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Exhibit B: Statement of Work and Services for Project

1. PURPOSE OF STATEMENT OF WORK

This Statement of Work and Services (SOW) describes the deliverables for the Citywide 800 MHz Radio System (CERS). The SOW contains information also included in the design review, equipment lists, various drawings, task table, time schedule, installation details, and other information determined relevant to the Project.

This SOW documents how the equipment shall be configured and what equipment and services shall be supplied. The SOW also describes the work involved in installation, installation standards to be followed, and Motorola's responsibilities in the completion of the Project. The use of the word "Motorola" in this document shall mean Motorola, Inc., and any of its Subcontractors. The use of "Performance Specification" in this document shall mean Exhibit A of the Citywide 800 MHz Radio System Project Agreement. All appendices referred to in this document are the appendices of the Performance Specifications. All definitions given in Article 1 of the Master Agreement apply to this SOW.

1.1 SOW AMENDMENT PROCEDURE

Motorola shall maintain the SOW with formal documentation denoting agreed upon changes. Two identical master copies are held: one by the City, the other by Motorola. SOW revisions will result from system changes or documentation updates, which will follow the Change Order process outlined in the Master Agreement Section 6.03.

2. SYSTEM DESCRIPTION

2.1 OVERALL CITYWIDE 800 MHZ RADIO SYSTEM

To meet the Performance Specifications the system shall use eight transmitter/receiver sites each equipped with 23 channels and configured in a simulcast mode. The backbone sites used are: (1) Central Radio Station, 1 Twin Peaks Boulevard, (2) Forest Hill water tank, 100 Mendosa Ave., (3) A T & T facility at Bernal Heights, 99 Moultrie St., (4) Fort Miley/ VA Hospital, Water tower 43rd and Clement, (5) San Francisco State University (Thornton Hall), (6) One Market Plaza, 1 Market St., (7) Building at Clay and Jones, 1250 Clay St. and (8) Reservoir 2b/South Hill water tank at Oakridge and Alta Vista (Daly City).

2.2 TRUNKING RADIO SYSTEM DESCRIPTION

The following describes the Fixed Network Equipment (FNE) portion of the CERS for the City of San Francisco.

2.2.1 Design Criteria:

Motorola's CERS system infrastructure is the product of several design choices selected to satisfy specific City needs and preferences. The fixed network is comprised of a Motorola Release 3.0 ASTRO mixed-mode SmartZone platform to support a single large-cell multi-site simulcast system.

The choices for appropriate redundancy are based upon both Motorola recommendations (the need for a Fault Tolerant SmartZone Controller, the need for Simulcast Prime Site Controller redundancy, the need for redundant TeNSr power supplies) and customer needs for increased Telecommunications Network Server (TeNSr) redundancy. During the detailed design phase of this Project a traffic loading study shall be executed using the detailed anticipated talkgroup structure ("fleetmap") and unit distribution that is developed.

2.2.2 System Description:

The system design for the equipment provided to the City is based on a SmartZone release 3.0 ASTRO mixed-mode infrastructure. The fixed network consists of a single large-cell simulcast subsystem with twenty-three (23) channels at each of the eight (8) sites. Each of the simulcast transceivers communicate to local trunking controllers. Simulcast infrastructure equipment is to be provided. This equipment includes redundant Prime Controllers (and associated redundancy hardware), ASTRO-TAC 3000 comparators, trunking distribution equipment, and special channel bank equipment to interface remote simulcast sites to the prime simulcast site via a digital

microwave subsystem. One of the eight simulcast transceiver remote sites is to be co-located with the simulcast Prime site (currently targeted to be CRS). The repeaters being supplied are the QUANTAR version trunking repeater.

The center of control for the fixed network is a fault tolerant SmartZone controller. Associated with this controller at the prime site is a database server, a CADI server, and remote terminal servers that interface via an ETHERNET LAN to the SmartZone controller. An EMBASSY audio switch connects to the SmartZone controller via redundant RS422 links so that the SmartZone controller can exercise control over the audio routing within the switch to the radio sites and to the console locations.

The simulcast Prime Site is co-located with the SmartZone master site (CRS). A simulcast Prime Site consists of the main control and audio distribution hub for the simulcast subsystem. Main control is served by two 6809 Prime Controllers which operate in a Main / Standby manner. Switching between the controllers is accomplished through a TBAR switch. The Prime Controller supplies control data to the Remote Site Controllers and supplies "low speed data" to the Universal Simulcast Controller Interface (USCI).

