percentage of the total business devoted to the type of services requested in this RFP

   c. Describe the Contractor's experience with similar projects

d. Indicate whether or not the company has an organized practice addressing the requested scope of services, who formally heads that practice, and where that person is located

e. Describe any local office(s) that will service the system including size, services, area covered, and principal contact person

f. Describe worker safety training programs, job-site safety programs, accident prevention programs, written safety and health plans, including incident investigation and reporting procedures

g. Provide a listing of the Project Team Qualifications and Experience

F. Response shall include the qualifications of the staff the Contractor may assign to this project.

a. Include a listing of proposed staff, functional disciplines, and responsibilities of the project team members

b. Provide a complete resume or description of key team member's education, professional experience, length of time employed by the Contractor and/or a subcontractor

c. No personnel, including sub-contractors, named in the proposal shall be substituted throughout the period of the contract without submission of a resume of the proposed replacement with final approval of the County

G. The County reserves the right to make such additional investigations as it may deem necessary to establish the competency and financial stability of any Contractor and, if after the investigation and in the sole opinion of the County, the evidence of competency and financial stability is not satisfactory, the County reserves the right to reject the proposal.

2.23 Cost Proposal

A. The Contractor shall provide turnkey system pricing on the provided Cost Proposal forms in Appendix C. The forms provided in these worksheets serve as the basis for the proposed pricing of all equipment and services including, but not limited to, equipment delivery, freight, installation, programming, optimization, project management, engineering, training, testing, Contractor travel and per-diem, supplies, and related expenses.

B. Contractors shall clearly and effectively communicate their system concept, infrastructure configuration and system components.

C. The Contractor’s Cost Proposal shall be submitted in a separate seal envelope.

D. The Contractor **shall not include any pricing** information in their technical response.

E. The Contractor at a minimum **shall complete all** Cost Proposal forms provided in Appendix C. Contractors may expand on the items in these worksheets, duplicate the worksheets as required to adequately portray the proposed architecture, and be as descriptive as possible and include equipment model names, supplier names, and model numbers for 3rd-party equipment.

2.24 Proposal Scoring Matrix

A. The following criteria and weighting will be used for the scoring of Contractor proposals.

Category	Total Points
Proposer's presented Project Schedule	5
Proposer's compliance with written technical specifications	30
Proposer's presented Project team qualifications	15
Proposer's Project turnkey pricing	30
Proposer's presented experience, capabilities and references from similar projects	20

2.25 Selection Committee

A. The Selection Committee will consist of one person from each of the following County departments, Communications, Sheriff's Office, Fire Rescue, IT and County Administration

B. The five (5) person Selection Committee will score all received compliant proposals per the scoring matrix in Section 2.24. Based on this score each Committee member will rank the proposals from 1 to n with n being the number of received compliant proposals.

C. The final ranking of proposals will be based on an average of the Selection Committee member's ranking of the proposals with the lowest average being the best.

2.26 Property Damage

D. When working on County property and facilities, the Contractor shall neither remove any fixture nor County property, real or personal, from County premises, nor temporarily or permanently affix any equipment to County premises not specifically required by this RFP and any resulting agreement without the expressed written consent of the County.

E. In the event that any real or personal property of the County is damaged by any act or omission of the Contractor or any of its employees, agents, subcontractors or servants, the Contractor shall, at the sole option of the County, either immediately repair or replace such damage to the complete satisfaction of the County, or upon the County's presentation of an invoice, reimburse the County for the actual reasonable cost of repairing such damaged property.

F. The Contractor shall regularly keep the County's premises reasonably clean of accumulations of rubbish or scrap.

G. Upon completion of the system, the Contractor shall leave the County's premises free from rubbish or scrap material resulting from the Contractor's performance.

H. At any time during the Project, if the County or its designee deems a site to be in need of trash removal due to the Contractor efforts, the Contractor shall be responsible for removing the rubbish at its expense upon County notification.

2.27 Existing System Interruptions

A. The Contractor shall understand that the System may at times, be operating in parallel with the current communication systems and that interruptions to the existing communication systems must be minimized or eliminated during the field implementation due to the commitment of the County to provide for the health, welfare, and safety of its citizens and personnel.

B. Therefore, the Contractor shall agree that at no time will its employees, agents, subcontractors or servants perform any work that may interrupt the existing communication systems or any components of such system unless coordinated in advance with the County.

C. If an interruption is unavoidable for the Contractor to perform the work, the Contractor shall contact the County's Project Manager in advance and describe in writing the following:

   a. The nature of the work that will cause the unavoidable interruption

   b. The duration of the interruption

   c. A detailed statement of the scope and sequence of the work to be performed during the interruption

D. After giving notice and providing the written notification described above, the Contractor may proceed with the work only after receiving written confirmation from the County's Project Manager that the interruption is both unavoidable and can be tolerated by the County.

E. If the Contractor fails to follow the procedure described above, or if the Contractor's work causes an interruption to a greater extent or duration than was described in their written notice, the Contractor shall be strictly liable for all actual damages arising from and caused by the interruption.

F. In no event shall the Contractor be granted any extensions of time for performance under any resulting agreement for the time spent following the above-described procedures.

2.28 Shipments

A. The Contractor shall be responsible for the shipment, storage, and warehousing at Contractor-provided facilities, of all equipment prior to deployment to the sites for installation.

B. The Contractor shall be responsible to ship all equipment and software to mutually agreeable locations for storage, for which the Contractor shall be responsible.

C. Any equipment or parts required to provide a complete and operational system and not specifically mentioned in the Contractor's proposal and any resulting contract shall be the sole responsibility of the Contractor without any claim for additional payment.

D. Deliveries shall be made in accordance with the Project Schedule as amended from time to time, and shall be made F.O.B.

E. The Contractor shall be responsible for transportation and storage of all hardware and software components of the system.

2.29 Transfer of Title and Ownership

A. All risk of loss or damage to the Contractor provided components while in transit, storage, installed in sites of work but prior to Final System Acceptance, shall be the responsibility of the Contractor.

B. In no circumstances shall the County assume liability for the Contractor provided hardware and software until the Contractor has received Final System Acceptance from the County.

C. Except as otherwise provided for in this Agreement, full and complete title for the system will pass from the Contractor to the County upon Final System Acceptance by the County, except for software and other products for which title does not transfer.

D. The Contractor warrants that the County shall have clear title in and to the system, free and clear of all encumbrances, upon Final System Acceptance by the County.

2.30 Contractor-Furnished Materials, Equipment and Workmanship

A. Only new, unused items of recent manufacture, specified quality, and free from defects will be accepted.

B. Rejected items shall be removed immediately from the work and replaced with items of the specified quality.

C. Failure by the County to order removal of rejected materials and equipment shall not relieve the Contractor from responsibility for quality of the materials supplied nor from any other obligation under the Contract documents.

D. No work defective in construction or quality, or deficient in meeting any requirement of the contract drawings and specifications will be acceptable regardless of the County's failure to discover or to point out defects or deficiencies during construction; nor will the presence of field representatives at the work relieve the Contractor from responsibility for the quality and securing progress of work as required by the Contract documents.

E. The County shall notify the Contractor of defective or unacceptable work if the County discovers such.

F. No payment, whether partial or final, shall be construed as an acceptance of defective work or improper materials.

G. The Contractor shall continuously check architectural and structural clearances for accessibility of equipment and mechanical and electrical systems.

H. No allowance of any kind will be made for the Contractor's negligence to foresee means of installing equipment into positions inside of structures.

2.31 Site Access

A. Access to the County sites shall be through means as indicated by the County and in accordance with the procedures established by the County.

B. The Contractor's plans for site access and storage areas shall be approved by the County.

C. The Contractor's access to the work areas shall be in such manner that the Contractor's traffic will not interfere with County operations.

D. The Contractor shall, at all times, maintain free unimpeded ingress and egress at the sites.

2.32 Definitions

A. The meaning of certain words as used within this document shall be controlled through the use of the following definitions unless stated otherwise in the document.

a. AC means alternating current

b. APCO means the Association of Public-Safety Communications Officials

c. Backhaul means a network that provides communications between RF transmission sites, communications centers where consoles are located, and the master core network control location

d. BER means bit error rate

e. CAI means Common Air Interface for a P25 radio network

f. Contractor means the proposer/respondent and any/all subcontractor(s) collectively

g. Conventional Channel means a non-trunked radio channel

h. CPC means Channel Performance Criterion which is the specified design performance level in a faded channel per TSB-88

i. CSSI means Console Sub-system Interface for a P25 radio network

j. DAQ is an acronym for Delivered Audio Quality

k. DC means direct current

l. FCC means the Federal Communications Commission

m. FDMA means frequency division multiple access

n. Fixed Network Equipment (FNE) means all hardware and software used to transmit and receive radio signals including but not necessarily limited to: the system's 700/800 MHz transceivers, comparator/voter, system control systems, combiners, multiplexers, antennas, microwave transceivers and dishes, etc.

o. In-building Coverage means the amount of signal margin in decibels or dB provided for in a radio system design for the purpose of overcoming signal attenuation due to the building structure, in order to provide the minimum received signal level necessary to provide acceptable portable radio communications inside a building

p. ISSI means Inter Sub-system Interface for a P25 radio network

q. MHSB means Monitored Hot Standby

r. MPLS means Multiprotocol Label Switching that directs data traffic from one network node to the next based upon short path labels rather than long network addresses

s. Network Site means a location for the installation of the fixed network equipment

t. NPSPAC means the National Public Safety Planning and Advisory Committee

u. PIM means passive intermodulation which is a form of intermodulation distortion that occurs in components normally thought of as linear, such as cables, connectors, and antennas

v. Project 25 or P25 means a standard 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 an emergency

w. Repeater means an electronic device deigned to instantly retransmit at a higher power the transmission of a subscriber

x. RF means radio frequency

y. RSL means Received Signal Level

z. Service Area is a specific user's geographic bounded area of concern

aa. Service Area Reliability is the probability of achieving the desired CPC over the defined Service Area

bb. Specification means the document through which the requirements of the procurement are defined

cc. System means all electronics, hardware, and software components routinely employed to operate the 700/800 MHz digital trunked network including but not limited to fixed network equipment, antenna, transmission lines, electronic control consoles, microwave system, towers, tower grounding systems, associated

subsystems, etc., resulting in a fully operational, licensable, highly reliable 700/800 MHz digital trunked public safety radio communications capability meeting the requirements of and intended to be part of this procurement

dd. Talk Group means a trunked virtual talk channel that is synonymous with a conventional radio channel or frequency

ee. Talk In from the 'mobile equipment' inbound to the fixed-end receiver system equipment. Also referred to as a reverse-link or up-link

ff. Talk Out from the fixed-end system equipment transmitters outbound to the 'mobile' units. Also referred to as a forward-link or down-link

gg. TDMA means time division multiple access

hh. TDR means time-domain reflectometer

ii. Turnkey Solution means the entire system and all tasks or services associated with the system, including the preparation of sites or structures for the installation of system components, including the removal of any existing components of any kind, shall be performed under the responsibility of the Contractor

jj. Test Tile is the location where the random subsamples for CPC are to be taken

kk. VAC means volts alternating current

ll. VDC means volts direct current

mm. 700 MHz means the radio spectrum between 763 and 805 Megahertz as currently authorized by the FCC

3. CURRENT SYSTEM DESCRIPTION

3.1 Overview

A. The County's current VHF communications system will be dismantled.

B. The County's unlicensed microwave backhaul system will be dismantled.

3.2 Communication Tower Sites

A. The County currently has six communication sites; four sites will be utilized for the new System.

Tower Site	Tower Type	Coordinates	Use for New System
Deep Creek	300' Guyed	30:20:10.9 N 82:39:21.7 W	Yes, existing tower and shelter
Cumorah Hill	315' Guyed	29:57:15.0 N 82:39:36.8 W	Yes, existing tower and shelter
Lulu	148' Monopole	30:06:35.12 N 82:29:43.49 W	Yes, existing tower and shelter
Franklin Street	255' Self-Supporting	30:11:37.9 N 82:38:4.8 W	Yes, existing tower and shelter microwave relay site only
Columbia City	120' Guyed	30:04:11.51 N 82:42:5.37 W	NO
Jail	400' Guyed	30:13:7.0 N 82:38:41.0 W	NO

3.3 County Dispatch Operations

A. The County's dispatch facility is located at located at the EOC 263 NW Lake City Ave. Lake City Florida, 32055

B. The EOC supports dispatch operations for the Columbia County Sheriff and the County Fire Department.

C. The EOC has nine (9) Motorola MCC5500 dispatch console positions that are directly connected to the console common electronics equipment located in the back room.

3.4 VHF Paging System

A. The County's VHF Paging System will be retained when the new System is operational.

B. The Paging System is a 3-site, simulcast VHF, Paging System using Motorola GTR8000 base stations and MLC8000s.

C. The Paging System base stations are located at the Deep Creek, Cumorah Hill, and the Franklin Street tower sites. The Paging System transmit frequency is 155.2050 MHz and the receive frequency is 150.7750 MHz.

TECHNICAL SPECIFICALTIONS AND REQUIRED SCOPE OF WORK

1. GENERAL SERVICES TO BE PROVIDED

1.1 Turnkey

A. This RFP and any resulting agreement require the "turnkey" design, construction, installation, testing, and delivery of a completely operational system.

B. The Contractor shall furnish all design, services, materials, equipment, tools, skill, engineering, testing, and labor necessary to fully complete, in a timely manner, the requirements according to the Contract documents.

C. The Contractor assumes full responsibility for personnel, materials, and equipment employed in the construction and installation of the system and agrees to make no claims against the County for damages to such materials or equipment except for that which is caused solely by the County, its employees, or agents.

1.2 System Design

A. Except as specifically noted elsewhere in this RFP, the Contractor shall be solely responsible for the design and performance of the System.

B. The Contractor shall warrant, guarantee, and covenant that the System is and will be engineered, furnished, installed, optimized, tested, and warranted by the Contractor to meet or exceed the requirements of this RFP.

1.3 Implementation and Integration

A. The Contractor shall be solely responsible for the proper installation and interface of all equipment provided pursuant to this RFP and any resulting agreement.

B. In any circumstances where existing equipment is utilized in the System, the Contractor will warrant that the equipment will perform in strict conformance to this RFP.

C. The Contractor shall be responsible for a complete, integrated factory staging of the System and ancillary subsystems, and any associated backhaul system equipment, prior to the shipment of the System for field integration.

D. Field integration of the System and the backhaul system, shall be the sole responsibility of the Contractor.

E. All electrical and mechanical work necessary to commission each site for usage and testing shall be the responsibility of the Contractor.

1.4 Backhaul Network

A. The Contractor shall engineer, design, and implement a public safety grade, highly available redundant, microwave radio backhaul system as defined in this RFP.

1.5 FAA/FCC Regulatory Work

A. The Contractor shall be responsible for all required frequency coordination, as well as for full processing of the FCC license applications for all radio system frequencies required to implement the System in accordance with the requirements of this RFP and any resulting agreement.

B. The Contractor shall be responsible for obtaining all required tribal, environmental, NEPA, SHPA, FAA, FCC, and any other miscellaneous studies and licenses necessary to commission the entire radio communications system at all of the network sites including FAA Studies and Determinations and modifications to FCC Antenna Structure Registrations.

C. The Contractor shall be responsible for producing all required technical studies, analyses, submittals, and all frequency coordination, NPSPAC Region 9 applications and submittals, licensing activities, and processing of the documentation with the appropriate licensing and regulatory authorities.

1.6 Permits

A. The Contractor shall be responsible for obtaining all necessary permits and provide the County with two (2) complete sets of the permitted drawings and addenda within five (5) days of issuance by the appropriate building official.

B. The Contractor shall be responsible for all fees and costs associated with obtaining the necessary permits.

C. If the permitted set of drawings change the scope of the work to be performed, the Contractor shall notify the County within thirty (30) days of receipt of the permitted drawings and such notification shall contain a written description of the change, the cost and time, if any.

D. Failure to provide such notice within thirty (30) days shall be a complete waiver by the Contractor of all additional cost and time and the Contractor shall perform the work at his expense and complete the work in accordance with the Project Schedule and in no event shall the Contractor recover delay or consequential damages.

E. The Contractor shall perform work only in accordance with the permitted drawings and any subsequent revisions thereto.

F. The Contractor shall meet all state and local building codes as well as the Contractor's own published internal quality and workmanship standards.

G. The Contractor shall agree to prepare and submit all necessary forms and to obtain all permits, licenses, certificates of occupancy, and clearances, as required.

1.7 Project Management and Engineering

A. The Contractor shall assign a Project Manager who is an actual full-time employee of the Contractor and is authorized to exercise technical direction of this Project.

B. The Contractor shall provide the name, contact information, and resume of the Project Manager.

C. The Project Manager will be the single point of contact for the Project.

D. The Contractor shall propose a Project Manager with exceptional verbal and written communicative and technical skills as well as a thorough knowledge of the components to be provided by the Contractor and experienced in Project management.

E. The Contractor's Project Manager is subject to initial approval and continual review by the County, which approval shall not be unreasonably withheld.

F. The County shall reserve the right at any time to require the Contractor to replace the Project Manager within 30 days upon written notification to the Contractor's executive management team.

G. The Contractor's Project Manager shall, at a minimum:

   a. Attend regular Project meetings as scheduled

   b. Generate meeting minutes for each Project meeting within 3 days of the respective meeting

   c. Produce a running log of Project issues and punch list items

   d. Provide written monthly status reports in draft and final forms in a format as approved by the County no later than the fifth business day after the end of each month for the draft report

   e. Archive all Project correspondence to be supplied with final system documentation

H. The County shall review the draft report and submit comments and/or corrections.

I. A final monthly report shall be provided no later than five (5) days after the end of the preceding month.

J. The Contractor's Project Manager shall provide written Schedule updates to the County Project team every 14 days as required using Microsoft Project conforming to the County's formatting and content requirements and transmitted to the County in electronic Adobe Acrobat format.

K. The Contractor's Project Manager shall provide other reports related to the system or its implementation as reasonably requested by the County.

1.8 Site Plans

A. The Contractor shall prepare site plans where required for zoning or any permit approvals as well as to file and be responsible for, all necessary zoning and applications for permits of any kind related to the system design and implementation.

B. All plans shall be submitted to the Project Manager for review and approval prior to final submission to the appropriate regulatory body or office.

C. The Contractor is responsible for coordinating, processing, and leading all zoning/permitting/licensing efforts on behalf of the County.

D. Attendance and involvement at any relevant hearings or committees shall be the responsibility of the Contractor throughout the course of the Project.

1.9 Testing

A. The Contractor shall perform all testing and re-testing as described throughout this specification and any resulting agreement.

1.10 Training

A. The Contractor shall conduct a comprehensive suite of training courses to instruct the County personnel in the proper operation, use, and maintenance of the system as well as to instruct employees in how to train other personnel in such subjects.

B. The Contractor shall comply with all training requirements contained in this specification and any resulting agreement.

C. The County agrees to notify the Contractor promptly in the event that a date change for a scheduled training program is required.

1.11 Detailed Design Review

A. The Contractor shall perform a comprehensive detailed design review (DDR) prior to the commencement of any manufacturing or field integration work.

B. The County will actively participate in the DDR with the Contractor and the County will provide signature signoff upon completion of this work effort to trigger the manufacturing and field integration process.

C. Completion of the DDR process shall take place upon mutual agreement between the Contractor and the County.

D. The Contractor shall supply all detailed design documents to the County in electronic Adobe Acrobat format.

E. The Contractor shall provide all documents in Microsoft Word and Microsoft Excel format as appropriate, in addition to electronic Adobe Acrobat format.

F. The detailed design must include, at a minimum, the following items for every system site:

   a. Network and subsystem block drawings

   b. Antenna subsystems

   c. Spares equipment list and pricing matrix

   d. Redundant backhaul design and network availability/reliability calculations

   e. Line item equipment and pricing lists

   f. Infrastructure, console, and network element programming parameters

   g. Dispatch Console and NCMS database parameters/design

   h. Failure mode analysis/system availability

   i. Physical site requirements, civil work, facilities, electrical, HVAC, tower design, etc. as applicable for the scope of work

   j. Preliminary factory and field ATPs

   k. Final coverage and site configuration design

   l. Final coverage ATP

   m. Preliminary cutover plan/migration strategy/downtime requirements

   n. Revised statement of work if modified

   o. Operations, administration, installation, and maintenance manuals for the system

   p. Software version control/equipment hardware and software roadmaps

1.12 Pre-Construction Conference

A. As soon as practical after award of the Contract, a pre-construction conference shall be scheduled with the County.

B. In attendance at said conference will be the County and its representatives.

C. The purpose of said conference is to determine procedures related to the smooth progress of the Project and for processing and distribution of all documents and correspondence related to the Contract will be established.

D. A schedule of values/equipment list shall be submitted to the County no later than the time and date of the pre-construction conference.

1.13 Contractor Meetings

A. The Contractor shall at its expense and as requested by the County, attend any and all meetings called by the County to discuss the work under the Contract.

B. Such meetings shall be conducted and recorded by the County with typed minutes of each meeting distributed to all attendees.

1.14 Standards of Work

A. The applicable sections or portions of the standards, regulations, and codes of the entities listed below shall apply to the Contractor for the equipment and site preparation and for the installation, operation, maintenance, and service of the system by the Contractor.

a. APCO Project 25 System and Standards Definition

b. APCO Project 25 Functional Requirements

c. FCC Rules and Regulations, Code of Federal Regulations, Title 47, Chapter I, including:

d. Part 17 - Construction, Marking and Lighting of Antenna Structures

e. Part 90 - Private Land Mobile Radio Services

f. Part 101 - Fixed Microwave Services

g. FAA Regulations

h. Vol. XI - Objects affecting Navigable Airspace Part 77

i. Advisory Circular 70/7460-1L

j. Electronic Industries Association (EIA) Standards:

k. EIA-152 Minimum Standards for Land Mobile Communications, FM, or PM Transmitters

l. EIA-204 Minimum Standards for Land Mobile Communication FM or PM Receivers (25-927 MHz)

m. EIA-210 Terminating and Signaling Equipment for Microwave Communication Systems

n. EIA-220 Minimum Standards for Land Mobile Communications Continuous Tone Controlled Squelch Systems (CTCSS)

o. EIA-232 Interface between data terminal equipment and data circuit-terminating equipment employing serial binary data interchange

p. EIA-310 Racks, Panels, and Associated Equipment

q. EIA-316 Minimum Standards for Portable/Personal Radio Transmitters, Receivers, and Transmitter/Receiver Combination Land Mobile Communications FM or PM Equipment, 25-1000 MHz

r. EIA-329 Minimum Standard for Land Mobile Communications Antennas, Part I - Base or Fixed Station Antennas, and Part II - Vehicular Antennas

s. Telecommunications Industry Association Standard TIA-603 latest revision

t. Telecommunications Industry Association Standard Technical Service Bulletin TSB-88 latest revision

u. Telecommunications Industry Association / Electronic Industries Association (TIA/EIA) Standard TIA-222 latest revision for communications towers

v. Telecommunications Industry Association (TIA) Standard TIA-102 latest revisions

w. IEEE - Institute of Electrical and Electronic Engineers

x. Military Standard 810 - where specified, radio equipment shall meet specific requirements of parts of Military Standard 810 C, D, E, F, and G

y. National Electrical Code

z. Local Electrical and Building Codes

aa. NEMA - National Electrical Manufacturer's Association

bb. National Fire Protection Association - (NFPA):

cc. NFPA #1221 - Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems

dd. NFPA #70 - National Electrical Code

ee. NFPA #37 - Combustion Engines

ff. NFPA #78 - Lightning Protection Code

gg. NFPA #110 - Emergency and Standby Power Systems

hh. NFPA #58 - Liquefied Petroleum Gas Code

B. The Contractor shall be responsible for meeting the requirements of the latest revisions of each document at the time of installation regardless of the revision level in place at the time of proposal submittal.

C. At time of installation, any non-compliant equipment shall be updated to the latest specification at no additional cost to the County.

D. In addition to the standards and codes referenced above, it is the intent of this document to specify a full and complete System that adheres to the objectives and requirements of APCO P25, Phase 1 and Phase 2 standards.

2. SYSTEM IMPLEMENTATION PLAN

A. The System implementation shall include the complete installation and optimization of the infrastructure equipment that is comprised of multiple repeater tower sites, microwave backhaul networks, base station repeater radios, trunked system controllers and network management systems, dispatch consoles and associated subscriber equipment.

B. All equipment furnished by the Contractor shall meet the requirements of this RFP and the manufacturers' published specifications, comply with all Federal, State, and Local laws, rules, regulations, and ordinances, at the time of delivery, reflect high quality workmanship throughout, and be suitable for the intended purposes delineated herein.

C. The Contractor shall provide detailed plans of processes for tracking and controlling the Project and shall include a high-level Project plan for the overall Project Schedule, work breakdown structure, Project communications, quality assurance, change control procedures, and a transition and cutover plan for each agency.

D. The Project plan will be a dynamic document that will be continually updated and evaluated as the Project progresses.

E. A detailed Project plan and schedule shall be required of the Contractor after the System design review.

2.1 Project Communications Plan

A. The Contractor shall provide a communications plan that includes contact information for the members of the Project team and escalation procedures to be followed if there is an issue that may put the Project or a portion of the Project at risk.

B. The communications plan must also show all levels of Project reporting throughout the Project lifecycle.

C. The County requires a regularly scheduled bi-weekly Project meeting starting immediately after the contract signing.

D. Additional meetings will be scheduled as required or requested by the County.

E. Items to be included in the communication plan:

   a. Project Team contact information

   b. Escalation procedure

   c. Scheduled meetings

   d. Meeting cycles

   e. Meeting agendas

   f. Meeting report sample

g. Required attendees by title (engineer, user, executive, etc.)

h. Project status reports

i. Status report cycle

j. Content to be provided in the status report

k. Status report sample

l. Status report recipients

m. Secure web site for document sharing

2.2 Project Schedule

A. The Contractor shall provide a detailed Project Schedule as part of their proposal and which shall be referenced to the contract execution date.

B. The Project Schedule shall include important milestones and logical breakpoints during which the County and the Contractor will assess the progress to date, and prepare for the remaining Project tasks.

C. The first milestone of the Contractor's schedule shall be contract execution. All other events shall be referenced in number of days from contract execution.

D. A second milestone in the proposed schedule shall be completion of system staging.

E. The Project Schedule shall clearly identify the tasks to be performed by both the County and the Contractor including the following tasks and milestones:

a. Contract Execution / Notice to Proceed

b. Completion of system Detailed Design Review

c. System Factory Staging completed and equipment shipped

d. Completion of infrastructure installations at the fixed end locations

e. Infrastructure acceptance testing successfully completed

f. Technical, Management Systems, and User/Operator training

g. Coverage testing successfully completed

h. Test documentation submitted to the County

i. 30-day operational test successfully completed

j. System infrastructure accepted and warranty begins

k. Completion of the transition of all agencies to the system

l. Decommissioning and disposal of the old equipment

m. Project completion and Final System Acceptance

2.3 Extension of the Project Schedule

A. Installation and satisfactory operation of the system must be completed within the Contract Time established in the Agreement.

B. Contract Time extensions will be considered as described in the Agreement.

2.4 Work Breakdown Structure

A. The Contractor shall provide to the County within 21 days after completion of the Detailed Design Review, a work breakdown structure that provides a detailed listing of the physical work and tasks to be accomplished by the Contractor and the County.

B. The work breakdown structure can be a part of the Project Schedule, but it must include the following:

   a. Task description

   b. Responsibility for completion of work task

   c. Date scheduled for completion

2.5 Quality Assurance Plan

A. The quality assurance plan is a physical guideline of the steps taken to demonstrate that system implementation is proceeding in a manner that is consistent with the County expectations and industry standards.

B. The quality assurance plan shall include a narrative and/or photos of the acceptable final product of each phase of the installation and physical inspection points shall be indicated and include the following as a minimum guideline:

   a. The system design review

   b. System design documentation

   c. Site development and construction (if applicable)

      i. Civil work completed

      ii. Tower construction

      iii. Equipment shelter foundations

      iv. Equipment shelter installation

      v. Grounding and bonding

      vi. Electrical installation

   d. Equipment staging

   e. Equipment inspection and inventory

   f. Steps of inspection throughout the implementation process

i. Before installing electronic equipment

ii. After installation of electronic equipment

iii. Before installation of antennas

iv. After installation of antennas

g. As-built documentation

h. Final acceptance

C. The County and the Contractor shall have the appropriate representatives inspect and approve the quality of work before moving to the next step and the inspection points shall be a part of the Project Schedule.

2.6 Change Control Process

A. As the Project moves forward, there may be changes to the original scope of work; an important part of managing a Project is to prevent, track and document changes.

B. The proposal shall include the procedures to minimize or stop "scope creep", identify potential problems that impact the schedule and Project cost, and track changes that are agreed upon by the County and the Contractor.

C. The proposal shall include a sample change control document.

2.7 Payment Schedule

A. Payments shall be made in accordance with the executed Communications System Contract Agreement.

2.8 Transition, Cutover, and Fallback Plan

A. The proposal shall include a high-level plan to transition agencies from the existing systems to the new system and the steps required to complete the cutover.

B. During transition, an agency must not have communications on the existing system disrupted.

C. The final cutover shall be planned in such a manner as to have minimal disruptions to the agency operations.

D. The Contractor shall consider the use of gateways, radio patches, timing, training, and/or other methods to minimize disruptions to operations.

E. The Contractor shall provide a detailed transition and cutover plan within 60 days from the Detailed Design Review.

F. The cutover plan must also include a fallback plan to transition back to the old system in the event that serious problem occurs during the cutover phase.

G. There must be a well-defined decision point for the County to determine if they are agreeable to the cutover of communications.

H. The County will work closely with the Contractor to develop a successful plan.

3. COMMUNICATION SYSTEM REQUIREMENTS

3.1 General Overview

A. The County intends to replace their current VHF radio system with a 5-site simulcast, P25 Phase 1 and Phase 2 compliant communications system.

B. The new P25 digital voice communications system shall provide improved radio coverage throughout Columbia County, including improved portable radio coverage within buildings, and improved interoperability with surrounding agencies and technologies.

C. The new communications system shall provide direct interoperability between participating agencies and shall be capable of interoperable communications at the CAI, and ISSI levels with surrounding P25 systems.

