Attachment 5

ExhibitA-1_Vol_IVofV_Subscriber

E.F. JOHNSON COMPANY

Agreement for Services of Independent Contractor: System Equipment and Installation Exhibit A: Scope of Services

Exhibit A-1: Revised Proposal Documents/Volume IV of V

Volume IV Components: Subscriber Equipment

May 1, 2021

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JVCKENWOOD

This symbol indicates EFJohnson's response

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A-1.4 Subscriber Equipment

The consolidation of EFJohnson's P25 subscriber portfolio under a single KENWOOD brand signifies the combination of two strengths—EFJohnson's proven P25 software expertise and KENWOOD's recognized quality and reliability. KENWOOD Viking® radios with TrueVoice™ technology are used throughout the world by military, police, fire, paramedics, transportation, public works, and homeland security personnel. Smarter engineering makes these radios reliable and easy to operate. Within Santa Barbara County, many users depend upon KENWOOD radios including law enforcement, fire departments, public works personnel, and business and enterprise. We are dedicated to building personalized long-term partnerships, ensuring our customers receive the solution that works best for their mission-critical needs.

EF Johnson is a member of the very important Department of Homeland Security (DHS) Compliance Assessment Program (P25 CAP). The P25 CAP is a partnership of the U.S. Department of Homeland Security's Science and Technology Directorate, SAFECOM, industry and the emergency response community. P25 CAP is a formal, independent process for ensuring communications equipment declared by the supplier actually is P25 compliant and tested against the standards with publicly published results. Through this open standard testing process, P25 CAP provides responders confidence that the communications equipment they use will be interoperable, regardless of manufacturer. Specifically, this voluntary program provides public safety agencies with evidence that the communications equipment they purchase is tested against and complies with the P25 standards for performance, conformance, and interoperability. Compliance testing concludes with official summary test reports and suppliers' declaration of compliance.

As a leading equipment supplier to public safety, EF Johnson is one of only 5 equipment suppliers to have a DHS-recognized laboratory to conduct performance, conformance, and interoperability tests on P25 products and the only laboratory to receive P25 recognition for ISSI/CSSI interoperability testing. Receiving this accreditation, our laboratory is authorized to test land mobile radio equipment, including mobile and portable subscribers, for compliance. All KENWOOD Viking® subscriber equipment is P25 CAP certified with the exception of our new multi-band portable radio (VP8000) which is in development and will be tested for P25 CAP compliance. As the new multi-band portable radio is based on our very popular P25 CAP compliant VP6000 radio, we anticipate our CAP compliance process will be streamlined and complete prior to delivery of radios to Santa Barbara County.

EFJohnson will maintain bid volume related pricing and applicable discounts for all subscriber equipment tiers and accessories, including every feature and every option, for life of the contract. EFJohnson's high-tier and mid-tier offering is the Viking VP8000 portables and VM7000 mobile radios to meet the needs of Santa Barbara County user groups. Alternatively, should any County department desire to purchase a mid- or low- tier radio, we also offer the VP6000 or VP5000 as a low-tier portable, and a choice of the VM6000 or VM5000 as a low-tier mobile radio, per the table below:

	HIGH TIER	MID-TIER	LOW-TIER
PORTABLE RADIOS	VP8000	VP8000	VP6000 VP5000
MOBILE RADIOS	VM7000	VM7000	VM6000 VM5000

Figure A-1.4-1. Tiered mobile and portable subscriber offering

Viking radios are highly configurable multi-mode radios, able to meet virtually all user requirements, from the simplest analog and legacy APCO 16 voice communications, to full P25 trunked and conventional digital operation. The radios support industry-standard encryption capabilities such as the County's preferred Advanced Encryption Standard (AES). All radios offer enhanced scanning capability and software control enables users to roam between conventional and trunked systems, while the radio's built-in P25 data capability provides full data transfer capability to support mission-critical applications such as Over-the-Air Rekeying (OTAR) and Over-the-Air-Programming (OTAP).

Santa Barbara County's public safety agencies require user equipment that meets their needs. KENWOOD Viking mobile, portable, and control station subscriber equipment is P25 Phase I and Phase II compliant and meets or exceeds the minimum acceptable user requirements outlined in the RFP. In addition to the feature sets of each radio model (see below), the Viking radios have general and available features and built-in quality associated with high-tier products.

KENWOOD Viking subscribers offer the following for Santa Barbara County agencies:

- High-quality build that allows us to confidently offer a 3-year standard warranty, with the option to upgrade any subscriber to a 5-year warranty if desired.
- Best in class Armada Fleet Management software with template-based codeplugs
- AES encryption to protect sensitive communications
- Over-the-Air Programming with "Smart Update"
- Over-the-Air Rekeying (OTAR)
- TrueVoice state-of-the-art software-based noise-cancelling technology
- Easy-to-manage perpetual software licenses with Vault®

A-1.4.1 Superior Audio Performance

All Viking radios use the Enhanced AMBE +2 P25Vocoder. In October 2005, the Project 25 Steering committee adopted the P25 Enhanced Vocoder as the recommended baseline for all P25 systems. Viking was the first high-tier P25 trunking radio manufacturer to implement the new Enhanced P25 Vocoder as a standard feature across its entire radio portfolio.

Both Public Safety Police and Fire agencies have experienced the P25 AMBE +2 Enhanced Vocoder's noticeably better audio clarity in moving vehicles at high speeds or when radios are operated in high-noise environments. While most other manufacturers of mobile radios have now caught up and use this vocoder, there are still a few older model radios still being marketed that continue to use old technology.

A-1.4.1.1 Encryption and Encryption Standards

The Viking subscriber portfolio supports a variety of encryption protocols. These include the DES, DES-OFB, and AES encryption types. Subscribers quoted for Santa Barbara County include AES encryption. AES was adopted by the U.S. Government, and the standard was announced by the NIST laboratory as

compliant with FIPS security requirements on November 26, 2001. It became effective as a Federal Government standard on May 26, 2002, after approval by the Secretary of Commerce. The APCO P25 standard requires AES encryption for interoperability purposes.