Distribution of simulcast audio is accomplished through a distribution hub at the Prime simulcast site. The equipment includes the USCI, the Simulcast Distribution Amplifiers (SDA), and the ASTRO-TAC 3000 comparators. Voice audio sources through the comparators. The comparators connect to the USCI that combines the voice audio with trunking data originating from the Prime Site Controller ("low speed data"). The combination signal is routed through distribution amplifiers (SDA) that sends the common signal for each channel to multiple channel banks for distribution to each remote simulcast site. The USCI's contain a single card for each channel. Loss of a single card results in the loss of a single simulcast channel. The comparators are supplied one per channel. Loss of a complete comparator results in the loss of one simulcast channel. The SDA is supplied one amplifier per channel. Loss of one SDA card results in the loss of one simulcast channel. The TeNSr channel bank equipment includes redundant power supplies, redundant Central Processing Unit (CPU) cards, and 1xN redundant WAN cards.

Simulcast Remote sites consist of simulcast transceivers, a Global Positioning Satellite/Rubidium (GPS/RB) frequency standard, a Remote Site Controller, and TeNSr channel bank equipment. Loss of a remote site controller (or controller connection) would result in loss of the site's ability to process Inbound Signaling Words (ISW's) from subscriber (field) units. Should the microwave links be intact, loss of the remote site controller shall not affect the sites ability to transmit control channel data or voice communications, nor shall it affect the sites ability to serve as a receiver voting site for calls in progress. The frequency standard includes a backup crystal oscillator that serves to provide redundancy should the RB oscillator fail. Either the RB standard or

the crystal oscillator will continue to function when a GPS satellite is not available. The TeNSr channel bank equipment is redundant in a similar manner to the Prime simulcast site (redundant power supplies, redundant CPU cards, and 1xN redundant WAN cards).

The simulcast infrastructure includes five (5) channels of the supplied twenty-three (23) equipped for encrypted ASTRO communications. The encrypted portion of the system includes Defense Encryption Standard - Output Feed Back (DES-OFB) encryption options for five (5) of the twenty-three (23) Digital Interface Units (DIU) located at the prime site. Six (6) key loaders are proposed to load the encryption key into the DIUs and the subscriber equipment (the fixed network transceivers are "transparent").

A telephone interconnect controller is equipped to provide five (5) channels of telephone interconnect on the trunking system. The control unit resides at the SmartZone prime site and includes functionality to control interconnect access based upon radio system traffic profiles. This interconnect unit is capable of expansion to twenty-one channels. Loss of the interconnect controller shall result in loss of telephone interconnect functionality on the system.

Antenna systems, mounting cabinets and racks, and power backup systems are provided for each site. The antenna systems provide redundancy by splitting channels between multiple antennas and combiners. The power system uses AC / UPS systems for controllers and other equipment that requires AC, and 48VDC for equipment compatible with DC (QUANTARs, TeNSr, ASTRO-TAC 3000 comparators, microwave radios).

The "Base System" identified in Appendix K shall be integrated into the CERS. The Base System shall appear as a second Zone on the Zone controller. Additional Central Controller boards, firmware, software, and channel bank equipment shall be supplied to interface the Base System into the CERS.

The existing Base System consists of 12 channels. Four of these channels shall be removed and their frequencies used elsewhere. The present Base System uses three MICOR stations and 9 MSF5000 stations. As the MICOR stations are not compatible with SmartZone we intend to use eight of the MSF5000's for the integration into the CERS.

The Base System shall be "hard partitioned". Three channels shall be partitioned to support existing Type I trunking fleets, subfleets, and subscriber users. Five channels shall be partitioned to support type II talkgroups and subscriber users. The existing 6809 controllers shall be programmed to control all type I trunking activity. The SmartZone Zone Controller shall control all type II trunking activity through the 6809 controller.

Once integrated, the RCS shall have access to all Type II talkgroups and subscriber units affiliated with the Base System as allowed by level 4 users. Type I Fleets, Subfleets, and subscriber units shall be accessible via control stations as identified by the City. The 6809 controller shall contain the subscriber access control (SAC) for all Type I units.

The CERS shall adopt the "System ID" of the Base System to minimize reprogramming of existing Base System subscribers.

Motorola shall work with the City to develop the City's fleet map. There can be only one fleet map for the entire system. The fleet map (individual ID's and talkgroups) shall be divided into ranges (minimum of 3, maximum of 32). Each range shall be identified as Type I only (fleets, subfleets, and individual ID's), Type II analog only (talkgroups and individual ID's), and Digital capable (talkgroups and individual ID's). To insure maximum flexibility, Motorola shall assign console ID's in the "digital capable" range(s).

Motorola shall provide all training as defined in Exhibit L, Project Training.