3.2 APCO Project 25 Compliance

A. The system architecture shall conform to the objectives and user requirements outlined in the current APCO Project 25 standards (see TIA/EIA-102 family of specifications) in terms of digital modulation, spectral efficiency, enhanced audio quality, conventional and trunking modes and signaling, ID methodology, and direct interoperability with equipment from other system and equipment manufacturers.

B. The Contractor shall adhere to the P25 standards for all features that are included in the P25 TIA/EIA 102 specifications, but the County will accept Contractor-specific solutions for those features currently outside of the P25 scope in order to obtain a full featured communications network.

C. The Contractor has the responsibility to demonstrate P25 conformance for those subscriber and network infrastructure features contained in the P25 standards, while clearly delineating those features that have been developed with proprietary solutions.

3.3 P25 Compliance Assessment Program

A. Proposals shall include complete and comprehensive detail for all fixed network equipment P25 conformance testing for equipment being offered to the County.

B. All proposed proprietary features and operational characteristics shall be clearly identified to the County in the proposal in writing for all proposed equipment to identify the Contractor’s deviation from the P25 standards.

C. For the life of the contract and maintenance period, the Contractor accepts full responsibility and expense for remedying and correcting any identified P25 non-conformance issue for all affected system hardware and software.

3.4 Infrastructure Network Control Point Equipment and Sites

A. The communications system network control point equipment shall be mounted in freestanding equipment racks or equipment cabinets, and shall be provided in a geo-

redundant, fault-tolerant configuration with redundant components including power supplies.

B. All communications system control point equipment shall be integrated to the Network Control and Management System and provide self-diagnostics and alarms when faults are detected.

C. The communications system control point equipment shall be located at the following County facilities:

   a. Master core and simulcast control (if applicable) equipment at the EOC

   b. Geo-redundant master core and simulcast control equipment at CCSO (if applicable)

D. The communications system base station repeater tower site equipment shall be located at the following facilities:

   a. Columbia County Sheriff's Office (CCSO)

   b. Lulu

   c. Cumorah Hill

   d. EOC

   e. Deep Creek

   f. Greenfield (Optional Sixth Site)

3.5 P25 Trunked Simulcast Infrastructure System

A. The new P25 simulcast communication system shall be implemented as a 5-site system utilizing the County's existing tower sites.

B. The proposed design approach shall be modular in nature and provide the flexibility to readily add channel capacity and add tower sites to increase radio coverage.

C. The replacement system shall include all base stations and antenna systems, system management and control systems, replacement of the backhaul network, and new dispatch consoles.

D. To ensure a high level of system availability, the system shall be configured with redundant and geo-redundant control and network equipment and subsystems in key areas that affect the delivery of wide-area, trunked radio system communications such that a single point of failure shall not inhibit or otherwise interrupt wide-area communications including the dispatch console operations.

3.5.1 Precision Frequency Source

A. A precision frequency source shall be redundant, and shall be provided at each simulcast site to stabilize frequency synthesizers in the repeater stations, and to provide synchronization of simulcast transmission equipment.

B. The precision frequency source shall be a redundant "off-the-air" GPS frequency locked source.

C. The frequency source shall be capable of maintaining the proper frequency stability and synchronization of the system upon failure/loss of the primary GPS reference signal receiver.

D. The GPS frequency source systems alarms shall be integrated to the Network Control and Management System.

3.5.2 Channel Capacity

A. The Contractor shall design the new P25 communications system with a total of five (5) repeater channels.

3.5.3 P25 Phase 1 and Phase 2 Operations

A. The System shall be designed, configured, and implemented to immediately support both Phase 1 (FDMA), and Phase 2 (TDMA) transmissions on all base station channels and dispatch consoles.

B. The Contractors shall propose a System that supports both Phase 1 and Phase 2 talk groups and transmissions, and automatically adjusts transmissions to Phase 1 operation on all channels to accommodate user equipment that is not Phase 2 compatible.

C. The Contractor shall provide in their proposal, a detailed and comprehensive description of their ability to support Phase 1 and Phase 2 talk groups and cross-patches on a common system.

3.5.4 Trunked ISSI Interface

A. The Contractor shall provide a Inter Sub-system Interface (ISSI) that shall meet P25 standard requirements.

B. The Contractor shall include a listing of the current features supported by their ISSI interface.

C. The Contractors shall describe in their proposal in technical and operational detail, the system features and functionality that is available for users on each system when they are interconnected through an ISSI including any operational and functional limitations imposed by the ISSI connection.

D. The ISSI shall have the ability to support a minimum of five (5) ports/connections. The ISSI shall support a minimum of 20 simultaneous talk groups per port/connection.

E. The Contractor shall include pricing in their proposal for the full cost of hardware and software licenses for a multi-port P25 Inter RF Subsystem Interface with three (3) ISSI interface to enable the County to connect to adjacent P25 systems.

F. The Contractor shall provide in their proposal line item pricing for each additional ISSI interface.

G. The ISSI subsystem shall be redundant in that the loss of a site shall not result in the loss of ISSI functionality.

H. The ISSI shall meet the following minimum functional requirements.

   a. Talk group Call
   b. Emergency Call
   c. Encrypted Voice
   d. P25 Phase 1 Vocoder
   e. P25 Phase 2 Vocoder
   f. Manual Inter-WACN Roaming
   g. Manual Inter-system Roaming
   h. Automatic Inter-WACN Roaming
   i. Automatic Inter-system Roaming
   j. Automatic Intra-system Roaming
   k. RFSS Service Capability Polling
   l. Transport of PTT-ID
   m. Priority Call
   n. Emergency Alarm
   o. Emergency Alarm Cancellation
   p. Group Emergency Alarm
   q. Busy Processing (Busy Queuing and Callback)
   r. Subscriber Unit Registration
   s. Transport of Authentication Credential
   t. Secure Subscriber Unit Registration
   u. Subscriber Unit Deregistration
   v. Group Affiliation
   w. Call Restriction
   x. The ISSI may meet the following requirements; please indicate your level of compliance in your Point-by-Point response.
   y. Selective Call

z. Selective Alert ("Call Alert")

aa. P25 Data

bb. Short Message / Pre-Programmed Data Message

cc. Radio Check

dd. Radio Monitor

ee. Radio Inhibit/Uninhibit

ff. Radio Status Query/Status Update

gg. Over-the-Air Rekeying

hh. Text Messaging

ii. Priority Level Access and Queuing

jj. Emergency Preemption (Ruthless Preemption)

kk. Dynamic Regrouping

I. The Contractors shall include in their proposals some examples of systems where they have connected other manufacturers' P25 systems via ISSI.

3.5.5 P25 Talk Group and User ID Capacity

A. The system shall be equipped, licensed and configured to support a minimum of 25,000 individual user ID's and have the capacity to support, at a minimum, 100,000 individual user ID's without additional hardware.

B. The system shall be equipped, licensed and configured to support a minimum of 700 talk groups and have the capacity to support, at a minimum, 5,000 talk groups without additional hardware.

3.5.6 P25 Data Communications

A. The system shall be equipped to provide P25 data services to support data communications with subscriber equipment for features such as over-the-air-rekeying OTAR, over-the-air-programming OTAP, and other features such as text messaging and AVL that require data communications.

3.5.7 700 MHz Frequencies

A. The County has twelve (12) 25 kHz 700 MHz channels assigned in the Region 9 Plan. The Contractor shall propose the use of five (5) 12.5 kHz 700 MHz channels.

3.5.8 Intermodulation Analysis

A. Prior to implementation and for each tower site, the Contractor shall perform an intermodulation analysis and shall consider the equipment from all tenants located at the proposed site per FCC license information.

3.6 National Mutual Aid Channels

A. The Contractor shall provide 8TAC92 at the Deep Creek tower site, 8TAC93 at the EOC tower site and 8TAC94 at the Cumorah Hill tower site.

3.7 Frequency Plan

A. The Contractor shall develop a preliminary frequency plan utilizing five (5) of the available 700 MHz channels from the Region 9 Plan.

B. The Contractor shall include 8TAC92 in the frequency plan at the Deep Creek tower site, 8TAC93 at the EOC tower site and 8TAC94 at the Cumorah Hill tower site.

3.8 System Reliability, Redundancy, and Backup Requirements

3.8.1 Single Point Failure Modes

A. The Contractor shall design their proposed system to prevent the loss of wide-area trunked communications due to any single point failure within the system.

B. The Contractor shall demonstrate in their proposal that their proposed system will not suffer a loss of wide-area trunked communications due to any single point failure within the system.

3.8.2 System Control Point Geo-Redundancy

A. Geo-redundant master core sites and geo-redundant simulcast control sites (if applicable) shall provide continuous call processing and system operation in the event of one or more unrelated points of component failure or the complete loss of a site.

B. The Contractor shall consider geo-redundant control site locations at the following County sites.

   a. EOC Communications Room

   b. CCSO Site

C. All master core site and simulcast control site failures and status messages shall be reported to the radio system management system allowing appropriate action to be taken to restore the system to its normal operation.

3.8.3 Simulcast Site Failure

A. In the event of the failure of one or more simulcast sites, the remaining simulcast sites shall maintain full operation.

3.8.4 Simulcast Base Station Failure

A. Should a single base station fail, the site shall continue to operate in the trunked mode.

3.8.5 Dispatch Console System Failure

A. The console system shall be equipped with a number of self-diagnostic subsystems that shall continuously monitor and verify the correct operation.

B. Diagnostic capability shall be distributed among independent and redundant subsystems and shall not rely on one central diagnostic circuit.

C. Should a fault be detected, the supervisory consoles shall be notified via the Network Monitoring and Control System.

D. Redundant equipment shall be automatically activated, and diagnostic information shall be logged.

E. Diagnostic messages shall be presented in an easy to read format.

F. Diagnostic systems that require the dispatch supervisor to cross-reference an error code to a fault message shall not be acceptable.

G. In the event of the failure of one or more console operator positions, the remaining dispatch console operator positions shall maintain full operation.

3.8.6 Dispatch Console Fallback

A. When link connectivity is lost to the P25 simulcast network, a link failure message shall prominently appear on the operator and supervisor displays to notify them that the console system is no longer in contact with the radio infrastructure.

B. The console system shall maintain connectivity and functionality with local network resources such as conventional interfaces, control stations, and Aux I/Os.

C. The operator can then select the desired talk group on a backup control station or portable radio to communicate with field personnel.

D. The Contractor shall include descriptions of failure scenarios and discuss all redundant features that include dual circuitry, switchover circuitry and the outage time to accomplish switchovers.

E. An alarm indicating that the failure and switchover occurred shall also be reported at the supervisor's console.

3.8.7 Infrastructure Power Systems Failure

A. In the event of the failure of commercial power, the trunked system infrastructure and dispatch consoles shall be powered by a suitably sized uninterruptible power source of sufficient capacity to maintain full operation of the equipment during the transition to the backup power generator system.

3.8.8 Catastrophic System Failure

A. Should the trunked radio system fail to the point that wide-area simulcast trunking can no longer be maintained, then the trunking system shall revert to what is commonly known as a “site trunking” or in some cases a "failsoft" mode of operation.

B. Contractors shall fully describe in their proposals their various fall back scenarios in the event of wide-area trunking.

3.8.9 Control Channel Reliability

A. In the event that the control channel fails, the failure shall be detected and one of the remaining base stations shall be automatically assigned to transmit the control signaling.

3.9 Trunked System Functional Requirements

3.9.1 Voice Encryption

A. The system infrastructure shall provide for Advanced Encryption Standard 256 (AES256) end-to-end digital voice encryption for all dispatch consoles and for properly-equipped user equipment.

3.9.2 P25 Data

A. The system shall be equipped to support P25 data communications.

3.9.3 Over-the-Air Programming

A. The County may decide to program subscriber radio code plugs “Over-the-Air” (OTAP) to reduce the amount of time and effort required in making changes to the radio fleet in the event of system changes or expansions.

B. The Contractor shall describe their system’s capability for OTAP including any limitations that programming of subscribers over-the-air has over traditional methods.

C. The Contractor shall describe the process by which the reprogramming takes place.

D. The Contractor shall describe the process by which the reprogramming takes place for the programming of other manufacturers’ user equipment.

3.9.4 GPS and AVL

A. The County would like to consider options for GPS/AVL services in this procurement.

3.9.5 Common System Features and Services

A. The proposed system shall be able to provide public safety features and services based upon the most current P25 guidelines, and shall provide the following functions and services at a minimum:

   a. Affiliation

   b. Announcement Group Call

c. Broadcast Voice Call
d. Busy Queuing and Call Back
e. Call Alert
f. Call Interrupt
g. Call Restriction
h. Call Routing
i. Channel Marker
j. Continuous Assignment Updating
k. Discreet Listening
l. Dynamic Regrouping
m. Emergency Call
n. Encryption
o. Group Voice Call
p. Individual Voice Call
q. Misdirected Radio Protection
r. Multiple Algorithms
s. Multiple Key Encryption
t. Multiple Priority Levels
u. Out-of-Range Indicate
v. Over-the-Air Rekeying
w. Priority Call
x. Recent User Priority
y. Preemptive Priority Call
z. Radio Check
aa. Radio Unit Inhibit
bb. Radio Unit Uninhibit
cc. Radio Unit Monitoring
dd. Registration
ee. Roaming
ff. Silent Emergency

gg. Status Request

hh. Status Update

ii. System Call

jj. Talk group Call

kk. Talking Party Identification

ll. Talk Prohibit Tone

3.9.6 Commercial Carrier Talk Group Interface

A. The County is interested in the interface technology that enables specially equipped cellular handsets to access specific talk groups on the P25 communication system.

B. The Contractor shall provide in their proposal a comprehensive technical and operational description of their offering and the estimated cost for hardware, software, and licensing fees.

C. The Contractor shall provide in their proposal a listing of the estimated cost for software and licensing fees by quantities of user groups of 50 and 100, and the cost by groups of talk groups.

3.10 NPSPAC Mutual Aid Conventional System

A. The Contractor shall provide 8TAC92 at the Deep Creek tower site, 8TAC93 at the EOC tower site and 8TAC94 at the Cumorah Hill tower site.

B. All wireline dispatch console positions shall be able to support repeat enable and repeat disable on all channels to comply with Region 9 requirements.

C. The Contractor shall provide for the integration of the National Mutual Aid Channels into the new antenna systems and backhaul network.

3.11 Trunked and Conventional Base Station Repeater Stations

A. All base station repeater equipment shall be certified to be FCC type accepted and meet all applicable FCC technical standards and Contractors shall provide the type acceptance numbers in their proposals.

B. All trunked stations shall meet the performance standards and specifications as specified in TIA-102.CCAB and performance recommendation.

C. The trunked repeater stations shall be capable of supporting the radio frequency signals and modulation modes defined in the P25 Standard for Phase 1 and for Phase 2 modulations and be 700 MHz and 800 MHz capable.

D. The trunked repeater stations shall support linear simulcast modulation modes for Phase 1 and for Phase 2 modulations.

E. All repeater stations shall be capable of operating at a 100% duty cycle at the full rated transmitter power output of 100 watts.

F. All trunked base station repeaters shall be of the same model and power rating to minimize the equipment spares requirements.

G. The Contractor shall provide extensive specifications and documentation for the proposed base station equipment and related systems such as:

   a. Station construction details (enclosure type, chassis type, etc.)

   b. Transmitter specifications

   c. Receiver specifications

   d. Tuning procedures

   e. RF devices such as Isolators, filters, duplexers, shielding, transmitter combiners, receiver multi-couplers, tower top amplifiers.

   f. Station ID devices

   g. Power supplies

3.12 Transmitter Power Monitoring System

A. The Contractor shall provide a cost in their proposal for an optional transmit power monitoring system for each simulcast site.

B. The County desires to be able to monitor the transmitter power input to the transmitter combiner and the power output of the transmitter combiner at each simulcast tower site.

C. The Contractor shall describe in detail in their proposal the capability of their proposed system and the alarm monitoring software and hardware proposed.

3.13 700/800 MHz Antenna Systems

A. The Contractor shall furnish and install a transmit antenna system at each of the trunked repeater sites including antenna, filters (if required), pigtails, transmission line and ground kits, surge suppressor, and transmitter combiner.

B. The Contractor shall furnish and install a receive antenna system at each of the trunked repeater sites including antennas, tower-top-preamps and preselector filters, pigtails, transmission lines and ground kits, surge suppressors, transmitter combiners, and receiver multicouplers.

C. The Contractor’s transmit and receive antenna systems design shall utilize 1-5/8” transmission lines for transmit and 7/8” transmission lines for receive.

D. The County prefers that all base station antennas and transmission lines shall be furnished with 7/16-inch DIN connectors.

E. Splices or adaptors in any transmission lines are not permitted and will be rejected.

3.13.1 Transmission Lines

A. All transmission lines and interconnecting jumpers shall be continuous length, 100% shielded, foam polyethylene dielectric, UV resistant, as manufactured by CommScope, or a County-approved equivalent and sized as required to meet the Contractor's engineering specifications.

B. Connectors shall be properly installed and shall match the appropriate mating connectors.

C. Standard stainless bolt-in hangers shall be used and snap-in hangers are not acceptable without County approval.

3.13.2 Transmitter Combiner

A. The Contractor shall provide transmitter combiners for transmitters at each tower site.

B. The Contractor shall submit the combiner plan in their proposal.

C. The proposal shall state the manufacturer and model numbers of the combiners proposed for each site and provide the complete specifications.

3.13.3 Receiver Multicoupler

A. The Contractor shall provide a receiver multicoupler and tower-top amplifier system for each receive site.

B. The multicoupler system shall consist of a redundant tower-mounted preamp, preselector filter, tower-top amplifier test port, and equipment shelter based receiver distribution system including power supply and associated controls.

C. The tower-mounted preamplifier shall be redundant, and it shall be possible to switch the "main" or "backup" preamp into service or bypass them altogether from the switching controller located in the shelter.

D. The tower-mounted preamplifier shall provide a failure mode where the preamps are bypassed in the event of a failure of both preamps.

E. The tower-top amplifier test port shall allow the preselector input to be transferred to an internal termination load for testing purposes.

F. An internal coupler shall be provided to permit injection of test signals between the termination and the preselector filter via a shelter mounted test port input and connecting coaxial cable.

G. The receive multicoupler systems shall provide six (6) outputs and be expandable to accommodate 100% growth.

H. The receiver multicoupler system shall be integrated to the Network Control and Management System RTU for alarm purposes.

3.14 System Interoperability

A. The County requires that the new communications system provide a high level of interoperability with surrounding agencies operating P25 or conventional communication systems.

3.14.1 Regional Interoperability with Other P25 Systems

A. The Contractor shall describe in technical and operational detail how their proposed system will provide the County's users interoperability with users on other P25 systems that may be interconnected with the County's system including the State of Florida, Alachua County FL, and Lowndes County Ga.

3.14.2 Interoperability with Legacy and Conventional Systems

A. The Contractors shall describe in their proposal in technical and operational detail how their proposed system interfaces will provide the County's P25 users interoperability with users on legacy and conventional systems including disparate technologies such as Digital Mobile Radio (DMR) and IDAS.

B. At a minimum, these interfaces shall include functionality for the following:

   a. Control station radios connected to the dispatch console systems to communicate with users on the backup conventional VHF base stations located at the County tower sites

   b. Future 2-wire and 4-wire tone-controlled wireline base stations

   c. Future control station radios

   d. Local control/PTT/COR for local radios

   e. Other 2-wire and 4-wire analog sources

3.15 Logging Recorder System

A. The Contractor shall include in their proposal, detailed pricing for a logging recorder system that is P25 compatible, and able to record dispatch console and conventional analog audio from mutual aid base stations, control station radios, and other sources that may be connected through conventional interface gateways.

B. The Contractor shall include one work station for retrieval of system communications to be located within the EOC at a location TBD.

C. The proposed logging recording system shall be provided and configured to support (48) unique talk groups and conventional analog resources and have the capability to expand to (96) unique talk groups and conventional analog resources.

D. The proposed logging recording system shall provide a minimum of 30 days of storage time before over-writing previous records.

3.16 Network Control and Management System

A. The Contractor shall furnish and install a Network Control and Management System (NCMS). The NCMS shall provide system administrators access to databases for data entry and retrieval, record keeping, adjustment of the system operating parameters, and system usage statistics.

B. The NCMS shall support multiple users and sessions.

C. The NCMS shall provision and monitor the integrity of all major communications system components and subsystems, and routinely poll system devices to determine their status.

D. This shall include, but not be limited to, the trunked system controller status, system and equipment diagnostics, fault reporting and alarms.

E. The NCMS shall allow operators to create, change, and delete items such as adding sites, talk groups, aliases, channels, and updating subscriber programming.

F. The NCMS and user terminals shall be powered from 120 VAC 60 Hz.

G. The NCMS and user terminals shall be equipped with 22” LCD display monitors.

3.16.1 Remote Access

A. The County desires to access the NCMS from remote locations including infrastructure sites on the proposed backhaul network and external unspecified locations.

B. Access shall be provided using a Windows based computer.

C. The Contractor shall provide in their proposal a detailed description of the remote access capabilities of their proposed system and clearly depict the functionality available via remote access, the method of connectivity proposed, and the security measures provided to prevent unauthorized system access.

3.16.2 NCMS Network Security

A. The Contractor shall provide in their proposal a detailed description of their proposed security measures to protect physical network components (routers/switches, buildings, etc.) and how the network and the information on the network will be kept secure.

3.16.3 System Manager Access Levels

A. The NCMS system management application shall have multiple levels of security access. The system management function shall be password protected and keep a log of all login and entries into the system by date, time, and authorized individual.

3.16.4 Data Base Partitioning

A. The NCMS system management application shall be capable of partitioning the database such that different managers have access and control over the units and groups for which they have been authorized.

3.16.5 Communication System Failure Notification and Alerting

A. The NCMS system shall provide the capability for e-mail and text alerts to be sent to designated administrators when critical failures occur on the communications system.

3.16.6 System Database Management

A. The NCMS system shall maintain a backup of system configuration information, such as talk group configurations and radio ID ranges.

B. A database shall be maintained to simultaneously store and update system user profiles such as user group access, priority levels, dynamic regrouping plans, authorization codes, call statistics, traffic recordings for each radio, talk group, fleet map and agency, etc.

C. Additionally, whenever a field unit is powered up and is within radio coverage of the system, the unit's discrete address and user group selection shall be recorded into the system database.

D. The database shall permit user defined sorting of calls by units, groups, time of day, duration of call, channel, site, and priority.

E. The database shall be continuously backed up in real time. The backup database shall act as a "fault tolerant" database that is automatically kept current.

F. Should there be a failure with the primary database; the backup database shall automatically be activated for system access with no drop in service.

G. The database shall have sufficient capacity to store all system profiles, as well as the capacity to store a minimum of ninety (90) days of system activity for report generation.

3.16.7 System Management Report Generation

A. The NCMS system shall include a monitoring/management terminal, with software that allows for system detailed and summary reports, individual radio reports and other customized radio reports based upon a given set of parameters.

B. The Contractor shall provide in their proposal a detailed description of the standard and optional reporting capabilities of their proposed system.

C. The system manager application shall be capable of generating system management reports to provide management personnel with pertinent system information and reports to make informed decisions regarding the system capacity and grade of service, and the operational effectiveness of the various components of the trunked radio system.

D. The system shall be capable of archiving a minimum of 90 days of data and reports shall include at least three months of system activity.

3.16.8 System Ancillary and Site Alarms, and Controls

A. System status information shall be accessible from the system management terminals.

B. Authorized personnel shall be able to query and retrieve alarm conditions pertaining to the alarm status of the communication systems and equipment.

C. System management and monitoring terminals shall be provided at the following locations:

   a. EOC Facility

   b. Radio System Manager's office at the EOC

D. The system management and monitoring terminals shall be equipped with 22" display monitors.

3.16.9 Remote Terminal Units

A. The Contractor shall furnish and install a new tower site alarm system and the associated remote terminal unit at each communications site.

4. DISPATCH CONSOLE REQUIREMENTS

A. The Contractor shall be fully understand the current dispatch console functionality and to maintain the current level of functionality when implementing the new dispatch console equipment.

4.1 Wireline Dispatch Console Locations

A. The Contractor shall provide wireline dispatch console operator positions and equipment at the following locations.

   a. Nine (9) operator positions at the EOC facility

4.1.1 EOC

A. The Contractor shall replace the existing Motorola dispatch console positions and install nine (9) new console positions.

B. The Contractor shall utilize the existing UPS-protected outlets currently powering the Gold Elite dispatch consoles for the new dispatch consoles.

C. The Contractor shall furnish and install the appropriate auxiliary and interface components to connect the ancillary systems such as conventional base stations, Mutual Aid base stations, and backup control stations to the new dispatch consoles.

D. The dispatch console systems shall continue to operate and function with the auxiliary and interface components to control the local conventional base stations, Mutual Aid base stations, and backup control stations in the event that network communications is lost with the system's master core site switches.

4.2 Mobile Dispatch Console Positons

A. The Contractor shall provide nine (9) mobile dispatch positions.

B. The Contractor shall propose either laptop or tablet based units that are capable full function dispatch capabilities.

C. The Contractor shall provide a full description of the proposed remote dispatch positions and detail what if any features or functions differ from the proposed fixed position radio dispatch consoles.

4.3 General

A. Operators shall be able to perform all functions through the LCD display monitor.

B. The 21" LCD touch screen display shall be designed so that the number of items which will appear on the screen at a given time shall be minimized thereby reducing the potential distractions to the operators.

C. All radio dispatch functions shall be operable from one display screen.

D. Operators shall not be required to access another screen display in order to perform a radio dispatch function.

E. The console electronics shall use a distributed IP based multi-processor concept and shall employ a physical architecture that consists of servers, routers, LAN/WAN equipment, conventional channel interfaces, Aux I/Os, instant recall recorder, logging recorder interface, and dispatch operator positions.

F. The screen display shall be flexible allowing authorized personnel to determine which functions are available at each operator position, which channels are available, how these channels appear on the screen and the names associated with channels, channel options, auxiliary functions, and indicators.

G. Each channel or auxiliary function shall be referenced by alphanumeric characters not numeric only or cryptic references.

H. The dispatch supervisory positions shall have Supervisory Control and the capability of overriding the other radio dispatch positions.

I. For personnel safety and equipment protection, all console equipment shall be grounded to the local building ground system.

J. The Contractor shall coordinate the location of the equipment ground with the County.

K. The Contractor shall provide any other equipment racks, grounding and bonding, and miscellaneous hardware and components required for completion of the dispatch console/backup radio installation.

4.4 Dispatch Console Furniture

A. The County will utilize the existing dispatch furniture at all dispatch locations that are part of this Project.

4.5 Dispatch Center Netclock Timing/Synchronization

A. The County will utilize the existing time synchronization system so that all systems are synchronized to a common time source. Spectracom NetClock/GPS 9383 TimeServer 9388

B. The Contractor shall work with the County and shall be responsible for interfacing to the County's time synchronization system so that all systems are synchronized to a common time source.

4.6 Console Common Electronics Equipment

A. The common console electronics equipment such as servers, routers, external hard drives, conventional interface units, and LAN/WAN equipment shall be installed in equipment racks within the existing EOC equipment room.

B. Space for front and rear servicing of the equipment shall be provided.

C. The Contractor shall provide scaled layout drawings, for the proposed electronics equipment and associated hardware.

D. The Contractor shall work with the County's personnel to identify the final location for the new equipment racks.

4.7 Console System Interfaces

A. The dispatch console electronics equipment shall provide interface to the following subsystems:

   a. Aux I/Os

   b. Logging Recorder Interface

   c. Conventional Channel Interface

   d. Call Director telephone headset audio

4.7.1 Aux I/O Functions

A. No Aux I/O interfaces are required by the County.

4.7.2 Conventional Channel Interface

A. At each unique dispatch center location, the operator positions shall be connected to a local conventional channel interface or gateway that will facilitate the interface of conventional base stations and control station resources at those locations.

B. The console systems shall support conventional analog interfaces to facilitate communications interoperability with a variety of outside agencies and local interface technologies.

C. The gateway shall support various radio channel interfaces and shall be capable of 2-wire and 4-wire audio and tone and E&M for local control of radio channels, and provide local control for analog resources such as control station radios, and the 800 MHz conventional and Mutual Aid channel repeaters.

D. The Conventional Channel Interface shall provide the tone control functionality to enable the "Repeater Disable" and "Repeater Enable" functions as required by Region 9 to knock-down the conventional Mutual Aid repeaters when they are not active.

E. The system shall be provided to support a minimum of number of conventional interface resources at each site as follows.

   a. EOC RF tower site – (12)

   b. At each of the four remaining RF tower sites – (4)

4.8 Call Director Function

A. All dispatch console positions shall be equipped with Call Director functionality.

B. The Call Director function shall enable dispatch operators to utilize their headsets to answer both telephone calls and radio dispatch calls with a common headset.

   a. The normal mode of operation is dispatch radio audio in the headset

   b. When the operator answers a telephone call, telephone audio moves to the headset and the radio audio moves to the dispatch console microphone and the select audio speaker

   c. When the operator terminates the telephone call, radio audio returns to the headset and the radio audio at the dispatch console is muted

4.9 Agency Partitioning

A. The console system shall allow multiple agencies to share a common system while maintaining full control over and functional operation of their respective resources.

4.10 Centralized Fault Management Network

A. The console system shall provide for robust system fault management from a centralized location. Secondary remote fault management from an alternate location shall also be provided.

B. Access to the fault management system shall be protected from unauthorized access without proper credentials and security clearances.

C. The Contractor shall include descriptions of failure scenarios and discuss all redundant features and the time to accomplish switchovers.

D. Redundancy and resiliency may be accomplished through IP-based and/or Ethernet-based technology.

4.11 Loss of Console LAN

A. In the event that the local dispatch console systems network becomes severed from the main trunked system network, the console systems shall continue to operate “stand-alone” and communicate with its local resources such as backup control stations, conventional base stations and interfaces, and Aux I/Os.

B. A loss of connectivity to the trunked system network core shall not result in a loss of control of local resources.

C. A loss of connectivity to the trunked simulcast system network shall provide a clear indication of a network failure to console operators and supervisors so that they may take appropriate action to implement their backup systems.

4.12 Diagnostics

A. The console system shall be equipped with a number of diagnostic subsystems that shall continuously monitor and verify the correct operation.

B. Diagnostic capability shall be distributed among independent and redundant subsystems and shall not rely on one (1) central diagnostic circuit.