A-1.4.1.2 Available Accessories

EFJohnson provides a full line of accessories to meet various user requirements and deployment needs from agencies, including law enforcement (including SWAT, tactical units, covert operational units, and others), Fire, EMS, and non–public safety users.

A-1.4.1.3 TrueVoice Noise Reduction Technology

TrueVoice Noise Reduction technology is an advanced software-based approach to voice clarity that consistently outperforms multi-microphone radio technologies.

All Viking subscribers are enabled with TrueVoice™, JVCKENWOOD's best-in-class frequency-based noise cancellation, which works for every call regardless of environment or accessory. TrueVoice eliminates the need to adjust settings while on scene. Its software-based technology is an advanced approach to voice clarity that consistently outperforms multi-microphone radio technologies. TrueVoice noise reduction technology is offered on Viking radios and tiers including both portables and mobiles, in analog and digital modes.

Figure A-1.4-2. TrueVoice™ Software-Based Technology

A-1.4.1.4 Radio Programming - Armada Fleet Management

Maintaining a fleet of radios and updating radio software programming (typically resulting from future expansion and/or the addition of talkgroups) is often an overlooked cost for agencies. ***Armada is the industry's first fleet-oriented management and programming software that provides the lowest total cost of ownership for its users.***

The entire fleet of Viking subscribers can use the Armada Fleet Management Software platform. Armada is the most intuitive profile creation tool in the industry, introducing the concept of templates to fleet management. Santa Barbara County will benefit from Armada's elimination of spreadsheet-driven profile tracking and manual entry errors, reducing time for radio programming and providing consistency throughout the entire radio fleet.

Armada introduces the concept of templates to fleet management. The fleet manager can create a master template and use it to program multiple radios in the fleet

Figure A-1.4-3. Armada Fleet Management Software

Armada Fleet Management solutions demand an approach that can accommodate programming and maintaining multiple fleets of radios. Armada is an intuitive, easy-to-use trunked radio fleet management tool, which has been specifically designed to program and maintain the radio codeplugs in a safe, efficient manner.

Unlike traditional configurators, Armada is template-based. This means that the fleet manager creates a master template and apply it to multiple radios in the fleet. Each user group will be able to develop a single profile for their specific agency and designate it as a template.

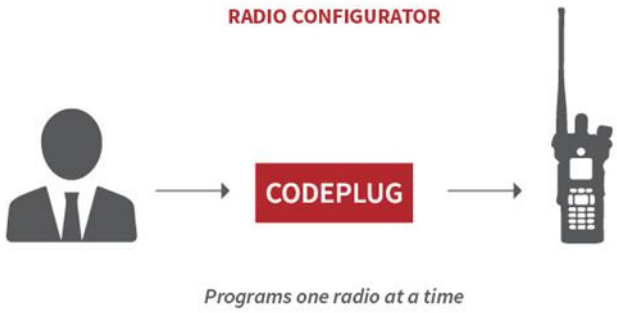

Figure A-1.4-4. Programming an Individual Radio

Each radio assigned to that agency can be "linked" to the template (the template will be downloaded into each radio). Once linked, Armada will update the radio profile as indicated by the fleet manager. Templates can be edited, with the corresponding radio profiles updated simultaneously, providing consistency and error-free programming across the radio fleet.

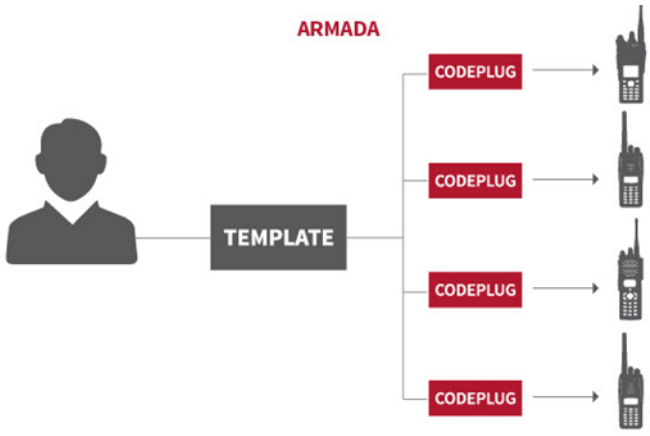

Figure A-1.4-5. Programming Multiple Subscribers

Armada supports either a direct computer connection or Over-the-Air Programming for radio programming. Because the direct connection is a USB connection, multiple radios can be connected via a USB hub for simultaneous programming, which reduces the cycle time for programming radios.

Per the RFP requirements, twelve (12) full sets of programming equipment for programming new subscribers have been included in this proposal to be operating on computers provided by the County.

A-1.4.1.5 Compliance

The subscriber radios are highlighted below:

	High Tier Portable & Mobile		Mid-Tier Portable & Mobile		Low Tier Portable & Mobile	
	VP8000 VM7000		VP8000 VM7000		VP6000 & VP5000 VM6000 & VM5000	
P25 Conventional Mode Capability	Yes	✓	Yes	✓	Yes	✓
P25 Phase 1 Trunking Capability	Yes	✓	Yes	✓	Yes	✓
P25 Phase 2 Trunking Capability	Yes	✓	Yes	✓	Yes	✓
Analog Conventional Capability	Yes	✓	Yes	✓	Yes	✓
Re-Key through OTAR	Yes	✓	Yes	✓	Yes	✓
Re-Program through OTAP	Yes	✓	Yes	✓	Yes	✓
Flash Programmable for Adding Future Enhancements	Yes	✓	Yes	✓	Yes	✓
Vocoder: IMBE, or AMBE preferred	Yes	AMBE	Yes	AMBE	Yes	AMBE
Configurable power output	Yes	✓	Yes	✓	Yes	✓
Scan: trunked, conventional, groups of 16, priority scan, retained, alter scan list	Yes	✓	Yes	✓	Yes	✓
Hardware Based System Key for Programming	Yes	✓	Yes	✓	Yes	✓
Centralized database for programming files (Vault)	Yes	✓	Yes	✓	Yes	✓
Remote programming & database access	Yes	✓	Yes	✓	Yes	✓
Encryption & authentication keys programmed via key management tool (KMF)	Yes	✓	Yes	✓	Yes	✓
KMF - view, change, erase, activate	Yes	✓	Yes	✓	Yes	✓
KMF-Controlling/compliant use configuration	Yes	✓	Yes	✓	Yes	✓

