

Exhibit C

Technical and Implementation Documents

C-1

System Description

Contra Costa West Cell System

-Nichol Knob (RF Site)

SYSTEM DESCRIPTION

Motorola is providing this proposal for the Nichol Knob site located in the Point Richmond area of the Contra Costa West Cell. The Nichol knob site will complete the equipment requirements for the implementation of the Contra Costa West Cell design.

This system description provides information regarding the equipment for the Nichol Knob site and identifies the existing equipment that has been purchased and is ready to implement in the Contra Costa County West Cell. At the completion of the installation and optimization of the sites listed below, Motorola will perform a Coverage Acceptance Test Plan (CATP) of the completed Contra Costa West Cell.

- **CCC West:**

The following 4 sites use 10 channels to cover the populated West portion of Contra Costa County:

1. Nichol Knob
2. 10900 San Pablo
3. Pearl Reservoir
4. Turquoise – Prime Site

- **Nichol Knob (RF Site)**

The Nichol Knob site is an underground shelter that is shared between the City of Richmond's trunked system and Contra Costa County (County). The shelter is split in half with Richmond on one side and County on the other.

This site will require special care when bringing this equipment into the shelter due to the weight and narrow opening at the top of the shelter. Motorola has done a preliminary site walk with County to identify ways to create room for the new site equipment. The easiest method identified requires the re-location of some of the existing equipment to a wall mount or over-head mounting method.

The existing tower used for the antenna systems is loaded fairly well. It may required that some existing antennas be removed or re-located to accommodate the two Omni antennas required for the CCC West 10 channel system.

The installation at this site will require some collaboration between County and the City of Richmond. The open wall or ceiling areas available for the relocation of equipment is located on the Richmond portion of the shelter.

Nichol Knob Equipment List

Qty	Nomenclature	Description
3	TRN7343	SEVEN AND A HALF FOOT RACK
2	DSJ4900B	HP PROCURVE SWITCH 2626B
1	ST2500	S2500 MULTIPROTOCOL WAN ROUTER
1	ST2511	S2500 FLEXWAN DAUGHTER BOARD
1	DSPREM1203F	CABLE 5FT DB25M TO V.35F STRAIGHT
1	DKN6119	CABLE,V.35,FLEXWAN,DTE 10FT
1	DSTRAK92003DC	DISTRIBUTION CHASSIS
3	DSTRAK91061	FOUR PORT DDM
1	DSTRAK91071	FOUR PORT IRIG B TIME CODE FDM
8	TDN9714	1/4" CONN N MALE S FLEX PLTD
150	L1700	1/4" SUPERFLEX POLY JKT PER FOOT
1	DSPREM891830	UNIVERSAL ENCLOSURE TENSER 800
2	DSPREM880460	CPU 2T1 E1 RCON BUS-CONNECT
1	DSPREM892060	8T1 E1 IF CARD 32K WITH MODEM
2	DSPREM890220	DC POWER SUPPLY 48 VDC
1	DSPREM821260	2 PORT V 35 HSU CARD WITH DB25F
2	DSPREM822560	10 PORT LD-SRU CARD
2	DSPREM801065	DUAL T1 E1 WAN CARD
4	DSPREM81230	CSU PLUG IN MODULE
2	DSPREM1239	Y ADAPTER 1:1 WAN REDUNDANCY
10	T7039	GTR 8000 BASE RADIO
10	X153AW	ADD: RACK MOUNT HARDWARE
10	CA00855AA	ADD: 700/800 MHZ MID POWER
10	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R
1	F4544	SITE MANAGER ADVANCED
3	V592	AAD TERM BLCK & CONN WI
1	V260	ADD: 48 VDC PS TO SM
1	V803	ADD: SDM3000 ASTRO F/W FOR A6.7/7.0
1	F4568	R-MUX 1004
		325 AMP 48VDC N+1 REDUNDANT POWER
1	DQLMHF6325148AL1	S
1	DQWLBG800MST	800 AH 48 VDC MEDIUM RATE VLRA BATT
12	DQSP4KHAM20B1A	BREAKER, 20 AMP

8	DQSP4KHAM10B1A	BREAKER, 10 AMP
6	DQSP4KHAM5B1A	5A CIRCUIT BREAKERS
3	DQSP4KCDPD100B1A	BREAKER, CDPD, 100 AMP
3	DQBPKR1948VL18R	48 VDC 19" RACK MOUNT BREAKER
3	DQBCKKBPKR	PANEL
		CLEAR REAR COVER BPKR PANEL
		120V 2-20A RACK MOUNT SURGE
1	DS1400	PROTECT
2	BLN6200	AC POWER STRIP, 6 OUTLET
1	DQ7489A06211TA10PR	MULTICOUPLER TXRX 806-869 MHZ 10 CH
2	DQBCD80010EDIN25	OMNI DIRECTIONAL ANTENNA 10 DBD, 80
2	DSL4PDMRC	1/2" 7-16 DIN MALE RING FLARE CONN
100	L1705	1/2" LDF HELIAX POLY JKT PER FT
3	TT05057AA	ADD: 7-16 DIN MALE, PS, ANTENNA END
1	TT05061AA	ADD: N MALE, PS, ANTENNA END
2	DSL5TDFPS	7-16 DIN FEMALE CONNECTOR - POSITIV
150	L3323	7/8" AVA HELIAX POLY JKT PER FOOT
		PCS MICRO FILTER PROTECTOR W/BF
1	DSDSXLMABF	BRA
		COMBINER PROTECTOR 800-2300 MHZ
1	DSXLDMABF	DIN
2	CDN6579	1/2" N MALE PLATED CONNECTOR
2	DSF4PDMV2C	1/2" 7/16 DIN MALE CONN SFLEX
100	L1702	1/2" SUPERFLEX POLY JKT PER FOOT
2	CDN6579	1/2" N MALE PLATED CONNECTOR
1	DSL5SGRIP	7/8" SUPPORT HOIST GRIP
3	TDN6674	5/8" - 7/8" CABLE GROUND CLAMP KIT
4	TDN9289	CABLE WRAP WEATHERPROOFING
150	L1713	1-1/4" LDF HELIAX POLY JKT PER FT
4	TDN7547	1-1/4" CABLE GROUND CLAMP KIT
1	DSL6SGRIP	1-1/4" SUPPORT HOIST GRIP
		DIN FEMALE TRIMETAL CONNECTOR -
2	DSL6TDFPS	POS
1	DSL4APDMDM6	1/2" JUMPER 7/16 DIN MALE 6'
2	TDN9289	CABLE WRAP WEATHERPROOFING
1	DDN9385	N FEMALE, POSITIVE STOP
1	CDN1159A	1/2" SF CONN 7-16 DIN MALE RA