C. Redundant equipment shall be automatically activated, and diagnostic information shall be logged.

D. Diagnostic messages shall be presented in an easy to read format.

E. Diagnostic systems that require a cross-reference of an error code to a fault message shall not be acceptable.

4.13 End-to-End Encryption

A. The console systems shall be capable of providing a high level of security by supporting end-to-end AES-256 encryption of selected talk groups that are configured for encrypted operation.

4.14 Console Patching

A. The dispatch console system shall provide for the flexible patching of talk groups without the need for “double vocoding” of talk groups.

B. A patching window will identify all active patches and patches in operation at any moment.

C. In addition, all channel modules will provide a displayed indication when a talk group or channel is involved in a patch.

D. The dispatch console patch function shall support the patching of trunked talk groups to conventional channel and analog resources.

E. It is essential that the communication resources to be patched within the system occur with as little delay as possible in bringing the patched system to a transmit ready state.

F. It is desired that an access time of less 250 ms be accomplished for each patch to minimize the loss of words and syllables.

G. The Contractor shall discuss the method to be used to begin setup of the patched system while a primary system voice transmission channel is being setup by the trunked radio system network control.

H. In addition, it is desirable that there be no unnecessary hang time at the end of any transmission after a radio user releases their transmit key.

I. The Contractor shall specify the total number of patches, on a temporary or permanent basis, that may be established from each operator position and the total number of patches supported by the system.

4.15 Channel Control Requirements

A. Each channel control window shall contain the specific command buttons and indicators required to control the corresponding base station/talk group.

B. Each channel control window shall be supplied with the following minimum functions and features:

C. Name - an alphanumeric name of a channel or talk group

D. Call indicator - flashes when receive activity is present

E. Transmit indicator - illuminated whenever channel is keyed; including keying from a parallel remote control point or parallel console position

F. Repeat Enabled/Repeater Disabled for conventional resources

G. The following control functions shall be provided by on screen command buttons and/or function keys on a keyboard:

H. Transmit - provides independent and direct keying of a channel

I. Mute - mutes the individual channel to a predetermined level without affecting other channels. Once muted, the channel shall remain muted until unmuted by the console operator or it shall automatically unmute if the channel is selected. When deselected, it shall revert back to the muted condition

J. Select - routes the channel audio to selected speaker output and allows the channel to be keyed via the system transmit function or foot pedal. Any previously selected channel returns to unselected status

K. Repeater Disable – Disables the repeat function of conventional tone-controlled conventional base station repeaters such as the NPSPAC Mutual Aid repeaters

L. Repeater Enable – Enables the repeat function of conventional tone-controlled conventional base station repeaters such as the NPSPAC Mutual Aid repeaters

M. The Contractor shall determine the station control configuration of the County's current equipment, including frequency assignments, conventional paging and signaling, method of control, multiple frequency, and/or multiple receiver stations, etc. and ensure that the proposed dispatch equipment support these existing configurations and capabilities.

4.16 Power Line Surge Protection and UPS Power Supply

A. The County will provide the appropriate electrical circuits required at the EOC center for the console operator and supervisory positions.

4.17 Common Dispatch Console Functions

A. Each of the radio dispatch consoles shall provide all controls that apply to the various channel/talk groups and auxiliary functions for the console.

B. Operator positions shall be PC based, utilizing equipment that is in current production at the time the system is staged to provide a long equipment support life.

C. The operator position application shall be Microsoft Windows based.

D. The Contractor proposals shall identify the proposed operating system and provide a description of the computer equipment proposed for the Project.

E. Contractors shall include in their proposal, their ability to provide the following features and functions.

4.17.1 User Login Accounts

A. Each operator position and supervisory position shall require a valid user login and security password to access the console system and its capabilities.

B. The system shall provide multiple levels of access security for different levels of system usage.

4.17.2 Network Link Failure

A. The console system shall notify the operator and associated supervisory positions of a network link failure between the operator position and the console network control system and between the console network control system and the P25 network control system.

4.17.3 System Not Wide Area/Failsoft

A. The console system shall notify the operator and associated supervisory positions of a system failure indicating a loss of wide area trunking and a failsoft condition if applicable.

4.17.4 Supervisory Control

A. The Supervisors' consoles shall provide takeover control to prevent other dispatch consoles from keying repeaters or base stations for each channel supported by parallel consoles.

B. Supervisory consoles shall be capable of overriding transmissions from other consoles and field units.

4.17.5 Aux I/O Functions

A. To facilitate input/outputs for local indicators and control.

4.17.6 Full Duplex

A. The console shall operate in the full duplex mode so that a dispatcher can simultaneously transmit and receive on duplex RF channels without having to release the transmit function.

B. The console supports this even when headsets are not being used as long as the speakers are not configured to mute during dispatcher PTTs.

4.17.7 Dispatch Console Priority

A. The console shall have wireline priority over a field unit and shall have the capability to preempt the field unit's repeat transmit audio from the system.

4.17.8 Select Speaker

A. Shall provide audio from the selected channels/talk groups, with an independent volume control.

B. A volume level display shall be provided for each channel as well as a select speaker audio level adjustment that ranges from silent to full volume.

4.17.9 Unselect Speaker

A. Shall provide audio from unselected channels/ talk groups, with an independent volume control for the unselect speaker.

B. The console shall be capable of three (3) unselect speakers per operator position but be equipped with one (1) unselect speaker.

4.17.10 Unselect Audio Mute

A. A timed unselect muting function shall be provided that reduces the audio level of all unselected channels to a predetermined level for a programmed period of time.

4.17.11 Speaker Volume Controls

A. Volume controls shall be provided for control of each speaker.

4.17.12 Individual Volume Adjust

A. This function shall be provided for each talk group or channel on the console.

B. Associated status indicators shall continuously show whether the channel is in the full or adjustable volume mode.

C. The volume shall revert to normal level when placed in select status and volume is adjusted by the Select Audio volume control.

4.17.13 Instant Recall Recorder

A. Each console operator position shall be equipped with an Instant Recall recorder.

B. The actual requirements per operator position will be defined during contract negotiations.

4.17.14 Headset and Jacks

A. Two headset jacks per operator position shall be installed at locations convenient to the operator.

B. The headset jacks shall support both 4-wire and 6-wire configurations and be configured during installation.

C. When a headset is inserted into the jack, the operator shall have the capability of routing selected audio to the headset and/or selected speaker.

D. Audio from the unselected channels shall remain routed to the unselected speaker output.

E. The selected speaker audio shall operate normally with the headset removed from its associated jack or when telephone audio is routed to the headset.

F. Individual headset volume controls for radio and telephone audio shall be provided and shall not affect the volume control setting of the selected speaker.

4.17.15 Microphone

A. A high quality cardioid pattern gooseneck or swivel mount microphone having a uniform frequency response and a minimum front-to-back discrimination of 15 dB shall be provided on a flexible arm.

B. The microphone shall be resistant to interference, such as transmitting hum from lights and other devices used in the proximity of the console.

C. Final selection of microphone types shall be determined during the preliminary design review.

4.17.16 Footswitch

A. Each console operator position shall be equipped with a dual footswitch.

B. The unit shall have a dual pedal footswitch for PTT of the selected channel(s).

C. The footswitch shall be heavy duty, designed for public safety use, and shall be designed so as not to skid on a smooth flooring surface.

4.17.17 Transmit PTT

A. A color-coded transmit function to control the push-to-talk (PTT) function for the selected transmitters and/or talk groups shall be provided on the screen or user interface.

B. The PTT function shall be capable of being enabled by a PTT button on the headset, a PTT indication on the LCD display, and by the foot switch at the position.

4.17.18 Instant Transmit

A. Each operator position (including supervisors) shall provide an instant transmit function that will allow the dispatcher to quickly transmit on a conventional channel or talk group resource by depressing the instant transmit “button”.

4.17.19 Busy Tone

A. A visible and audible alert shall be initiated at the console if the dispatcher attempts to make a call and all trunked channels are busy.

B. When the channel becomes available, the console shall automatically alert the dispatcher with an audible tone.

C. The console shall retain the channel availability for the dispatcher for a predetermined time to allow the dispatcher time to activate the transmit function for a user group.

4.17.20 Talk group and ID Alias Display

A. The console system shall be capable of displaying the discrete unit ID, emergency ID, the alias name, and the talk group ID of trunked field units and other dispatch positions on each of the console operator positions.

4.17.21 Intercom

A. An intercom function shall be provided to permit the operator to selectively talk to another console position.

B. In the intercom mode, the screen shall list the user-defined names of all consoles and prompt the operator to select the desired console position.

C. The intercom function shall disconnect the keying signal from the transmit circuit in use so that the operator can use the console microphone circuit to communicate solely with any console or parallel remote control unit similarly equipped.

D. Multiple simultaneous intercom conversations between individual consoles shall be possible.

4.17.22 Clock

A. Shall display time in a twelve or twenty four-hour format (user selectable) and day of the year (HH:MM:SS day) at each operator position.

B. The console clock shall derive its reference time signal from a master time source.

4.17.23 VU Display

A. Shall present a visual indication of receive and transmit audio levels.

4.17.24 Keypad

A. Screen representation of a keypad for numeric data entry.

4.17.25 Keyed Channel Interlock

A. A means shall be provided to lock out control of a channel from other console positions if that channel is already keyed from another console position.

B. The supervisor position can override this feature.

4.17.26 Channel Name

A. Designated channel control modules shall include a minimum of twelve character alphanumeric display symbols to identify the channel.

4.17.27 Channel Marker

A. Channel Marker provides the ability for an operator to place a periotic marker indicator on a talk channel when speech is not present to notify new arrivals that the dispatch operator is currently busy handling a call on that channel and to standby with new traffic.

4.17.28 Conventional Channel Monitor

A. A monitor function shall be provided to permit the operator to disable the continuous tone controlled squelch system (CTCSS) of any selected conventional base station receiver (if so equipped) in order to permit monitoring of the communications channel prior to making a transmission.

4.17.29 Repeater Disable

A. Disables the repeat function of conventional tone-controlled conventional base station repeaters.

4.17.30 Repeater Enable

A. Enables the repeat function of conventional tone-controlled conventional base station repeaters.

4.17.31 Talk group/Channel Select

A. Each talk group or channel shall be capable of independent selection by the dispatcher.

B. The channel window shall provide a visual window indication when the corresponding channel is selected and when it is transmitting.

4.17.32 Call History Window

A. Each console position shall provide a call history window that allows the operator to review the last 20 calls received at that position.

4.17.33 ID Display Queuing

A. Queuing of at least ten plain English ID's (ID scroll list) on the channel window for standard calls and emergency calls.

4.17.34 Simultaneous Select

A. Controls shall be provided that allow the operator to manually select any combination of console controlled talk groups and base stations for simultaneous transmissions.

B. This mode of operation shall allow the selection of multiple trunked talk groups and/or conventional channels.

C. The combined transmission shall utilize a single trunked channel when involving more than one talk group.

D. The trunked field units shall be able to talk back to the dispatcher directly without having to change the user talk group selector switch.

4.17.35 Multi-Auto Select

A. Pre-programmed groups of conventional radio channels and/or trunked user groups shall automatically be selected by the selection of single command button or keystroke.

B. These groups of channels shall be operator programmable.

4.17.36 Talk group Call

A. The console system shall support trunked talk group calls on any talk groups programmed in the system with appropriate management approvals.

4.17.37 Selective Call Alert

A. Selected users and all dispatchers shall have the ability to selectively send and receive an alert to and from an individual user on the system regardless of the assigned talk group.

B. The call shall allow an individual to alert another user with a distinctive tone and their individual ID (ID on display radios only).

4.17.38 Private Call

A. A private conversation shall be possible between the console position operator and any properly equipped mobile, portable, or RF control station.

B. This conversation shall not be able to be monitored by other units on the system.

4.17.39 Talk group/Channel Busy Indicator

A. Dispatch Consoles shall have channel busy indicators to visually indicate that the channel is in use.

4.17.40 Talk Group Merge

A. When operating in this mode, the console shall patch the trunked user talk groups together utilizing only one RF trunked channel.

4.17.41 Talk Group/Channel Cross Patch

A. Shall allow the dispatcher to patch any two or more resources together.

B. The purpose is to allow field units of different conventional radio channels and/or trunked talk groups to intercommunicate directly.

C. If the dispatcher transmits on any talk group or channel included in a patch, then audio shall be heard by all members of the patch.

4.17.42 Talk Group/Channel/Telephone Cross Patch

A. This function shall allow cross patching talk groups/channels and telephone conversations to permit intercommunications.

B. As participants are added or deleted, there shall be no variation in audio levels or quality.

C. All patch audio shall be digitally processed.

D. The patch shall utilize a single trunked channel when patching more than one (1) talk group.

4.17.43 Talk Group/Channel Audio Cross Mute

A. Dispatch Consoles shall include a programmable cross mute feature, which precludes voice communication from a dispatcher's microphone being repeated over loud speakers at other consoles in the dispatch center.

4.17.44 Trunked Announcement Group Calls

A. The console system shall support trunked announcement group calls on any announcement groups programmed into the system, with appropriate management approvals.

4.17.45 Trunked Emergency Calls

A. The console system shall support trunked emergency calls from any user radio programmed in the system with appropriate management approvals.

4.17.46 Emergency Call Alert and Display

A. When a field unit initiates an emergency alert, the console shall provide an audible alert and display the unit ID (alias) of the calling unit in plain English.

4.17.47 Emergency Reset

A. All consoles shall be capable of declaring and receiving emergency alerts from user radios and other operator positions operating on the trunked radio system regardless of the status of the channel control window.

B. Emergency messages shall be indicated by a flashing indicator, an emergency ID character, and an audible alert.

C. Dispatcher acknowledgment of the message shall silence the audible alert and stop the flashing display.

D. The console system shall be capable of queuing multiple emergency messages in the display stack and the emergency ID character shall continue to flash until all messages have been viewed by the dispatcher.

E. The most recent emergency declaration shall be displayed and the dispatcher shall be able to scroll through the queue to view queued emergencies.

F. The Emergency feature shall be programmable to allow the alert message to be delivered and displayed in predefined ways, including display on the current talk group in use by the person declaring the emergency, and display on a separate pre-defined talk group.

G. The declaring alias shall be displayed on user radios of the same talk group and at the appropriate dispatch operator positions.

4.17.48 Alert Tones

A. The console system shall provide a minimum of three distinct over-the-air tones to be used for alerting purposes.

B. Each alert tone shall be immediately broadcast on the selected talk group, group call or all call, when activated.

C. Tones shall be presented in the headset as side tone audio only, at a reduced volume level to confirm that the tone was generated and sent.

D. The following selections shall be available as a minimum:

   a. Alert 1: Steady Alert Tone - shall generate a nominal 1000 Hz steady tone

   b. Alert 2: Warbling Tone - shall alternate low and high frequency audio signals

   c. Alert 3: Pulsed Alert Tone - shall initiate an automatic sequence, consisting of a nominal 1000 Hz tone, for a period of two (2) seconds

4.17.49 Paging Encoder

A. The console system shall include paging encoder functionality for manual paging and to allow for the configuration of preprogrammed single button function paging.

B. The console system shall include a multi-format paging/signaling encoder that is capable of encoding industry standard two-tone sequential and DTMF signaling formats.

4.17.50 Preprogrammed Single Button Function Paging

A. Each console shall be capable of supporting a quantity of pre-programmed single-button paging functions.

4.17.51 Status Messaging

A. Each of the console operator positions and Supervisory positions shall be equipped with the ability to receive and display status messaging from user radios.

B. A minimum of 125 different pre-defined messages shall be supported.

C. Typically, text messages will be used to indicate status reports and updates from field units.

D. The ID of the sender shall be displayed in a dedicated status-messaging window on the GUI.

E. The window shall display the message sent, along with the ID and a time stamp.

F. The window shall scroll messages & place the most recent message at the top of the list.

G. Upon receipt of a message, an audible alert shall notify the operator that a new message has arrived and needs to be viewed.

H. Text messages shall include a message requesting to speak with the console operator.

I. The operator shall be able to respond with a group call for a group alias and with an individual call for an individual alias.

J. Text messages shall be archived by the system so that they can be easily reviewed at any time for management or emergency purposes.

4.17.52 Radio-Telephone Interface

A. The console equipment shall accommodate a radio/telephone interface with the console operator's headset.

B. Operation shall be such that when the headset is not plugged into its associated jack, selected received audio is routed to the "selected" speaker and console microphone audio is routed to the selected radio functions.

C. When the headset is plugged into the headset jack and no telephone line is selected, the selected speaker is muted, selected audio is routed to the headset, and transmit audio originates from the headset microphone and is routed to the selected radio functions.

D. When the headset is plugged into the headset jack and a telephone line is selected, selected audio appears at the selected speaker, telephone audio appears in the headset, and headset microphone audio is routed to the telephone.

E. With the latter configuration, should the console position be placed in a transmit condition, headset microphone audio would transfer from the telephone to the selected radio channel and would revert to the telephone upon release of the transmit key.

5. USER EQUIPMENT REQUIREMENTS

A. All Contractor provided user equipment shall be P25 Phase 1 and Phase 2 equipped and be fully operational in both the 700 and 800 MHz frequency bands.

B. For public safety users, the County requires that Contractor propose only rugged, high-quality, high-tier subscriber equipment that is commensurate with mission critical communications.

C. For local government users, the County requires that Contractor propose only rugged, high-quality, mid and lower-tier subscriber equipment that is commensurate with local government communications.

D. Contractor is expected to offer a range of end user subscriber radio equipment and accessories, to include a variety of options, providing a performance range from the highest quality, highest duty rating, and high performance robust components down to less featured, less mission critical equipment for local government users.

E. Contractor shall include only equipment that is of current design and manufacture and FCC Type Accepted.

F. All proposed subscriber equipment shall incorporate electronic, alphanumeric displays to provide visual indication of system availability, channel/talk group selection, incoming user ID, call alerts, and operational status such as scan and channel busy.

G. All proposed subscriber equipment shall be capable of operating in analog and P25 digital, trunked, or conventional FM modes.

H. The determination of which mode the radio operates in shall be an automatic function of the channel or talk group selected by the user.

I. Direct, radio-to-radio, communications (talk-around) capability is required and this capability shall be available using both analog and P25 digital modulations.

J. When operating in talk-around mode, a P25 digital modulation protocol is required.

5.1 MIL-STD and IP Requirements

A. All proposed subscriber equipment shall incorporate heavy-duty construction, weather-sealed enclosures and weather sealed controls to meet MIL-STD-810 C, D, E, F, and G for water, shock, vibration, dust, humidity, and high/low temperature performance, and the Contractor shall provide these specifications the test method and procedure referenced with their proposal.

B. All proposed subscriber equipment shall be capable of operation without significant degradation when subjected to shock, humidity and vibration.

C. All proposed mobile radio equipment shall meet or exceed Ingress Protection (IP) IP54 for dust and water intrusion.

D. All proposed portable radio equipment including microphone accessories for public safety users shall meet or exceed IP67 for dust and water intrusion.

E. All proposed portable radio equipment including microphone accessories for local government users shall meet or exceed IP54 for dust and water intrusion.

5.2 Features and Functions

A. All mobile, portable, and control station equipment shall be equipped with "Call Alert" for the selective alerting of individual users and/or user groups.

   a. The Call Alert feature lets a dispatch console or certain radios leave a "page" at an unattended radio or dispatch console

   b. Upon returning to the radio or dispatch console, the called user is notified that someone tried to call them

   c. A Call Alert can be used to trigger an activity such as a Call Alert may cause a vehicle's horn to sound and its lights to flash

B. Emergency Call

   a. The public safety subscriber radios used on the current system have an easily identifiable "Emergency" button, recessed to prevent accidental initiation

   b. When users find themselves in a dangerous situation, they can very quickly use that button to alert dispatchers and other users in their talkgroup of the situation

C. Encryption

   a. Specific talk groups and user groups may utilize encryption and the new communications system shall support the capability to utilize end-to-end encryption within user talk groups

D. Loss of Trunking Indication

   a. Contractor shall describe the capabilities of the user equipment radios to provide an indication to the user that the trunked system is operating in a condition that is not normal such as a failsoft mode

   b. It is preferred that users have the ability to silence the failure indication tone

E. Time-Out-Timer

   a. A transmitter time out timer shall be provided to limit key down time

F. Priority Scan/Monitoring

   a. This feature makes it possible for a radio user to scan talk groups in their system, and to mark up to two conventional channels or talk groups in their scan list as "Priority"

   b. A non-priority conversation will be interrupted by Priority 1 or Priority 2 talk group activity

c. A priority channel or talk group is monitored more often than other channels, and will continue to be monitored if listening to another channel or talk group of lesser priority is captured

G. Non-Priority Scan

a. This feature makes it possible for a radio user to scan between multiple systems, talk groups, or conventional channels.

H. "Man-Down" Function

a. This functionality will initiate an emergency alarm on the system, in the event that a radio (and presumably its operator) has been in a static horizontal position for a certain amount of time

b. This functionality allows for dispatchers and other members of the talkgroup to be notified that a user is in need of assistance, even if the user has been incapacitated and is unable to initiate the emergency on their own

c. This functionality has been identified as critical by public safety users on the system and must be available as an option on the subscriber radios

I. Dual-Band Capability

a. The 700 MHz band and the 800 MHz band are considered as a single band for the purposes of this Section

b. This functionality provides the capability for a single radio to operate on two radio frequency bands, such as 700/800 MHz and VHF or 700/800 MHz and UHF

c. This would eliminate the need for users who need to operate on multiple types of systems to carry multiple radios, and would simplify the management of the radio fleet by reducing the total quantity of radios required

d. There must be a subscriber radio option available for this functionality

J. Multi-Band Capability

a. This functionality provides the capability for a single radio to operate on more than one radio frequency band, such as 700/800 MHz, VHF, and UHF

b. This would eliminate the need for users who need to operate on multiple types of systems to carry multiple radios, and would simplify the management of the radio fleet by reducing the total quantity of radios required

c. There must be a subscriber radio option available for this functionality

K. GPS Location Operation

a. This functionality provides the capability to remotely monitor the location of radio units.

b. When combined with the "Man Down" functionality, this becomes a very powerful tool for quickly coming to the aid of fallen users in need of assistance.

c. The new system must include the option of this capability within the radio subscribers.

d. In addition, it is desired by the County that the GPS antenna be integrated within the subscriber radio or its antenna and that an additional external GPS unit and antenna not be required for this functionality.

L. Digital Filtering/Noise Cancellation

a. This specific functionality has been tested by the Athens-Clarke Fire Department and has been found to improve voice intelligibility by eliminating the background noise picked up by the radio microphone and accurately filtering the caller's voice from background noise. Subscriber radios for the new system must incorporate Noise Reduction Software (NRS) and dual microphone capability. This improves user safety by ensuring that transmissions are not only heard, but also clearly understood.

M. Intelligent Radio Display

a. Intelligent radio display feature enables the control of audio level, lighting, and tone alerts of the radio. For example, a user in bright sunlight or high-noise environments must be able to increase the lighting or audio level, or if the user is conducting ongoing, covert surveillance, they need to be able to create a profile that provides lower lighting with subdued alert tones and audio. The new system and the available subscriber radios must support this capability.

N. Alphanumeric Texting

a. This functionality provides the capability for radio users and/or dispatchers to send text messages, in place of voice transmissions. This feature would be very helpful in situations where public safety officers need detailed information such as location addresses or suspect descriptions. Rather than relying on memory or the need to write down the information, the user can go back and read the information stored in the radio. The new system and the available subscriber radios must support this capability.

O. Radio Authentication

a. System security is very important to the County and it would be unacceptable for unauthorized users to interfere with or even monitor the communication activities of public safety agencies. While Selective Radio Inhibit has been an important means of providing some of this security, it provides only the capability of disabling a known threat. To provide a higher level of protection to the radio system, it is desired by the County that the radio system and the subscriber radios be capable of performing an authentication of the radio subscriber units before allowing them access to the system

upon each transmission. The new system and the available subscriber radios must support this capability.

5.3 GPS Specifications

A. Accuracy specifications are for long-term tracking, 95th percentile values, > 5 satellites visible at a nominal signal strength of -130dBm.

   a. TTFF Cold Start < 1 minute

   b. TTFF Hot Start < 10 seconds

   c. Horizontal Accuracy < 10 meters

5.4 Mobile Radio General Requirements

A. The mobile radio shall operate from a nominal 13.8 Volt DC primary power source, and shall be equipped with suitable reverse polarity protection to avoid damage if the radio or battery were to be incorrectly installed.

B. The mobile radio shall be protected against voltages above 14 VDC and operate at voltages as low as 11 VDC without emitting any spurious emission or loss of programming.

C. Mobile radios shall have a transmitter output power of 30 watts minimum, and furnished to operate on all channels in the 700/800 MHz bands.

D. All installations, cabling, brackets, etc. shall be part of this procurement.

5.5 Mobile Radio Configurations and Options

A. The mobile subscriber equipment shall be a universal mount (front/rear) radio.

B. Mobile equipment shall be available for motorcycle, watercraft, and aircraft applications.

C. Open-air mobile units and all external headsets, microphones, and speakers shall be weatherproofed and suitable for outdoor installation.

D. A remote mounting kit and universal mounting kit shall be provided for designated units. The mounting kit shall include control cable, power cable, external control head and microphone, external speaker, and all mounting brackets and interconnecting cable shall be supplied.

E. When front mounted, the control unit shall become an integral part of the radio set housing.

F. The speaker may be internal or external where required and shall be environmentally weatherproof in its design and operation.

G. All mobile radios shall be equipped with a palm-type heavy-duty microphone.

H. Different models shall be provided to designated radio units as described below:

a. Heavy-duty palm microphone

b. A hand-held control head microphone with the capability of selecting talkgroups and channels, adjustment of volume, and activation of the emergency function

c. A noise canceling microphone for use in a high-noise environment

I. Contractor shall provide a roof mounted ¼-wave heavy-duty mobile antenna for each mobile.

J. The mobile antennas shall mount in a ¾-inch hole and be of all brass construction with O-ring seals.

K. Designated mobile radio units shall be equipped with an external speaker (mounted in the vehicle).

L. Mobile radios shall provide a minimum audio power output of ten (10) watts at no greater than 3.0% audio distortion for use in high noise environments.

M. Dual Control Heads: designated mobile radios shall offer dual control heads for an County-selected number of units and be interfaced with the current vehicle intercom and/or headset systems.

N. Contractor shall provide per unit pricing for public safety and local government mobile user equipment and accessories based upon the general tier descriptions and feature-sets listed below:

Radio Features for Mobile Radio Equipment	Low-Tier	Mid-Tier	High-Tier
700/800 MHz Capable	X	X	X
Group/Channel Selector, 16 Position	X	X	X
Volume Control	X	X	X
Minimum Number of Modes	48	512	512
Scan Control with Priority Scan	X	X	X
Alphanumeric Display Backlit	X	X	X
Partial Keypad with Backlit Keys		X	
Full Keypad with Backlit Keys			X
Emergency Button	X	X	X
Over-the-air-Reprogramming	X	X	X
(Public Safety Mobiles Only) Multi-Key Encryption (48 minimum)	X	X	X
(Public Safety Mobiles Only) Over-the-air Rekeying	X	X	X
Ruggedized Construction Option	X	X	X
Intrinsically Safe Option	X	X	X

Table 1 – Mobile Radio Features

5.6 Portable Radio General Requirements

A. The radio set shall be small, lightweight, and rugged and shall be capable of withstanding severe operating conditions.

B. The portable housing shall be constructed of high impact resistant material and shall be sealed and gasketed to protect internally mounted circuitry against dust, foreign particles, moisture, and splashing water.

C. Opening the battery compartment shall not break the seal to the radio circuitry.

D. If available, ruggedized and weather resistant portable radios shall be offered and thoroughly described.

E. All proposed portable subscriber radios shall be less than 24 ounces in total weight with attached battery not including external accessories.

F. The portable radio shall fit comfortably in the hand and permit one hand operation.

G. Controls shall be top-mounted display and rotary controls with positive stops for volume and channel mode selection.

H. Control placement must be sufficient to allow operation wearing gloves as typically used by the fire service.

I. A sealed transmitter "push-to-talk" (PTT) switch shall be provided on the side of the unit, and an emergency switch shall be provided for user-defined quantities of radios.

J. Transmitter RF power output shall be a minimum of 2.5 watts.

K. All proposed portable radios shall be equipped with a personal, desktop-style single battery charger, a spare battery of the same type and duty cycle rating as the primary battery provided with the radio, and a standard with a belt clip.

L. Portable radios not operating in a vehicular charger or adapter, shall provide no less than 500 milliwatts of audio output power at no greater than 1.5% audio distortion.

M. All proposed portable radios shall be equipped standard with a ½-wavelength whip style antenna operational across the 700-800 MHz frequency bands per current FCC requirements.

N. Contractor shall describe the capabilities of the proposed portable radios to provide an indication to the user that the trunked system is operating in a mode that is not normal; it is preferred that users have the ability to silence the failure indication tone.

O. Radios shall be delivered with all necessary channels already programmed.

P. Contractor shall provide a matrix showing all models of portable radios available and shall include the dimensions and weight of each model.