	High Tier Portable & Mobile		Mid-Tier Portable & Mobile		Low Tier Portable & Mobile	
	VP8000 VM7000		VP8000 VM7000		VP6000 & VP5000 VM6000 & VM5000	
KMF-Controlling/compliant capable of programming keys	Yes	✓	Yes	✓	Yes	✓

The subscribers exceed the RFP's proposed capabilities outlined in the County's RFP:

	High Tier Portable & Mobile	Mid-Tier Portable & Mobile	Low Tier Portable & Mobile
Perpetual Licensing -Buy it once and reuse the software as needed	✓	✓	✓
Intelligent Template Based Programming through Armada	✓	✓	✓
TrueVoice supreme noise-canceling software in both analog and digital modes	✓	✓	✓
FireSafe software designed for Fire Fighter Safety (portables)	Optional	Optional	Optional
Intrinsically Safe (portables)	Optional	Optional	Optional
Man-Down Alert (portables)	Optional	Optional	Optional
Proactive Battery Management Software (portables)	Optional	Optional	Optional
Integrated Playback of missed message	Optional	Optional	Optional
Voice Recording	Optional	Optional	Optional
GPS	Optional	Optional	Optional
P25 Authentication for Enhanced Security	Optional	Optional	Optional
OTIP – Over the Internet Programming of Radios (portables)	Optional	Optional	OTAP only
Bluetooth & Bluetooth Low Energy	Optional	Optional	Optional
Text Messaging	Optional	Optional	Optional
Authentication	Optional	Optional	Optional

A-1.4.2 Tier Portable Radios for Santa Barbara County

In response to RFP #810131 Attachment B – Functional Specifications Section 1.16 Field/Subscriber Radio Equipment together with Addendums, and the features identified, the following portable radio tiers have been identified for the County:

- **High Tier**: VP8000 multi-band portable radios.
- **Mid-Tier**: VP8000 dual-band portable radios.
- **Low-Tier**: VP6000 VP5000 single band portable radios.

Each tier of portable radio, together with its specific capabilities, are listed below. Some of the capabilities are enabled at time of purchase as specified per the RFP while other capabilities are available via software flashes available for purchase as needed on demand. Please refer to the pricing pages for the radios as configured, software options, and accessories for the following radios.

	Req'd Spec	High Tier VP8000	Req'd Spec	Mid-Tier VP8000	Req'd Spec	Low Tier VP6000	Req'd Spec	Low Tier VP5000
Flexible Covered Antenna	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Securely Attached Battery	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Internal Speaker/ Microphone mutes when connected to external speaker/earpiece	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Universal & individual connectors	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Attachment point on main chassis	Yes	✓	Yes	✓	Yes	✓	Yes	✓
VHF, UHF, 700/800 MHz	Yes	ALL BANDS	Yes	UHF & VHF	Yes	UHF or VHF	Yes	UHF or VHF
PTT, on/off volume knob, top mounted emergency button	Yes	✓	Yes	✓	Yes	✓	Yes	✓
2 softkeys and 3+ navigation keys	Yes	✓	Yes	✓	No	Standard	No	Standard
Keypad	Yes	Full 4x3 Keypad	No	Optional	No	Optional	No	Optional
Top mounted rotary switch – 3 banks of 16 channels/talkgroups	Yes	✓	Yes	✓	Yes	✓	Yes	Lever Switch instead of rotary

	Req'd Spec	High Tier VP8000	Req'd Spec	Mid-Tier VP8000	Req'd Spec	Low Tier VP6000	Req'd Spec	Low Tier VP5000
Readable Display with text– Sunlight or darkness, battery indicator, in-range indicator	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Disable indicators in surveillance mode	Yes	✓	Yes	✓	No	Standard	No	Standard
Fire-Service configuration: Intrinsically safe, large knobs, high temp, visible color housing	Yes	✓	No	Optional	No	Optional	No	
Channel Capacity	1,200	✓ 2048 channels	1,000	✓ 1024 channels	512	✓ 1024 channels	512	✓ 1024 channels
Battery- 10-hour duty cycle, 5/5/90 with optional high-capacity 16-hour duty cycle 5/5/90	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Battery - Fully drained charge time of 8 hours or less	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Battery Charger - 110 VAC Single or multiple unit chargers with standard or high capacity battery support	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Battery - Rapid Charge time (1-2 hours)	Yes	190 minutes	Yes	190 minutes	Yes	190 minutes	Yes	190 minutes

A-1.4.2.1 Compliance to Environmental Specifications

The RFP states that all portable radios shall meet or exceed the environmental specifications per MIL-STD-810E (or equivalent items in 810 F). However please note that the Viking Series of radios quoted in this proposal are Mil Spec tested to the newest 810G standard. In addition, the VP8000 radio is currently under development with anticipated availability to market to meet the timelines of this RFP. The VP8000 environmental specifications are expected to conform to VP6000 results.

	Req'd Spec	High Tier VP8000	Mid-Tier VP8000	Low Tier VP6000	Low Tier VP5000
Operating Temperature	-30C to +60C	-30C to +60C	-30C to +60C	-30C to +60C	-30C to +60C
Low Pressure Operation	500.3 PII	500.5 PI/II	500.5 PI/II	500.5 PI/II	500.5 PI/II
High Temperature, Storage/Operation	501.3 P1/II	501.5 PI/II	501.5 PI/II	501.5 PI/II	501.5 PI/II
Low Temperature, Storage/Operation	502.3 P1/II	502.5 PI/II	502.5 PI/II	502.5 PI/II	502.5 PI/II
Temperature Shock	503.3 PI	503.5 PI	503.5 PI	503.5 PI	503.5 PI
Solar Radiation	505.3 PI	505.5 PI	505.5 PI	505.5 PI	505.5 PI
Humidity	507.3 PII	507.5 PII	507.5 PII	507.5 PII	507.5 PII
Dust, Blowing	510.3 P1	510.5 PI	510.5 PI	510.5 PI	510.5 PI
Vibration	514.4 PI	514.6 PI	514.6 PI	514.6 PI	514.6 PI
Shock, Functional	516.4 PI	516.6 PI/IV	516.6 PI/IV	516.6 PI/IV	516.6 PI/IV
Rain, Blowing/Dripping Water	506.3 PI/II	506.5 PI/III Immersion IP67/68	506.5 PI/III Immersion IP67/68	506.5 PI/III Immersion IP67/68	506.5 PI/III Immersion IP67/68
Salt Fog	509.3 P1	509.5	509.5	509.5	509.5
Fire Service Configuration environmental specifications	Available	Available	Available	Available	