System: CCCO West
 Site Nicol Knob

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Item Num	Qty	Nomenclature	Description	Entity
1	3	TRN7343	SEVEN AND A HALF FOOT RACK	Staging
2	2	DSJ4900B	HP PROCURVE SWITCH 2626B	Staging
3	1	ST2500	S2500 MULTIPROTOCOL WAN ROUTER	Staging
4	1	ST2511	S2500 FLEXWAN DAUGHTER BOARD	Staging
5	1	DSPREM1203F	CABLE 5FT DB25M TO V.35F STRAIGHT	Staging
6	1	DKN6119	CABLE,V.35,FLEXWAN,DTE 10FT	Staging
7	1	DSTRAK92003DC	DISTRIBUTION CHASSIS	Staging
8	3	DSTRAK91061	FOUR PORT DDM	Staging
9	1	DSTRAK91071	FOUR PORT IRIG B TIME CODE FDM	Staging
10	8	TDN9714	1/4" CONN N MALE S FLEX PLTD	Staging
11	150	L1700	1/4" SUPERFLEX POLY JKT PER FOOT	Staging
12	1	DSPREM891830	UNIVERSAL ENCLOSURE TENSER 800	Staging
13	2	DSPREM880460	CPU 2T1 E1 RCON BUS-CONNECT	Staging
14	1	DSPREM892060	8T1 E1 IF CARD 32K WITH MODEM	Staging
15	2	DSPREM890220	DC POWER SUPPLY 48 VDC	Staging
16	1	DSPREM821260	2 PORT V 35 HSU CARD WITH DB25F	Staging
17	2	DSPREM822560	10 PORT LD-SRU CARD	Staging
18	2	DSPREM801065	DUAL T1 E1 WAN CARD	Staging
19	4	DSPREM81230	CSU PLUG IN MODULE	Staging
20	2	DSPREM1239	Y ADAPTER 1:1 WAN REDUNDANCY	Staging
21	10	T7039	GTR 8000 BASE RADIO	Staging
21a	10	X153AW	ADD: RACK MOUNT HARDWARE	Staging
21b	10	CA00855AA	ADD: 700/800 MHZ MID POWER	Staging
21c	10	CA00025AF	ADD: CIRCUIT BASED MULTISITE BASE R	Staging
22	1	F4544	SITE MANAGER ADVANCED	Staging
22a	3	V592	AAD TERM BLCK & CONN WI	Staging
22b	1	V260	ADD: 48 VDC PS TO SM	Staging
22c	1	V803	ADD: SDM3000 ASTRO F/W FOR A6.7/7.0	Staging
23	1	F4568	R-MUX 1004	Staging
24	1	DQLMHF6325I48AL1	325 AMP 48VDC N+1 REDUNDANT POWER S	Field
25	1	DQWLBG800MST	800 AH 48 VDC MEDIUM RATE VLRA BATT	Field
26	12	DQSP4KHAM20B1A	BREAKER, 20 AMP	Staging
27	8	DQSP4KHAM10B1A	BREAKER, 10 AMP	Staging
28	6	DQSP4KHAM5B1A	5A CIRCUIT BREAKERS	Staging
29	3	DQSP4KCDPD100B1A	BREAKER, CDPD, 100 AMP	Field
30	3	DQBPKR1948VL18R	48 VDC 19" RACK MOUNT BREAKER PANEL	Staging
31	3	DQBCKKBPKR	CLEAR REAR COVER BPKR PANEL	Staging
32	1	DS1400	120V 2-20A RACK MOUNT SURGE PROTECT	Staging
33	2	BLN6200	AC POWER STRIP, 6 OUTLET	Staging
34	1	DQ7489A06211TA10PR	MULTICOUPLER TXRX 806-869 MHZ 10 CH	Field
35	2	DQBCD80010EDIN25	OMNI DIRECTIONAL ANTENNA 10 DBD, 80	Field
36	2	DSL4PDMRC	1/2" 7-16 DIN MALE RING FLARE CONN	Field
37	100	L1705	1/2" LDF HELIAX POLY JKT PER FT	Field
37a	3	TT05057AA	ADD: 7-16 DIN MALE, PS, ANTENNA END	Field
37b	1	TT05061AA	ADD: N MALE, PS, ANTENNA END	Field
38	2	DSL5TDFPS	7-16 DIN FEMALE CONNECTOR - POSITIV	Field
39	150	L3323	7/8" AVA HELIAX POLY JKT PER FOOT	Field

40	1	DSDSXLMABF	PCS MICRO FILTER PROTECTOR W/BF BRA	Field
41	1	DSXLDMABF	COMBINER PROTECTOR 800-2300 MHZ DIN	Field
42	2	CDN6579	1/2" N MALE PLATED CONNECTOR	Field
43	2	DSF4PDMV2C	1/2" 7/16 DIN MALE CONN SFLEX	Field
44	100	L1702	1/2" SUPERFLEX POLY JKT PER FOOT	Field
45	2	CDN6579	1/2" N MALE PLATED CONNECTOR	Field
46	1	DSL5SGRIP	7/8" SUPPORT HOIST GRIP	Field
47	3	TDN6674	5/8" - 7/8" CABLE GROUND CLAMP KIT	Field
48	4	TDN9289	CABLE WRAP WEATHERPROOFING	Field
49	150	L1713	1-1/4" LDF HELIAX POLY JKT PER FT	Field
50	4	TDN7547	1-1/4" CABLE GROUND CLAMP KIT	Field
51	1	DSL6SGRIP	1-1/4" SUPPORT HOIST GRIP	Field
52	2	DSL6TDFPS	DIN FEMALE TRIMETAL CONNECTOR - POS	Field
53	1	DSL4APDMDM6	1/2" JUMPER 7/16 DIN MALE 6'	Field
54	2	TDN9289	CABLE WRAP WEATHERPROOFING	Field
55	1	DDN9385	N FEMALE, POSITIVE STOP	Field
56	1	CDN1159A	1/2" SF CONN 7-16 DIN MALE RA	Field

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C-3

Statement of Work

PHASE 2 - COCO INFRASTRUCTURE EXPANSION

DESIGN REVIEW

General Information

This Statement of Work (SOW) defines the principal activities and responsibilities of all parties for the expansion of the Contra Costa County West Cell System (CC West) under the contract with Alameda County for Contra Costa County (County). The System Description provides information on the equipment implemented under this scope. A System Description is included in this proposal.

Deviations and changes to this SOW are subject to mutual agreement between Motorola and the County will be addressed in accordance with the Change provisions of the Contract.

This Statement of Work is an Appendix to the full project SOW, and all the general responsibilities, as well as the project initiation and project closure descriptions apply to this SOW.

The County and Motorola will review the CC West design through analysis of the system connectivity and frequencies, as mutually agreed between Motorola and the County. Motorola will present design materials such as system diagrams, interference and intermodulation analyses, etc. Design Review tasks and responsibilities are described in greater detail in the following sections of this SOW. Motorola and the County deliverables and responsibilities are defined in the Responsibility Matrix below.

Responsibility Matrix

Task	Responsibility	Deliverable
Site surveys will be conducted at each site where new or upgraded equipment will be installed.	Motorola and the County	Site Surveys

Task	Responsibility	Deliverable
<p>Motorola will deliver coverage maps based on the specific site locations and antenna placement, as well as the specific parameters of the FCC licenses. These coverage maps will represent the portions of the simulcast cells that will be implemented. Since no one simulcast cell within the two county design is completed by this expansion, these maps will not represent the final coverage.</p>	<p>Final Coverage Design</p>	<p>Coverage Maps: 95% Reliable Portable Coverage Maps</p>
<p>The County will provide a list of frequencies for use within the new sites for the CC West. Any changes to the frequency list may result in additional engineering design effort, which can be provided through the change order process.</p>	<p>Motorola and the County</p>	<p>Agreement of site location and configuration</p>
<p>Motorola will evaluate each site within the coverage design for its compatibility with the identified frequencies. Frequency compatibility with the identified sites will drive the configuration of the CC West simulcast cell.</p>	<p>Motorola</p>	<p>Evaluation of Frequency Compatibility with Sites.</p>
<p>Motorola will execute intermodulation analysis, based on a computer model, and identify any IM hits based on that analysis. Motorola will make recommendations to the County to alleviate IM problems that are discovered through this process.</p>	<p>Motorola</p>	<p>Computer Based Intermodulation Analysis & Other County Frequency Recommendations</p>
<p>Motorola and the County will define the requirements for the CC West connectivity based on the following requirements: New CC West Sites and Channels Legacy system Expansion</p>	<p>Motorola and the County</p>	<p>Connectivity Requirements</p>
<p>Motorola will provide link specifications and system microwave requirements to the County.</p>	<p>Motorola</p>	<p>Connectivity and Design Specifications</p>
<p>The County will approve the design and technical specifications.</p>	<p>Motorola</p>	<p>Connectivity Design and Technical Specifications</p>
<p>Motorola and the County will finalize the project implementation schedule.</p>	<p>Motorola and the County</p>	<p>Project Schedule</p>