Q. Contractor shall provide per unit pricing for public safety subscriber equipment and accessories based upon the general tier descriptions and feature-sets listed below:

Radio Features for Public Safety Tier Portable Radio Equipment	Low-Tier	Mid-Tier	High-Tier
700/800 MHz Capable	X	X	X
Top-Mounted Group/Channel Selector, 16 Position for portables	X	X	X
Top-Mounted Volume Control for portables	X	X	X
Top-Mounted Display for portables	X	X	X
Minimum Number of Modes	48	512	512
High Capacity Battery	X	X	X
Vehicular Portable Charger	X	X	X
Speaker Mic (w/o Antenna)	X	X	X
Speaker Mic Antenna	X	X	X
GPS	X	X	X
Scan Control with Priority Scan	X	X	X
Alphanumeric Display Backlit		X	X
Partial Keypad with Backlit Keys		X	
Full Keypad with Backlit Keys			X
Emergency Button	X	X	X
Over-the-air-Reprogramming	X	X	X
Multi-Key Encryption (48 minimum)	X	X	X
Over-the-air Rekeying	X	X	X
Ruggedized Construction Option	X	X	X
Intrinsically Safe Option	X	X	X

Table 2 – Public Safety Portable Radio Features

R. Contractor shall provide per unit pricing for local government subscriber equipment and accessories based upon the general tier descriptions and feature-sets listed below:

Radio Features for Local Government Tier Equipment	Low-Tier	Mid-Tier	High-Tier
700/800 MHz Capable	X	X	X
Top-Mounted Group/Channel Selector, 16 Position	X	X	X
Top-Mounted Volume Control	X	X	X
Top-Mounted Display	X	X	X
Minimum Number of Modes	48	512	512
High Capacity Battery	X	X	X
Vehicular Portable Charger	X	X	X
Speaker Mic (w/o Antenna)	X	X	X
Speaker Mic Antenna	X	X	X
GPS	X	X	X
Scan Control with Priority Scan	X	X	X
Alphanumeric Display Backlit		X	X
Partial Keypad with Backlit Keys		X	
Full Keypad with Backlit Keys			X
Emergency Button	X	X	X
Over-the-air-Reprogramming	X	X	X
Multi-Key Encryption (48 minimum)	X	X	X
Over-the-air Rekeying	X	X	X
Ruggedized Construction Option	X	X	X
Intrinsically Safe Option	X	X	X

Table 3 – Local Government Portable Radio Features

5.7 Portable Radio Configurations and Options

A. Contractor shall propose Lithium-ion (Li-Ion) “smart” rechargeable batteries, which shall be quickly and easily removed from the radio.

a. The proposed “smart” battery technology shall be capable of monitoring and reporting its condition to the operator

b. Battery life, based on a 10% transmit, 10% receive, 80% stand-by duty cycle, measured in accordance with EIA RS-316 at 250 milliwatts of audio output, shall be at least twelve (12) hours

c. Batteries shall be capable of full recharge in one (1) hour or less.

d. Batteries provided shall be capable of withstanding a 3-foot drop test to concrete without damaging battery performance or visibly cracking the battery housing.

e. Contractor shall provide in the proposal a list of time parameters for each type of battery and capacity available for each type of portable radio.

B. External accessory connections shall be provided as an integral part of the radio, for the connection of various types of remote speaker/earplug/microphone/ antenna combinations.

C. A flexible antenna shall be provided and shall connect to the appropriate connector on the radio or speaker-microphone.

a. Antennas mounted on the radios shall be ½-wave whip type.

D. A belt-mounted carrying case shall be provided.

E. Speaker-Microphones.

a. Speaker microphones shall not have antennas on the microphone, shall be water resistant, and shall use coiled cords in at least three (3) different lengths.

b. Speaker microphones shall be noise canceling.

c. It shall be possible for an operator to remove the speaker microphone from a portable radio without the use of tools, and then operate the radio in normal fashion.

F. Speaker-Microphone-Antenna Combination.

a. Designated portable units shall be equipped with a public safety remote speaker-microphone-antenna (SMA) or a speaker-microphone configuration without the antenna.

b. SMAs shall be water resistant, and shall be noise canceling.

c. It shall be possible for an operator to remove the SMA from a portable radio without the use of tools, and then operate the radio in normal fashion.

G. Single-unit Charger.

a. The portable radio shall operate in the receive and transmit modes while being charged in the single unit charger.

b. The charger shall operate from a 120 VAC, 60 Hz single-phase source.

H. Multi-unit Charger.

a. The portable radio shall operate in the receive and transmit modes while being charged in the multi-unit charger.

b. A multi-unit fast charger shall provide proper charging of batteries whether in or out of the portable radios.

c. The charger shall operate from a 120 VAC, 60 Hz single-phase source.

d. The multi-unit fast charger shall be capable of charging a minimum of six batteries simultaneously, and have a battery status indicator for each battery position.

I. Vehicular Charger.

a. The portable radio shall be capable of operating in both the receive and transmit modes while being charged in the vehicular charger.

b. The vehicular charger shall be capable of charging a battery whether on or off the respective radio (without the need for a spacer or adapter) and operate from a nominal 13.8 VDC vehicular source.

c. The vehicular charger shall be designed in a manner that will allow full view of the portable radio alphanumeric display.

J. Intrinsically Safe.

a. Portable radios, batteries and accessories (used by the fire service) proposed must be approved by Factory Mutual as intrinsically safe for the following hazardous environments: Class I and II Division I, groups C, D, E, F and G and non-incentive for Class I, Division 2, Groups A, B, C and D.

5.8 Control Station Radio Configurations and Options

A. Control stations, excluding antennas and transmission lines, shall be provided that operate from 120VAC, 60Hz primary power.

B. All radio equipment shall be FCC type accepted under Part 90 of the FCC Rules and Regulations.

C. Control stations shall be frequency synthesized with a transmitter output power of 30 watts minimum, and furnished to operate on all channels in the 700/800 MHz bands.

D. Control stations shall be configured and supplied with a desk-stand type microphone and shall contain a PTT transmit switch.

E. Single Control Station Antenna and Transmission Line.

a. The new control stations may utilize the existing indoor and outdoor antenna systems if specified in this RFP.

b. Any newly installed control station that is not a replacement for an existing control station shall use an Antenex Y8063 yagi model or equivalent.

c. For pricing purposes, Contractor shall assume 100 feet of 1/2-inch foam LDF transmission line length for a typical control station installation.

d. All installation hardware, transmission line surge suppressors, ground kits, etc. shall be provided.

F. Multiple Control Station Antenna and Transmission Line.

a. The new control stations may utilize the existing indoor and outdoor antenna systems if specified in this RFP

b. For the installation of multiple control stations, the Contractor shall propose a control station combining system with dual Antenex Y8063 yagi model antennas or equivalent

c. For pricing purposes, Contractor shall assume 100 feet of 1/2-inch foam LDF transmission line length for each control station antenna

d. All installation hardware, transmission line surge suppressors, ground kits, etc. shall be provided

G. Digital Remote Control Unit.

a. Digital remote control units where required shall be compact desktop style units for the remote operation of the control stations

b. The remote control unit shall be capable of controlling the conventional and trunked features of the control station radio such as modes, talkgroups, channels, emergency, and typical mobile radio control head functions

H. Alerting Capabilities.

a. Where required, control stations shall be equipped to provide a switched output with dry relay contacts that may be connected to County-provided signaling and control equipment typically used for fire station alerting

b. Activation of the switched output shall be controlled by the transmission of a Call Alert message

5.9 Fleet Mapping and Subscriber Equipment Programming

A. The Contractor, with input from the County, shall develop and program the fleet map assignments for the entire system infrastructure.

B. The Contractor shall develop the fleet mapping for all public safety and mutual aid talk groups.

C. All local government agencies will remain on the existing SmartNet system for an extended period of a time, so fleet mapping for these agencies is not required.

D. The Contractor shall be responsible for the final subscriber equipment templates or programming of the subscriber equipment.

E. Contractor shall provide two (2) sets of programming cables and current versions of programming and maintenance software for each model and type of mobiles and portables provided.

6. FAA AND FCC FILINGS AND AUTHORIZATIONS

6.1 FAA Study and Determination

A. The Contractor shall be responsible for filing and obtaining any and all FAA Studies and Determinations prior to construction, and for the notification of the FAA upon the commencement and completion of construction by the filing of the appropriate forms.

B. This requirement includes any and all studies required for the addition or modification of system antennas and frequencies for all new and existing tower structures.

6.2 FCC Application, Coordination, and Licensing

A. The Contractor shall be responsible for any and/or all frequency coordination, modifications to existing licenses, engineering documentation, submittals, and applications to the Region 9 Committee and coordination, FCC applications, FCC filings, waivers, etc. for the licensing of the communication system frequencies and any licensing work required in this RFP.

B. The Contractor shall be responsible for any and all fees levied by the frequency coordinators.

6.3 FCC Antenna Structure Registration

A. The Contractor shall be responsible for all work, studies, and costs for obtaining or modification of any and all FCC Antenna Structure Registrations required for antenna structures provided and any existing towers modified in this Project.

6.4 AM Detuning

A. If applicable, the Contractor shall be responsible for all work, studies, and costs for obtaining any and all AM Detuning Services for tower structures provided or modified in this Project including the assessment and correction of pattern distortion where wireless antenna structures (towers) can unintentionally interfere with an AM broadcast station's antenna pattern.

6.5 Environmental, Tribal, Historical, MPE, EME/NIR, and Other Studies

A. The Contractor shall be responsible for obtaining any and all required environmental, tribal, historical, maximum permissible exposure, electromagnetic exposure, non-ionizing radiation, or any antenna structures provided and any existing towers modified in this Project.

B. The Contractor shall be responsible for any and all payments to American Indian tribes.

6.6 Receiver Desense

A. The County requires that tower-top amplifier preselector filters be furnished and installed and that transmitter bandpass filters be furnished and installed where vertical separation cannot be achieved on the supporting structure.

B. The County desires that no receiver installed at any site by the Contractor be desensed by more than one (1) dB due to the presence of carrier signals from any transmitter that is located at that site.

C. The Contractor shall provide calculations showing that appropriate filtering equipment, if required, has been provided as part of their proposal.

7. SCOPE OF WORK FOR COMMUNICATION SITES

A. The Contractor shall be responsible for any renovation work at existing communication facilities that may be required to support the implementation of their proposed communications system.

B. The Contractor shall be solely responsible for the assessment of the communication system facilities, and for the development of the scope of work and the costs associated with these renovations.

C. The renovation work may include the relocation of existing equipment, racks, antenna systems, and other components installed at the sites.

7.1 Sites of Work

A. The County has performed a number of tower site upgrades in preparation for the new System implementation, however the Contractor shall be responsible for any renovation work at existing communication facilities that may be required to support the implementation of their proposed communications system.

B. The Contractor shall be solely responsible for the assessment of the communication system facilities, and for the development of the scope of work and the costs associated with these renovations.

C. The sites listed below have been recently developed by the County in a previous project and are ready for equipment installation by the Contractor.

Site	Tower	Electrical	Shelter Size	Generator	Compound Size
EOC	300-ft SS	200Amp Overhead	12'x12'	35kW Diesel	60'x60'
Deep Creek	300-ft guyed	200Amp Overhead	12'x12'	35kW Diesel	60'x60'
CCSO	155-ft SS	200Amp Overhead	12'x12'	35kW Diesel	60'x60'
Lulu	Existing	200Amp Overhead	12'x12'	35kW Diesel	Existing Modified
Greenfield (Optional)	300-ft SS	200Amp Overhead	12'x12'	35kW Diesel	60'x60'

D. The sites listed below are existing County tower sites where equipment will be installed by the Contractor.

Site	Tower	Electrical	Shelter Size	Generator	Compound Size
Cumorah Hill	315-ft guyed	200Amp Overhead	10'x15'	58kW Diesel	60'x60'
Franklin Street	255-ft SS	200Amp Overhead	10'x16'	50kW Diesel	60'x60'

7.2 Emergency Power Systems

A. The County plans to use a combination of conventional UPS systems and -48VDC power plants at their fixed-end equipment sites as follows.

a. EOC Dispatch and Communications Equipment Room– existing building UPS system and generator for fixed-end geo-redundant control, RF, and dispatch console equipment

b. EOC tower site – new -48VDC power plant for all new systems existing 35 kW generator

c. Deep Creek tower site – new -48VDC power plant for all new systems existing 35 kW generator

d. Cumorah Hill tower site – new -48VDC power plant for all new systems existing 25 kW generator

e. Lulu tower site – new -48VDC power plant for all new systems existing 35 kW generator

f. CCSO tower site – new -48VDC power plant for all new systems existing 35 kW generator, new UPS for redundant master and simulcast control equipment (if applicable)

g. Greenfield site – new -48VDC power plant for all new systems existing 35 kW generator

7.3 UPS Systems for Geo-Redundant Site

A. The County desires to place the geo-redundant core switch equipment at the CCSO tower site.

B. The County desires to implement -48VDC power equipment whenever possible, but in the event that 120/240VAC equipment is required then an approximately sized UPS shall be furnished and installed.

C. The Contractor shall provide one (1) new 120/240VAC, single-phase UPS backup power systems and bypass switches of sufficient capacity (minimum 10kVA) to maintain full

system operation of the communications site during transition to the backup power generator system for a minimum of 30 minutes.

D. The UPS system shall not introduce single points of failure to the system and shall be provided with a full maintenance bypass switches.

7.4 DC Power Plant Systems

A. The Contractor shall provide a single new -48VDC power plant system at each of the new RF communications sites to support both the trunked system infrastructure and microwave backhaul network equipment:

   a. All sites shall support load shedding and a 30-minute full-load run time for the trunked system infrastructure and a 8-hour run time for the microwave backhaul network equipment

B. The Contractor shall provide a single new -48VDC power plant system at the Franklin Street communications site to support microwave backhaul network equipment:

   a. The system shall provide an 8-hour run time for the microwave backhaul network equipment

7.4.1 DC Power Plant Requirements

A. The Contractor shall furnish and install -48VDC power plant systems that shall power all trunked system infrastructure and network backhaul equipment. The Contractor shall provide all batteries, battery mounting or racking facilities, float-type battery chargers/rectifiers, low voltage disconnects, and DC load centers.

B. The Contractor shall furnish plans and specifications to all materials and labor necessary to complete the installation of DC power plant systems at the specified communication sites.

C. When sizing the system, the Contractor shall consider the required run-time and the load of the equipment specified in this project, plus a growth factor equivalent to a 100% base station load expansion.

D. Ancillary site equipment essential to continuous system operation, tower-top preamps and receiver multicouplers, GPS reference oscillators, etc. shall be powered by the sites' -48VDC power plant system where ever possible.

E. Battery Run-Time

   a. The Contractor shall consider the load of the trunked system infrastructure and microwave equipment specified in this project, plus a growth factor equivalent to a 50% load expansion when calculating battery run time

F. Batteries

a. Modular stationary batteries shall be sealed maintenance-free type with sufficient ampere-hour capacity to support the run-time requirements and the battery life expectancy shall be at least 20 years in normal float-type service

b. Battery capacity ratings shall be adjusted by a factor of 1.25 to compensate for battery capacity degradation over their 20-year life

c. No venting facilities or special battery rooms shall be required for normal operating conditions

d. Batteries shall be EnerSys PowerSafe DDm series, or engineer-approved equivalent

e. Secure mounting facilities shall be incorporated in the design of the battery bank

G. Battery chargers/rectifiers shall provide 100% redundancy with sufficient current capability to supply all site equipment load requirements plus a 50% load expansion and simultaneous charging of a discharged battery bank to full capacity in 24 hours.

H. Each rectifier chassis shall be powered by a two dedicated 240VAC, properly sized breakers and receptacles for redundancy.

I. Battery chargers/rectifiers shall be capable of battery eliminator operation and power switching and disconnect capability such that the rectifiers, batteries, and commercial power sources may be separately isolated in a manner whereby each component may be serviced safely.

J. The switching and disconnect capability shall be designed such that radio communications system operation is not impaired or interrupted during any repair or maintenance action.

K. The battery chargers/rectifiers shall be rack-mounted in an EIA 19-inch rack and the rectifier modules shall be provided on a redundant N+1 basis and shall operate in ambient temperatures of 0º C to +50º C.

L. The battery chargers/rectifiers shall be provided with AC circuit breakers, DC circuit breakers, minimum 2% accuracy DC voltmeter and DC ammeter, current limiting and high voltage shutdown circuitry, continuous float and equalizing voltage adjustment, and 24-hour equalizing timer and these features may be integral to the chargers/rectifiers or provided in separate rack mount assemblies.

M. The chargers/rectifiers shall have the following minimum alarm points:

a. Battery charger low voltage

b. Battery charger high voltage

c. Battery charger no charge

N. A rack-mounted DC load center with circuit breakers shall be provided with the battery power system to provide a protected DC distribution to all -48VDC powered

communications equipment, and the Contractor shall furnish and install a minimum of five spare DC circuit breakers of the same type supplied on the panel for future use.

O. The DC-power circuit breakers shall be configured in a manner to preserve system redundancy.

P. A separate (not in the DC distribution panel) DC load breaker shall be provided to disconnect the battery from the -48VDC rectifier system and the DC battery disconnect shall be equipped with alarm relay contacts and connected to the system alarm system.

Q. Automatic low-voltage disconnects shall be provided for the radio and microwave equipment to remove the load from the battery plant at the point when the battery voltage reaches a preset dropout voltage level.

7.5 Power Inverters

A. Communication control and other network equipment shall be powered either directly from the DC power plant or by individual, redundant 120VAC/-48VDC input to 120VAC output power inverters that shall have a capacity rating of at least twice that of the calculated equipment loads.

B. These power inverters shall be equal or equivalent to NEWMAR model 48-1000 or 48-2000 and sized appropriately for the connected loads.

7.6 UPS System Requirements

A. The UPS equipment shall be comprised of a microprocessor-controlled inverter, battery charger, and necessary metering to provide operator information, and shall include a computerized self-diagnostic monitoring and control package in order to keep operators advised of system status.

B. The UPS shall operate as an on-line, fully automatic system capable of operating in the following modes:

   a. NORMAL - The rectifier/charger derives power as needed from the commercial AC utility or generator source and provides filtered and regulated DC power to the on-line inverter and simultaneously charges the batteries. The inverter converts the DC power to highly regulated and filtered AC power for the critical loads

   b. EMERGENCY - Upon failure of the commercial AC utility or generator source, the inverter continues to power the critical loads. The inverter receives its power without interruption, from the batteries

   c. RECHARGE - Upon restoration of the commercial AC utility or generator source, the rectifier/charger again provides filtered and regulated DC power to the inverter and simultaneously recharges the batteries. This shall be an automatic function and occurs without interruption to the critical loads

d. AUTOMATIC BYPASS - The automatic bypass transfers the critical loads to the commercial AC source in the case of an overload, load fault, or internal failures. Return from bypass mode to normal mode is automatic except in the case, which the overload exceeds specified limits or an internal failure has occurred

e. MANUAL BYPASS - The manual bypass provides the capability to transfer the critical loads to the commercial AC source for UPS servicing

C. The Contractor shall consider the load of the equipment specified in this project plus a growth factor equivalent to a 25% load expansion when calculating UPS capacity and run time.

D. Batteries supplied with the uninterruptible power system shall be sealed maintenance free, high-rate discharge with a minimum life of ten (10) years, be suitable for use in an equipment shelter environment without external ventilation, and shall be arranged in a steel, lockable cabinet suitable for the purpose and size of the batteries and to permit servicing of the batteries within the equipment room.

E. The batteries shall have provision for an equalization charge attachment in an off-line mode in order to insure proper battery life and stability.

F. An AC load center with circuit breakers shall be provided with the UPS system to provide a protected AC distribution to all communications and site equipment including a minimum of five spare AC circuit breakers of the same type supplied on the panel for future use.

7.7 EOC Communications Room

A. The communications equipment room has adequate space and will be used for the new communications system main control site, simulcast control point and dispatch backroom electronics.

B. The EOC's existing UPS and emergency backup generator shall be used to power the new communications system and network equipment.

C. The EOC Communications Room will be connected to the EOC tower site via a Contractor supplied fiber optic cable. The Contractor shall furnish and install a six (6) pair single mode fiber cable between the EOC Communications Room and the EOC tower site utilizing the existing 4" conduit.

7.8 EOC Tower Site

A. The communications shelter is new and will be used for the new radio system.

B. The emergency backup generator is new and will be used for the new System.

C. The Contractor shall furnish and install a new -48VDC power plant.

D. The Contractor shall furnish and install a six (6) pair single mode fiber cable between the EOC Communications Room and the EOC tower site utilizing the existing 4" conduit.

7.9 Deep Creek Tower Site

A. The communications shelter is new and will be used for the new radio system.

B. The emergency backup generator is new and will be used for the new System.

C. The Contractor shall furnish and install a new -48VDC power plant.

7.10 Cumorah Hill Site

A. The communications shelter is in good condition and will be used for the new radio System.

B. The emergency backup generator is in good working order and will be used for the new System.

D. The Contractor shall furnish and install a new -48VDC power plant.

7.11 CCSO Tower Site

A. The communications shelter is new and will be used for the new radio system.

B. The emergency backup generator is new and will be used for the new System.

C. The Contractor shall furnish and install a new -48VDC power plant.

7.12 Lulu Tower Site

A. The communications shelter is new and will be used for the new radio system.

B. The emergency backup generator is new and will be used for the new System.

C. The Contractor shall furnish and install a new -48VDC power plant.

8. MICROWAVE BACKHAUL NETWORK

A. The Contractor shall furnish and install a 6 GHz, IP-based, loop microwave backhaul network complete with antenna systems and -48 VDC power plants.

B. The Contractor's backhaul design shall not incorporate leased lines of any type.

C. The Contractor shall design and implement a robust and redundant design that optimizes backhaul reliability and redundancy.

D. The microwave system shall utilize IP technology and licensed 30 MHz channels.

E. The microwave system shall utilize adaptive code modulation to increase the network reliability.

F. The proposed microwave system shall consist of all outdoor mounted radio equipment unless stated otherwise.

G. The new digital microwave communications network shall provide network connectivity support to include the following:

   a. The new P25 communications System control and communication system infrastructure sites as specified herein

   b. The site alarm and network management systems

   c. All associated site communications needs e.g. phones, network data access, site surveillance, and remote monitoring/control to be determined by the County

H. The equipment shall be designed and manufactured for continuous duty operation in a fixed station application and, with proper maintenance, have an expected operational and maintenance service life of at least 20 years.

I. All equipment and hardware including wiring, connectors, cabling, fuses, circuit breakers, brackets, fasteners, power supplies, surge suppressors, converters or conditioners, and other items that are necessary to provide a complete and fully functioning microwave network shall be furnished by Contractor.

J. The proposed equipment shall be designed and manufactured by a company who has at least 10 years of experience in designing and providing microwave equipment for critical communications system users such as public safety.

K. The system performance shall be designed using a technology which will not suffer any degradation due to adverse weather conditions throughout all seasons of the year for any length of time no matter how short the duration.

L. A full and complete materials list and full and complete set of specifications describing the system as proposed shall be included in the proposal.

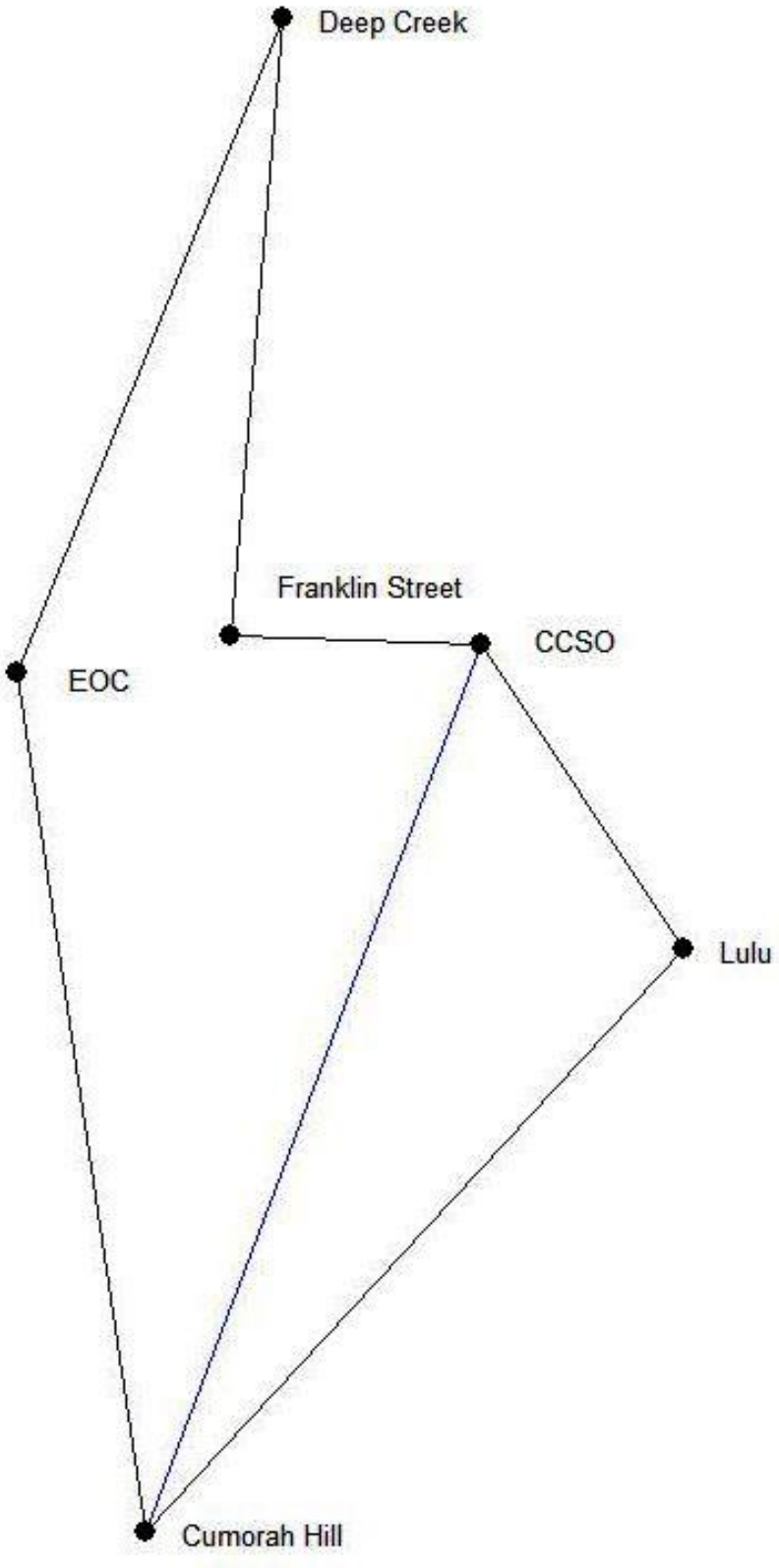


Figure 1 - Proposed Microwave Backhaul Network

8.1 Microwave Frequencies and Licensing

A. The paths for the digital microwave network shall utilize licensed Federal Communications Commission (FCC) Part 101 frequencies assigned for full-period service.

B. All new frequencies shall support 30 MHz channel bandwidth.

C. The results of the required path engineering analysis and the applications for FCC authorization shall be submitted to the County for review prior to filing with the FCC.

8.2 Performance Objectives

A. All microwave paths shall utilize adaptive code modulation.

B. All microwave paths shall be designed for an annual two-way, per-path availability of 99.999% or better at fixed modulation with a throughput of 45 mbps, 10-6 BER. With the exception of the CCSO to Cumorah Hill path which shall be designed for an annual two-way, per-path availability of 99.999% or better at fixed modulation with a throughput of 75 mbps, 10-6 BER.

C. All microwave paths shall utilize licensed 30MHz channels and provide a per-path availability of 99.95% or better for 155 mbps, 10-6 BER.

D. Contractor shall utilize monitored hot standby radios for all spur paths unless otherwise specified.

E. It is recognized that the mathematical models to predict availability vary within the industry; consequently, the Contractor is required to fully support its system design with the procedures, equations, and theories used to compute availability.

F. The proposed microwave system equipment shall be capable of providing the following protection options:

   a. Loop protection

   b. Non-protected

   c. Monitored hot standby

   d. Monitored hot standby space diversity

   e. Split transmitter space diversity

   f. Errorless Receive Switching - all receiver switching, including diversity path selection, shall be errorless

   g. Adaptive code modulation

G. The Contractor shall specify the mean time between failure (MTBF) of their proposed equipment.

8.3 Microwave Network Configuration and Capacity

8.3.1 Six-Site Microwave Loop

A. Contractor shall propose a digital loop microwave system utilizing the six County tower sites.

B. Contractor shall maximize the network reliability and availability that is commensurate with the capacity requirements stated herein.

C. The microwave network shall be designed to provide alternate routing between critical network controller sites, dispatch sites, and the 700/800 MHz tower sites.

D. Contractor shall identify the excess capacity of the microwave network after satisfying the communications systems requirements.

8.3.2 Backhaul for Optional Sixth Simulcast Site

A. The County would like to consider the addition of a sixth simulcast site that would be built in the far northwest portion of the County.

B. Contractor shall propose a digital loop or a MHSB spur to include this sixth optional tower site.

C. This optional microwave configuration shall be designed and proposed to meet all the requirements of this RFP.

8.4 Microwave Equipment Requirements

8.4.1 Configuration and Operation

A. Any spur paths proposed shall be fully protected with monitored hot-standby (MHSB) transmitters and receivers unless otherwise specified.

B. The antenna input to MHSB receivers shall be via an asymmetrical minimum loss splitter favoring the "A" receiver to maximize fade margin.

C. The receiver outputs shall be switched in an "errorless" manner.

D. The MHSB transmitters shall be switched in a manner to provide proper termination and isolation to the standby transmitter.

E. Provisions shall be included for testing and alignment of the standby units without disturbing the active units.

F. The transmitters and receivers shall be sensed and switched separately and both transmitters and receivers shall meet all requirements of these specifications when in the active mode (threshold of the "B" receiver excepted due to asymmetrical splitting).

G. Contractor shall include in their proposal a description of the switchover operation during equipment failures.

8.4.2 Monitoring and Test Points

A. The microwave radio equipment shall contain readily identifiable test points and built-in metering to determine proper equipment operation and perform alignments and adjustments.

B. The system shall be capable of reporting alarm conditions as they occur and in plain language.

C. Alarm status monitoring terminals shall be provided at the following locations:

   a. In the Radio System Manager's office at the EOC facility

D. The alarm status monitoring terminals shall be equipped with 22" LCD display monitors.

8.5 Physical Path Survey

A. Contractor shall physically survey all paths associated with the proposed microwave network including the links between the existing sites.

B. Contractor shall document the location of antenna towers, building structures, significant trees, and other landmarks or improvements associated with the microwave paths.

C. Contractor shall provide all personnel, transportation, lodging, subsistence, surveying instruments, maps, etc., necessary to perform the work.

D. Survey activities shall include the determination of the following:

   a. Critical obstructions on-path and potential obstructions off-path

   b. Reflection points/unblocked reflections

   c. Expected tree growth along paths

   d. Site geographic coordinates

   e. Site elevations

   f. Recommended antenna heights based on survey data and performance objectives

E. The report shall include the following documentation:

   a. Data determined by the survey activities

   b. Antenna tower locations accurately depicted on 8-1/2-inch by 11-inch sections of USGS 1:24,000 topographic maps; proposed path azimuths shall be depicted relative to True North

   c. Profile graphs for each path surveyed. Path profiles shall be constructed using terrain data from USGS 1:24,000 topographic maps and modified as necessary with field survey data

d. Path profiles shall consider radio refractive index and depict critical obstructions, reflection points, target height above obstructions, antenna centerlines, and line of sight

e. Site plot plans depicting structures, landmarks, tower orientation, and improvements.

f. Proposed path azimuths shall be depicted relative to True North

g. The plot plans are not meant to serve as construction drawings but should present the site features with reasonable accuracy

h. Recommendations relative to the viability of the proposed microwave paths, reliability considerations, and/or alternate routings, and any suggestions that Contractor deems appropriate to the project

i. Site geographic coordinates referenced to NAD 83 and identified with notation NAD 83

j. Photos depicting the view of the path from each end

F. Contractor shall coordinate with the County and its technical consultant in advance of its field activities.

G. Should it be obvious to Contractor during the field survey activity that a particular path is not viable, Contractor shall immediately advise the County and their technical consultant in writing.