2.3 MICROWAVE TRANSMISSION SYSTEM

The Microwave Transmission System (MTS) is configured as a three loop network providing highly reliable protection for all communications links between the prime site at CRS and the main dispatch center at CECC and all of the remote radio sites in the simulcast system. The first loop interconnects CRS with Forest Hill, San Francisco State University, Fort Miley, Clay Jones and One Market Plaza sites. The second loop interconnects CRS with Bernal Heights and South Hill sites. The third loop interconnects CRS with CECC using Bank America site for the alternate routing. The first two loops shall be supplied with all new microwave equipment for each link using repeater configurations at each remote site and terminal configurations at CRS. The third loop shall use the existing City microwave equipment to link CRS with CECC and CECC with Bank America, and add new microwave terminal equipment for the link between CRS and Bank America. Loop switching equipment shall be added at all sites where needed to provide route protection for each DS1 circuit that shall be installed. Existing microwave links between CRS and Hall of Justice and DTIS Rankin Street shall be used to transport circuits for dispatch and monitoring of the CERS system. Service channel equipment shall be included at all new sites and shall be interconnected to any existing service channel circuits as needed to provide the proper system continuity. Each RF link shall have one DS3 capacity (28 DS1) with all sites equipped for the maximum DS1 ports available for each respective configuration.

TeNSr channel bank equipment shall be provided at all simulcast sites to interface with radio repeaters and remote controller equipment. Additional TeNSr equipment shall be

provided at CECC, Hall of Justice and DTIS Rankin Street to carry traffic for LAN connections, conventional channel logging audio, and remote operator dispatch connections. Almost all of these circuits shall be routed to corresponding TeNSr equipment at CRS. Multiple DS1 circuits shall be routed between CRS and CECC to carry traffic between the Embassy switch and CCE2 console equipment at CECC.

All necessary antennas, lines, and backup power necessary to make the MTS fully operational shall be supplied at each site as required. Final equipment configuration shall be determined during detailed design when the results of the physical path survey and the microwave frequency coordination study become available.

2.4 RADIO CONSOLE SYSTEM

The design for the console system for the City is centered on the Ambassador Electronics Bank (AEB), also referred to as the "audio switch". The AEB is located at the prime site. Connected to the audio switch are two concentrations of Console Control Equipment (CCE) also referred to as Central Electronics Banks (CEB's).

The first of these two concentrations, referred to as CCE1, consists of 5 CEB's. CCE1 is physically located at the prime site and connected to the audio switch via local E1 lines. Each CEB has two E1 lines for redundancy. CCE1 contains modules to support 49 Conventional base stations, 18 conventional Mutual Aid base stations, and 8 dispatch operator positions referred to as Console Terminal Equipment (CTE's). With exception of 1 local CTE (used for Department of Telecommunications and Information Services (DTIS) maintenance), all CTE's are remoted. Five positions are remoted via microwave to the Hall of Justice (HOJ), four for Department of Parking and Traffic (DPT), and one for the Sheriff Jail 9. One position is routed from the prime site to DTIS (901 Rankin Street) via microwave and then routed, via dedicated lines, to the Water Department. One position is remoted to DTIS (Rankin Street) via microwave to be used as a maintenance console. Each conventional Base Interface Module (BIM) has a logging recorder port as a standard feature. Thirty-nine of these logging recorder ports shall be routed from CRS to CECC via 4 wire microwave audio circuits to a City provided audio logging recorder.

The second concentration of CCEs are referred to as CCE2 and shall be located at the CECC. The five CEBs that comprise CCE2 are physically connected to the audio switch via T1 lines. Each CEB has 2 T1 lines for redundancy. These T1 lines originate at the prime site and are routed to CECC via microwave. Each CEB within CCE2 contains one BIM (City to define usage). Three of the five CEB's contain a Smart Phone Interface Module (SPI). Each SPI is routed to one of three consoles dedicated to the San Francisco Police Department (SFPD), San Francisco Fire Department (SFFD), and Department of Public Health (DPH). These five CEB's support 38 locally connected CTE's. Sixteen CTE's are for the SFPD, eight CTE's are for the SFFD, six

CTE's are for the DPH, six CTE's are for the Office of Emergency Services (OES), and two CTE's for DTIS (one for maintenance and one for DTIS dispatch).

All CTE's, regardless of location, consist of a Console Interface Electronics (CIE) unit, Pentium PC with Ethernet LAN connection, 17" touch screen monitor, Dual headset jacks, dual foot switches, and a Personal Utility Control (PUC). The PUC is a hand held device (box) that has ten push-button switches. Associated with each switch are 2 LED's that reflect the status of the switch. The PUC interfaces to the CTE via a ten-foot cord. The PUC is used for controlling frequently used console functions such as but not limited to multiselect, All Call, Alert tones, Instant Transmit, and RTS/CTS.