Task	Responsibility	Deliverable
<p>Motorola will deliver a Design Document that reflects changes in design and scope, as well as definition of details determined during the Design Review.</p> <ul style="list-style-type: none"> ■ Motorola will update the equipment list as necessary to accommodate the specifics of the Design Review. ■ Motorola will update the System Description to reflect changes in the system design. ■ Motorola will update the system drawings and documentation to reflect changes in the system design. ■ Motorola will update the SOW to reflect changes in the implementation scope. ■ Motorola and the County will finalize the implementation schedule. <p>Motorola will submit a final Design Document to the County through the change order process. This document will be baselined by the System Description, SOW, Project Schedule, and other documentation provided prior to contract approval.</p>	<p>Motorola</p>	<p>Equipment List System Description System Drawings Statement of Work Project Schedule Change Orders (as necessary)</p>
<p>The County will review the work performed by Motorola and sign an approval document for the Design Review</p>	<p>County</p>	<p>Approval Statement</p>

Site Survey/Preparation

Site inspections will be conducted during this phase of the project. All equipment locations will be audited for Site Ready purposes and Motorola will prepare a Site Audit Report for each location. Where Motorola is providing civil work, Motorola will implement facilities that meet the Site Readiness / R56 requirements. Site surveys are executed as an integral part of installation preparation. This section addresses the facilities where the County is responsible for Site Readiness.

Responsibility Matrix

Task	Responsibility	Deliverable
<p>Site Access:</p> <p>The County will assure site access to inspect equipment installation sites, finalize equipment locations and determine if any course of action is necessary to handle installation constraints.</p> <p>The County will provide existing site and system drawings as available.</p>	County	Site Access And Existing System Documentation
<p>Site Readiness Audits:</p> <p>Motorola will perform a R56 site audit to verify site readiness.</p> <p>Motorola will prepare a report that includes recommendations detailing site preparation required to provide a suitable environment for installation of the equipment. This report will become part of the final system documentation.</p>	Motorola	Site Audit Reports
<p>Motorola will provide site improvement costs to the County based on the Site Readiness Audits if necessary.</p>	Motorola and the County	Defined Site Improvement Scope
<p>Recommended site upgrades that are not implemented remain the responsibility of the County.</p>	County	Sites that meet Site Readiness Requirements
<p>The County will provide any permits and licenses that are identified for the system.</p>	County	Approved Licenses and Permits

Completion Criteria

This phase is considered complete when all necessary site improvements have been implemented by the County and verified as complete.

Order Processing

Description

Motorola will execute major subcontracts.

Responsibility Matrix

Task	Responsibility	Deliverable
Motorola will execute major subcontracts	Motorola	Subcontracts in place

Completion Criteria

This phase is considered complete when all subcontracts have been placed.

Equipment Shipment and Factory Staging

Description

During this phase of the project, Motorola will perform factory staging which includes the assembly and testing of all major radio system components. The system will be configured as it will be in the field for this Factory Testing. The factory testing will exercise the functional capabilities of the communications system. The equipment that will be staged was procured outside of the contract by the Oakland UASI. The equipment is currently being warehoused by the County. The equipment required for factory staging shall be shipped by the County to Motorola CCSI Bay 3, 1305 E Algonquin RD, Schaumburg, IL 60196. County is responsible for the cost and safe delivery of the equipment to CCSI. Once the equipment is received, CCSI will perform an inventory and confirm safe delivery.

Responsibility Matrix

Task	Responsibility	Deliverable
Ship required equipment to Motorola CCSI for factory staging. Motorola CCSI Bay 3 1305 E Algonquin RD Schaumburg, IL 60196	County	Safe delivery of equipment required for staging.
Inventory and verify safe delivery of the equipment to be factory staged.	Motorola	Inventory
Rack and configure equipment per the Detailed Design Document.	Motorola	Confirm equipment is configured per DDD.

Completion Criteria

This task is considered complete when the equipment is inventoried, inspected, and staged.

Factory Testing

Description

Once the system is configured as it will be in the field, CCSI will exercise the functional capabilities of the communications system.

Responsibility Matrix

Task	Responsibility	Deliverable
<p>Functional Performance Testing: Motorola will perform a Functional Performance Test in order to verify the functionality of the communications system.</p> <p>The Functional Performance Test will include the following:</p> <ul style="list-style-type: none"> ■ Physical inspection; ■ Thorough exercise of the hardware and software; ■ Testing of the voice communications features; ■ Verification of device and system recovery from failures 	Motorola	Functional Performance Tests

Completion Criteria

This task is considered complete when the subsystems pass the Functional Performance Tests.

Site Preparation

Motorola will begin work at a site only after mutual agreement by the County and Motorola that the site is deemed ready. At a minimum, Site Ready requires a site to have adequate room in an existing building or shelter to accommodate the equipment to be installed, and electrical service and internal distribution in place. In addition, network testing must have been satisfactorily completed.

Sites are required to meet or exceed the requirements as defined in the Motorola document "Fixed Network Equipment Installations" ("R56 Standard"). Detailed Site Ready audits will be performed by Motorola after contract execution. Motorola will provide a detailed site

report identifying any site deficiencies. All site upgrades not identified in this document specifically as a Motorola deliverable are the responsibility of the County.

The County may elect to contract with Motorola to perform necessary site upgrades, perform the upgrades itself, or utilize the services of a third party subcontractor. Site requirements must be met before Motorola will begin installation of system equipment.

Installation of Fixed Network Equipment (FNE)

Description

Installation of the Fixed Network Equipment (FNE) consists of the radio communications infrastructure and computer equipment at the dispatch and control centers.

Responsibility Matrix

Task	Responsibility	Deliverable
Site Ready: <ul style="list-style-type: none"> ■ The County will prepare the site for equipment installations, resolving any site deficiencies identified in the Site Audit Reports. Sites will be ready according to the project schedule for equipment installation. 	County	Sites Meeting Site Preparation Requirements for Installation
General Installation Responsibilities <ul style="list-style-type: none"> ■ Motorola will install the new system equipment that is provided in the equipment list. ■ Motorola will ground and bond the site equipment to the ground system, in accordance with the R56 site installation standards. ■ Motorola will remove and dispose of any debris that is a result of the project activities from the site. ■ Motorola will create "As Built" documentation of the prime site installation for inclusion in the final project documentation 	Motorola	New Equipment Installations per Motorola's Site Quality Standards
Motorola will install the RF equipment as described in the System Description.	Motorola	Radio System Installation Audit

Task	Responsibility	Deliverable
Site Links: <ul style="list-style-type: none"> ■ The County supply T1 connectivity as defined by Motorola to support the system. 	County	County digital microwave in place or leased T-1s
The County will sign installation acceptance certificates after inspection and check out of FNE on a site-by-site, system-by-system basis.	County	Signed Installation Acceptance Documents
The County will sign installation acceptance certificates after inspection and check out of FNE on a site-by-site, system-by-system basis.	County	Signed Installation Acceptance Documents

Completion Criteria

This task is considered complete when the County reviews FNE installations with Motorola and approves by signing the installation check sheets. The installation of each FNE subsystem must be completed for this phase of the project to be considered complete.

Systems Integration and Optimization

Description

During this phase of the project, Motorola will configure, optimize, and program all system equipment. Motorola will integrate all of the Motorola provided subsystems, as well as integrate the County provided subsystems into the communications system. Motorola technologist(s) will be onsite for this phase and will prepare the system for acceptance testing.