A-1.4.2.2 Portable Radio – High-Tier Model and Mid-Tier- VP8000

Model	Tier	Keypad	Frequency Band	Protocol	Display
VP8000 	All Band High-Tier Two Bands – Mid-Tier	Model 3—Full Keypad offered Also available in Model 2—Limited Keypad	All Band VHF UHF 700/800 MHz	Mixed protocol operation P25 Phase 1 and 2, and FM Analog	Top Display & Front display w/user-selectable color themes (day & night)

The Viking VP8000 multi-band portable subscriber is the next generation Viking portable platform with expanded features specifically designed for today's public safety agencies with advanced features and ergonomics to meet the first responder's mission critical operational needs. The mid-tier offering includes any two bands: UHF, VHF, or 700/800 bands per the RFP. The VP8000 is also our proposed portable radio for high tier, as it will be ordered from the factory as a multi-band selectable radio of UHF/VHF or any combination of bands including 700/800 MHz.

THE VP8000 will have user-friendly features familiar with the VP6000, including day and night user-selectable display, multi-line text, and a backlight that changes for event indication. The VP8000 also has great mission-critical field worker ergonomics, including a flared grip for better control, glove-friendly knobs, and large PTT and easily accessible emergency button. The VP8000 includes a top display that flips based on orientation, is fully ruggedized, and has a full catalog of accessories to meet your needs.

Figure A-1.4-6. VP8000 Models and Screen Display Day and Night Examples

As with all Viking radios, the VP8000 buttons are programmable with the Armada fleet manager software. Up 23 programmable option keys/buttons are included with the Full Key Model (DTMF keypad). In addition, the ABCD toggle has four positions. Each option key/button is programmable with a different function for each operating mode (conventional or trunked). With the hard stop, the channel select switch supports 16 channels or 255 channels by removing the switch stop ring, which allows the switch to rotate freely and provides soft stops.

Users have expanded control with the KMC-70M smart three-button microphone. The Viking microphone provides a PTT and Emergency button as expected. It also includes two additional button that are programmable, as are the buttons on the VP8000 portable. This puts more control in the hands of the users.

The Viking VP8000 portable radios have the following features:

- Large graphic display with backlight and programmable backlight on receive timer
- Menu mode
- AES 256-bit FIPS 140-2 approved encryption available on P25/digital channels
- DES-OFB on P25/digital channels (Optional)
- Emergency calls for high priority system access
- Priority (standard) and Radio Wide scan modes with user-programmable scan lists
- User-selectable high and low power output
- Surveillance mode
- Time-out timer
- Keypad lock to prevent accidental key presses
- Power up password to prevent unauthorized use
- Programmable and user-adjustable tone volume
- Programmable minimum volume level
- Soft power down to prevent accidental power off
- Operates on both wide and narrowband channels
- Over-the-Air Programming (OTAP) enables users to program radios without connecting them to a computer for P25 trunking and conventional P25.
- Easy radio programming and feature updating for portable radios
- Auto unmute
- Speaker microphone disconnect alarm (portable)
- Visual and audible low battery alerts and low battery health alerts
- User-programmable channel, zone, and radio event voice announcements
- Fireground mode
- Automatic volume control (FDMA only)

- GPS location services (Optional)
- Radio authentication (Optional)
- Analog and digital noise reduction
- Enhanced Vehicular Repeater System (Optional)
- Man Down detection and alerting (Optional)
- FIRESafe® Commander and First Responder modes (Optional)
- Wi-Fi support for broadband data and improved throughput (Optional)
- Support for a range of Bluetooth microphone accessories (Optional)
- Bluetooth programming (Optional)

NOTE: The VP8000 product is in development at time of publication. Features shown are design objectives and are subject to change. Images shown are representative picture of ergonomics, size, and design. Final images will be available at a later date.

A-1.4.2.3 Low-Tier Portable Radio – VP6000 and VP5000

Users have two choices for low-tier radios that operate in a single band, the VP6000 or the VP5000. In addition, the VP6000 is offered in high-visibility casing for fire-fighter use or black for law enforcement.

A-1.4.2.3.1 Viking VP6000 Portable

Model	Tier	Keypad	Frequency Band	Protocol	Display
VP6000 	Single Band Low-Tier	Model 3—Full Keypad or Model 2—Limited Keypad	Single Band VHF/UHF, or 700/800 MHz	Mixed protocol operation P25, and FM Analog	Top Display & Front display w/user-selectable color themes (day & night)

Figure A-1.4-7. VP6000 Features Overview

Figure A-1.4-8. VP6000 Models and Screen Display Day and Night Examples

The Viking VP6000 portable subscriber has user-friendly features, including day and night user-selectable color display, multi-line text, and a backlight that changes for event indication. The VP6000 also has great mission-critical field worker ergonomics, including a flared grip for better control, glove-friendly knobs, and a large emergency button. The VP6000 includes a top display that flips based on orientation, is fully ruggedized, and has a full catalog of accessories to meet the County's end-user needs.

As with all Viking radios, the VP6000 buttons are programmable with the Armada fleet manager software. Up 23 programmable option keys/buttons are included with the Full Key Model (DTMF keypad). In addition, the ABCD toggle has four positions. Each option key/button is programmable with a different function for each operating mode (conventional or trunked). With the hard stop, the channel select switch supports 16 channels or 255 channels by removing the switch stop ring, which allows the switch to rotate freely and provides soft stops.

Users have choice among many speaker mics and audio accessories to provide a customized and comfortable use of the VP6000. Similar to the high- and mid-tier VP8000 portable radio, users have expanded control with the KMC-70M smart three-button microphone. The Viking microphone provides a PTT and Emergency button as expected. It also includes two additional button that are programmable, as are the buttons on the VP6000 portable. This puts more control in the hands of the users.