8.6 Microwave Antenna Systems

A. Contractor shall propose all new antennas, transmission line waveguides, mounting apparatus, and installation hardware for the digital microwave system.

B. Solid parabolic dish antennas and jacketed copper elliptical waveguides appropriate for the proposed frequency band shall be proposed.

C. Antenna system VSWR shall be commensurate with the return loss specification of Contractor's microwave radio antenna.

D. Contractor shall furnish appropriate mountings as required for support of the microwave antennas.

E. The Contractor shall provide the necessary equipment, hardware, labor, and procedures to securely attach the microwave antennas to the supporting structure.

8.7 Antennas

A. Antennas shall be of solid construction with pressurized feeds and radomes, and shall be rated for a minimum survival wind speed of 125 mph.

B. Antennas shall be Andrew CommScope or engineer-approved equivalent, and the size shall be determined by Contractor according to the system design.

8.8 Data Service Channel

A. The Contractor shall provide a digital data port at each site on a drop/insert basis with an interface capable of transporting data at rates of at least 64 kbps.

8.9 Microwave Equipment Installation

A. The microwave system installation shall include all of the equipment formally specified for the new digital microwave system and all other equipment, hardware, and procedures required for a complete operating system.

8.9.1 Equipment Installation

A. The microwave radio equipment shall be installed in accordance with the technical parameters of the FCC license authorizations and all applicable requirements of Part 101 of the FCC Rules and Regulations.

B. The Contractor shall provide the necessary wiring, cabling, and conduits necessary for connection of the microwave station equipment to power and ground. Equipment racks shall be firmly bolted in place.

C. As necessary, the Contractor shall provide, route and terminate all cables to the demarcation blocks within the equipment shelter.

8.9.2 Antennas and Transmission Lines

A. Antennas shall be mechanically and electrically aligned for proper operation.

B. All microwave transmission lines shall be "finish-cut" to length.

8.9.3 Transmission Line Grounding and Weatherproofing Kits

A. The Contractor shall follow good engineering and installation practices when performing the installation of lightning protection equipment for the antenna systems.

B. At the top of the tower and at the center of the tower, a mechanical connection between the transmission line ground and the tower is acceptable.

   a. The grounding strap may be attached to a tower member by bolting or clamping and each ground strap shall be separately attached.

   b. At the bottom of the tower, the ground kit shall be connected to the tower ground bar.

C. Weatherproofing for transmission lines and connectors shall be Andrew Corporation Connector/Splice Weatherproofing Kit, or approved equivalent.

D. The cut in the jacket of the transmission lines made for grounding shall be carefully wrapped with rubber weather proofing tape and the rubber tape shall then be covered with Scotch brand #88 all-weather vinyl electrical tape, or approved equivalent, per the manufacturer’s instructions.

E. Use of other grades of Scotch tape or their equivalents is not acceptable.

F. The entire spliced area shall then be painted with Scotchkote brand electrical coating.

8.10 Microwave System Testing and Verification

A. The Contractor shall furnish a microwave network acceptance test plan (ATP) for County review and approval at least thirty (30) days prior to the commencement of acceptance testing.

B. Following equipment installation and system optimization, at a minimum, the following tests shall be performed for the microwave subsystem and shall be witnessed by a representative of the County. These tests shall include, but not be limited to:

   a. Microwave Radio

   b. Visual mechanical inspection

   c. Compliance with FCC Rules and Regulations including:

      i. Transmitter power output

      ii. Transmitter frequency

      iii. Emission bandwidth

      iv. Antenna height

   d. Net path loss shall be measured and recorded for each path

   e. Received carrier power for each end of each path

   f. Calculation of flat fade margin

   g. Data service channel

   h. Receiver threshold sensitivity for 10-6 BER

   i. Transmitter fade and receiver fade margin verification tests

   j. Adaptive modulation steps

   k. Switches and indicators

   l. Meter readings

   m. Simulated local failures to demonstrate MHSB and loop switching

   n. Antenna system VSWR/return loss across the frequency band of operation

C. Microwave Network Monitoring and Control System

   a. RTU alarm monitoring points shall be tested using local display

   b. Verify reporting of alarm remote terminals to workstation terminals. Verify performance of controls to remote terminals

c. Master terminal station shall be verified for proper programming, redundant switching, reporting, and report generation

d. Workstation terminals shall be demonstrated for proper operation and presentation of graphics and textual displays

D. The Contractor shall provide documentation of the test results in both hard copy and electronic PDF format on a flash drive.

E. Any equipment not meeting the requirements of this RFP shall be adjusted, repaired, or replaced by the Contractor without additional cost to the County.

9. RADIO COVERAGE AND DESIGN REQUIREMENTS

9.1 General Requirements and Region 9 Compliance

A. The Contractor's proposed system design shall be in full compliance with the technical specifications, limitations, and technical requirements of the Region 9, Plan.

B. The Contractor's proposed system design shall maintain the contours to within the specified 3 to 5 miles of the defined service area per the Region 9, Plan.

C. The Contractor shall not assume for the purposes of their system design, that any waivers may be granted pertaining to the contour requirements, technical specifications, limitations, and technical requirements of the Region 9, Plan.

D. It is the County's goal to achieve 97% service area reliability for portable radios operating outdoors, and 95% service area reliability for portable radios operating within 6 dB loss buildings, based upon the modified County border to the north, with a Delivered Audio Quality (DAQ) of 3.4.

9.2 Radio Coverage Definition

A. All references to coverage reliability in this document refer to service area reliability.

B. Radio coverage is defined as the ability to successfully complete inbound (field-to-dispatch), outbound (dispatch-to-field), and radio-to-radio communications throughout the designated service area with the required delivered audio quality DAQ 3.4.

C. In the TIA/EIA Technical Service Bulletin TSB-88, the Telecommunications Industry Association (TIA) defines the delivered audio quality which is a numeric rating of the intelligibility of speech as described in the abbreviated DAQ Table 4 below.

Delivered Audio Quality	Subjective Performance Description
DAQ 4.0	Speech easily understood. Occasional Noise/Distortion.
DAQ 3.4	Speech understandable with repetition only rarely required. Some Noise/Distortion.
DAQ 3.0	Speech understandable with slight effort. Occasional repetition required due to Noise/Distortion.

Table 4 - Delivered Audio Quality

9.3 Radio Coverage Requirements

9.3.1 Radio System Service Area

A. The modified jurisdictional boundaries of Columbia County shall define the coverage requirements for the System.

B. The County has provided a shape file of the modified Columbia County service area that the contractors shall use for the preparation of all coverage prediction maps.

9.3.2 Infrastructure System Sites and Antenna Heights

A. For system engineering purposes, the Contractor shall utilize the following antenna tower sites and antenna mounting heights to the base of the antenna.

Tower Site	Coordinates	Tower Ht. AGL	TX Antenna Ht.to Base	RX Antenna Ht.to Base
Deep Creek	30:21:29.9 N 82:37:7.7 W	300’	270’	300’
Cumorah Hill	29:57:15.0 N 82:39:36.8 W	305’	270’	300’
Lulu	30:06:35.12 N 82:29:43.49 W	150’	145’	145’
EOC	30:11:1.9 N 82:41:59.6 W	300’	270’	300’
CCSO	30:11:28.8 N 82:33:24.1 W	154’	140’	140’

Table 5 – Tower Site Antenna Height Parameters

9.3.3 User Equipment Configuration

A. For system engineering purposes, and for the modeling and verification of radio coverage, the Contractor shall utilize the following user equipment configurations for inbound and outbound communications:

   a. A portable radio with a ½-wave antenna, worn on the belt with the technical parameters in **Table 6** below

   b. A mobile radio with a ¼-wave antenna mounted in the center of the roof with the technical parameters in **Table 6** below

User Equipment Technical Parameters

A. **Table 6** below depicts the user equipment required technical parameters to be used for the system coverage design and the coverage acceptance testing.

B. Portable antenna Body Loss parameters for ½-wave antennas are inclusive of antenna gain/loss and body shielding loss and the Contractor shall not include any other adjustments.

Mobile and Portable Radio Parameters for Calculation of Coverage				
P25 Phase 1 LSM Portable	Portable rated receiver sensitivity	-119.0	dBm	5.0% BER
	CPC DAQ 3.4	-108.5	dBm	2.0% BER
	Portable rated transmitter power	34.8	dBm	3-Watts
	Body Loss, 1/2-wave on hip at 3.3' AGL	10.3	dB	
	Adjustment for the loss of a 1/4-wave magnetic mount test antenna referenced to a 1/2-wave dipole	3.0	dB	
	Height adjustment attenuation for test vehicle at 5.0' AGL	1.3	dB	
P25 Phase 2 LSM Portable	Portable rated receiver sensitivity	-119.0	dBm	5.0% BER
	CPC DAQ 3.4	-109.9	dBm	2.4% BER
	Portable rated transmitter power	34.8	dBm	3-Watts
	Body Loss, 1/2-wave on hip at 3.3' AGL	10.3	dB	
	Adjustment for the loss of a 1/4-wave magnetic mount test antenna referenced to a 1/2-wave dipole	3.0	dB	
	Height adjustment attenuation for test vehicle at 5.0' AGL	1.3	dB	
P25 Phase 1 LSM Mobile	Mobile rated receiver sensitivity	-119.0	dBm	5.0% BER
	CPC DAQ 3.4	-108.5	dBm	2.0% BER
	Mobile rated transmitter power	44.0	dBm	25-Watts
	Adjustment for the loss of a 1/4-wave antenna referenced to a 1/2-wave dipole	3.0	dB	
P25 Phase 2 LSM Mobile	Mobile rated receiver sensitivity	-119.0	dBm	5.0% BER
	CPC DAQ 3.4	-109.9	dBm	2.4% BER
	Mobile rated transmitter power	44.0	dBm	25-Watts
	Adjustment for the loss of a 1/4-wave antenna referenced to a 1/2-wave dipole	3.0	dB	

Table 6 – User Equipment Required Technical Parameters

9.4 Contractor-Guaranteed Service Area Reliability

A. The Contractor shall state in their proposal their guaranteed service area reliability for each line item and modulation type depicted in Table 7 below.

B. Contractors shall assume a receiver sensitivity specification for mobile and portable equipment of -119.0 dBm for 5% BER and utilize faded CPC DAQ 3.4 outdoor target signal levels as follows.

   a. A signal level of -108.5 dBm for Phase 1 FDMA

   b. A signal level of -109.9 dBm for Phase 2 TDMA

C. Contractors shall utilize the height AGL, the portable antenna body loss, and the building losses stated in Table 7.

Contractor-Guaranteed Percentage of Service Area Reliability for Radio Coverage		
	Phase 1 FDMA %	Phase 2 TDMA %
Modified County Service Area Portable, 1/2-wave on hip at 3.3' AGL, body loss of 10.3dB Outdoors		
Modified County Service Area Portable, 1/2-wave on hip at 3.3' AGL, body loss of 10.3dB in 6 dB loss buildings		

Table 7 - Contractor-Guaranteed Service Area Reliability 5 Sites

9.5 Coverage Maps

A. The Contractor shall provide individual coverage maps for the following radio configurations:

a. P25 Phase 1, Contractor-guaranteed service area reliability, outdoors for both inbound and outbound communications for a portable with a 1/2-wave antenna on hip at 3.3' AGL

b. P25 Phase 2, Contractor-guaranteed service area reliability, outdoors for both inbound and outbound communications for a portable with a 1/2-wave antenna on hip at 3.3' AGL

c. P25 Phase 1, Contractor-guaranteed service area reliability, within 6 dB loss buildings for both inbound and outbound communications for a portable with a 1/2-wave antenna on hip at 3.3' AGL

d. P25 Phase 2, Contractor-guaranteed service area reliability, within 6 dB loss buildings for both inbound and outbound communications for a portable with a 1/2-wave antenna on hip at 3.3' AGL

e. P25 Phase 1, Contractor-guaranteed service area reliability, for both inbound and outbound communications for a mobile with a 1/4-wave antenna mounted on the roof at 5.0' AGL

f. P25 Phase 2, Contractor-guaranteed service area reliability, for both inbound and outbound communications for a mobile with a 1/4-wave antenna mounted on the roof at 5.0' AGL

g. The Region 9 compliant contours for each transmit site

h. Any areas that have a service area reliability less than the desired levels shall be clearly visible on the coverage maps

i. The Contractor shall consider simulcast time delay interference (TDI) zones where a high BER may be encountered and clearly depict these areas on their coverage maps

9.5.1 Technical Parameters

B. For the purpose of the evaluation and validation of the Contractor's proposed radio coverage, the Contractor shall furnish the following information for each map and each tower site:

a. Transmit and receive antenna models, gain, beamwidth, azimuth, downtilt, sidearm length, and mounting height referenced to base and center of radiation

b. Transmission line type and length for transmit and receive antenna systems

c. Insertion loss and gain values noted in decibels for all proposed transmit combiners, receiver multicouplers, filters, duplexers, connectors, circulators, lightning arrestors, jumper cables, attenuators, etc.

d. Transmitter power level for all base station transceivers and subscriber units

e. The effective radiated power level for each site

f. Net amplification gain for the tower top amplifier system

g. Receiver sensitivity specifications for all base station transceivers

h. The faded performance margin (Cf/(I+N)) utilized per TSB-88 for the required CPC (channel performance criterion) requirement for DAQ 3.4 and BER

i. The minimum base station RSL for DAQ 3.4 and BER

C. The Contractor shall provide a complete schematic diagram for each transmit and receive antenna system per site noting all proposed antennas, transmission lines, tower top amplifiers, receiver multicouplers, transmit combiners, circulators, filters, connectors, etc.

D. The Contractor shall provide product data sheets for all proposed antennas, transmission lines, tower top amplifiers, receiver multicouplers, transmit combiners, circulators, filters, connectors, attenuators, etc.

E. The Contractor shall provide all engineering analyses and coverage modeling shall be executed in accordance with NPSPAC Region 9 requirements, contours, parameters, and restrictions.

F. The coverage maps shall be provided to the County in 11"x17" size, high-resolution in both printed and electronic PDF document format.

G. Coverage maps shall indicate the County's boundaries that include portions of adjacent parishes, base site locations, interstate, and primary roads, and any areas of non-coverage.

9.6 Optional Sixth Tower Site

A. The County would like to consider the addition of a sixth simulcast site that would be built in the far northwest portion of the County.

B. The Contractor shall provide coverage maps detailed in Section 10.5 including this optional site

9.6.1 Optional Greenfield Site and Antenna Heights

A. For system engineering purposes, the Contractor shall utilize the following antenna tower sites and antenna mounting heights to the base of the antenna.

Tower Site	Coordinates	Tower Ht. AGL	TX Antenna Ht.to Base	RX Antenna Ht.to Base
Greenfield	30:34:8.24 N 82:40:51.63 W	300’	270’	300’

9.6.2 Contractor-Guaranteed Service Area Reliability

A. The Contractor shall state in their proposal their guaranteed service area reliability for each line item and modulation type depicted in Table 8 below.

B. Contractors shall assume a receiver sensitivity specification for mobile and portable equipment of -119.0 dBm for 5% BER and utilize faded CPC DAQ 3.4 outdoor target signal levels as follows.

   a. A signal level of -108.5 dBm for Phase 1 FDMA

   b. A signal level of -109.9 dBm for Phase 2 TDMA

C. Contractors shall utilize the height AGL, the portable antenna body loss, and the building losses stated in Table 8.

Contractor-Guaranteed Percentage of Service Area Reliability for Radio Coverage		
	Phase 1 FDMA %	Phase 2 TDMA %
County Service Area Portable, 1/2-wave on hip at 3.3' AGL, body loss of 10.3dB Outdoors		
County Service Area Portable, 1/2-wave on hip at 3.3' AGL, body loss of 10.3dB in 6 dB loss buildings		

Table 8 - Contractor-Guaranteed Service Area Reliability 6 Sites

10. INSTALLATION REQUIREMENTS

10.1 General Installation Requirements

A. The Contractor shall execute all aspects of the system installation work in a professional manner.

B. The County is extremely concerned about the quality of the surge suppression and the grounding and bonding equipment and techniques, and the Contractor shall maintain the County's high standards while implementing the new system.

C. The equipment installation required by this RFP shall be performed in accordance with industry standards and best practices, and the manufacturers' installation standards and specifications for the equipment provided as well as other attachments, hardware, software, and procedures as may be required to ensure a complete installation which is in accordance with the standards of good engineering practice, all Federal, State, and County regulations and codes, and all building codes and ordinances in effect at the sites delineated in this RFP.

D. Proposal pricing shall include all installation hardware, brackets, braces, fasteners of all kinds, wiring, ancillary devices, procedures, and services required to install and/or interface components to provide a complete operating system, which fulfills the requirements of this RFP.

E. To the fullest extent possible, the existing radio communications systems shall remain in parallel operation during installation of the new system and until the County provides final system acceptance.

10.2 Installation Approval

A. The installation work shall be approved by the County prior to commencement of work on a site-by-site basis.

B. The Contractor shall provide complete descriptions and site layout drawings showing the proposed installations at each site at least 30 days prior to beginning work at that site.

C. No work shall commence without written approval from the County.

10.3 Equipment Storage and Delivery

A. The Contractor shall be responsible for delivering, storing, placement, handling, and disposition of materials.

B. All initially unused material, brackets, keys, hardware, accessories, etc. shipped with the equipment to be installed are to remain property of the County and as such, shall be retained by the County.

10.4 Installation Coordination

A. The Contractor shall provide at least one Project Manager on-site during critical phases of the system installation.

B. The Project Manager shall oversee all aspects of system implementation, including site preparation, equipment programming, staging, installation, etc.

C. Other individuals may assist the Project Manager in various functions such as reporting, accounting, testing, optimization, etc., but this individual shall have primary responsibility for the performance of the system.

D. The Project Manager shall carefully coordinate all phases of the work with the County to provide site access and minimize equipment downtime.

E. The coordination efforts shall be between the Contractor, subcontractors, and the County.

F. Access to the sites shall require prior coordination with the Project Manager.

10.5 Grounding and Bonding Systems

A. For sites with existing structures and buildings, the Contractor shall make their best effort with the County's input, to locate a suitable low impedance ground point for interconnection of the protective grounding and bonding system.

B. The connection point should be the main building electrical service ground and/or building structural steel and tower ground system.

C. At any site where building structural members are used for grounds, connections to those main structural steel members shall be made with exothermic "Cadweld", Burndy press, or equivalent type connectors.

D. Any paint or fire retardant material shall be scraped away down to bare metal before applying the connector and surface preparation recommendations of the manufacturer of the exothermic welding process to be used shall be followed.

E. Contractor shall furnish and install the required grounding and bonding conductors, and make connections to grounding system at each communications site.

10.5.1 Standards

A. Standard requirements for the installation of radio communications equipment shall include the adherence to the following standards at a minimum:

   a. American National Standard for Telecommunications:

   b. T1.334-2002, Electrical Protection of Communications Towers and Associated Structures

   c. T1.313-2003, Electrical Protection for Telecommunications Central Offices and Similar Type Facilities

d. T1.333.2001, Grounding and Bonding of Telecommunications Equipment

e. ANSI–J-STD-607-A-2002, Commercial Building Grounding and Bonding Requirements or Telecommunications

f. ANSI/NFPA 780-2004, Standard for the Installation of Lightning Protection Systems

g. National Electrical Code

10.5.2 Grounding and Bonding Conductors

A. All grounding and bonding conductors shall be as straight as possible with a minimum number of bends.

B. The minimum bending radius of any grounding/bonding conductor shall be one foot.

C. All ground connections that are not exothermically welded shall use two-hole long barrel compression lugs.

D. Connections between dissimilar metals shall not be made unless a material specifically approved for use with the dissimilar metals separates the conductors.

E. Star or split lock washers shall be placed under the head of the screws, bolts, or nuts and not between the conductive surfaces of the lug and the metal surface to be bonded.

F. Self-tapping sheet metal screws shall not be used for attaching grounding conductors to any surface.

G. Paint shall be removed from any painted surface before ground connections are made and the appropriate antioxidant compound shall be applied to the connection.

H. All exterior and underground connections shall utilize the exothermic welding process such as Cadweld and shall be #2/0 AWG tinned bare solid copper wire.

I. Mechanical connections to metal objects outdoors such as HVAC cabinets shall be bonded by #2 AWG copper wire jumpers with two-hole long barrel compression lugs.

J. All equipment rack and cabinet grounding and bonding conductors shall be made directly to the interior ground systems using green insulated #2 AWG stranded copper wire and two-hole long barrel compression lugs.

K. All individual equipment grounding and bonding conductors shall be made directly to the equipment rack or cabinet ground bus using green insulated #6 AWG stranded copper wire and two-hole long barrel compression lugs.

L. All surge suppression devices shall be bonded directly to the ground systems using green insulated #2 AWG stranded copper wire and two-hole long barrel compression lugs.

10.5.3 Equipment Grounding and Bonding

A. Grounding of electronic communications equipment and components, cabinets, and all associated equipment within the equipment shelter shall conform to the latest version of

the radio manufacturers' company standards or guidelines for site grounding, bonding, and lightning protection.

B. Each unique piece of equipment or chassis shall be bonded to its associated equipment rack or equipment cabinet ground bus.

C. The "daisy-chaining" of grounding and bonding jumpers is not acceptable.

D. Should a discrepancy or conflict arise between manufacturers' guidelines or standards, the more stringent of the standards shall apply.

E. At a minimum, the following bonding connections shall be made directly to the interior ground system using green insulated #2 AWG stranded copper wire.

   a. Electrical conduits, ventilation louvers and metal ductwork, transmission line pressurization equipment

   b. All metal racks and cabinets, generator transfer switch, UPS equipment and panels, power panel cabinets, metal conduits, fire suppression chemical storage tanks, Telco/alarm panel demarcation block cabinet, cable trays, file cabinets, metal desks and other exposed metal surfaces

F. Mechanical connections between sections of the cable trays shall be bonded to one another by #2 AWG copper wire jumpers.

10.5.4 Transmission Line Grounding and Bonding

A. The Contractor shall follow good engineering and installation practices when performing the installation of lightning protection for the antenna systems.

B. All provided transmission lines shall be grounded with Andrew Corporation model ground kits with field attachable two-hole crimp-on lugs, or approved equivalent; be routed by the most direct path to the nearest grounding system conductor the crimp connection shall be made with factory recommended crimping device.

C. Transmission line grounding kits shall be bonded to the tower using tower manufacturer approved methods, typically a mechanical clamp, and each ground strap shall be separately attached and shall be installed on each transmission line as follows:

   a. At the top near the antenna

   b. At intervals along the transmission line of no greater than 75 feet

   c. At the bottom near the point of transition from the tower to the cable bridge

   d. At the cable entry port of the equipment shelter

D. Weatherproofing for transmission lines and connectors shall be Andrew Corporation Connector/Splice Weatherproofing Kit, or approved equivalent.

E. The cut in the jacket of the lines made for grounding shall be carefully wrapped with rubber weather proofing tape.

F. The rubber tape shall then be covered with Scotch brand #88 all-weather vinyl electrical tape, or approved equivalent, per the manufacturer's instructions.

G. All ground kits connections at the transmission lines shall be wrapped with overlapping layers of black outdoor electrical tape and protected with Scotchkote or equivalent outdoor treatment approved by the County.

10.5.5 Lightning and Surge Suppression Requirements

A. The Contractor shall furnish and install all surge suppression devices in accordance with the industry's strictest guidelines and requirements for all new installation work.

10.5.6 Type 3 Individual Equipment AC Surge Suppression

A. A Type 3 AC power SDP shall be a Normal Mode (L-N) device that is used to protect equipment devices.

B. Type 3 SPDs may be wire-in receptacle outlets or receptacle outlet panels, or power strips.

C. Type 3 SPDs shall be installed at equipment locations where power is provided from a remotely-located distribution panel within a building.

10.5.7 DC Power Plant Surge Suppression

A. DC SPDs shall be provided and installed at the load distribution panel for each different output voltage provided by the DC power system.

B. DC distribution panel SPDs shall be Transtector CB Series, I2R ICP Series or APT TE/11XP-48VDC or equivalent.

C. The SPDs shall use silicon avalanche diode (SAD) technology and have a visual status indicator and isolated Form-C relays for remote fault annunciation to the site alarm system.

D. Each SPD shall be selected based upon the specific application to maximize its effectiveness and shall be installed at the equipment to be protected in accordance with the manufactures' instructions.

10.5.8 Coaxial Transmission Line Surge Suppression

A. A coaxial surge suppressor such as the Polyphaser series or equivalent shall be mounted and grounded at the entry port panel for each transmission line per the manufacturer's instructions.

B. All Contractor-provided outdoor antennas for control stations shall be equipped with a Polyphaser series surge suppressor or equivalent.

a. These lightning arrestors shall be grounded to a 5/8" X 8-ft copper clad steel driven ground rod with #2 AWG tinned copper wire attached to the rod using exothermic welding.

b. It is preferred that the grounding system used for the control station lightning arrestor shall be connected back to the building ground system at the power service entrance.

C. Transmission lines shall be cut to proper length for connection to the surge protection equipment.

10.5.9 Low-Voltage and Copper Line Surge Suppression

A. All Telco leased line circuits, outdoor microwave Ethernet conductors, alarm conductors, and all other copper conductors that enter an electronic equipment room or equipment shelter shall be equipped with electrical SPDs utilizing the appropriate SPD, Transtector series, Northern Technologies TMC-50, or equivalent.

B. These arrestors shall be installed as close as practicable to the point of entry to the facility.

C. Surge suppression devices used on Telco leased circuits shall consist of both primary at the Telco demarcation and secondary at the point of cross-connection to communications equipment.

a. Primary surge suppression devices shall use silicon avalanche diode technology, and shall be bonded to the equipment shelter/room ground system.

10.6 Infrastructure Equipment Installation

A. The location and position of all equipment shall be in accordance with good engineering practices and conscious of County practices, such that optimum functional efficiency and equipment maintainability shall result.

B. All equipment shall be arranged and installed in a coordinated fashion so that each item of equipment's intended function shall not be impaired due to the influence of adjacent equipment or environmental factors.

C. Sufficient space and clearance shall be provided so that service and maintenance of each item of equipment can be readily performed.

D. All external equipment inter-cabling, whether network, RF, electrical power, audio/data, or control cables and/or wiring, shall be labeled with pre-printed adhesive wire markers/labels.

E. Markers shall be placed at each end, and adjacent to the connector, plug, or terminus; this data shall be recorded in the installation documentation.

F. All equipment cables or cable bundles within the equipment shelter, to the greatest extent feasible, shall be neatly tied by means of plastic tie wraps and secured by clamps to flat surfaces.

G. For cables and/or wiring installed within the equipment shelter, markers shall be placed at both ends of the cable.

H. All cable/wiring bundles exiting the equipment must do so through the top of the cabinets or racks.

I. Rubber grommets or other suitable protection shall be used at cabinet knockouts to protect the cable/wiring.

J. Splicing of network, RF, electrical power, audio/data, or control cable/wiring will not be permitted.

10.7 Equipment Mounting

A. To maximize space utilization and facilitate equipment maintenance, the Contractor shall install the fixed equipment in open 19-inch self-supporting racks or equipment cabinets.

B. The Contractor shall install the equipment and connect the equipment to the appropriate AC and DC power sources.

10.8 Electrical Systems

A. All AC power wiring outside of the building/shelter shall be enclosed in heavy wall galvanized rigid steel conduit with form eight gasketed fittings.

B. Weatherproof grounding type hubs shall be used at boxes and equipment enclosures

C. All wall penetrations shall be sealed with weatherproof compounds

D. All AC power electrical wiring inside of the building/shelter shall be enclosed in EMT (electro metallic tubing) with compression type fittings (setscrew type fittings are not acceptable).

E. EMT shall be surface mounted in a neat, professional like manner; UL approved locknuts and grounding bushings or EMT box connectors shall be used at boxes and equipment enclosures.

F. All alarm conductors and Telco cabling inside the shelter shall be enclosed in 3/4-inch EMT conduit.

G. Flexible metallic conduit (UL approved) with UL fittings shall be used as final connections to all mechanical vibrating/rotating machinery such as transformers, UPS units, generator sets, etc.

H. All conduit routings shall be horizontally and vertically straight, neat in appearance, indicative of professional workmanship, and shall conform to existing conduit routings where applicable.

I. Where existing conduit supports are adequate, they may be used.

J. If new supports are required, they shall be installed at intervals in accordance with the NEC.

K. Only structural members suitable for conduit supports shall be used; piping, HVAC ducts, etc. shall not be used for support of conduits.

L. Conduit support intervals shall be based upon the NEC Table 346-12.

M. Power conductor insulation shall be color coded with tape at each termination end.

N. Branch circuit conductors shall be labeled using Brady or approved equivalent wire markers at each end with the appropriate circuit numbers.

O. All outlet boxes shall be metallic surface mounted types suitable for the quantity of devices enclosed.

P. Faceplates shall match the outlet boxes.

Q. The outlet boxes shall be marked with the associated circuit and breaker numbers.

R. Outlet boxes that are fed by emergency power shall be plainly marked and identified.

S. All power feeders and branch circuits shall contain an equipment grounding conductor which shall have green colored THWN/THHN insulation or green identifying tape at both ends and which shall be suitably terminated to an equipment ground bus or device screw terminal at both ends.

T. All wire for power, lighting, control and grounding systems shall be stranded copper with UL THWN/THHN 600V insulation, sizes as indicated.

U. Minimum size for power shall be #12 AWG and minimum size for lighting shall be #14 AWG.

V. Electrical equipment such as DC power plant rectifiers, UPS units, etc. shall be wired in accordance with the manufacturers wiring diagrams furnished with the equipment.

10.9 Antenna Systems Installation

10.9.1 Antenna System Documentation

A. The Contractor shall provide in their proposal, figures and engineering drawings that detail the antenna tower and antenna mounting assemblies, tower-top amplifiers, transmission lines, ground kits and connectors, and surge suppression devices.