The Motorola Technologist will maintain a punch list of items that need resolution. The County will be responsible for directing the activities of other vendors directly contracting with the County and supporting agencies. The County is also responsible to coordinate all on-site integration activities including assistance to Motorola for system testing requiring participation from vendors directly contracting with the County.

Motorola and the County will each ensure that any of their subcontractors perform in accordance with the implementation schedule.

Responsibility Matrix

Task	Responsibility	Deliverable
Provide and install all communication lines and equipment that are not Motorola provided deliverables. Provide all required liaison support with the agencies and vendors required to support the solution Ensure that the necessary technical support is made available for installation and testing with third party vendors and interfaces	County	County Provided Equipment and Interfaces Required for Integration
Install, integrate and test the hardware, software and interfaces as specified in the contract.	Motorola	Installation and Integration of Equipment
Maintain a punch list of items that need resolution Manage the resolution of punch list items.	Motorola	Punch list Resolution

Completion Criteria

This task is considered complete when the system is ready for acceptance testing.

Acceptance Testing

Description

Motorola proposes a multi-level acceptance testing procedure. This process provides multiple checkpoints for the County to oversee the overall progress that is being made as the communications system implementation progresses. This testing is composed of Equipment Installation Acceptance, Functional Acceptance Tests, and Coverage Acceptance Testing. The coverage of the West Contra Costa cell is incorporated into this scope because the implementation of Nichol Knob completes that simulcast cell.

Functional Tests

Description

The Functional Acceptance Test Procedure (ATP) will be executed in accordance with the mutually agreed upon Functional ATPs within the existing Alameda County contract.

If deficiencies are found during the testing, both the deficiencies and resolutions to the deficiencies shall be documented and agreed upon. If the documented deficiencies do not prevent productive operational use of the system, as determined by the County then the test will be deemed complete. Motorola will, however, remain responsible for the resolution of the documented deficiencies using a punch list as a controlling document for resolution planning.

Responsibility Matrix

Task	Responsibility	Deliverable
Motorola will perform functional ATPs for the communications system. During each test, test results will be recorded for review and approval of the test.	Motorola	Execution of Functional Acceptance Testing
Upon successful completion of each Acceptance test on a site-by-site and system-by-system level, the County and Motorola will sign acceptance certificates documenting acceptance.	County	Written Approval of Successful Functional Acceptance Testing

Completion Criteria

Upon completion of the acceptance testing, the County will acknowledge system acceptance by signing the System Acceptance document per the terms of the contract.

Coverage Acceptance Tests

Description

Coverage Acceptance Tests will be performed when the RF site and control equipment installations and optimization are complete. The Coverage Acceptance Tests verify the coverage performance of the system, as agreed upon in the Design Review. A detailed Coverage Acceptance Test Plan (CATP) is included in the East Bay RCS two county design document and defines the scope of the CATP.

Responsibility Matrix

Task	Responsibility	Deliverable
Motorola will perform Coverage ATPs for the Contra Costa West Cell, once all four sites are installed and optimized and for Project 25 operation. During the test, test results will be recorded for review and approval of the test.	Motorola	Execution of Coverage Acceptance Tests
Upon successful completion of each coverage acceptance test, the County and Motorola will sign acceptance certificates documenting acceptance.	County	Written Approval of Successful Coverage Acceptance Testing

Completion Criteria

This task is considered complete upon the County approval and sign-off of the Equipment Installation Acceptance, Functional Test and Coverage Acceptance Test.

The successful completion of the acceptance tests constitutes acceptance of the software and hardware provided by Motorola. Upon completion of this Acceptance Test Plan, the County representatives participating in and observing the tests will sign off on the ATP, signifying acceptance of the system. If no punch list items are identified during the acceptance testing process, and Motorola has completed all other project deliverables, the County authorized signature will represent Final System Acceptance. If a punch list of unresolved issues is created as a result of the acceptance testing, Final System Acceptance will occur upon resolution of all items on the punch list.

Training

No additional training is included under this expansion to the CC West.

Subscriber Services

Description

No subscriber equipment or services are included under this expansion to the CC West .

Cutover to New System Operations

Description

The new equipment will only be placed into service under a change order when the frequencies become available to make the equipment operational.

System Documentation

Motorola will provide a consistent level of system documentation for this expansion to the CC West as provided by the current contract with Alameda County.

Project Finalization

Description

The finalization phase of the project consists of ensuring that all criteria for Final Project Completion have been met.

Responsibility Matrix

Task	Responsibility	Deliverable
Motorola will resolve punch list items documented at System Acceptance	Motorola	Approved Punch list Resolution
Motorola will ensure that the criteria defined to transition the project to the Motorola Service Organization have been completed, including the development of a Customer Support Plan with the County.	Motorola	Service Transition Certificate and Customer Support Plan

Task	Responsibility	Deliverable
All documents listed in System Manual – “As Built” Documentation Section will be submitted, as they become ready.	Motorola	System Manual – “As Built” Documents
Final approvals of all System Manual – “As Built” Documents	County	Written Approval Statement(s)
The County will acknowledge Final Project Completion upon completion of the criteria for Final Project Completion for the communications system.	County	Signed Final Acceptance Documents

Completion Criteria

This task is considered complete when the County and Motorola have signed the Final Project Completion certificate, representing the completion of the system and acknowledgement of system acceptance as described in the Acceptance Test Plan.

Warranty Period

Description

The services provided through the system warranty are delivered in this phase of the project.

Responsibility Matrix

Task	Responsibility	Deliverable
Warranty Transition Certificate	Motorola & the County	Agreed Warranty Start Date
Documented Customer Support Plan	Motorola & the County	Agreed upon service procedures and expectations document

Completion Criteria

This task is considered complete when the warranty period expires.

A. ACCEPTANCE TEST PROCEDURES

C-4

A.1 INTRODUCTION

This document details the Acceptance Test Procedures (ATPs) that will be used by Motorola and Contra Costa County (County) to confirm that the ASTRO 25 SmartZone System is complete and operational. The combination of the tests allows for a detailed and documented procedure to examine the network and overall system performance. There are four levels of system testing consisting of:

- ◆ Staging
- ◆ Site Testing
- ◆ System Functional Tests
- ◆ Coverage

Upon completion of each acceptance test a County representative will be asked to sign a statement of acceptance that the test passed successfully.

The acceptance tests will be performed by Motorola and witnessed by County representative during the installation and testing phases. Each test will be performed independently using detailed procedures provided in this document. If a deficiency is found during a test, the deficiency, the appropriate resolution and party responsible for resolution shall be identified and documented in a "punch list". In cases such that the defined deficiencies do not prevent productive operational use of the system, the County representative will grant conditional acceptance to Motorola, and the test will be accepted as successfully completed. Conditional acceptance shall also be granted if County derives beneficial use of the system. Conditional acceptance will not relieve County or Motorola from resolving the identified deficiencies as agreed to prior to conditional acceptance.

A signature on a Test Verification Acceptance Form shall indicate that a test has been successfully completed. Signatures on all of the tests, and resolution of the deficiencies punch list, constitutes unconditional acceptance of the system.