The Viking VP6000 portable radios have the following features:

- Large graphic display with backlight and programmable backlight on receive timer
- Menu mode
- AES 256-bit FIPS 140-2 approved encryption available on P25/digital channels
- DES-OFB on P25/digital channels (optional)
- ARC4 Encryption, a software-based encryption that uses keys (up to 126) stored in the codeplug; compatible with ADP encryption; available on P25 and digital channels (Optional)
- Emergency calls for high priority system access
- Priority (standard) and Radio Wide scan modes with user-programmable scan lists
- User-selectable high and low power output
- Surveillance mode
- Time-out timer
- Keypad lock to prevent accidental key presses
- Power up password to prevent unauthorized use
- Programmable and user-adjustable tone volume
- Programmable minimum volume level
- Soft power down to prevent accidental power off
- Operates on both wide and narrowband channels
- Over-the-Air Programming (OTAP) enables users to program radios without connecting them to a computer for P25 trunking and conventional P25
- Easy radio programming and feature updating for portable radios
- Auto unmute
- Analog and digital noise reduction
- Speaker microphone disconnect alarm
- Visual and audible low battery alerts and low battery health alerts
- User-programmable channel, zone, and radio event voice announcements
- Fireground mode

- Automatic volume control (FDMA only)
- GPS location services (Optional)
- Radio authentication (Optional)
- Enhanced Vehicular Repeater System (Optional)
- Man Down detection and alerting (Optional)
- Bluetooth audio (Optional)
- Bluetooth programing (Optional)

A-1.4.2.3.2 Viking VP5000 Portable

Model	Tier	Keypad	Frequency Band	Protocol	Display
VP5000 	Single Band Low-Tier	Model 3—Full Keypad OR Model 2—Limited Keypad	Single Band VHF, UHF, or 700/800 MHz	Mixed protocol operation P25, and FM Analog	Top Display & Front display w/user-selectable color themes (day & night)

Figure A-1.4-9 VP5000 Features Overview

Smarter engineering makes the Viking VP5000 portable radio a reliable option for your personnel that is easy to operate. We listened to our end-users and created a rugged radio that offers effortless communications in even the most hazardous environments. At just under 5.5 inches tall, these small Viking portable radios are packed with advanced features for today's public safety agencies.

The portable radio has been tested to, and meets and exceeds, MIL-STD 810G standards for high and low pressure, temperature shock, solar radiation, rain, humidity, salt fog, blowing dust, vibration, and shock. The 5000 portable series also meets Military Standards 810 C, D, E, and F, and G. With mixed protocol operation capabilities, superior audio, and advanced visual features, built-in GPS capabilities, and IP67/68 rating, the Viking VP5000 is a value-packed, high-quality option for first responders and local government alike.

Model 2 (limited keypad) and Model 3 (full keypad) versions are available, and both have the front panel display. The User-selectable color themes provide enhanced personalization of the radio for each individual user. The display offers:

- Multi-line text
- Multiple visual indicators including battery
- Health & signal strength
- Day & night user selectable display options - (8 themes available)

The VP5000 features include:

- Mixed protocol operation (P25 Phase 1 & 2 Trunking, P25 Conventional, Viking16 (Optional), FM Analog)
- Mixed protocol zones (each channel in a zone can be from a different system)
- 1024 channels
- Powerful 1-Watt audio output for high noise environments
- Voice annunciation & custom announcement creation
- Fully ruggedized - IP67 & MIL-STD-810 C/D/E/F/G

- Offered in full key models (w/numeric keypad) & standard key models (w/o numeric keypad)
- Built-In GPS receiver/antenna for enhanced awareness (optional)
- MDC-1200 & GE-Star signaling (optional)
- P25 Authentication (optional)
- Bluetooth® (optional)
- Man Down (optional)
- Instant Recording Replay (IRR) (optional)
- Voice Recording (optional)
- Encryption
  - ARC4™ software encryption (optional)
  - DES-OFB (optional)
  - AES-256 (FIPS 140-2) Single and Multi-Key
  - Over-the-Air-Rekeying (OTAR)
  - VK5000 or KVL3000/KVL4000 Key loader

A-1.4.3 Tier Mobile Radios for Santa Barbara County

In response to RFP #810131 Attachment B – Functional Specifications Section 1.16 Field/Subscriber Radio Equipment together with Addendums, and the features identified, the following mobile radio tiers have been identified for the County:

- **High Tier**: VM7000 multi-deck/multi-band mobile radios.
- **Mid-Tier**: VM7000 dual-deck/dual-band mobile radios.
- **Low-Tier**: VM6000 and VM5000 single band mobile radios.

Each tier of mobile radio, together with its specific capabilities, are listed below. Some of the capabilities are enabled at time of purchase as specified per the RFP while other capabilities are available via software flashes available for purchase as needed on demand. Please refer to the pricing pages for the radios as configured, software options, and accessories for the proposed radios.

	Req'd Spec	High Tier VM7000	Req'd Spec	Mid-Tier VM7000	Req'd Spec	Low Tier VM6000	Req'd Spec	Low Tier VM5000
Chassis for remote mount install, remote head, minimum 17' cable, microphone, internal or external speaker 5W, brackets and interface cables	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Multi-band VHF, UHF, 700/800 MHz	Yes	✓	No	✓	No		No	
Dual-band VHF/UHF operation	No	✓	Yes	✓	No		No	
Single-band VHF UHF or 700/800 MHz operation	No	✓	No	✓	Yes	✓	Yes	✓
Capabilities: on/off button, volume knob, PTT on microphone	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Rotary knob for mode/zone selection, each bank 16 channels/talkgroups	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Full-sized DTMF keypad	Yes	✓	No	✓	No		No	
Five soft keys	No	✓	Yes	✓	No		No	
Three soft keys	No	✓	No	✓	Yes	✓ (5)	Yes	✓ (5)
Siren control buttons	Yes	✓	No	✓	No	✓	No	✓
Emergency button	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Display with two lines of text (min 12 characters per line), icons, menus	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Display readable in direct sunlight and total darkness	Yes	✓	Yes	✓	Yes	✓	Yes	✓
Fire service configuration with water-resistant control head, palm microphone, internal speaker, interface to headset via 6-wire	Yes	✓	No	✓	No	✓	No	✓
Motorcycle configuration with water-resistant microphone, speaker, power, and interface cables	No		Yes	✓	No	✓	No	✓
Channel Capacities	1,200	2,048	1,000	1,024	512	1,024	512	1,024

A-1.4.3.1 Compliance to Environmental Specifications

The RFP states that all mobile radios shall meet or exceed the environmental specifications per MIL-STD-810E (or equivalent items in 810 F). However please note that the Viking Series of radios quoted in EFJohnson's proposal are Mil Spec tested to the newest 810G standard.