B. The Contractor shall provide Tower Loading Detail drawings that depict the antenna tower with the antenna mounting locations as specified in this RFP, and the proposed equipment.

10.9.2 Communications System Antennas

A. The antennas shall be supplied with mounting brackets and all other suitable mounting hardware for mounting to the County provided 6-ft sidearm assemblies located at the specified level of the tower.

B. All antenna mounts and sidearm mounts shall include a “stiff arm” or “tie-back” brace to prevent movement under high wind conditions.

C. All brackets, mast, clamps, and hardware shall be of a suitable material to minimize corrosion and rust.

10.9.3 Transmission Lines and Waveguides

A. Transmission lines shall be cut to length.

B. The equipment shelter end of the coaxial transmission lines shall terminate at the surge suppression device on the interior of the transmission line entry port.

C. Each transmission line connector on the bulkhead panel shall be labeled to identify its associated antenna and mounting height.

D. The Contractor shall meet all manufacturers’ cable bending specifications for strain relief purposes.

10.9.4 Hangers and Hoist Grips

A. All transmission lines and waveguides shall be securely fastened using the specified clamp devices.

B. Hanger clamps shall be approved by the cable manufacturer, installed per cable manufacturers’ instructions, and properly torqued.

C. The best commercially available parts shall be used, no snap-in hangers are allowed without written permission from the County.

D. Hoist grips shall be utilized at the manufacturer specified intervals for lifting the transmission line.

E. Hoisting grips shall be left in place to secure the cable.

10.9.5 RF Connectors

A. The mating surfaces shall remain tightly wrapped and protected until mating; touching with the fingers shall be avoided.

B. Silicone or other material shall not be used in the connectors.

C. All connectors shall be approved by the cable manufacturer, installed per the manufacturers' instructions, and be properly torqued.

D. Connectors shall be torqued to the manufacturer’s specifications with a proper torque wrench.

E. After proper torqueing, outdoor connections shall be shrink tube protected to preclude corrosion.

F. Shrink tube size shall be in accordance with the manufacturer's recommendations for the size of line and type of connector.

10.9.6 Coaxial Jumpers

A. Coaxial jumper cables shall be used to interconnect all interference protection or multiplexing devices with the coaxial antenna transmission line and radio frequency equipment.

B. Coaxial jumper assemblies for each antenna system shall be factory constructed to length.

C. The connection to the top of the transmission line shall be weather-protected and the connection to the antenna shall be weather-protected as described in this RFP.

10.9.7 Control Station Antennas

A. All control station antennas provided and installed by the Contractor shall be installed using solid-jacketed transmission line installed as specified above.

B. Directional or omni-directional control station antennas shall be provided as specified in this RFP.

10.9.8 Transmitter Combiners, Duplexers, and Filters

A. The transmitter combiner components shall be mounted in an "open" floor mounted rack or integrated into equipment cabinets.

B. All RF connectors shall be properly torqued; hand tightening is not acceptable.

10.9.9 Receive Multicouplers and Tower-Top Amplifiers

A. The receiver multicoupler shall be installed within the equipment room within a separate or shared rack or equipment cabinet.

B. All connectors, joints and fasteners shall be securely tightened and properly torqued to preclude RF noise generation.

C. All exterior connections shall be weatherproofed per the transmission line requirements of this RFP.

10.10 Dispatch Center Installations

A. The Contractor shall provide any and all equipment racks, grounding and bonding, surge protection devices, and miscellaneous hardware and components required for completion of the dispatch console installations.

B. All installations shall be neat and professional and performed per the manufacturer's recommendations using good engineering practice with cables bundled, no sharp edges exposed, no wire exposed, etc.

C. All console related equipment shall be bonded to the dispatch facility ground systems.

D. All control stations shall have their antenna systems and transmission lines bonded to ensure that any surge currents do not reach the console operator positions and personnel.

E. Current dispatch equipment shall remain operational at every dispatch position until the trunked communications system is complete and operational or until dispatch capabilities are fully integrated into the new consoles.

F. All console operator position installations shall be performed in such a way and to a schedule that shall minimize the interruptions to dispatch operations.

G. The Contractor shall coordinate all dispatch operator installations and removals with County personnel.

H. Scheduling shall be completed by the Contractor no less than 30 days prior to the start of the work.

10.11 Logging Recorder System Installation

A. The Contractor shall furnish and install any necessary devices, interfaces, firmware, and software to connect the trunking equipment to the existing upgraded or replacement logging recorder system equipment.

10.12 Site Cleanup

A. At the completion of the installations specified herein, the Contractor shall remove all debris that are a result of such installations, and return the work areas to normal conditions.

B. Special consideration must be given to the public safety communications center during equipment relocation and installation to minimize the disruption of "ongoing" dispatch operations.

C. Damage to any equipment, floor tiles, rooftops, exposed surfaces, or other building facilities in any way shall be repaired or replaced by the Contractor at the Contractor's expense; repair or replacement shall be at the sole discretion of the County.

11. PERFORMANCE VERIFICATION AND ACCEPTANCE

A. Performance verification shall consist of factory tests, mechanical installation inspections, field specification tests, field functional and operational tests, radio coverage tests, and system reliability tests.

B. The Contractor, in conjunction with the County's technical personnel and representatives, shall verify and demonstrate to the County that all systems and equipment have been properly installed optimized, is fully functional, and meets all of the requirements specified within this RFP.

C. The Contractor shall provide all necessary acceptance test plans, technical personnel, transportation, and test equipment to conduct the performance verification tests.

D. The Contractor shall coordinate scheduling of the testing with the County.

E. All deviations, anomalies, and test or specification failures discovered during testing shall be documented in a Project punch list and remedied by the Contractor in a timely manner.

F. When the system has been fully installed, programmed, optimized, made operational, and fully tested by the Contractor according to the agreed upon test scripts, the County shall then be notified in writing that the system is ready for acceptance testing.

G. The proposed Project schedule shall include an appropriate amount of time for the County’s representatives to witness all such testing.

H. All test results shall be recorded in a standardized format to be determined by the Contractor.

I. The format to be used for recording of test program data shall be submitted to the County for approval 30 days prior to testing.

J. All recorded test program data shall be dated, witnessed, and signed by the designated representatives of the County and the Contractor.

K. All test data shall be presented in a single test report.

11.1 Factory Staging and Acceptance Testing

A. The Contractor shall provide a Factory Acceptance Test Plan (FATP) to the County and stage all trunked and conventional communications and backhaul systems infrastructure equipment at the Contractor’s factory location within the continental United States for the purpose of conducting a Factory Acceptance Test (FAT).

B. All equipment must be functional within the factory-staged systems prior to acceptance of the FAT by the County.

C. At staging, all of the infrastructure equipment required to make a fully operational communications system shall be assembled into the proposed configuration and tested as a system, including, but not limited to:

a. Repeater site equipment

b. Network and site controllers

c. LAN/WAN/ Distribution Equipment

d. Alarm panels and control units

e. Dispatch Consoles

f. Network Control and Management Systems

D. The County, at their option, shall supply representatives to witness the factory staging and testing of the system.

E. At the successful completion of system staging, the fixed network shall not be shipped until the County has granted approval to ship.

F. Upon receipt of the County's approval, the fixed network equipment shall be delivered to the Contractor's facility by a method designed to safely transport sophisticated electronic equipment.

G. Upon arrival at the destination, all equipment will be received and inventoried by the Contractor.

H. Any interim storage required for the equipment prior to the delivery to the County sites for installation shall be the responsibility of the Contractor.

11.2 System Acceptance Test Plan

A. The Contractor shall provide a System Acceptance Test Plan (SATP) for all communication systems and backhaul communication systems equipment for establishing the basis of system acceptance.

B. This plan shall form the basis for a mutually agreed upon SATP between the County and the Contractor.

C. The SATP shall, as closely as possible, resemble the "real life" application of the communications system and equipment.

D. An example of the topic areas to be analyzed in depth in the field shall include, but not be limited to, the following testing areas which must show conformance to all of the specifications contained in this RFP:

a. System infrastructure P25 features, redundancy systems and hardware, functionality, programming, and performance

b. Dispatch console redundancy, functionality and performance

c. Interoperability and mutual aid interface infrastructure functionality and performance

d. Conventional interface infrastructure functionality and performance

e. Network Control and Management Systems functionality and performance

f. Base station transceiver functionality, optimization, and performance

g. Radio coverage design verification

h. Site facilities mechanical inspection, functionality and performance (e.g., generators, power plant systems, shelter alarms, fire suppression, grounding, etc.) for site facilities provided by the Contractor

i. P25 ISSI interoperability conformance

j. Network backhaul system functionality and performance

11.3 Tower and Facilities Mechanical Inspection and Tests

11.3.1 General

A. The entire infrastructure installation effort shall be inspected for conformity to this RFP.

B. All equipment and installation services provided under the requirements of this RFP shall be inspected for compliance to the standards of good engineering practice, all Federal, State, and County regulations and codes, and all building codes and ordinances in effect at the sites delineated in this RFP.

C. Particular attention shall be paid to:

a. All installation work performed in a neat and professional manner in compliance with manufacturer's recommendations

b. All fasteners and hardware tightened and properly torqued

c. All backup power and electrical systems are properly configured and installed

d. All antennas are plumb and of proper pattern and orientation

e. All transmission lines are properly installed, labeled, and swept

f. Sites are free of debris and excavations backfilled, compacted, and restored

g. Interior and exterior ground systems properly installed and bonded

h. All SPD/TVSS devices are appropriate for the application and properly installed and bonded

i. All alarms, circuits, and electrical circuits and outlets are functional and properly labeled

11.4 UPS Power Systems

A. The Contractor shall perform testing on all UPS systems provided by the Contractor.

B. UPS systems may consist of a combination of DC power plants (Rectifiers and Batteries) that are the primary power source at a site, conventional UPS systems providing 120/240

VAC output from a dedicated battery power source, and UPS systems providing 120/240 VAC output from power inverters that derive their power from the site's DC power plant.

C. These tests shall include but not be limited to:

   a. Initial startup testing by the manufacturer representative

   b. Normal operation

   c. Simulated power outage to switch to generator

   d. Battery/UPS only operation at rated load for specified required run times

   e. Return to normal operation from the conditions above

   f. Maintenance bypass

   g. Self-tests/diagnostic programming

11.5 Equipment Specification Testing and Antenna System Sweeps

A. Following equipment installation and optimization, the Contractor shall perform the following tests for each piece of equipment including any modified and/or relocated existing equipment.

B. A representative of the County shall witness these tests and the Contractor shall provide documentation of the test results to the County.

C. Any equipment not meeting their manufacturer's specifications or the requirements of this RFP shall be adjusted, repaired, or replaced by the Contractor without additional cost to the County.

D. The specification tests shall be witnessed by the County and shall at a minimum include the following.

E. Base stations in FDMA and TDMA modes as applicable.

   a. Forward and reflected power at transmitter output

   b. Forward and reflected power at combiner output

   c. Insertion loss of combiner

   d. Receiver BER threshold sensitivity at the chassis (each slot for TDMA)

   e. Receiver BER threshold sensitivity at the top-of-rack (multicoupler input) (each slot for TDMA)

   f. Receiver BER threshold sensitivity through the tower-top-amplifier test port in the presence of noise (each slot for TDMA)

F. Receiver multicoupler gain/loss.

G. Voting comparator, if applicable.

a. Operational tests to be conducted to verify end-to-end functioning of each channel of each comparator

H. Antenna systems and transmission line tests.

a. The Contractor shall perform Time Domain Reflectometry (TDR) and Return Loss testing for all LMR infrastructure transmit and receive system transmission lines and waveguides

b. All infrastructure site antennas and transmission lines shall be tested from the interior of the equipment shelters at the input connector of the surge suppression device on each transmission line

c. This method of measurement shall indicate the Return Loss and any impedance irregularities in the transmission line/waveguide/antenna system

d. Return Loss on any transmission line or waveguide shall not exceed 17.0 dB

I. RF control stations if applicable.

a. Forward and reflected power at transmitter output

b. Proper programming of talk groups/channels, features and functions

J. Mobile radios if applicable.

a. Forward and reflected power at transmitter output

b. Proper programming of talk groups/channels, features and functions

K. Portable radios if applicable.

a. Proper programming of talk groups/channels, features and functions

b. Proper battery life in 5-5-90 duty cycle testing including proper operation of the radio's low battery indicator

11.6 Radio Coverage Acceptance Testing

A. The County's acceptance of the radio coverage of the system shall be based upon the successful passage of the Coverage Acceptance Test Plan (CATP).

B. The Coverage Acceptance Tests shall not begin until the system has been fully optimized and the infrastructure tests have been successfully completed.

C. Documentation of both the infrastructure and coverage test results shall be presented for the County's review following successful completion of the coverage tests.

D. The Coverage Acceptance Tests shall only take place when full foliage conditions exist and rain shall not delay the scheduled testing.

E. Prior to initiation of the coverage testing process, the Contractor shall provide the County with written certification that the system has been properly installed and fully optimized so that CATP testing may begin.

F. The proposed schedule shall allow at least two (2) weeks for the County to review and approve the final test documentation after all testing has been completed.

11.7 CATP Requirements and Test Plan

A. The Contractor shall provide a detailed CATP in their proposal and the CATP shall reflect the proposed system design and include at a minimum, the following items:

   a. A schedule of the tasks and activities

   b. An explanation and description of the methodology explaining how the test will be conducted

   c. An explanation of how the results shall be tabulated and documented

   d. An explanation of why the methodology of data gathering and the subsequent presentation of the results to the County shall "prove" that the coverage requirements of this specification have been met

   e. The Contractor's expectation including time commitments, of the required County personnel and vehicle resources needed for the testing

   f. A list of mobile and portable radio equipment required for the testing

B. The Coverage Acceptance Test Plan shall cover Phase 2 communications only.

   a. Automated outbound BER tests

   b. Automated outbound signal level measurements for informational purposes

C. The Coverage Acceptance Test Plan shall consist of the following:

   a. Subjective Voice Quality tests for inbound and outbound transmissions

   b. Simulated in-building signal margin testing using attenuated radios

D. The coverage acceptance tests shall be performed in all areas of Columbia County.

E. The Contractor shall clearly show the calculations and assumptions used for compliance with coverage requirements specified in this RFP and the calculations shall be subject to County approval and review.

F. Once radio coverage testing has been initiated, system modifications such as replacement or reorientation of base station antennas or other factors that may influence radio coverage including software-roaming parameters, shall not be made without the County's approval.

G. Modifications affecting radio coverage will require that the radio coverage test be restarted from the beginning at no cost to the County.

11.8 CATP Pass/Fail Criteria

A. The CATP Automated BER test for Phase 2 modulations shall be deemed to have passed if the number of test girds passing is divided by the total number of test grids and this percentage is equal to or greater than the contractual Service Area Reliability percentage as proposed by the Contractor and agreed to by the County.

B. The CATP Subjective Voice Quality test for Phase 2 modulations shall be deemed to have passed if the number of test girds passing is divided by the total number of test grids and this percentage is equal to or greater than the contractual Service Area Reliability percentage as proposed by the Contractor and agreed to by the County.

11.9 Automated BER and Informational Receive Signal Level Testing

A. The Contractor shall perform outbound Automated BER and informational RSL measurement tests for Phase 2 modulations.

B. The test data shall be statistically significant for the required confidence level.

C. The automated tests shall incorporate critical time constants for communications system radio coverage testing.

D. A method of correlating the test location with the Automated BER and RSL measurements, such as a GPS receiver, shall be employed to assist with analysis of the test data.

E. The test instrumentation shall be capable of operation in a vehicle for outbound tests.

F. A test route shall be developed by the Contractor and approved by the County.

G. Continuous data shall be recorded throughout the test route.

H. Transportation shall be provided by the County and to any test locations not generally accessible by car if required.

I. The Automated BER test shall consider the effects of delay spread or Time Delay Interference (TDI) on the outbound test channel.

11.10 Subjective Voice Quality Testing

A. The Contractor shall perform a Subjective Voice Quality test for inbound and outbound transmissions to field test units from dispatch for Phase 2 modulations.

B. A method of correlating the test location of the Subjective Voice Quality test such as a GPS receiver, shall be employed to assist with analysis of the test data.

C. The test evaluation team(s) shall consist of no less than two (2) County representatives and one (1) Contractor representative.

D. Each evaluation team and dispatcher shall score each test call for inbound and outbound voice transmissions as PASS or FAIL based on a minimum DAQ 3.4 voice quality.

E. The test is conducted using a Phase 2 talk group.

F. Both the dispatcher and the portable radio user must successfully transmit and receive test messages in order to complete the test.

G. If the voice quality of the test messages meet or exceed the test criteria, as agreed by a majority of the test evaluation team, the grid is considered to have passed.

H. If the test messages do not meet the test criteria, as agreed by a majority of the test evaluation team, the grid is considered to have failed.

I. If a test call in a grid fails, a single "retry" will be permitted and the user may move up to 5-feet and repeat the test.

J. All retries shall be recorded on the scoring template and no more than 5% retries will be allowed for passage of this portion of the coverage test.

K. If the discrepancy cannot be rectified, then that grid will be set aside for discussion and evaluation.

L. The test message shall consist of a short message representative of typical public safety call durations and shall include the identification of the location being tested.

M. The suggested test message is "TEST TEAM #ONE, TESTING BUILDING YYY, LOCATION NUMBER XXX", followed by a short sentence or two, possibly from a newspaper or a Harvard Phrase, of approximately eight 8 to 20 words total.

N. To ensure that the message is understood, the test message may be repeated by the dispatcher or portable radio user who will then make a similar test call.

O. The suggested response test message is "TEST TEAM #ONE, CONFIRMING BUILDING YYY, LOCATION NUMBER XXX", followed by a short sentence or two possibly, from a newspaper or a Harvard Phrase, of approximately eight 8 to 20 words total.

P. If a member of the test team exhibits bias, they may be replaced.

11.11 Attenuated Radio Configurations

A. The County will utilize new and existing mobile and portable radio equipment on the new System.

B. The County understands and does not object if the Contractor utilizes their preferred mobile or portable radio equipment for the Automated and Subjective Voice Quality tests.

C. To ensure consistency among the Contractor system designs, the County has specified the outdoor signal level on the street, and the baseline technical parameters for the user equipment that shall be used for the performance of the CATP.

D. A modified (attenuated) portable radio will be used to simulate a portable radio operating on the hip outdoors and within buildings.

E. This process involves the attenuation of a portable radio to "normalize" the roof-mounted mobile ¼-wave magnetic-mount test antenna and to simulate the performance degradation that would be encountered while operating the portable radio on the hip outdoors and within buildings having a specific loss characteristic.

F. The Contractor shall provide the ¼-wave magnetic-mount test antennas for unobstructed placement on the vehicle roof used for the testing.

G. The Contractor shall install the appropriate signal attenuators to the portable test radio to emulate the following:

   a. The body losses experienced when the portable radio is worn on the hip which is specified by the County to be 10.3 dB for a ½-wave whip antenna

   b. The antenna adjustment of 3.0 dB for the ¼-wave magnetic-mount test antenna when compared to a half-wave dipole

   c. The antenna height adjustment of 1.3 dB for a ¼-wave magnetic-mount test antenna installed at 5.0-ft AGL

   d. The specified signal level margins for building loss in dB

H. The adjustment to the level of attenuation that may be required to "normalize" the receiver sensitivity specifications of the Contractor-provided test radio to match the -119.0 dBm at 5% BER chassis receiver sensitivity specification stated in this RFP; the Contractor shall measure and demonstrate to County personnel, the 5% BER chassis receiver sensitivity threshold of their test radios and their recommended adjustments to normalize their test radio receiver to -119dBm at 5% BER

I. The Contractor shall provide a thorough description, including block diagrams and attenuation levels of the proposed test setup, and the County shall approve the Contractors final plan for attenuation.

J. The Contractor shall verify and the County shall witness that each portable radio to be used for the coverage test has been bench-tested and found to be operating within the manufacturer's specifications, and that the appropriate amount of attenuation is in place to "normalize" the Contractor-provided test radio.

K. The Contractor shall certify and the County shall witness that the testing methodology and modifications to the radios provide a loss equal to that of a portable radio operating in compliance with the requirements of this RFP.

11.12 Test Equipment Records

A. The Contractor shall keep thorough records during the equipment testing process and shall provide a permanent record of the testing results to the County and its technical representative prior to the initiation of the coverage testing process.

B. The Contractor shall record the make, model, serial number, and calibration date for all radio test equipment used during the equipment testing process.

C. The Contractor shall record and track the make, model, and serial numbers of all radio equipment used during the radio coverage testing process.

D. This documentation shall include the versions of software and settings programmed into each of the radios.

11.13 Test Grids and Locations

A. The Columbia County jurisdictional area shall each be divided into grid squares with sizes as determined by the methodology defined in the latest version of TSB-88 to yield a 99% confidence level and 2% confidence interval in the resulting test data.

B. An Automated BER, informational signal level, and Subjective Voice Quality test shall be performed in each grid where a portion of that grid is within the Columbia County boundary.

C. Testing points within each grid shall be chosen per the TSB88 defined methodology and the test point shall be randomly chosen as to not be biased by either party and, to the extent possible, should not cluster adjacent grid test points together.

D. The DAQ test is normally performed following the auto-triggered Automated BER and the informational signal level test.

E. For every test grid, the Subjective Voice Quality test shall be performed using a portable radio modified to simulate a portable radio operating within buildings.

11.14 Coverage Test Results and Report

A. For each grid tested, the Automated BER tests and the Subjective Voice Quality tests shall stand alone and shall be evaluated independently of each other in that failure of the Automated BER test does not constitute failure of the Subjective Voice Quality test and vice versa.

B. For each modulation type tested, the Automated BER tests and the Subjective Voice Quality tests shall stand alone and shall be evaluated independently of each other in that failure of the Automated BER test does not constitute failure of the Subjective Voice Quality test and vice versa.

C. For the Automated BER test, a test location shall be considered to pass only if the Automated BER measurements are less than or equal to the maximum agreed upon thresholds for PASS/FAIL criteria for each modulation type tested.

D. For the Subjective Voice Quality tests, a test location shall be considered to pass only if both the inbound and outbound voice transmissions were scored as a PASS for each modulation type tested.

E. The Contractor shall generate a CATP test report to summarize the test results and to recommend any corrective steps that may be required to fix any failed test.

F. The Contractor's CATP report shall include the following information for each test:

   a. Description of the test methodology and the final results

   b. Test location (map grid, address, or intersection for non-moving tests, etc.)

   c. The test results for the Automated BER and Subjective Voice Quality tests by grids shall be displayed on 11" x 17" maps with the grids color keyed to indicate the test results; red indicates a grid failure, green indicates a passed grid, yellow indicates a grid that is not accessible or tested

   d. Automated BER detailed test results by grid

   e. Subjective Voice Quality test results by grid

   f. Informational RSL measurements by grid

   g. Paper and soft copies in PDF format of the data record collection work sheets

   h. Date and time stamps on the test reports

   i. Test conditions (type of radio, attenuation levels, antennas, equipment serial numbers, etc.)

   j. The names of the test team participants

G. The CATP test report documentation shall be presented to the County for review following the successful completion of the coverage tests.

H. The County shall have a minimum of 21 days to review and approve the test documentation after all testing has been completed.

I. Successful completion of the CATP test shall occur when the Contractor has demonstrated that they have met their minimum Service Area Reliability coverage commitment and the contractual requirements of the contract.

11.15 Coverage Test Failures

A. The CATP shall be considered to have failed if any of the following conditions are demonstrated:

   a. Unauthorized changes to the system or equipment under test

   b. The Contractor has failed to demonstrate that they have met their minimum Service Area Reliability coverage commitment and the contractual requirements of the contract for outdoor radio coverage within the Columbia County jurisdictional area

B. If the system fails the coverage test as described above, then the Contractor shall take corrective action to resolve the coverage deficiencies and repeat the coverage tests.

C. The costs of the corrective actions shall be borne by the Contractor.

D. The costs associated with the repetition of the CATP shall be borne by the Contractor inclusive of the participation by the County's technical representative.

11.16 Remedies for Coverage Failure

A. The Contractor shall bear the full responsibility and costs to mitigate the failure to demonstrate compliance with the contractual coverage commitment.

B. Remedies for failure of the CATP shall address the entire problem area and not be limited to correcting a portion of the failed area.

C. Remedies may not degrade areas of coverage that were previously accepted.

D. A retest of the CATP shall be conducted in any area (previously failed or not) potentially affected by the remedy in order to verify that the composite coverage is maintained.

E. All remedies must meet the performance, feature-functionality, and reliability requirements of this RFP.

F. At a minimum, these remedies may include the following:

   a. Modifications to the design of the system including the antenna and transmitter configurations which shall comply with Region 9 and any regulatory and zoning restrictions of Columbia County

   b. The complete inspection and testing of the transmit/receive antenna systems to determine that it meets all manufacturer and design specifications

11.17 Functional and Operational Tests

A. The functional and operational testing shall be performed following the CATP.

B. The Contractor shall provide and define a detailed "step-by-step" functional test procedure and check list specific for their system that exercises and demonstrates each and all of the required and proposed functions and capabilities including those of the dispatch consoles.

11.18 Communications System Cutover Plan

A. The Contractor shall include in their proposal a preliminary cutover plan describing the transition of users to the new communications system.

B. This plan shall include a chronological chart (Gantt-type format) with the tasks to be accomplished and the time for achievement of each task shown.

C. The Contractor shall provide a phased implementation plan that will ensure that no current dispatch function is negatively impacted or impaired during system cutover to the new communications system.

D. The Contractor shall provide an updated detailed cutover plan for each user agency 60 days prior to equipment installation.

E. The plan shall be approved by the County before commencement of installation.

F. The detailed cutover plan shall include a narrative description of the sequential cutover steps and a clear delineation of which tasks are the responsibility of the Contractor and which tasks are the responsibility of the County.

G. The current communication systems shall remain operational during the cutover phase and after cutover for a period to be determined by the County.

11.19 30-Day Performance Period

A. The Performance Period shall consist of a 30-Day Performance Period or burn-in period, and shall be scheduled to begin upon written notification to the County that the system is ready for the 30-Day Performance Period, and that the initial user training and initial user group transitions have been successfully completed.

B. The system will be observed during this period to ensure that it performs as specified.

C. Any failure to perform as specified in the contract will be remedied before the infrastructure is accepted.

D. If the system performs as specified for 30 consecutive days, and the remainder of the acceptance tests and punch-listed items have been resolved, then the system infrastructure will be considered for acceptance.

E. Successful operation is defined as the absence of any major failure of equipment or loss of system functionality.

F. Any major failure that occurs may reset the 30-Day Performance Period clock at the discretion of the County.

G. The County’s decision to reset the 30-Day Performance Period should be based in part, upon the source and the severity of the failure as well as the operational impact suffered by the users.

H. The decision of the County to reset the 30-Day Performance Period shall be final and binding on the Contractor.

I. The cutover and transition of the remaining the County’s agencies if applicable, will follow the same process as the initial agencies but will not begin until the 30-Day Performance Period has been successfully completed.

11.20 Major and Minor Failures

A. Successful operation is defined as the absence of any major failure of equipment or loss of system functionality.

B. Minor failures, such as operational problems and adjustments normally encountered during implementation of a new system, shall not constitute a failure in achieving successful operation.

C. The following is a listing of items that define a major failure:

   a. System in non-trunked fallback mode or failsoft

   b. System in “site trunking”

   c. Groups of mobiles or portables receiving a denial or busy tone

   d. More than one dispatch console operator position off the air

   e. The loss of voice communications

   f. The loss of data communications if applicable

   g. Failure of the trunked system switch/controller

   h. Greater than two trunked repeater channel resources down

   i. A simulcast failure affecting one or more sites or more than two channels

   j. Loss or failure of system configuration database

   k. Loss or failure of user database

   l. Failures that prevent acceptance criteria from being achieved

D. The following is a listing of items that define a minor failure:

   a. Failure of any equipment which does not cause the interruption of trunking operation or dispatch console functionality, provided that redundant equipment automatically switches into operation in accordance with the RFP

   b. Momentary (ten seconds) system outages during switching to redundant control equipment

   c. Failure of no more than one repeater channel, provided that such failures are corrected within the maintenance response time required by the RFP

   d. Failure of a single dispatch console position that is not attributable to other system failures

   e. Failure of a site frequency standard provided that redundant equipment automatically switches into operation in accordance with the RFP

   f. Failure of a single tower-top amplifier or multicoupler

E. During the Performance Period, the Contractor shall provide maintenance response, replacement parts and materials, and qualified personnel to service the fixed-end system and equipment at the sites of work within one (1) hour after notification of a major equipment failure as reported to the Contractor's service facility, during normal working hours (8:00 a.m. through 5:00 p.m. Monday through Friday) and within two (2) hours after hours.

F. The Contractor shall have sufficient personnel and parts available to maintain the system and equipment so that the equipment can be repaired within eight (8) hours after notification of equipment failure.

G. This provision shall apply on a 24 hours per day, seven days per week basis including holidays.

11.21 Performance Documentation

A. The documentation shall be maintained in a common electronic database, the database shall permit sorting by field to facilitate the analysis of maintenance records.

B. This database shall be maintained by the Contractor but shall be accessible, via remote login provided to the County by the Contractor to the County at all times.

C. During the performance period, the Contractor shall establish and maintain the following documentation.

   a. Prepare and maintain a service/repair record system

   b. Each major piece of equipment and radio subscriber unit shall be maintained by serial number and asset number

   c. Prepare and maintain a failure reporting system to insure that all failures are reported promptly to the County

   d. A failure log shall be available for inspection by the County at all times

D. A formal failure report shall be submitted to the County on a monthly basis and shall show for each failure.

   a. The problem and the time reported

   b. The time that the technician responded

   c. The problem actually found

   d. The repairs performed and the time of restoration

   e. An itemized list of parts replaced

   f. The technician's name

   g. Any FCC required measurements made due to repairs

11.22 Final System Acceptance

A. The County will consider the system ready for Final System Acceptance upon the satisfaction of the following conditions.

   a. All punchlist and action items are completed and no outstanding problem issues exist

   b. All control station, test equipment, encryption and related equipment to be provided in accordance with the RFP have been received by the County

   c. All required training has been performed per the RFP

   d. All functional and performance tests are complete and the results have been provided to the County and accepted as complete and in accordance with the RFP

   e. All as-built drawings, service manuals, operator manuals and related documentation required in the terms and conditions and the RFP have been provided to the County and are accepted as complete and in compliance with the requirements

   f. All legacy system equipment and antenna systems have been removed and properly disposed of

   g. Submission of proof of payment of fees, taxes or similar obligations

   h. Obtain all permits, certificates of inspection and other approvals and releases by governing authorities required for the County's occupancy and use

   i. Settle liens and other claims

   j. Settle Liquidated Damages due to the County, if any

   k. Transfer operational, access, security and similar provisions to the County and remove temporary facilities, tools and similar items

   l. Obtain Consent of Surety for final payment

B. The Contractor shall provide in their proposal, a complete listing of the Final System Acceptance documents that will be the deliverable to the County.