A.2 STAGING ACCEPTANCE TEST PLAN

Motorola utilizes the detailed implementation procedure described in the Statement of Work to implement our radio systems. Staging is an integral part of this implementation procedure. During the staging process, the entire system will be installed and cabled according to the rack and floor plan diagrams provided in

the Design Review Document as developed by Motorola and approved by the County. Additionally, the equipment will be configured to operate as specified in the Design Review Document. The overall system and each subsystem will be functionally tested, including failure modes of the system using the functional test scripts provided in the System Functional Test section of the Design Review Document. The functional tests that Motorola will perform at staging are:

Wide Area SmartZone Trunking Features

- TALKGROUP CALL
- PRIVATE CALL
- CALL ALERT
- RECENT USER PRIORITY
- EMERGENCY ALARM AND CALL WITH RUTHLESS PREEMPTION

Site Trunking Features

- SITE TRUNKING TALKGROUP CALL
- SITE TRUNKING CALL ALERT
- SITE TRUNKING BUSY QUEUING AND CALLBACK
- SITE TRUNKING EMERGENCY CALL AND ALARM
- SITE TRUNKING ROAMING TO WIDE AREA SITES

MCC 7500 Features

- TALKGROUP SELECTION AND CALL
- MULTIGROUP CALL
- TALKGROUP PATCH
- MULTI-SELECT/APB
- CONSOLE INITIATED PRIVATE CALL
- RADIO TRANSMISSION ON IP-BASED ANALOG CONVENTIONAL VOICE CHANNEL - COR
- TRANSMISSION ON IP-BASED ANALOG CONVENTIONAL VOICE CHANNEL - RELAY KEYING
- EMERGENCY ALARM (ACK'D BY MCC 7500 CONSOLE) AND CALL DISPLAY DESCRIPTION
- PTT UNIT ID / ALIAS DISPLAY FOR MCC 7500
- LINK FAILURE BETWEEN MCC 7500 SITE AND ZONE CONTROLLER
- LOGGING TRUNKING TALKGROUP CALL
- LOGGING ANALOG CONVENTIONAL CALL

System Management Tests

- FULL VISION FAULT MANAGEMENT/SITE PATH FAILURE
- FULL VISION FAULT MANAGEMENT/AMBASSADOR LINK FAILURE
- FULL VISION FAULT MANAGEMENT/STATION POWER AMP FAILURE
- FULL VISION FAULT MANAGEMENT/CORE ROUTER FAILURE
- CURRENT STATUS AND DIAGNOSTICS FOR AN RF SITE
- CURRENT STATUS AND DIAGNOSTICS FOR MCC 7500 CONSOLE
- ZONEWATCH
- CONFIGURATION MANAGEMENT - SUBSCRIBER CAPABILITIES
- CONFIGURATION MANAGEMENT - CONSOLE USER (MCC 7500 SYSTEMS ONLY)
- AFFILIATION DISPLAY

- Radio Control Manager (RCM) Features
 - EMERGENCY ALARM DISPLAY
 - RADIO CHECK
 - RADIO STATUS
- Report Generation Tests
 - HISTORICAL REPORTS
 - ZONE CONFIGURATION MANAGER REPORTS: INFRASTRUCTURE
 - USER CONFIGURATION SUBSYSTEM (UCM) REPORTS
- System Reliability Features
 - SIMULCAST ESSENTIAL SUBSITE OPERATION
 - MULTIPLE CONTROL CHANNELS
 - SITE FAILSOFT
 - BASE STATION IDENTIFICATION
 - REDUNDANT ZONE CONTROLLER SWITCHING/AUTOMATIC SWITCHOVER
 - REDUNDANT SITE LINK FAILURE
 - WAN SWITCH CPU CARD FAILURE
 - RECEIVER INTERFERENCE SHUTDOWN
 - TRANSMITTER POWER FAILURE SHUTDOWN
 - STATION FAILURE
 - REDUNDANT SITE CONTROLLER SWITCHING/USER INITIATED SWITCHOVER
- Network Security Tests
 - VIRUS DETECTION
- MOSCAD Fault Management System
 - SCREEN NAVIGATION
 - FULLVISION MOSCAD MAP POPULATION
 - INTOUCH ALARM PROCESSING - ACKNOWLEDGED ALARM
 - INTOUCH ALARM PROCESSING - UNACKNOWLEDGED ALARM
 - PHYSICAL INPUTS/OUTPUTS - DIGITAL INPUTS
 - PHYSICAL INPUTS/OUTPUTS - ANALOG INPUTS
 - TRAK GPS - GPS FAULT
 - TRAK GPS - COMMUNICATION STATUS FAULT
 - TRAK GPS - POWER SUPPLY FAULT
 - TENSR CHANNEL BANK - T1 NO SIGNAL (NOS)
 - TENSR CHANNEL BANK - USER CARD ALARM (OOS)
 - TENSR CHANNEL BANK - POWER SUPPLY FAIL
 - TENSR CHANNEL BANK - CONFIGURATION
 - ASTRO-TAC COMPARATOR - WIRE LINE FAIL

A.3 SITE TESTING

This test plan is intended to test installed equipment at the final installation sites. Site construction and installation techniques are also observed for contract completion. This phase is performance oriented, not oriented toward features. It verifies that all equipment is performing as designed and specified to insure a usable system.

- A. R56 Audits: Motorola will perform Fixed Network Equipment (FNE) quality audits on all sites, utilizing Motorola's stringent R56 standards. A copy of the audit will be provided to County along with any recommendations for County to improve items under their direct control.
- B. Equipment specifications: Motorola will test and provide documentation that the installed equipment meets or exceeds the equipment specifications. The equipment tested and the results of the test are identified in Site Data Logs. This test is not a test that is scheduled to be formally witnessed by County. The tests are completed as equipment is installed. County is encouraged to participate in the testing and re-check any measurements they deem appropriate.

This information will also be included in the as-built documentation. If a failure is encountered during the test, Motorola will take corrective action. Failure or deficiencies requiring corrective action which are not resolved during the testing process will be tracked on a punch list. Motorola will coordinate the punch list resolution with County.

A.4 SYSTEM FUNCTIONAL TEST

Once the system has been implemented in the field and each site has been tested using the Site Testing procedure provided above, Motorola will perform a functional test to verify that the system operates as required by County. This test will test the overall functionality of the system, including various failure modes such as site trunking and failsoft. The functional test scripts will be provided during the design review phase of this project. The functional tests are the same as the tests performed during staging with the addition of testing equipment/features that were not available during staging such as tests involving the Ambassador Electronics Bank or the CentraCom Gold Elite consoles. The functional tests are:

Wide Area SmartZone Trunking Features

- TALKGROUP CALL
- PRIVATE CALL
- CALL ALERT
- RECENT USER PRIORITY
- EMERGENCY ALARM AND CALL WITH RUTHLESS PREEMPTION

Site Trunking Features

- SITE TRUNKING TALKGROUP CALL
- SITE TRUNKING CALL ALERT
- SITE TRUNKING BUSY QUEUING AND CALLBACK
- SITE TRUNKING EMERGENCY CALL AND ALARM
- SITE TRUNKING ROAMING TO WIDE AREA SITES

MCC 7500 Features

- TALKGROUP SELECTION AND CALL
- MULTIGROUP CALL

TALKGROUP PATCH
MULTI-SELECT/APB
CONSOLE INITIATED PRIVATE CALL
RADIO TRANSMISSION ON IP-BASED ANALOG CONVENTIONAL VOICE
CHANNEL - COR
TRANSMISSION ON IP-BASED ANALOG CONVENTIONAL VOICE CHANNEL -
RELAY KEYING
EMERGENCY ALARM (ACK'D BY MCC 7500 CONSOLE) AND CALL DISPLAY
DESCRIPTION
PTT UNIT ID / ALIAS DISPLAY FOR MCC 7500
LINK FAILURE BETWEEN MCC 7500 SITE AND ZONE CONTROLLER
LOGGING TRUNKING TALKGROUP CALL
LOGGING ANALOG CONVENTIONAL CALL

Elite Console features

TALKGROUP SELECTION AND CALL
MULTIGROUP CALL
TALKGROUP PATCH
MULTI-SELECT/APB
CONSOLE INITIATED PRIVATE CALL
EMERGENCY ALARM AND CALL DISPLAY
PTT UNIT ID/ALIAS DISPLAY
ALERT TONES
CONVENTIONAL RADIO RESOURCE (BIM ONLY)