	Req'd Spec	High Tier VM7000	Mid-Tier VM7000	Low Tier VM6000	Low Tier VM5000
Operating Temperature	-30C to +60C	-30C to +60C	-30C to +60C	-30C to +60C	-30C to +60C
Low Pressure Operation	500.3 PII	500.5 PI/II	500.5 PI/II	500.5 PI/II	500.6 PI/II
High Temperature, Storage/Operation	501.3 P1/II	501.5 PI/II	501.5 PI/II	501.5 PI/II	501.6 PI/II
Low Temperature, Storage/Operation	502.3 P1/II	502.5 PI/II	502.5 PI/II	502.6 PI/II	502.5 PI/II
Temperature Shock	503.3 PI	503.5 PI	503.5 PI	503.5 PI	503.6 PI
Solar Radiation	505.3 PI	505.5 PI	505.5 PI	505.5 PI	505.5 PI
Humidity	507.3 PII	507.5 PII	507.5 PII	507.5 PII	507.6 PII
Dust, Blowing	510.3 P1	510.5 PI	510.5 PI	510.5 PI	510.5 PI
Vibration	514.4 PI	514.6 PI	514.6 PI	514.6 PI	514.6 PI
Shock, Functional	516.4 PI	516.6 PI/V	516.6 PI/IV	516.6 PI/IV	516.6 PI/IV
Rain, Blowing/Dripping Water (for metal case)	506.3 PI/II	506.5 PI/III RF Deck: IP54, Remote control head: IP 55	506.5 PI/III RF Deck: IP54, Remote control head: IP 55	506.5 PI/III RF Deck: IP54, Remote control head: IP 56	506.5 PI/III RF Deck: IP54, Remote control head: IP 55
Salt Fog (for metal case)	509.3 P1	509.5	509.5	509.5	509.5

Figure A-1.4-10. Mobile Tiers Environmental Compliance

A-1.4.3.2 Mobile Radio – High-Tier Model and Mid-Tier- Viking VM7000

Model	Tier	Frequency Band	Protocol	Control Head
VM7000 	Mid-Tier High-Tier	All-Band or Dual-Band Multi-Deck	Multi-protocol operation P25, and FM Analog	Viking Control Head w/ color display, Wide viewing angle (120°)

Figure A-1.4-11. VM7000 Features

The VM7000 allows multi-RF deck operation to a single or dual control head. Each RF deck can use the same or different RF bands, allowing the user to have a single control head. When dual heads are used, they mirror each other, and also have an independent volume for each head.

Simultaneously receive and display up to four bands with the Viking VM7000 all-band mobile so you never miss a call. The "select" and "unselect" speakers give you the option for audio control similar to a dispatch console. KENWOOD Viking is the industry's only mobile platform providing TrueVoice™ noise cancellation. Multiple RF decks on the same band allow the user to listen to multiple channels at the same time and without scanning so calls are heard. Battalion Chiefs enjoy this multi-deck capability when managing a fire scene.

Additionally, RF decks can be added later for the users that need access to the Santa Barbara County radio system, at a fraction of the cost of a complete additional radio.

With the VM7000 KCH-20RV head, users can simultaneously receive and display up to four RF decks, so they never miss a call. The "select" and "unselect" speakers give users the option for audio control similar to a dispatch console.

The proposed VM7000 for high-tier choice is equipped with a RF decks for VHF, UHF, and 700/800 MHz and a control head that includes 2,048 channels, exceeding the RFP specifications of 1,200 channel capacity. For mid-tier, this radio can be configured with two decks (bands) and is quoted at 1,024 channels. The radio can be ordered to contain up to 4,096 channels, along with P25 Common Air Interface AMBE+2 vocoder, analog conventional, and P25 conventional and trunking licenses. Each RF deck shares the first RF deck's licenses, saving costs when adding additional RF decks.

The VM7000 also includes a KENWOOD Viking control head (KCH-20 series), which is equipped with programmable option buttons, day and night display options, and dedicated emergency key and channel/volume control knobs. The separated control head from the RF deck provides flexibility in installation. Several cable lengths are available, including 1.6', 17', 25', 50', and 100'. The proposed cable is 17'.

Enhanced Control Head

- Larger display - 2.75" (36 x 60 mm)
- Resolution of 400 x 240 pixels
- Viewing angle of 140°
- Multi-color LCD + TX/RX (green/red) LEDs
- D-Pad & more PF keys, dedicated emergency key & channel/volume control knobs
- Replaceable A/B/C button labels
- User selectable themes (8 themes available)
- Day & night display options

Day - High Contrast

Night - High Contrast

The VM7000 features include:

- Mixed protocol operation (P25 Phase 1 & 2 Trunking, P25 Conventional, FM Analog)
- 2,048 channels for high-tier and 1,024 channels for mid-tier (4,096 channels is optional)
- Mixed protocol zones
- P25 Authentication (Link Layer Authentication) (optional)
- P25 IP packet data
- P25 GPS data (built in GPS) (optional)
- MDC-1200 & GE-Star signaling (optional)
- P25 Conventional vote scan
- Single or Dual Remote Mount configurations available
- External speaker
- Over-the-Internet-Programming (OTIP)
- Encryption
  - ARC4™ software encryption (optional)
  - DES-OFB (Optional)
  - AES-256 (FIPS 140-2) Single and Multi-Key
  - Over-the-Air-Rekeying (OTAR)
  - VK5000 or KVL3000/KVL4000 Key loaders
- Wi-Fi (optional)
- Instant Recording Replay (IRR) (optional)
- Voice Recording (optional)

A-1.4.3.3 Smart Microphone

The 12-key smart microphone allows direct entry to a channel and for keypad programing. In addition, Armada can smartly program the 12-control head and 12-key microphone buttons for additional functions. The additional functions are listed in the following table.