12. TRAINING

A. The Contractor shall include in their proposal, their proposed training courses to be provided, and a syllabus of the proposed training program.

B. The Contractor representatives shall provide training on-site to County personnel who will be responsible for training additional personnel in the operation and functions of the new communications system.

C. The Contractor shall develop and provide a comprehensive and detailed plan for all training associated with the use, operation, and management of the new communication system as described in this Section.

D. The training plan shall provide on-line “prerequisite” training as required, and on-site training by highly skilled training personnel with extensive training and experience on the equipment and systems supplied under this RFP.

E. The training sessions shall be scheduled at times and locations as negotiated with the County.

F. Dispatcher training may be required on a 24-hour basis without extra cost to the County.

G. The County will provide classroom space where training can be conducted.

H. The County’s live operational equipment will be used in a "hands-on" environment.

I. The Contractor shall provide the training plan to the County for approval at least 90 days prior to the cutover of system to live operation.

J. Written materials and audiovisual aids produced by the Contractor for the training shall be furnished to the County for continuing education purposes.

K. The Contractor shall provide all necessary instructional materials, manuals, handouts, and other training materials which shall be retained by the trainees for their reference

12.1 Dispatcher Trainer Training

A. The Contractor shall provide a comprehensive “Train-the-Trainer” program for the identified audiences and the subjects defined in this section.

B. Such training shall include at a minimum, sessions for up to 6 trainers each.

C. The training shall be tailored to the requirements of each user agency and shall use the agencies’ final console screen configuration.

D. The dispatch consoles used for training shall be connected to the new System.

E. The first training class shall be given to supervisory personnel of the agencies involved so that any deficiencies discovered in the training program may be corrected before the remaining personnel are trained.

F. Concurrent with the installation and prior to the performance period of the communications system, the Contractor shall provide orientation and training for all of the participating department's dispatch radio personnel trainers for all aspects of the operation and functioning of the P25 communications system and equipment.

G. The County will provide classroom space for the training and the Contractor shall provide the connectivity between the classroom to the System.

H. If the Contractor intends to utilize the actual console hardware to be provided to the County, the Contractor shall work with the County to determine which consoles are to be used for the training sessions.

I. Personnel shall be trained on-site in all features and functions as well as in the following areas:

   a. The configuration of the new system and its operational modes, and the primary differences between the new system and the current system

   b. Operational theory of the dispatch consoles

   c. The failure modes of the System and backup systems such as RF control stations, mobile and portable equipment, trunking and conventional, and the failure modes of operation

   d. Hands-on familiarization with all communications control functions and equipment

   e. Basic dispatch operator maintenance and diagnostic troubleshooting techniques

   f. System manager terminals and report generation

   g. Fire Station Alerting, Aux I/Os, and other ancillary systems

12.2 System Management Training

A. The Contractor representatives shall provide on-site training to County communication system supervisor and management personnel who will be responsible for database entries, setting up user files, and administering services for the communications system.

B. This training shall include intensive instruction on all aspects of the tasks necessary to operate the system.

C. The training class shall consist of up to 5 people.

D. The System Manager training course shall be a comprehensive program designed to familiarize the Radio System Managers with all of the available features, reports, provisioning, and system diagnostics.

E. The System Manager course must include, at a minimum, the following topics:

   a. System overview

   b. Operational theory of all system components

c. Detailed discussion of system failure modes and the appropriate response
d. Basic troubleshooting techniques
e. The available system features and report generation
f. The available system diagnostics and reports
g. Dispatch console management and configuration administration
h. Development and maintenance of system databases and archives
i. Detailed discussion of system and site alarm systems
j. Hands-on training and familiarization with all of the above
k. Fleet-mapping for the system
l. Disable/enable user radios authorized on the system
m. System utilization by their radios and talk groups
n. Basic report generation
o. OTAR configuration and administration
p. Logging recorder interface configuration and administration if applicable
q. ISSI interface configuration and administration
r. Microwave system alarm and management systems

12.3 System Maintenance Training

A. The County's personnel may assume some duties pertaining to the maintenance response for the new communication system backhaul and infrastructure systems.

B. The Contractor shall provide familiarization and maintenance training for County technical personnel during the equipment staging and installation phases of the Project.

C. This training will ensure that County maintenance personnel are familiar with the various components and equipment of the communications system.

D. The Contractor shall provide on-site training seminars for a minimum of five (5) persons, and shall include complete training, beginning with basic digital theory through comprehensive coverage of the provisioning, operation, and maintenance of the communications system and backhaul equipment supplied under this contract.

E. The Contractor shall supply training personnel that are highly skilled with extensive training and experience on the equipment supplied as part of this Project, and all necessary instructional materials.

F. All manuals, schematics, diagrams, and other printed and soft copy materials shall become the property of the attendees.

G. The technician training courses shall cover, at a minimum, the following topics:

   a. An overview of the system configuration and capabilities, block diagrams and circuit and component descriptions

   b. Network backhaul configuration, setup and IP addressing

   c. A presentation of the general communications equipment, theory, configuration, and features

   d. Principles of digital P25 Phase 1 and Phase 2 transmissions

   e. Simulcast theory, principles, operation, alignment and maintenance

   f. System failure modes, troubleshooting, diagnostics, and alarms

   g. Base station operation and maintenance, transmit and receive antenna systems testing and optimization

   h. Operation of specialized test equipment

   i. Detailed repair procedures, unit/module replacement, alignment, optimization, and testing procedures

   j. Detailed preventative maintenance and record-keeping procedures

12.4 On-Site User Trainer Training

A. The Contractor shall provide a comprehensive "Train-the-Trainer" program for the identified audiences and the subjects defined in this section.

12.4.1 On-Site Radio User Training

A. The Contractor shall provide on-site, "Train-the-Trainer" type courses for the following categories of equipment:

   a. Subscriber Mobiles

   b. Subscriber Portables

   c. Subscriber Control Stations

   d. Vehicular Repeaters (if utilized)

   e. Alternative Support Systems and Specialized Equipment (if utilized)

B. Training shall include system orientation and familiarization that includes theory of operation discussion and equipment demonstration, and shall be designed so that, upon completion, each student will be qualified to train system end-users on the operation of the specific equipment.

C. The Contractor shall customize all "Train-the-Trainer" courses per the County's satisfaction in conjunction with the specific programming and configuration parameters utilized by the County.

D. The Contractor shall provide training for up to two (2) classes of fifteen (15) students per class.

E. The Contractor's highly skilled personnel shall conduct the training.

F. Instructional material shall be included as part of each course and will become property of the County.

G. Training aids such as videos, system diagrams, training manuals showing working functionality and a qualified instructor shall be available for these classes.

H. There shall be handouts available for all attendees up to thirty (30) copies. Each student shall receive a personal "Trainer's Guide" training manual.

I. In addition to the "Trainer's Guide" training manual, an electronic version such as *.pdf (Portable Document Format) readable with the Adobe Acrobat Reader software shall be provided; thirty (30) USB flash-drive copies shall be supplied.

J. The Contractor shall provide, in addition to the training plan, and handout material, five (5) video copies that would instruct a user on the operational functions and features of all proposed radio system subscribers.

13. SYSTEM DOCUMENTATION

13.1 General

A. The Contractor shall supply a complete set of documentation that describes the overall communications system layouts, block diagrams, architecture, as-built documents, and its operating and failure modes for all systems, subsystems, and components supplied under the contract.

B. The documentation shall consist of three (3) electronic copies on a flash drive and one (1) bound hard copy of the entire system documentation.

C. The Contractor shall supply the documentation as specified in this Section. The documentation shall consist of the following at a minimum:

   a. User instruction and operation manuals

   b. Detailed equipment maintenance, setup, and alignment manuals

   c. System and equipment test data (both factory and field)

   d. Software documentation which describes system and equipment software and versions

   e. System and site as-built drawings and diagrams

   f. A complete inventory of all provided equipment and software including model numbers, serial numbers, version numbers in printed form and in the latest version of Microsoft Excel

D. The Contractor shall provide all documentation in Adobe Acrobat format (PDF) as well as in Microsoft Word or Microsoft Excel format as appropriate.

13.2 System Drawings

A. The Contractor shall prepare system engineering drawings for each site of work with all changes, configurations, and modifications documented for each individual communications site showing the equipment configuration, cabling schematic, cabling plan, and all other important system elements.

B. The equipment shall be installed in accordance with these drawings and specifications, which shall be delivered to the County as an integral part of the communications system when it becomes operational.

C. Any deviations from the planned installation shall be noted in the as-built, installed, programmed, wired, configured, and modified drawings, in accordance with this RFP.

D. The Contractor shall provide a general system manual that describes the overall system layouts, architecture, and its operating and failure modes including:

   a. System block diagrams

b. Site layouts and floor plans for each equipment site, and dispatch facility to scale

c. Rack face drawings to scale

d. Drawings showing cable tray location details to scale

e. Interconnection drawings that show all connections between sub-assemblies, such as terminal boards, panel assemblies or other equipment, and which external connections are made, shall be provided

f. Documentation of numbering and labeling of all cabling associated with remote control units

g. Documentation of numbering and labeling of all connections to termination blocks associated with the control consoles Aux I/Os, and conventional interfaces

h. Documentation of numbering and labeling of all interconnecting cabling between repeaters, the central control, any remote site controllers or processors, alarm circuits, leased telephone company circuits, and the backhaul system

i. Documentation and labeling of transmission line routing and antenna mounting at all fixed sites, with detailed drawings showing all mounting hardware and accessories

j. Any unique wiring configurations or circuit modifications that are not part of the standard equipment documentation provided

13.3 Instruction and Operation Manuals

A. The Contractor shall provide to the County all system documentation, including operating instruction manuals for each type of equipment supplied at each site.

B. This documentation shall be organized in a manner to allow the County's personnel quick access to the information. As a minimum, the following shall be provided:

a. General practices

b. User operating manuals

C. The Contractor shall supply necessary operating manuals, drawings and other documentation to assure that the County's personnel shall be able to operate the communications system both initially and in the future.

D. All system documentation shall be provided prior to training.

E. Documentation shall be used during training sessions and updated as needed for revisions found during training.

F. Revised system documentation shall be re-submitted prior to system acceptance.

G. At a minimum, this documentation shall include:

a. Complete set of maintenance and operations manuals shall be provided for the system as whole and for each category of equipment purchased in association with this Project

b. Manuals for OEM hardware for each component of the system

c. All system, field unit, and station user manuals published by the equipment manufacturers

d. System diagrams showing as-built configurations (to date) for all parts of the RF, controlling, transmission, and management systems.

e. Each major component shall be identified and the interconnecting relationship shall be clearly shown

13.4 Maintenance Manuals

A. The Contractor shall provide to the County all system maintenance manuals for each type of equipment supplied at each site.

B. This documentation shall be organized in a manner to allow the County's personnel quick access to the information.

C. As a minimum, the following shall be provided:

a. General practices

b. Parts manuals

c. Maintenance manuals

d. All equipment-programming templates used in the system

e. Helpdesk/Emergency Contact Information

D. The Contractor shall supply necessary manuals, drawings and other documentation to assure that the County's personnel shall be able to maintain the communications system both initially and in the future.

E. All system documentation shall be provided prior to maintenance training.

F. Documentation shall be used during training sessions and updated as needed for revisions found during training.

G. Revised system documentation shall be re-submitted prior to system acceptance.

H. At a minimum, this documentation shall include:

a. All system, field unit, and station user manuals published by the equipment manufacturers

b. System diagrams showing as-built configurations (to date) for all parts of the RF, controlling, transmission, and management systems.

c. Each major component shall be identified and the interconnecting relationship shall be clearly shown

d. Maintenance drawings for each item that is capable of replacement for maintenance purposes shall be shown in an appropriate drawing, which clearly indicates its position and relationship to the communications system.

e. Exact names, part, and identification numbers shall be shown with instructions and information for future procurement

13.5 As-Built Drawings

A. Thorough "as built" documentation shall be provided by the Contractor and delivered to the County's PM following Final System Acceptance.

B. These drawings shall include all communication sites and equipment that the Contractor had installed new, modified, and/or relocated existing equipment.

C. All deviations from the original system documentation shall be noted in the final as-built documents.

13.6 System Testing and Acceptance Documentation

A. The Contractor shall provide a complete set of documentation of the system acceptance testing and verification tests which at a minimum includes the following:

a. Factory Staging test results and acceptance testing for all staged systems

b. Site installation, mechanical, electrical and grounding inspections

c. Microwave and LMR antenna systems testing including TDR and Return Loss sweep test results, installation and grounding inspections

d. UPS and DC power systems startup and run tests

e. FAA, FCC, and other regulatory studies, coordination, and licensing

f. Building permits

g. System Functional Acceptance Test Plan and results

h. Equipment Specification Test results

i. System Acceptance Test plans and results

j. Radio propagation coverage maps

k. Coverage Acceptance Test Plan documentation and test results including in-building testing

l. 30-Day Performance Period results and all major/minor system failures

m. Final completed punch list

n. Final fleet map configuration with all group I.D.s, aliases, etc.

o. A complete roster of unit I.D.s and aliases

p. Documentation of final programming configuration for all software programmable equipment

q. A log of level settings for all analog audio and control circuits

r. A listing of telephone circuits by circuit number and telephone number for service on these circuits if installed

14. WARRANTY AND MAINTENANCE REQUIREMENTS

A. The Contractor shall include in their proposal, the cost to provide a parts and labor warranty maintenance period, and the cost of a corrective and preventative, parts and labor, infrastructure maintenance contract for years two (2) through fifteen (15) that includes communications system monitoring, hardware and software maintenance, Contractor-provided backhaul network equipment, and scheduled network server and technology platform updates.

B. The Contractor shall provide within the warranty period, all labor, parts, supplies, transportation, test equipment, and facilities to maintain all dispatch consoles and infrastructure communications system components, equipment, and software to the level of factory performance and within the requirements contained herein.

14.1 Warranty Maintenance Commencement

A. The warranty maintenance period shall commence upon the date of Final System Acceptance.

14.2 Warranty Maintenance Period

A. The Contractor shall warrant that all equipment and installation conform to the specifications provided within this RFP, or the manufacturer's published specifications, whichever is most stringent, that it shall be free from defects in materials, functionality, and workmanship for a period of at least one (1) year from the date of Final System Acceptance.

14.3 Ongoing Corrective and Preventative Maintenance

A. The Contractor shall include the cost to extend the system infrastructure corrective and preventative maintenance on an annual basis for an additional fourteen (14) years following the expiration of the one-year system warranty.

B. Maintenance response, terms, and conditions shall be the same as those described for the first year of warranty coverage.

C. The extended maintenance proposal shall be broken down by year.

D. Maintenance proposals shall clearly identify those items covered under the agreement, and clearly delineate items that are not included or conditions that would invalidate the maintenance agreement.

14.4 Technology Refresh Cost

A. The County desires to evaluate the cost to refresh critical system components over the expected life cycle of the infrastructure system.

B. Regardless of their recommended system maintenance plan, the Contractor shall provide their cost to perform a technology refresh at year 5 and year 10 commencing on the day of Final System Acceptance.

C. The technology refresh shall include the replacement of critical components whose failure would result a switchover of network master cores or the loss of service of more than one (1) communication tower site or dispatch console but shall not include any optional upgrade to features or functions.

D. The Contractor shall replace the following components during the technology refresh.

   a. Network core servers
   b. Network core storage systems
   c. Network core routers
   d. Network core switches
   e. Logging recorder interface servers
   f. Dispatch center routers
   g. Dispatch center switches
   h. Dispatch center console computers
   i. ISSI application server
   j. Simulcast control point servers

E. Items not to be refreshed include the following.

   a. Simulcast comparators and voters
   b. Repeaters and receivers
   c. Combiners, filters, multi-couplers
   d. Antenna systems
   e. Microwave backbone and antenna systems
   f. UPS
   g. DC power system
   h. Network management servers and workstations
   i. Application servers (OTAR, OTAP, GPS, etc.) other than ISSI application server
   j. Alarm systems

14.5 OEM Warranties

A. The Contractor shall pass the original equipment manufacturers' warranty to the County for all equipment that may have warranties for a period that extends beyond the Contractor warranty period for equipment such as communication shelters and roofing warranties, tower warranty, genset warranties, UPS and batteries, etc.

14.6 Spares and Test Equipment

A. The Contractor shall include in their proposal a detailed itemized price list for the recommended infrastructure spare equipment and parts, modules and assemblies, test equipment, tools, and fixtures.

B. All equipment provided by the Contractor shall be new and in current production at the time of delivery.

C. If any spares require firmware or software, each spare should have the appropriate versions installed.

D. These spares will be available to the Contractor to meet the warranty and maintenance requirements however the County shall retain ownership of this equipment.

E. The Contractor shall provide and be responsible for all additional and necessary spares, required to meet the response specified in the maintenance plan.

F. The County may allow storage of the spares at system sites, but the Contractor shall be responsible for maintaining the proper inventory and for maintaining the spares in good working order at all times for the system restoration.

G. In the event that the spares are consumed, they shall be replaced promptly.

H. Replacement stock shall also be available via emergency request with expedited delivery within twenty-four (24) hours of the equipment failure.

I. The Contractor shall provide programming software, cables, and required interface devices for each model of software programmable equipment included in the system.

J. The Contractor shall provide a complete list, including model number and price, for each piece of software and equipment required to program the new equipment and any associated passwords required to maintain the system.

K. Critical backhaul system spare parts, modules, and assemblies are those components, which upon failure will cause system outage.

L. The presence of redundant backhaul routing systems shall not be considered as spare parts.

M. The Contractor shall test all spare equipment on an annual basis to verify that is operational and of the correct firmware/software version as required by the system.

14.7 Remote System Monitoring

A. During the warranty maintenance period, the Contractor shall provide remote network monitoring of the system for security and maintenance purposes on a 7 days per week, 24 hours per day, 365 days per year basis.

B. Network monitoring shall provide the Contractor with visibility of all system specific elements, events, and alarms.

C. The Contractor's network monitoring center shall be continuously staffed with trained technologists, who are capable of acknowledging events, running diagnostics, and initiating an appropriate maintenance response.

D. Summary system performance reports shall be provided to the County on a monthly basis

14.8 Preventative Maintenance Service

A. The Contractor shall provide preventative maintenance service to review, document and validate system performance for each device in the network individually and as a whole.

B. The Contractor shall provide trained personnel to perform preventative maintenance on the radio system and all support systems, including the backhaul system components provided by the Contractor, at each of the infrastructure locations.

C. The Contractor shall perform the preventative maintenance in a manner that will have the least amount of impact to the user and will contact the County prior to disabling equipment that would significantly reduce the performance of the system.

D. If the Contractor discovers equipment that does not perform per the specifications or found inoperable, the Contractor shall replace or repair the equipment.

E. The Contractor has the following responsibilities:

   a. Maintain a regular schedule to visit the sites for visual inspection at a minimum of one (1) time per month

   b. Maintain a regular schedule to perform preventative maintenance at a minimum of twelve-month intervals. Preventative maintenance activities to include the following checks on the system and adjust the equipment as required:

F. RF site documentation to include:

   a. Repeater TX and RX performance (TX power, RX sensitivity, audio levels where applicable)

   b. RX sensitivity through the tower-top amplifier test port

   c. Combiner and band pass filter losses

G. The County will have the following responsibilities:

   a. Review and comment on the PM documents supplied by the Contractor

   b. Supply on-site presence when requested

   c. Supply tower climbers when required to investigate any questionable problems with the antenna system and to have available the spare parts that were purchased with the original system

14.9 Software Upgrade

A. After Final System Acceptance, the Contractor shall provide the County one complete system infrastructure software upgrade to the latest version.

B. The software upgrade shall include the cost of the software specific system modifications, if any, services and all labor to perform the upgrade.

C. All labor to install the upgrade shall occur during a time convenient to public safety operations and selected by the County.

D. This item shall be included in the Contractor's proposal base cost.

14.10 Maintenance Personnel

A. The Contractor shall provide competent, experienced personnel to execute the required maintenance tasks during the warranty period.

B. All maintenance personnel shall be trained and experienced in standard communications industry practices.

C. Personnel who perform maintenance on the system shall have completed all required manufacturer-approved training for that equipment.

D. Said training, or appropriate refresher courses, shall have been completed within the previous year and evidence thereof shall be provided to the County.

14.11 Contractor Service Facilities

A. The Contractor shall maintain one or more properly stocked, equipped, and staffed service facilities to maintain the communication system and equipment supplied under this RFP within the area such that the maintenance response and restoration time requirements can be met.

B. The Contractor shall specify in their proposal the location of their service facilities nearest to the County.

C. The Contractor shall specify the testing and maintenance equipment that is available as a permanent part of the Contractor's on-site maintenance facility and used for maintaining the communications system.

14.12 Severity Levels Definitions and Response Time Requirements

A. Service for communication system infrastructure including but not limited to master core site network controller, site controllers, dispatch console systems, base station repeaters, antenna systems, control stations and communications center equipment, voting receiver equipment, and backhaul equipment shall be provided on a 7 days per week, 24 hours per day, 365 days per year basis.

B. Table 9 - Severity Response Time Requirements below provides the response time requirements for the warranty and maintenance service periods.

Severity Level	Response Time Requirement
Severity 1	Telephone response within 30 minutes, and if required, on-site within 2 hour from receipt of notification, 7x24x365. Fault restoration within 4 hours from receipt of notification
Severity 2	Telephone response within 30 minutes of notification, and if required, on-site within 4 hours from receipt of notification, 7x24x365. Fault restoration within 8 hours from receipt of notification
Severity 3	Next business day

Table 9 - Severity Response Time Requirements

C. Table 10 below provides definitions for the response time requirements listed in Table 9 - Severity Response Time Requirements.

Severity Level	Problem Types
Severity 1	Major system failure One or more of RF sites off-line 25% or more of the system talk paths off-line Loss of two (2) or more dispatch consoles Loss of ISSI or any interoperability interface The loss of the Fire Station Alerting systems Loss of master core site Loss of the network management system Failure resulting in any simulcast sub-system reverting to “site-trunking” Loss of two (2) or more System Manager/Alarm Terminals Loss of “full-featured” dispatch capability (revert to radio dispatch) Backhaul system failure resulting in path outage
Severity 2	Significant system impairment 10% or more of the system talk paths off-line Loss of one (1) dispatch console The loss of a logging recorder interface Intermittent problems, interference

Severity Level	Problem Types
Severity 3	User equipment failures System problems under monitoring Operational and informational questions Configuration change support questions

Table 10 - Severity Level Definitions

14.13 Maintenance Response Penalty

A. Failure to meet the response times to a Severity 1 failure shall result in a deduction of one (1) week's maintenance contract fees for each 30-minute period or fraction thereof beyond the 30-minute point.

B. Failure to meet the response times to a Severity 2 failure shall result in a deduction of one (1) day's maintenance contract fees for each 30-minute period or fraction thereof beyond the 30-minute point.

C. These fees shall be deducted from the annual maintenance contract.

14.14 Availability of Replacement Parts

A. The Contractor shall certify that replacement parts for infrastructure equipment shall be available for a period of ten (10) years following the date of product discontinuance by the manufacturer.

B. If provided, mobile, portable, and control station radio parts and accessories shall be available for seven (7) years after the date of product discontinuance.

C. The location of the parts depot that stocks the replacement parts shall be specified in the proposal.

D. Should replacement parts be unavailable as outlined above, such that the radio system components cannot be repaired, the Contractor shall replace that item with a current year, equivalent model of the same item, with the same features and capabilities, at the last contract price of the component being replaced.

E. If equipment is proposed, which cannot be field diagnosed and repaired, or which require special instrumentation or devices to repair, the Contractor shall specify how such assemblies will be repaired at a central facility, and how the equipment will be packed, shipped, received, and repaired by the Contractor.

14.15 Maintenance Documentation

A. There shall be a maintenance log with sufficient detail on each failure or maintenance action to enable the maintenance personnel to analyze the problems within the communications system and take the required corrective or preventative action.

B. This log shall be initiated at the start of the warranty period and shall be maintained throughout the entire maintenance period.

C. The log shall include all equipment purchased under this contract and shall include at a minimum make, model, serial number, date put in service, unit cost, asset number, and where the unit is located.

D. The maintenance log shall be stored in an electronic database that can be updated.

14.16 Firmware and Software Maintenance

A. The proposed maintenance contract shall include the costs associated with maintaining the infrastructure to the most current firmware and software versions released by the Contractor over the 15-year warranty/maintenance period.

B. The Contractor shall provide the County with, at minimum, quarterly bulletins that announce and explain available system releases for Contractor software for use with upgrade-capable Contractor equipment.

C. The Contractor shall have the following responsibilities:

   a. Provide bulletins to the County announcing software releases

   b. Provide to the County available software releases as ordered by the County

   c. If the County orders a software release, provide those standard features included in the release that apply to the County's existing system components

D. The County will have the following responsibilities:

   a. The County will contact its Contractor representative to order an available enhancement release or core release

   b. Pay any charges associated with additional engineering or hardware required for each software release that the County choose to order and install

   c. Use the software and releases in accordance with the terms of the Contractor’s software license agreement executed by the County or the Contractor’s standard software license terms if no license was signed

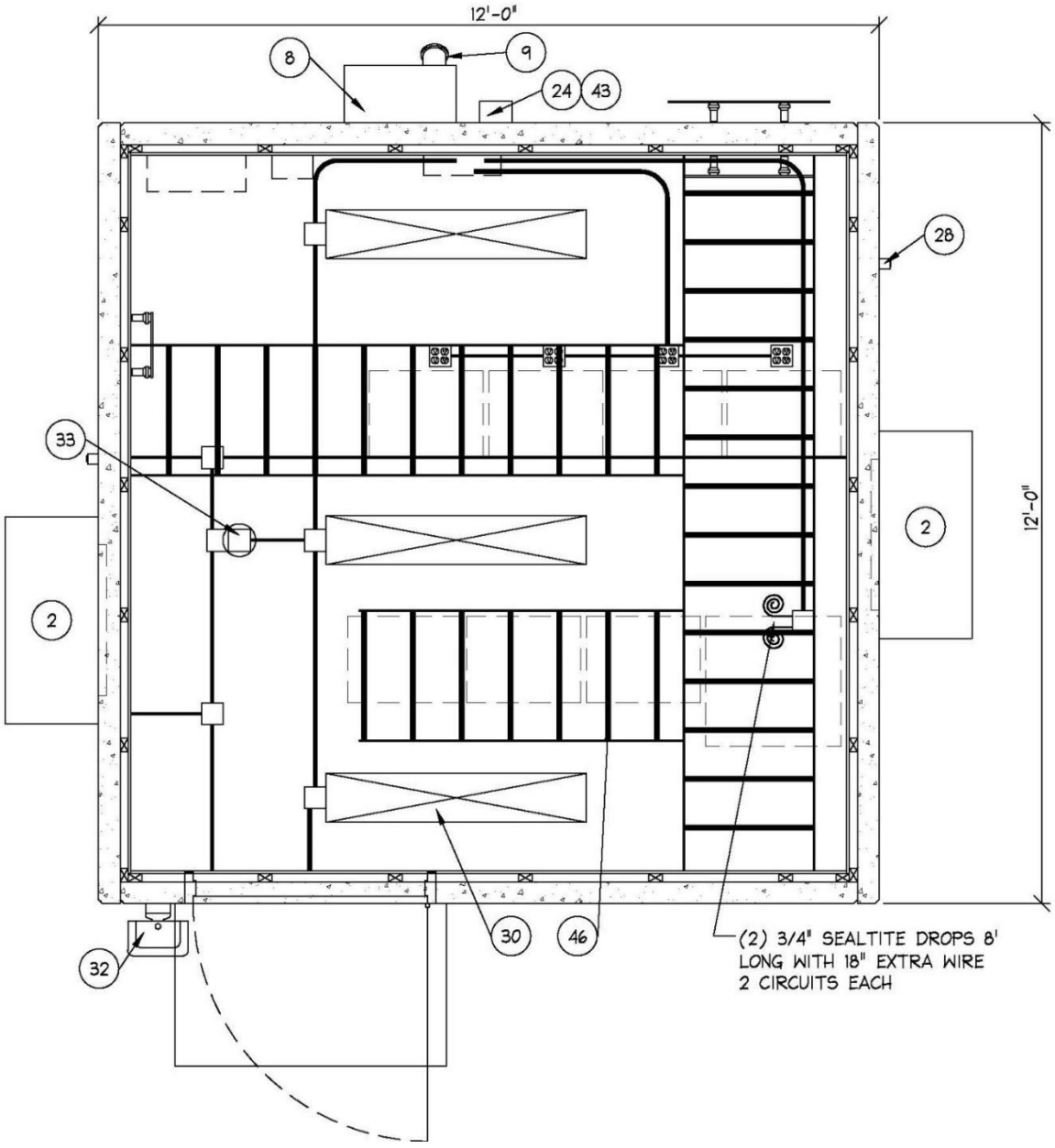
   d. Cooperate with the Contractor and perform all acts that are reasonable or necessary to enable the Contractor to provide the support to the County

E. If the County requires installation of software, the Contractor may charge an additional fee.

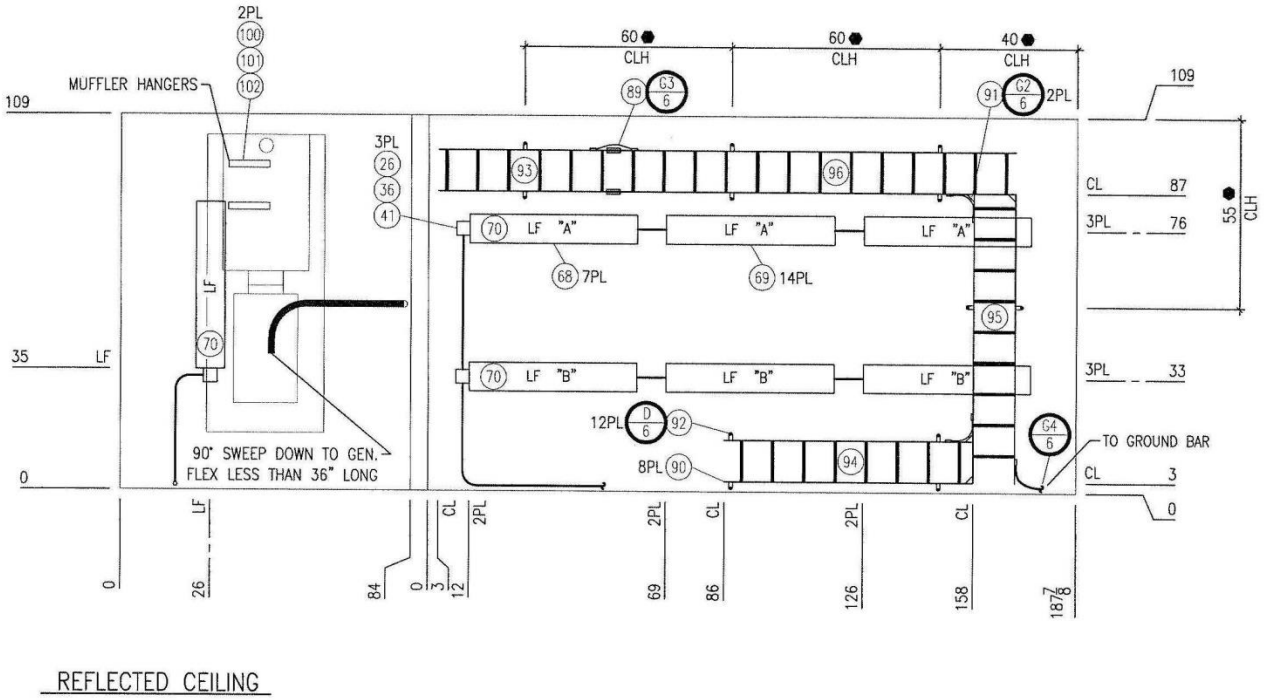
F. It shall be the Contractor’s responsibility to notify the County of each of these upgrades and coordinate a time that is amicable to all parties to install these updates.