System Management Tests

FULL VISION FAULT MANAGEMENT/SITE PATH FAILURE
FULL VISION FAULT MANAGEMENT/AMBASSADOR LINK FAILURE
FULL VISION FAULT MANAGEMENT/STATION POWER AMP FAILURE
FULL VISION FAULT MANAGEMENT/CORE ROUTER FAILURE
CURRENT STATUS AND DIAGNOSTICS FOR AN RF SITE
CURRENT STATUS AND DIAGNOSTICS FOR MCC 7500 CONSOLE
ZONEWATCH
CONFIGURATION MANAGEMENT - SUBSCRIBER CAPABILITIES
CONFIGURATION MANAGEMENT - CONSOLE USER (MCC 7500 SYSTEMS
ONLY)
AFFILIATION DISPLAY

Radio Control Manager (RCM) Features

EMERGENCY ALARM DISPLAY
RADIO CHECK
RADIO STATUS

Report Generation Tests

HISTORICAL REPORTS
ZONE CONFIGURATION MANAGER REPORTS: INFRASTRUCTURE
USER CONFIGURATION SUBSYSTEM (UCM) REPORTS

System Reliability Features

AEB TO CEB REDUNDANT LINK FAILURE (CENTRACOM GOLD ELITE ONLY)

AEB TO ZONE CONTROLLER REDUNDANT LINK FAILURE (CENTRACOM GOLD ELITE ONLY)SIMULCAST ESSENTIAL SUBSITE OPERATION
 MULTIPLE CONTROL CHANNELS
 SITE FAILSOFT
 BASE STATION IDENTIFICATION
 REDUNDANT ZONE CONTROLLER SWITCHING/AUTOMATIC SWITCHOVER
 REDUNDANT SITE LINK FAILURE
 WAN SWITCH CPU CARD FAILURE
 Redundant MGEG* (CENTRACOM Gold Elite only)
 RECEIVER INTERFERENCE SHUTDOWN
 TRANSMITTER POWER FAILURE SHUTDOWN
 STATION FAILURE
 REDUNDANT SITE CONTROLLER SWITCHING/USER INITIATED SWITCHOVER
 Network Security Tests
 VIRUS DETECTION
 MOSCAD Fault Management System
 SCREEN NAVIGATION
 FULLVISION MOSCAD MAP POPULATION
 INTOUCH ALARM PROCESSING - ACKNOWLEDGED ALARM
 INTOUCH ALARM PROCESSING - UNACKNOWLEDGED ALARM
 PHYSICAL INPUTS/OUTPUTS - DIGITAL INPUTS
 PHYSICAL INPUTS/OUTPUTS - ANALOG INPUTS
 TRAK GPS - GPS FAULT
 TRAK GPS - COMMUNICATION STATUS FAULT
 TRAK GPS - POWER SUPPLY FAULT
 TENSr CHANNEL BANK - T1 NO SIGNAL (NOS)
 TENSr CHANNEL BANK - USER CARD ALARM (OOS)
 TENSr CHANNEL BANK - POWER SUPPLY FAIL
 TENSr CHANNEL BANK - CONFIGURATION
 ASTRO-TAC COMPARATOR - WIRE LINE FAIL

A.5 COVERAGE ACCEPTANCE TESTING

A.5.1 GENERAL

A Coverage Acceptance Test Plan (CATP) is needed to verify that a radio system implemented by Motorola meets or exceeds the required coverage reliability within the covered area indicated on Motorola's coverage maps attached (Titled as COCO West on Street on Hip, 95% Portable Talk In), or within the Customer's service area. The CATP defines the coverage testing method and procedure, the coverage acceptance criteria, the test documentation, and the responsibilities of both Motorola and the Customer.

A.5.2 Coverage acceptance test plan

A.5.2.1 Overview

This Coverage Acceptance Test Plan (CATP) is designed to verify that the voice radio system implemented by Motorola meets or exceeds the required coverage reliability within the Contra Costa County West Simulcast System (CC West) service area as indicated on Motorola's coverage maps. The CATP defines the coverage testing method and procedure, the coverage acceptance criterion, the test documentation, and the responsibilities of both Motorola and County.

Coverage Acceptance Testing is based upon a coverage prediction that accurately represents the implemented infrastructure and parameters that are consistent with the contract agreements. If the implemented system varies from the design parameters, then a revised coverage map will be prepared. New test maps will reflect the measured losses and gains associated with the implemented infrastructure and subscribers. These will be used to define the test configuration and potential areas from which test locations may be included in the evaluation process.

To verify that the radio coverage reliability is met, the indicated coverage area within the CC West operating area will be divided into a number of equally sized test tiles that will be agreed to by both Motorola and County.

A.5.2.2 CATP Definitions

Several definitions are needed to accurately describe the coverage test method. Where cited, these terms or methods are defined in TSB-88A-1¹.

Coverage Area:

The coverage area is the geographical region in which communications will be provided that meets or exceeds the specified Channel Performance Criterion at the specified reliability for the specified equipment configuration(s). Radio systems are typically designed to maximize the coverage area within the customer's service area (users' operational area, jurisdictional boundaries, etc.) {TSB-88A, clause 4.1} The predicted coverage area for this system is indicated on Motorola's coverage map(s) supplied with this proposal.

Channel Performance Criterion (CPC):

The CPC is the specified minimum design performance level in a faded channel. {TSB-88A, clause 4.2} For this system, the CPC is a Delivered

¹ *Wireless Communications Systems --- Performance in Noise- and Interference-Limited Situations --- Recommended Methods for Technology-Independent Modeling, Simulation, and Verification*, Technical Service Bulletin TSB-88A-1, Telecommunications Industry Association (TIA), Arlington VA, 1999 & 2002.

Audio Quality of DAQ-3. The DAQ definitions are provided in Table 1. {TSB-88A, §4.5.1, Table 1}. Given the static reference sensitivity of a receiver, the faded performance threshold for the specified CPC is determined by using the projected CPC requirements for different DAQs listed in TSB-88A, Annex A, Table A-1. For digital voice systems, the faded performance threshold is for a Bit Error Rate (BER) that provides the specified CPC. The CATP pass / fail criterion for each test location is the faded performance threshold, plus any adjustments for antenna performance and in-building or in-vehicle losses. {TSB-88A, sub clause 4.5.1, Figure 2}

Table 1 – Delivered Audio Quality Definitions

DAQ	Delivered Audio Quality	Subjective Performance Description
	1	Unusable, speech present but unreadable.
	2	Understandable with considerable effort. Frequent repetition due to noise / distortion.
	3	Speech understandable with slight effort. Occasional repetition required due to noise / distortion.
	3.4	Speech understandable with repetition only rarely required. Some noise / distortion.
	4	Speech easily understood. Occasional noise / distortion.
	4.5	Speech easily understood. Infrequent noise / distortion.
	5	Speech easily understood.

Reliability:

The reliability is the percentage of locations within the coverage area that meet or exceed the specified CPC. Motorola’s coverage map(s) indicate the area within which this system is predicted to provide at least 95% reliability to a portable on the hip of meeting or exceeding the CPC of DAQ-3. {TSB-88A, sub clause 4.4.2; **not** regulatory contour reliability}

Equipment Configurations:

Motorola’s coverage maps represent the 95% reliability for system wide coverage from a portable on the street on the hip. Motorola will test the composite talk out portable on hip, on street coverage for the East Bay Regional Communications System (EBRCS) project. The subsystems and sites included in the composite test include:

- ALCO West Simulcast System
- ALCO East Simulcast System
- Crane Ridge ASTRO 25 Repeater Site

- CCC West Simulcast System
- CCC Central Simulcast System
- CCC East Simulcast System

The coverage maps represent the Simulcast system and ASTRO 25 Repeater Site coverage to ASTRO narrow pulse portables using P25 modulation vocoder. The portable with its Heliflex antenna is located at the user's hip level for transmit and receive.