Function	Conventional	Project 25 Trunking
AUX1	X	X
AUX2	X	X
AUX3	X	X
Alert tones	X	X
Analog Noise Reduction	X	
Authentication Key load		X
Auto Site Search		X
Backlight Bright/Medium/Dim/Off	X	X
Bluetooth Audio	X	X
Bluetooth Programming	X	X
Call Alert (Paging)	X	X
Call Response	X	X
Cancel Dynamic Regroup		X
Change Keyset	X	X
Change Color Theme	X	X
Change User Password	X	X
Channel Down	X	X
Channel Announcement	X	X
Channel Select	X	X
Channel Up	X	X
Channel RX OST	X	
Channel TX OST	X	
Clear/Secure Encryption Select	X	X
Clock	X	X
Clock Source	X	X
Disable Call Guard	X	
Display GPS	X	X
Display Information	X	
Emergency Mode	X	X
Erase Keys	X	X

Function	Conventional	Project 25 Trunking
Function Recall	X	X
GPS	X	X
GPS/BT Reset	X	X
High/Low Power	X	X
Home	X	X
Home 2	X	X
Home 3	X	X
Home 4	X	X
Home 5	X	X
Horn Honk	X	X
Instant Recording Replay	X	X
Key Select	X	X
Keypad Programming	X	
Menu	X	X
Message	X	X
Mic To PA	X	X
Monitor Mode	X	
Monitor Rx	X	
Mute/Unmute	X	X
Normal/Selective Squelch	X	
Nuisance Delete	X	X
OORI Tone	X	
P25 Packet Data	X	X
P25 Two Tone Unmute	X	X
Phone Call	X	X
Priority Channel Select	X	
Radio Wide Scan (RWS) List Edit	X	X
Radio Info	X	X
Radio Wide Scan	X	X
Rekey Request	X	X
Repeater Enable (VRS)	X	X
Repeater Talk Around (Car-to-car)	X	
Request to Talk	X	
RX to PA	X	X
Scan Mode	X	X
Scan List Edit	X	X

Function	Conventional	Project 25 Trunking
Scan List Select	X	X
Single Tone Encoder	X	
Single Touch 1	X	X
Single Touch 2	X	X
Single Touch 3	X	X
Single Touch 4	X	X
Single Touch 5	X	X
Single Touch 6	X	X
Single Touch 7	X	X
Single Touch 8	X	X
Site Lock		X
Smart Siren (1-15)	X	X
Smart Siren Signal Master Button	X	X
Smart Siren Slide Position (1-3)	X	X
Smart Siren Warning	X	X
Site Search		X
Soft Buttons Left	X	X
Soft Buttons Right	X	X
Squelch Adjust	X	
Squelch List Select	X	
Status	X	X
Surveillance Mode	X	X
Talkgroup Lock	X	
Talkgroup Select	X	
Text Messaging	X	X
Toggle Theme Mode	X	X
Tone Volume Edit - Alert	X	X
Tone Volume Edit - Keypress	X	X
Two Tone Encoder	X	
Two Tone Unmute	X	
Unit Call	X	X
Unprogrammed	X	X
Voice Announcements	X	X
Volume Down	X	X
Volume Up	X	X
Wi-Fi	X	X

Function	Conventional	Project 25 Trunking
Zone Down	X	X
Zone Edit	X	X
Zone Select	X	X
Zone Up	X	X
Select Deck 1	X	X
Select Deck 2	X	X
Select Deck 3	X	X
Select Deck 4	X	X
Select Deck Cycle	X	X
Select Deck Down	X	X
Select Deck Up	X	X
Multiline Display Toggle	X	X
Unselected RF Deck Mute	X	X
RF Deck Volume Adjustment	X	X
RF Deck Speaker Adjustment	X	X

Figure A-1.4-12. Additional Programmable Functions

A-1.4.3.4 Low-Tier Mobile Radio – VM6000 and VM5000

Two low-tier Viking mobile radios are the VM6000 and VM5000.

A-1.4.3.4.1 Viking VM6000

Model	Tier	Frequency Band	Protocol	Control Head
VM6000  **Viking Control Head**	Single Band Low-Tier	Offered in UHF, VHF, or 700/800 MHz	Multi-protocol operation, P25, and FM Analog	Viking Control Head with transmissive color display, Wide viewing angle (120°)

The KENWOOD Viking VM6000 delivers uncompromised quality and performance with public safety ergonomics and is included in the industry's only mobile platform providing TrueVoice™ noise cancellation.

Additional VM6000 mobile radio features available in the radio include: mixed protocol operation (P25 Phase 1 and 2 trunking, P25 conventional, analog, 1,024 channels (2,048 and 4,096 options); mixed protocol zones; P25 authentication (link layer authentication); P25 IP packet data; P25 GPS data (built-in GPS); MDC-1200 and GE-Star signaling; analog and P25 conventional vote scan; remote mount only (Viking Control Head); Dual Viking Control Heads (option); external speaker; fixed control station; Wi-Fi; Bluetooth; Instant Recording Replay (IRR); voice recording; and encryption (ARC4™ software encryption; compatible with Motorola ADP™, DES-OFB, AES-256 [FIPS 140-2] Single and Multi-Key, Over-the-Air-Rekeying [OTAR], VK5000 or KVL3000/KVL4000 key loaders).