APPENDIX A: TYPICAL NEW EQUIPMENT SHELTER LAYOUT

The following drawing of the 12’ x 12’ equipment shelter is typical of the equipment shelters at EOC, Deep Creek, CCSO, Lulu and the Optional Greenfield Site.



APPENDIX B: EXISTING CUMORAH HILL SHELTER FLOOR PLAN



REFLECTED CEILING

APPENDIX C: COST PROPOSAL FORMS

1. P25 SYSTEM COST PROPOSAL FORMS

1.1 General

Contractors shall submit detailed pricing based upon the format of the following pricing worksheets. The forms provided in these worksheets serve as the basis for the proposed pricing of all equipment and services including, but not limited to, equipment delivery, freight, installation, programming, optimization, project management, engineering, training, testing, Contractor travel and per-diem, supplies, and related expenses.

Contractors may expand on the items in these worksheets, duplicate the worksheets as required to adequately portray the proposed architecture, and be as descriptive as possible and include equipment model names, supplier names, and model numbers for 3rd-party equipment.

Contractors shall clearly and effectively communicate their system concept, infrastructure configuration and system components.

1.2 Master Core Control Point Equipment and Services (EOC Communications Room)

Master Core Control Point Site (EOC Communications Room)			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Master Network Core Controller (Geo-Redundant)		**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
P25 Phase 1 FDMA and Phase 2 TDMA dynamically on all Channels		**$**	**$**
Configured for 64,000 User IDs		**$**	**$**
Configured for 700 Talk Groups		**$**	**$**
Server/Client Equipment		**$**	**$**
Alarm Monitoring Equipment		**$**	**$**
P25 ISSI Interface	**3**	**$**	**$**
Each Additional P25 ISSI Interface		**$**	**$**
P25 Data and Gateway		**$**	**$**
Other Equipment (Please Specify)		**$**	**$**
Services: Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.3 Geo-Redundant Master Core Control Point Equipment and Services (CCSO)

Geo-Redundant Master Core Control Point Site (CCSO)			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Master Network Core Controller (Geo-Redundant)		**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
P25 Phase 1 FDMA and Phase 2 TDMA dynamically on all Channels		**$**	**$**
Configured for 64,000 User IDs		**$**	**$**
Configured for 700 Talk Groups		**$**	**$**
Server/Client Equipment		**$**	**$**
Alarm Monitoring Equipment		**$**	**$**
P25 ISSI Interface	**3**	**$**	**$**
Each Additional P25 ISSI Interface		**$**	**$**
P25 Data and Gateway		**$**	**$**
Other Equipment (Please Specify)		**$**	**$**
Services: Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.4 P25 Simulcast System Control Equipment and Services (EOC Communications Room)

(Please include if applicable to your system architecture)

P25 Simulcast System Control (EOC Communication Room)			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Simulcast System Controller		**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
Simulcast System Receiver Voting		**$**	**$**
Simulcast Sync Equipment		**$**	**$**
Simulcast System Monitoring Equipment		**$**	**$**
Other Equipment (Please Specify)		**$**	**$**
Services: Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.5 P25 Geo-Redundant Simulcast System Control Equipment and Services (CCSO)

(Please include if applicable to your system architecture)

P25 Geo-Redundant Simulcast System Control (CCSO)			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Simulcast System Controller		**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
Simulcast System Receiver Voting		**$**	**$**
Simulcast Sync Equipment		**$**	**$**
Simulcast System Monitoring Equipment		**$**	**$**
Other Equipment (Specify)		**$**	**$**
Services: Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.6 Commercial Carrier Talk Group Interface for Smartphones

Commercial Carrier Talk Group Interface for Smartphones			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Control and Server System Interface Hardware		**$**	**$**
System Interface Software and Licensing Costs		**$**	**$**
Software Cost per Smartphone		**$**	**$**
Licensing Cost per Smartphone		**$**	**$**
Licensing Cost per Smartphone for Encryption		**$**	**$**
Licensing Cost per Talk Group		**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
Other Equipment (Please Specify)		**$**	**$**
Services: Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.7 Network Control and Management System Equipment and Services

NCMS System			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Network Control and Management System		**$**	**$**
System Management/Alarm Client Terminals 1 – Columbia County Sheriff's Office 1 – Radio System Manager's Office	**2**	**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
NCMS Reports Module		**$**	**$**
RTUs at Remote Sites	**5**	**$**	**$**
Other Equipment (Please Specify)		**$**	**$**
Services: Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.8 EOC Dispatch Center Common Console Equipment and Services

EOC Dispatch Center Common Console Equipment			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Switch, LAN, WAN Network Equipment		**$**	**$**
Conventional Channel Gateways	**9**	**$**	**$**
AES 256 Encryption	**9**	**$**	**$**
Control Station Radio for P25 Conventional Backup Repeaters via Conventional Channel Gateways with AES 256 Encryption and OTAR	**9**	**$**	**$**
Four-wire interface to communicate on the FIN system via Conventional Channel Gateways	**2**	**$**	**$**
Services: Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.9 EOC Dispatch Equipment

EOC Dispatch Center			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Full-Featured Wireline Dispatch Consoles and Accessories	**9**	**$**	**$**
AES 256 Encryption	**9**	**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
Call Director Feature	**9**	**$**	**$**
Services: Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.10 Mobile Dispatch Equipment

Mobile Dispatch Equipment			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Mobile Laptop/Tablet Dispatch Consoles and Accessories	**9**	**$**	**$**
AES 256 Encryption	**9**	**$**	**$**
Services: Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.11 EOC Site System Maintenance Console Equipment and Services

System Maintenance Dispatch Console			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Full-Featured Wireline Dispatch Consoles and Accessories	**1**	**$**	**$**
AES 256 Encryption	**1**	**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
Services: Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.12 Logging Recorder System and Integration and Services

Logging Recorder System			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Logging Recorder Integration to the P25 System		**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
Services: Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.13 EOC Tower Site Equipment and Services

EOC Tower Site			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Site Controller		**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
Sync Equipment		**$**	**$**
Trunked Base Stations (5 Channels)	**5**	**$**	**$**
NPSPAC Mutual Aid 8CALL92 Channel	**1**	**$**	**$**
Antenna Systems Transmit	**1**	**$**	**$**
Antenna Systems Receive	**1**	**$**	**$**
Conventional Channel Gateways	**4**	**$**	**$**
Site Development Work		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.14 Deep Creek Tower Site Equipment and Services

Deep Creek Tower Site			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Site Controller		**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
Sync Equipment		**$**	**$**
Trunked Base Stations (5 Channels)	**5**	**$**	**$**
NPSPAC Mutual Aid 8TAC93 Channel	**1**	**$**	**$**
Antenna Systems Transmit	**1**	**$**	**$**
Antenna Systems Receive	**1**	**$**	**$**
Transmitter Power Monitoring System		**$**	**$**
Conventional Channel Gateways	**4**	**$**	**$**
Site Development Work		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.15 Cumorah Hill Tower Site Equipment and Services

Cumorah Hill Tower Site			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Site Controller		**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
Sync Equipment		**$**	**$**
Trunked Base Stations (5 Channels)	**5**	**$**	**$**
NPSPAC Mutual Aid 8TAC94 Channel	**1**	**$**	**$**
Antenna Systems Transmit		**$**	**$**
Antenna Systems Receive	**1**	**$**	**$**
Conventional Channel Gateways	**4**	**$**	**$**
Site Development Work		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.16 Lulu Tower Site Equipment and Services

Lulu Tower Site			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Site Controller		**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
Sync Equipment		**$**	**$**
Trunked Base Stations (5 Channels)	**5**	**$**	**$**
Antenna Systems Transmit	**1**	**$**	**$**
Antenna Systems Receive	**1**	**$**	**$**
Conventional Channel Gateways	**4**	**$**	**$**
Site Development Work		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.17 CCSO Site Equipment and Services

CCSO Tower Site			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Site Controller		**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
Sync Equipment		**$**	**$**
Trunked Base Stations (5 Channels)	**5**	**$**	**$**
Antenna Systems Transmit	**1**	**$**	**$**
Antenna Systems Receive	**1**	**$**	**$**
Conventional Channel Gateways	**4**	**$**	**$**
Site Development Work		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.18 Greenfield Site Equipment and Services (Optional)

Greenfield Tower Site (Optional)			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Site Controller		**$**	**$**
Switch, LAN, WAN Network Equipment		**$**	**$**
Sync Equipment		**$**	**$**
Trunked Base Stations (5 Channels)	**5**	**$**	**$**
Antenna Systems Transmit	**1**	**$**	**$**
Antenna Systems Receive	**1**	**$**	**$**
Conventional Channel Gateways	**4**	**$**	**$**
Site Development Work		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.19 EOC Microwave Network Backhaul System

EOC Microwave Network Backhaul System			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Microwave Radio Backhaul Outdoor Equipment		**$**	**$**
Microwave Antenna Systems Equipment		**$**	**$**
-48VDC Battery Plant (Sized to support the RF Systems as well)		**$**	**$**
Switch, LAN, WAN Equipment		**$**	**$**
Alarm Monitoring and Network Management Equipment		**$**	**$**
Physical Path Surveys		**$**	**$**
Other Site Work (Describe)		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.20 Deep Creek Microwave Network Backhaul System

Deep Creek Microwave Network Backhaul System			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Microwave Radio Backhaul Outdoor Equipment		**$**	**$**
Microwave Antenna Systems Equipment		**$**	**$**
-48VDC Battery Plant (Sized to support the RF Systems as well)			
Switch, LAN, WAN Equipment		**$**	**$**
Alarm Monitoring and Network Management Equipment		**$**	**$**
Physical Path Surveys		**$**	**$**
Other Site Work (Describe)		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.21 Cumorah Hill Microwave Network Backhaul System

Cumorah Hill Microwave Network Backhaul System			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Microwave Radio Backhaul Outdoor Equipment		**$**	**$**
Microwave Antenna Systems Equipment		**$**	**$**
-48VDC Battery Plant (Sized to support the RF Systems as well)		**$**	**$**
Switch, LAN, WAN Equipment		**$**	**$**
Alarm Monitoring and Network Management Equipment		**$**	**$**
Physical Path Surveys		**$**	**$**
Other Site Work (Describe)		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.22 Lulu Microwave Network Backhaul System

Lulu Microwave Network Backhaul System			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Microwave Radio Backhaul Outdoor Equipment		**$**	**$**
Microwave Antenna Systems Equipment		**$**	**$**
-48VDC Battery Plant (Sized to support the RF Systems as well)		**$**	**$**
Switch, LAN, WAN Equipment		**$**	**$**
Alarm Monitoring and Network Management Equipment		**$**	**$**
Physical Path Surveys		**$**	**$**
Other Site Work (Describe)		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.23 CCSO Microwave Network Backhaul System

CCSO Microwave Network Backhaul System			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Microwave Radio Backhaul Outdoor Equipment		**$**	**$**
Microwave Antenna Systems Equipment		**$**	**$**
-48VDC Battery Plant (Sized to support the RF Systems as well)		**$**	**$**
Switch, LAN, WAN Equipment		**$**	**$**
Alarm Monitoring and Network Management Equipment		**$**	**$**
Physical Path Surveys		**$**	**$**
Other Site Work (Describe)		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.24 Franklin Street Microwave Network Backhaul System

Franklin Microwave Network Backhaul System			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Microwave Radio Backhaul Outdoor Equipment		**$**	**$**
Microwave Antenna Systems Equipment		**$**	**$**
-48VDC Battery Plant (Sized to support the RF Systems as well)		**$**	**$**
Switch, LAN, WAN Equipment		**$**	**$**
Alarm Monitoring and Network Management Equipment		**$**	**$**
Physical Path Surveys		**$**	**$**
Other Site Work (Describe)		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.25 Greenfield Microwave Network Backhaul System (Optional)

Greenfield Microwave Network Backhaul System (Optional)			
Description	**Qty**	**Unit Cost**	**Extended Cost**
Microwave Radio Backhaul Outdoor Equipment		**$**	**$**
Microwave Antenna Systems Equipment		**$**	**$**
-48VDC Battery Plant (Sized to support the RF Systems as well)		**$**	**$**
Switch, LAN, WAN Equipment		**$**	**$**
Alarm Monitoring and Network Management Equipment		**$**	**$**
Physical Path Surveys		**$**	**$**
Other Site Work (Describe)		**$**	**$**
Services: FCC Licensing, Frequency Coordination, Installation, Engineering, Optimization, Programming		**$**	**$**
Project Management		**$**	**$**
Total Equipment and Services			**$**

1.26 Public Safety Mobile Radios

Public Safety Mobile Equipment			
Description	**Qty**	**Unit Cost**	**Extended Cost**
P25, 700/800 MHz FDMA/TDMA Mobile Radio Mid-Tier, 30-Watt Minimum Output Power	**194**	**$**	**$**
Phase 2 TDMA	**194**	**$**	**$**
GPS Integrated	**194**	**$**	**$**
GPS Antenna	**194**	**$**	**$**
Heavy-Duty Palm Microphone	**194**	**$**	**$**
AES Multi-key Voice Encryption	**30**	**$**	**$**
Over-the-Air Rekeying (OTAR)	**30**	**$**	**$**
Over-the-Air Programming (OTAP)	**194**	**$**	**$**
P25 Data	**194**	**$**	**$**
P25, 700/800 MHz FDMA/TDMA, Dual Band Upcharge	**50**	**$**	**$**
Mobile ¼-wave Antenna	**194**	**$**	**$**
Auxiliary External Speaker	**1**	**$**	**$**
Personality Programming Cost and Template	**194**	**$**	**$**
Dash-Mount Standard Installation Cost	**170**	**$**	**$**
Remote-Mount Standard Installation Cost	**24**	**$**	**$**
Total Equipment and Services			**$**

1.27 Public Safety Portable Radios

Public Safety Portable Equipment			
Description	**Qty**	**Unit Cost**	**Extended Cost**
P25, 700/800 MHz FDMA/TDMA Portable Radio Mid-Tier	**217**	**$**	**$**
Li-Ion Battery Standard Capacity (Specify 10-10-80 Run-Time)	**217**	**$**	**$**
Phase 2 TDMA	**217**	**$**	**$**
½-Wave Whip Antenna	217	$	$
Single-Unit Smart Charger	**217**	**$**	**$**
Belt Clip Carry Holster	**217**	**$**	**$**
Speaker-Microphone	**130**	**$**	**$**
Covert ear - piece	**138**	**$**	**$**
Emergency Alert	**217**	**$**	**$**
Priority Scan	**217**	**$**	**$**
P25 Data	**217**	**$**	**$**
GPS Integrated	**217**	**$**	**$**
P25, 700/800 MHz FDMA/TDMA, Dual Band Upcharge	**56**	**$**	**$**
Ruggedized/Fire Rated Upcharge	**58**	**$**	**$**
AES Multi-Key Voice Encryption	**41**	**$**	**$**
Over-the-Air Rekeying (OTAR)	**41**	**$**	**$**
Over-the-Air Personality Programming (OTAP)	**217**	**$**	**$**
Personality Programming Cost and Template	**217**	**$**	**$**
Total Equipment and Services			**$**

1.28 Local Government Mobile Radios

Local Government Mobile Equipment			
Description	**Qty**	**Unit Cost**	**Extended Cost**
P25, 700/800 MHz FDMA/TDMA Mobile Radio Low-Tier	**108**	**$**	**$**
Phase 2 TDMA	**108**	**$**	**$**
GPS Integrated	**108**	**$**	**$**
GPS Antenna	**108**	**$**	**$**
Heavy-Duty Palm Microphone	**108**	**$**	**$**
Over-the-Air Programming (OTAP)	**108**	**$**	**$**
P25 Data	**108**	**$**	**$**
Mobile ¼-wave Antenna	**108**	**$**	**$**
Auxiliary External Speaker	**1**	**$**	**$**
Personality Programming Cost and Template	**108**	**$**	**$**
Dash-Mount Standard Installation Cost	**1**	**$**	**$**
Remote-Mount Standard Installation Cost	**1**	**$**	**$**
Total Equipment and Services			**$**

1.29 Local Government Portable Radios

Local Government Portable Equipment			
Description	**Qty**	**Unit Cost**	**Extended Cost**
P25, 700/800 MHz FDMA/TDMA Portable Radio Low-Tier	**6**	**$**	**$**
Phase 2 TDMA	**6**	**$**	**$**
NiMH Battery Standard Capacity (Specify 10-10-80 Run-Time)	**6**	**$**	**$**
½-Wave Whip Antenna	**6**	$	$
Single-Unit Smart Charger	**6**	**$**	**$**
Belt Clip Carry Holster	**6**	**$**	**$**
Emergency Alert	**6**	**$**	**$**
P25 Data	**6**	**$**	**$**
GPS Integrated	**6**	**$**	**$**
Over-the-Air Personality Programming (OTAP)	**6**	**$**	**$**
Personality Programming Cost and Template	**6**	**$**	**$**
Total Equipment and Services			**$**

1.30 Public Safety Mobile Radio Options and Accessories Per-Unit Cost

Mobile Radio Options and Accessories Per-Unit Cost	
Description	**Unit Cost**
P25, 700/800 MHz FDMA/TDMA Mobile Radio Low-Tier	$
P25, 700/800 MHz FDMA/TDMA Mobile Radio Mid-Tier	**$**
P25, 700/800 MHz FDMA/TDMA Mobile Radio High-Tier	**$**
P25, 700/800 MHz FDMA/TDMA/VHF Dual Band Upcharge	$
Dash Mount	**$**
Remote Mount	**$**
Motorcycle	**$**
Marine	**$**
Basic Desktop Control Station Package with Desk Mic and 120VAC Power Supply (Less Antenna System)	**$**
Control Station Digital Remote Control Unit with Interface and 250-ft of Cable	$
GPS Integrated	**$**
GPS Antenna	**$**
Covert Hand-Held Control Head Accessory	**$**
Heavy-Duty Palm Microphone	**$**
Dual Control Head	**$**
AES Single-key Voice Encryption	**$**
AES Multi-key Voice Encryption	**$**
Over-the-Air Rekeying (OTAR)	**$**
Over-the-Air Programming (OTAP)	**$**
P25 Data	**$**

Mobile ¼-wave Antenna	**$**
Mobile 3 dB-Gain Antenna	**$**
External Relay Control	**$**
Auxiliary External Speaker	**$**
Personality Programming Cost and Template	**$**
Personality Programming Cost with Existing Template	**$**
Dash-Mount Standard Installation Cost	**$**
Remote-Mount Standard Installation Cost	**$**

1.31 Public Safety Portable Radio Options and Accessories Unit Cost

Portable Radio Options and Accessories Per-Unit Cost	
Description	**Unit Cost**
P25, 700/800 MHz FDMA/TDMA Portable Radio Low-Tier	**$**
P25, 700/800 MHz FDMA/TDMA Portable Radio Mid-Tier	**$**
P25, 700/800 MHz FDMA/TDMA Portable Radio High-Tier	**$**
P25, 700/800 MHz FDMA/TDMA, Dual Band Upcharge	**$**
Ruggedized/Fire Rated Upcharge	$
Emergency Alert	**$**
Priority Scan	**$**
GPS Integrated	**$**
GPS Microphone	**$**
P25 Data	**$**
AES Single-Key Voice Encryption	**$**
AES Multi-Key Voice Encryption	**$**
Over-the-Air Rekeying (OTAR)	**$**
Over-the-Air Personality Programming (OTAP)	**$**
Speaker-Microphone	**$**
Speaker-Microphone-Antenna	**$**
Belt Clip Carry Holster	**$**
Intrinsically Safe	**$**
Man-Down	**$**
Single-Unit Smart Charger	**$**
Six-Unit Multi Smart Charger	**$**

Vehicle-Mounted Smart Charger	**$**
NiMH Battery Standard Capacity (Specify 10-10-80 Run-Time)	**$**
NiMH Battery High-Capacity (Specify 10-10-80 Run-Time)	**$**
Li-Ion Battery Standard Capacity (Specify 10-10-80 Run-Time)	**$**
Li-Ion Battery High-Capacity (Specify 10-10-80 Run-Time)	**$**
Personality Programming Cost and Template	**$**
Personality Programming Cost with Existing Template	**$**
Vehicle-Mounted Smart Charger Standard Installation Cost	**$**

1.32 Recommended Spares for Infrastructure Equipment

Please list and price the Contractor-recommended spare equipment (including backhaul) separately so that the District understands the extent of the spare equipment proposed for the system. The District recognizes that spares are required for warranty service and for ongoing maintenance of the system. Sufficient spares shall be provided such that the required service response and system restoration times are met.	
	$
	$
	$
	$
	$
	$
	$
	$
	$
	$
	$
	$
	$
	$
	$
Total Recommended Spares for Infrastructure Equipment	**$**

1.33 Training

Please list and price a Training Plan as described in this RFP. Please be descriptive on each line item so that the District understands the content, location, and the extent of training proposed in the system.	
On-site Dispatch Console Supervisor Training	**$**
On-Site Dispatch Console Train-the-Trainer Operator Training	**$**
On-Site End User Equipment Operation Training for CCSO	**$**
On-Site End User Equipment Operation Training for CCFD	**$**
On-Site End User Equipment Operation Training for Local Government	**$**
On-Site System Management Training	**$**
On-Site System Maintenance Training	**$**
On-Site User Equipment Programming Training	**$**
On-Site User Equipment Maintenance Training	**$**
Total Training	**$**

1.34 Corrective and Preventative Maintenance Pricing

Year 1 is the warranty maintenance period for the proposed system. Please provide the maintenance costs for years 2-15 for each item below.

Maintenance Period	Corrective Maintenance	Preventative Maintenance	Total Maintenance
Year 2			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**

Year 3			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**
Year 4			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**

Year 5			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**
System Technology Refresh Update	**N/A**	**N/A**	**$**
Year 6			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**

Year 7			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**
Year 8			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**

Year 9			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**
Year 10			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**
System Technology Refresh Update	**N/A**	**N/A**	**$**

Year 11			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**
Year 12			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**

Year 13			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**
Year 14			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**

Year 15			
Factory depot equipment repair/replacement support for P25 system infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
Factory depot equipment repair/replacement support for microwave backhaul equipment (less local on-site response)	**N/A**	**N/A**	**$**
Software/firmware support services for P25 infrastructure and dispatch console equipment (less local on-site response)	**N/A**	**N/A**	**$**
On-site local technical response for P25 system infrastructure, microwave backhaul system, and software/firmware support	**$**	**$**	**$**
System monitoring and service dispatch	**N/A**	**N/A**	**$**
Telephone technical support for P25 system infrastructure, microwave backhaul system, and software/firmware support	**N/A**	**N/A**	**$**
Annual Cost Escalation Factor After Year 15 (%)			**%**

1.35 Pricing Summary and Proposed Total Cost

This worksheet summarizes all of the previous pricing worksheets to derive a Total Project Cost. Contractors are encouraged to provide cost reduction measures in the form of Trade-In allowances and/or other cost reduction Incentives.	
1.2 Master Core Control Point Equipment and Services (EOC Communications Room)	**$**
1.3 Geo-Redundant Master Core Control Point Equipment and Services (CCSO)	**$**
1.4 P25 Simulcast System Control Equipment and Services (EOC Communications Room)	**$**
1.5 P25 Geo-Redundant Simulcast System Control Equipment and Services (CCSO)	**$**
1.6 Commercial Carrier Talk Group Interface for Smartphones	**$**
1.7 Network Control and Management System Equipment and Services	**$**
1.8 EOC Dispatch Center Common Console Equipment and Services	**$**
1.9 EOC Dispatch Equipment	**$**
1.10 Mobile Dispatch Equipment	**$**
1.11 EOC Site System Maintenance Console Equipment and Services	**$**
1.12 Logging Recorder System and Integration and Services	**$**
1.13 EOC Tower Site Equipment and Services	**$**
1.14 Deep Creek Tower Site Equipment and Services	**$**
1.15 Cumorah Hill Tower Site Equipment and Services	**$**
1.16 Lulu Hill Tower Site Equipment and Services	**$**
1.17 CCSO Hill Tower Site Equipment and Services	**$**
1.19 EOC Microwave Network Backhaul System	**$**
1.20 Deep Creek Microwave Network Backhaul System	**$**
1.21 Cumorah Hill Microwave Network Backhaul System	**$**
1.22 Lulu Microwave Network Backhaul System	**$**

1.23 CCSO Microwave Network Backhaul System	**$**
1.24 Franklin Street Microwave Network Backhaul System	**$**
1.26 Public Safety Mobile Radios	**$**
1.27 Public Safety Portable Radios	**$**
1.28 Local Government Mobile Radios	**$**
1.29 Local Government Portable Radios	**$**
1.32 Recommended Spares for Infrastructure Equipment	**$**
1.33 Training	**$**
100 % Performance and Payment Bond	**$**
Total Proposed System Turnkey Cost (Before Cost Adjustments)	**$**
Trade-In Allowance	**$ ( )**
Cost Reduction Incentives (Explain)	**$ ( )**
Other Cost Reduction Incentives (Explain)	**$ ( )**
Total Proposed System Turnkey Cost (After Cost Adjustments)	**$**
1.34 Total Corrective and Preventative Maintenance Services Costs Year 2 through Year 15	**$**
Total to add Greenfield Site items 1.18 and 1.25	**$**
Total to Upgrade Microwave Network from outdoor radios to all indoor radios (Base system)	**$**
Total to Upgrade Microwave Network from outdoor radios to all indoor radios (Including optional Greenfield Site)	**$**

1.36 Contractor Name and Authorized Signature

Contractor/Proposer
Company Name:_____

Contractor/Proposer
Authorized Signature:_____

APPENDIX D: COLUMBIA COUNTY FLORIDA INSURANCE REQUIREMENTS

The insurance described herein reflects the insurance requirements deemed necessary for this contract by the County.

It is not necessary to have this level of insurance in effect at the time of submittal, but certificates indicating that the insurance is currently carried or a letter from the Carrier indicating upgrade ability will speed the review process to determine the most qualified Proposer.

The successful Proposer(s) shall not commence operations until certification or proof of insurance, detailing terms and provisions of coverage, has been received and approved by the Columbia County Risk Manager.

The following insurance coverage shall be required.

a. Worker's Compensation Insurance covering all employees and providing benefits as required by Florida Statute, Chapter 440, regardless of the size of the company (number of employees). The Contractor further agrees to be responsible for employment, control and conduct of its employees and for any injury sustained by such employees in the course of their employment.

b. Liability Insurance

1) Naming Columbia County as an additional insured, on General Liability Insurance only, in connection with work being done under this contract.

2) Such Liability insurance shall include the following checked types of insurance and indicated minimum policy limits.

LIMITS OF LIABILITY

Type of Insurance	Each Occurrence	Aggregate
GENERAL LIABILITY	***MINIMUM $200,000 per OCCURRENCE/$300,000 AGGREGATE***	
* Policy to be written on a claims incurred basis		
XX	comprehensive form	
XX	premises - operations	bodily injury
__explosion & collapse		
hazard	property damage	
__underground hazard	_____	_____
__products/completed		
operations hazard	bodily injury and	
XX	contractual insurance	property damage
XX	broad form property	combined
damage	_____	_____

XX	independent contractors		
XX	personal injury	personal injury	
AUTOMOBILE LIABILITY	***MINIMUM $200,000 per OCCURRENCE/$300,000 AGGREGATE***		
	bodily injury		
	(each person)		
	bodily injury		
XX	comprehensive form	(each accident)	
XX	owned	property damage	
XX	hired	bodily injury and	
XX	non-owned	property damage	
	combined		
REAL & PERSONAL PROPERTY			
__comprehensive form	Consultant must show proof they have this coverage.		
EXCESS LIABILITY			
	bodily injury and		
__umbrella form	property damage		
__other than umbrella	combined	$2,000,000.	$2,000,000.
XX	**PROFESSIONAL LIABILITY**		$1,000,000.$1,000,000.

* Policy to be written on a claims made basis

The certification or proof of insurance must contain a provision for notification to the County, and the County's contracted law enforcement provider if applicable, thirty (30) days in advance of any material change in coverage or cancellation.

The successful Proposer shall furnish to the County the certification or proof of insurance required by the provisions set forth above, within ten (10) days after notification of award of contract.

Columbia County APCO P25 700MHz Radio System Project Shape Files

Columbia County Border

Columbia County Modified Border