A.5.2.3 CATP Method

The method used to test coverage is statistical sampling of the predicted coverage area to verify that the CPC is met or exceeded at the required 95% area reliability for a portable on the street on the hip test. It is impossible to verify every point within a coverage area, because there are infinite points; therefore, coverage reliability will be verified by sampling a statistically significant number of randomly selected locations, quasi-uniformly distributed throughout the predicted coverage area.

This CATP provides an objective, quantitative method of measurement using Motorola's VoyagerSM hardware and software. The method follows TIA TSB-88A section 7.0, "Performance Confirmation", and has direct correlation with Motorola's coverage prediction methodology.

Determine the required number of test tiles in the coverage area:

The predicted coverage area shown on Motorola's coverage map will be divided into a tile pattern to produce at least the number of uniformly sized test locations (or tiles) required by the Estimate of Proportions formula. {TSB-88A, sub clause 7.2.1, equation 52} The minimum number of test tiles required varies for different systems, from a hundred to many thousands, depending on the size of the coverage area, desired confidence in results, type of coverage test, and the predicted versus required reliability

Constraints on test tile sizes

The minimum tile size is 100 by 100 wavelengths; however, the minimum practical test tile size is typically about 400 by 400 meters (about 0.25 by 0.25 miles). The minimum practical tile size for any system is determined by the distance traveled at the speed of the test vehicle while sampling, GPS error margin, and availability of road access within very small test tiles. A related consideration is the time, resources, and cost involved in testing very large numbers of very small tiles. The maximum test tile size is 2 by 2 km (1.25 by 1.25 miles). {TSB-88A, sub clause 7.4.3}. In some wide-area systems, this constraint on maximum tile size may dictate a greater number of test tiles than the minimum number required by the Estimate of Proportions formula.

Accessibility to test tiles

Prior to testing (if possible) or during the test, Motorola and County will determine whether any test tiles are inaccessible for the coverage test (due to lack of roads, restricted land, etc.) Inaccessible tiles will be eliminated from the acceptance test calculation. {TSB-88A, sub clause 7.4.4}

Randomly Select A Test Location Within Each Tile:

Using VoyagerSM, the actual test location within each test tile will be randomly selected by the test vehicle crossing into the tile at an arbitrary point, with an arbitrary speed and direction.

Perform Measurements In Each Tile:

In each test tile, a series of sequential measurements (subsamples) will be made. This test location measurement, containing a number of subsamples, constitutes the test sample for this location. The test sample will establish the local mean BER within the test tile. The distance over which the subsamples are measured will be 40 wavelengths. A mean of multiple BER subsamples is used rather than a single measurement to ensure that the measurement is not biased by taking a single sample that might be at a peak or null point on the radio wave.

Determine If Each Test Tile Passes Or Fails The CPC Requirement:

For each test tile, the pass / fail criterion is the Bit Error Rate (BER) that provides the specified CPC. To measure BER, the coverage test will be performed with the appropriate attenuator value installed in the test receiver's antenna line, to establish an equivalent signal level performance.

Coverage for the portable equipment configuration will be verified for acceptance by attenuation of the test receiver for BER tests. The attenuation will be the difference between the test receiver's antenna system and the additional loss used in Motorola's coverage prediction to account for portable antenna performance. The attenuator value is 10.9dB for the configuration that the users will be using the system (1/2 Flex whip antenna on the hip in a swivel case).

This provides an objective method of verifying that the radio system provides the faded performance threshold (BER) for the specified CPC for each of the defined equipment configurations.

Determine The Coverage Area Reliability For Acceptance:

After all accessible tiles in the coverage area have been tested; the coverage area reliability (%) will be determined by dividing the number of tiles that pass by the total number of tiles tested. {TSB-88A, clause 7.1, equation 51} The coverage test acceptance criterion is: the tested coverage area reliability must be equal to or greater than the required reliability (95% area reliability).

A.5.2.4 Responsibilities and Preparation

This information will help set the expectations of County and Motorola regarding requirements for equipment, personnel, and time during the coverage test.

County will provide the following for the duration of the coverage test:

- ◆ At least one test vehicle that is representative of the vehicles to be installed with mobile radios, including antenna location
- ◆ At least one County representative, to drive each test vehicle and/or to be the customer representative(s) for the test team(s)

Motorola will provide the following for the duration of the coverage test:

- ◆ At least two Motorola representatives, to navigate and to operate VoyagerSM
- ◆ At least one calibrated Motorola VoyagerSM coverage testing package
- ◆ At least one laptop computer equipped with VoyagerSM software

Coverage acceptance testing will be performed in the area predicted by Motorola to provide the required 95% area reliability indicated on the coverage map. Motorola will determine the minimum number of test tiles required, as described in the Method section of this CATP. Motorola and County will plan the route for the test vehicle(s) through the coverage test area, to ensure that at least the minimum required number of tiles are tested. If possible, any tiles not accessible to the test vehicle(s) will be identified while planning the route.

No acceptance testing will be performed in locations on Motorola's coverage map(s) predicted to be below the required reliability. Motorola and County may agree to perform "information only" tests in such locations; however, these "information only" test results will not be used for coverage acceptance. Any "information only" test locations must be defined before starting the test. If the added locations require significant additional time and resources to test, a change order will be required and Motorola may charge County on a time-and-materials basis.

Motorola will calibrate the test receiver(s) used with the VoyagerSM coverage testing package. Depending on the system, the test receiver(s) may be provided by either Motorola or County.

Motorola will provide the attenuators required to evaluate each equipment configuration from the outbound BER measurements.

Motorola will conduct this test only once. If any portion of the test is determined to be unreliable because of proven equipment malfunctions or failures, Motorola will repeat the portion of the test affected by the equipment malfunction or failure. County will have the option to accept the coverage at any time prior to completion of the coverage test.

Before starting the test, County and Motorola will agree upon the time frame for Motorola's submission of a report containing the coverage test results.

A.5.2.5 CATP Procedures

A quantitative coverage acceptance test will be performed using Motorola's VoyagerSM package, to provide objective verification that the system provides the faded performance threshold for the specified CPC.

VoyagerSM consists of the following:

- ◆ A calibrated digital voice test receiver, connected to an antenna installed in a representative location on the test vehicle. The test receiver will monitor transmissions from the fixed network radio site(s).
- ◆ A Global Positioning System (GPS) receiver, which will provide the computer with the location and speed of the test vehicle.
- ◆ A laptop computer with VoyagerSM software and a mapping database, which includes highways and local streets [political boundaries, rivers, and railroads.

The procedure for the objective BER coverage test will be as follows:

- ◆ The VoyagerSM package will be installed in a test vehicle. County personnel will drive the test vehicle over a route planned to cover the accessible tiles within the coverage test area. Motorola personnel will operate the VoyagerSM package.
- ◆ During the coverage test, the laptop computer will display the vehicle's location on a map of the coverage test area overlaid with the test grid. VoyagerSM will automatically initiate signal level and BER measurements when the GPS receiver indicates that a test tile has been entered. The computer will provide a visual indication that a measurement has been completed in a tile. VoyagerSM will manage the coverage test data collection, and will store for later analysis the mobile outbound reference signal level measured in each tested tile.
- ◆ Attenuation of the test receiver will be used to evaluate whether each tile passes or fails the required BER for each equipment configuration. The tile pass / fail evaluations will be used to determine the coverage area reliability.
- ◆ Coverage acceptance will be based on demonstrating that at least 95% of the tiles in the coverage test area are measured to provide a mean level of 2.62% BER or better at the test receiver input. The system coverage acceptance criterion will be the successful passing of each of the equipment configurations.
- ◆ Any tile that fails the objective VoyagerSM BER test described above will be re-tested using a subjective Delivered Audio Quality (DAQ) test. Any

tile that fails the objective test, but passes the subjective re-test will be declared passed.