Viking Control Head

Public safety knobs & ergonomics

High contrast transmissive color display for direct sunlight & night time viewing; not compromised by polarized sunglasses

Resolution of 480 x 128 pixels

Viewing angle of 120°

User selectable themes (8 themes available)

Day & night display options

An optional KCH-21RV Handheld Control Head (HHCH) can be used with the VM6000 radio

Day - High Contrast

Night - High Contrast

The VM6000 features include:

- Mixed protocol operation (P25 Phase 1 & 2 Trunking, P25 Conventional, FM Analog)
- 1024 channels (2048 optional)
- Mixed protocol zones
- P25 Authentication (Link Layer Authentication) (optional)
- P25 IP packet data
- P25 GPS data (built in GPS)
- MDC-1200 & GE-Star signaling (optional)
- Analog & P25 Conventional vote scan
- Remote mount only (Viking Control Head)
- Dual Viking Control Heads (optional)
- External speaker
- Fixed control station (optional)
- Wi-Fi (optional)
- Bluetooth (optional)
- Instant Recording Replay (IRR) (optional)
- Voice Recording (optional)
- Encryption
  - ARC4™ software encryption (optional)
  - DES-OFB (optional)
  - AES-256 (FIPS 140-2) Single and Multi-Key
  - Over-the-Air-Rekeying (OTAR)
  - VK5000 or KVL3000/KVL4000 Key loaders

A-1.4.3.4.2 Viking VM5000

Model	Tier	Frequency Band	Protocol	Control Head
VM5000 	Single Band	VHF or UHF or 700/800 MHz	Mixed protocol operation P25, and FM Analog	422 x 154 pixel, viewing angle of 140°, user-selectable color themes (day & night)

The Viking VM5000 is a next-generation P25 radio that offers multiple configuration options. It is equipped with industry-leading audio, display, and advanced feature capabilities for police, fire, EMS, and other mission-critical users.

The VM5000 supports up to 1,024 channels, has mixed protocol zones, and has a P25 conventional vote scan. The VM5000 also includes a KENWOOD control head (KCH-19, NX-5000 series), which is equipped with programmable option buttons, automatic backlight brightness, and a detachable front panel. It also has internal and external speakers. Note the VM5000 has an on/off button and a toggle up down for volume control instead of a rotary dial.

Figure A-1.4-13. Viking VM5000 Mobile Radio Programmable Option Buttons

Basic Control Head

Resolution of 422 x 154 pixel

Viewing angle of 140°

User selectable themes (8 themes available)

Day & night display options

Day - High Contrast

Night - High Contrast

The VM5000 features include:

- Mixed protocol operation (P25 Phase 1 & 2 Trunking, P25 Conventional, FM Analog)
- 1024 channels
- Mixed protocol zones
- P25 Authentication (Link Layer Authentication) (optional)
- P25 IP packet data
- GPS AVL data (built in GPS) (optional)
- MDC-1200 & GE-Star signaling (optional)
- Analog & P25 Conventional vote scan
- Dash mount (KCH-19 control head only)
- Remote mount
- Dual control heads
- Internal or external speaker
- Fixed control station (optional)
- Wi-Fi (remote mount configuration only)
- Bluetooth (Future)
- Instant Recording Replay (IRR) (optional)
- Voice Recording (optional)
- Encryption

- ARC4™ software encryption (optional)
- DES-OFB(optional)
- AES-256 (FIPS 140-2) Single and Multi-Key
- Over-the-Air-Rekeying (OTAR)

A-1.4.4 Control Stations

Model	Tier	Frequency Band	Protocol	Control Head
VM5000 	Single Band	VHF or UHF or 700/800 MHz	Mixed protocol operation P25, and FM Analog	422 x 154 pixel, viewing angle of 140°, user-selectable color themes (day & night)

The Viking VM5000 control station provides ease of use. It is equipped with industry-leading audio, display, and advanced feature capabilities for police, fire, EMS, and other mission-critical users. The VM5000 supports up to 1,024 channels, has mixed protocol zones, and has a P25 conventional vote scan. The VM5000 also includes a KENWOOD control head (KCH-19, NX-5000 series), which is equipped with programmable option buttons, automatic backlight brightness, and a detachable front panel.

The control stations proposed are supplied complete with desktop microphone, mounting hardware, coaxial cable, and unity gain antennas to provide for a complete installation. The control stations and antenna systems will be installed with proper site grounding specifications.

The proposed control stations support the following features:

- Full compliance with P25 features and operation
- Desk top microphones
- Front-mounted on/off volume knob (provided with power on/off button, and up down toggle volume control)
- Talkgroup/channel selector
- Emergency button, protected from inadvertent activation
- Alphanumeric display

- Transmit indicator
- OTAP (option)
- AES encryption (option)
- OTAR (option)

Also quoted per RFP requirements are the following options and accessories:

- Cables
  - Data cables
  - Extension cables
  - Adapters
  - Power cables
- Antennas
- External Speakers
- Public address kits
- Desktop microphone

In addition, as an option, we have included multiband control stations (VM7000) capable of operating in the following frequency bands:

- VHF
- UHF
- 700/800 MHz

The control stations quoted comply with the programming capacities specified for the mid-tier mobile radios of 1000 channels (provided with 1024 channels). The Control stations quoted comply with the environmental requirements specified for the mobile radios.

A-1.4.5 Optional Vehicular Extender

The vehicular extender meets the following specifications:

- Vehicular Extender Equipment that complies with applicable requirements of Part 90 and Part 15 of the FCC Rules and Regulations, as well as appropriate TIA/EIA and similar standards and is FCC type accepted in accordance with FCC Part 90 rules and regulations for the specific application.

- The Vehicular Extender interfaces to a P25 Phase 2 Trunked mobile unit, providing connection to radio frequency (or pair) separate from the network, allowing voice traffic to be exchanged between the P25 Phase 2 Trunked network and radio units in the vicinity of the Vehicular Extender.
- The Vehicular Extender will operate on the UHF public safety radio bands, and in the following modes:
  - On simplex channels in conventional mode
  - On duplex channels in conventional mode
  - On both simplex and duplex channels in conventional mode
  - In analog conventional mode
  - In P25 conventional mode
  - Selectable in both analog and P25 mode
- The Vehicular Extender provides a minimum of 2 Watts RF output
- The Vehicular Extender has received sensitivity appropriate for balanced operation with a portable radio of similar power
- The Vehicular Extender quoted is provided as a fully functional package with antenna, mounting, all interface cables and ancillary equipment required

The Vehicular Extender is provided with all programming software and cables required to program from a standard PC or laptop.