- ◆ Motorola reserves the right to review any test tiles that fail both the objective BER and subjective DAQ tests, versus the signal strength samples taken for the same test tiles.
- ◆ If a coverage test, or a portion thereof, is suspected by Motorola to have failed due to external interference, those tiles suspected of being affected by an interferer may be re-tested. If the test tiles re-tested are confirmed to have failed due to interference, those test tiles will be excluded from all acceptance calculations and Motorola will work with County to identify potential solutions to the interference issues.

A.5.2.6 CATP Documentation and Coverage Acceptance

During the coverage acceptance test, VoyagerSM generates computer files that include the Reference Tile Levels for each test tile. A copy of this raw data will be provided to County at the conclusion of the coverage test. Motorola will process this data to determine whether the coverage test was passed for each equipment configuration, and to produce a map detailing the coverage test results.

Motorola will submit to County a report detailing the coverage test results. This report will include a document, which is to be signed by both County and Motorola, indicating the test was performed in accordance with this CATP and the results of the test indicate the acceptance or non-acceptance of the coverage portion of the system. County will have the option to accept the coverage at any time prior to completion of the coverage test or documentation process.

A.5.3 Frequently Asked Questions about CATPs

Q: Why is the coverage test performed with the test receiver moving? What if some / most of the customer's radios are used when stationary? (For example, a portable user standing still, or a stopped vehicle) Shouldn't the test be performed while the test receiver is stationary?

A: The CATP target is the faded performance threshold, adjusted for any portable antenna performance, body loss, or in-building loss. {TSB-88A, sub clause 4.5.1, Figure 2} Motorola's coverage maps indicate the probability of meeting or exceeding the faded performance threshold (i.e. the reliability); therefore, the pass/fail criterion of the CATP is to measure a signal at or above the faded performance threshold for the specified equipment configuration.

A stationary CATP does not measure the local mean power in the test tile, as recommended in TIA TSB-88A, sub clause 7.5.2. Also, in a stationary CATP there is the possibility of inappropriately failing test tiles due to being stationary in a Rayleigh fading null or inappropriately passing test tiles due to being

stationary in an area of constructive interference. A moving vehicle test allows measurement of local mean power over the appropriate number of wavelengths.

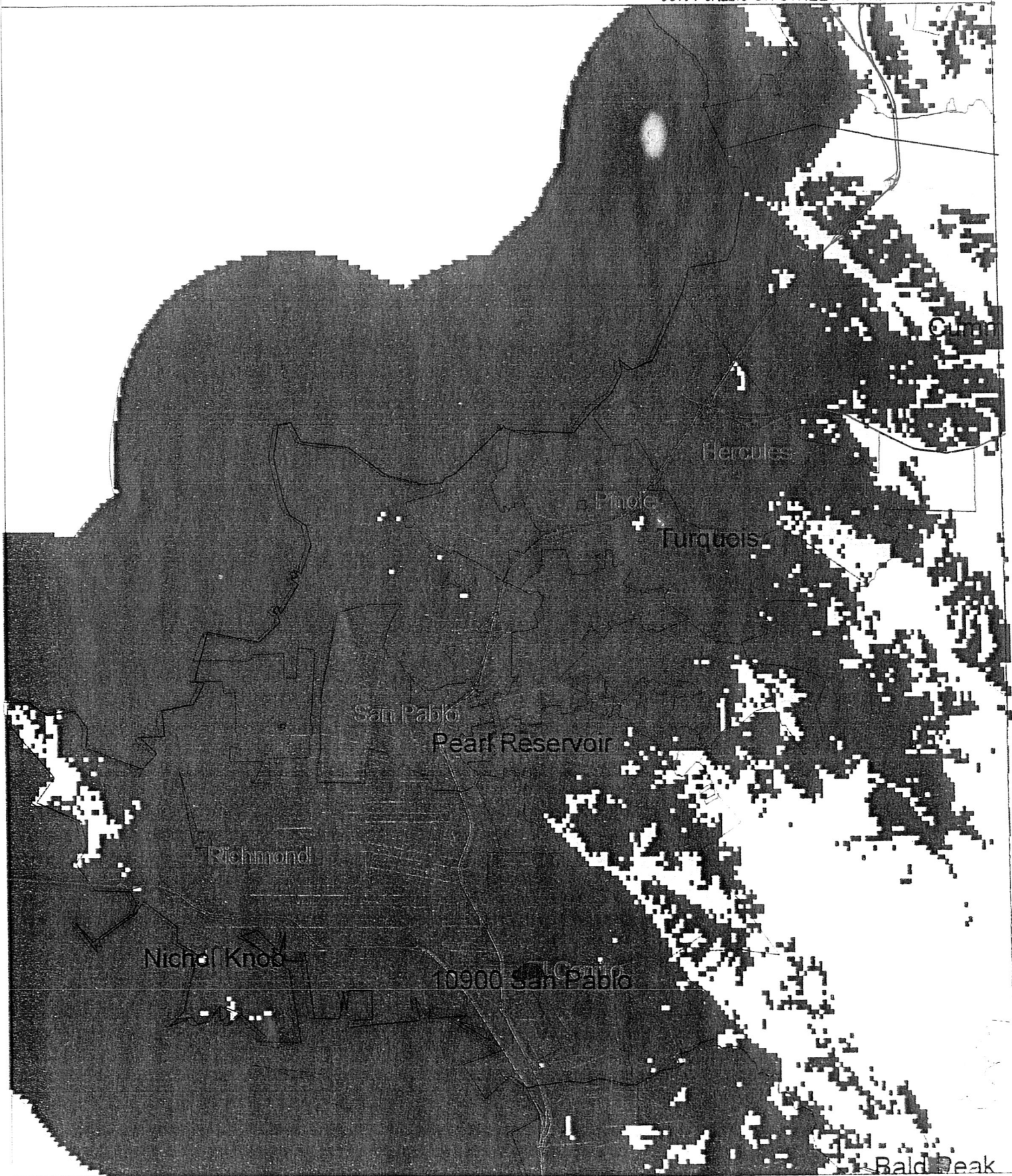
If proposed, a stationary CATP must allow for at least one re-test in each tile if the initial test fails; the re-test(s) must use a distance of a few to several feet away (frequency dependent) from the initial test, to account for the possibility of the initial test being in a Rayleigh fading null.

Q: Can a CATP commit to a statement such as "No adjacent test tiles will fail" ?

A: No. Attempts to eliminate adjacent tile failures can result in costly system over-design. In CATPs, smaller tile sizes result in higher correlation between measurements in adjacent tiles, and thus a higher probability of adjacent tile failures. Even in the case of moderately large tile sizes, however, adjacent tile signal strengths tend to be correlated because of similar path characteristics. HydraSM does not model the probability of failure of adjacent tiles, nor is Motorola aware of other coverage prediction software that does.

Q: For digital voice systems, should the mean or median BER be used for the coverage acceptance criterion?

A: The mean measured BER is used as the coverage acceptance criterion for digital voice. This matches the coverage prediction, which is based on the mean BER that provides the desired DAQ



0 1.45 2.90 mi
1 inch = 1.45 miles @ 1:92000

C-5 Proposed Schedule

Nichol Knob's schedule will be a 10 to 12 week equipment delivery time and 4-6 week installation time after receipt. In Nichol Knob's case it's a very basic single site equipment and install.

3-3-88