Selected CTE's have a feature called Request-to-Send, Clear-to-Send (RTS/CTS). Only those console positions and talkgroups/conventional channels specifically identified by the City have this RTS/CTS feature. This feature is implemented as follows. Icons of RTS buttons are associated with radio resource windows. These buttons are mapped to relay contacts on 16 I/O modules in the CEB at CCE2. These relay contacts shall be wired to a MOSCAD Remote Terminal Unit (RTU). Pressing the RTS button causes the relay contacts to close. This closure is passed to the MOSCAD RTU which, through a preprogrammed logic matrix, produces an output that is wired to an input on the 16 I/O module. This input shall produce a visual indication on the desired console's radio resource (labeled RTS). This console operator presses a corresponding CTS button which is routed to the 16 I/O relay board, MOSCAD matrix, 16 I/O input and produce a visual CTS indication on the originating console. Space is provided in the CEB to add additional 16 I/O boards as required.

All programming and Alias data for the CTE's is stored in a PC server. The server connects to all CTE's via an industry standard Ethernet LAN. Remote operator CTE's shall connect to the LAN via microwave circuits and in the case of the water department via a dedicated line from the water department to DTIS on Rankin Street. Trunking talkgroups are recorded on a new Dictaphone® recorder that record each of the 23 trunked audio channels on 23 separate audio tracks. Trunking control channel data is recorded on a separate track. The control channel data is used to re-construct the talkgroup audio during play back.

In addition to the above hardware, Motorola shall provide:

1. A Spectracom external time standard for synchronization of the console clocks with 3 spare output ports.

2. Spares as defined in the equipment list.

With the exception of the Water Department, no console furniture is being provided. Four bays of furniture are supplied to meet the water department's requirements.

2.5 CERS MANAGER (OPTIONAL - COVERAGE ENHANCEMENT PHASE)

Motorola shall provide a MOSCAD FAULT MANAGEMENT NETWORK to support the functionality of the Citywide 800 MHz Radio Manager (CERSM). The MOSCAD Network is the element manager that provides fault management for monitoring and control of various segments of RF site equipment, infrastructure/backbone network equipment as well as on-site environmental and security equipment. Specifically, MOSCAD monitors the City's new TRS, MTS and RCS fault activity functions. MOSCAD displays system configurations, and provides fault alarm monitoring and diagnostics for the following hardware:

1. SmartZone controller
2. Quantar Base stations
3. Voting Comparators
4. TeNSr Channel Bank Communication Server
5. Harris Farinon DVM Microwave
6. Gold Console Electronics
7. Efratom MFS GPS/Rb Standard
8. AC, DC, UPS and RF Power Systems
9. Discrete Alarms

The MOSCAD Network provides configuration management of the following hardware:

1. QUANTAR Repeaters
2. Harris Farinon 18 GHz M/W
3. TeNSr Communication Server
4. Request to Send Console Functionality

The components of MOSCAD Fault Management are: Master Centrals, MOSCAD Front End Processors, and MOSCAD Remote Terminal Units. The Central shall be a Graphic Master Central utilizing a MOSCAD MDLC-TCP/IP Gateway for transporting

data to the Network Management level. The Central utilizes a Front End Processor to bridge between the central and the field RTU.

The Graphic Master Centrals (GMC) or Graphic Work Stations (GWS), are Windows NT based PC's with a Graphical User Interface software package to allow viewing and controlling of the entire system. The GWS is identical in graphics and functionality to the GMC, however the GWS is reliant on the GMC databases for information update and control, and is linked via a local LAN network to the GMC. The graphics display and database is based upon the WonderWare InTouch Windows application. The custom graphic screens depict current system status where the user can navigate from a macroscopic system view down to the individual site details. All system alarms, Change of States, and controls are time stamped, stored in the alarm history file, and printed for hard copy record keeping. The Graphic Master Central provides remote dial-up capability for secondary link redundancy to remote terminal units. The GMC also provides alphanumeric alarm paging. The paging software shall be the WIN911 from Specter Instruments. This package along with internal modems shall allow dial-up of any Motorola or equal RCC and send descriptive alarm messages on alphanumeric capable pagers (pagers not provided).

The MOSCAD system supports multiple GMC computer locations for fully redundant functioning nodes. Each GMC is capable of the full set of alarm and control capabilities and shall resume control when the primary GMC is not functioning.

The centrals shall support two printers connected to the computer; one for printing all alarms and the other for various custom reports. The alarms print out at the time the alarm is detected by the central. Logon/Logoff information is reported on the printer allocated for alarm printing.

Five MOSCAD Fault Manager System Graphic Master Centrals and one Graphic Work Station Centrals shall be supplied at the following locations:

CECC - DTIS has a GMC and a GWS,
DPW - DPW has a GMC
CFAS - CFAS has a GMC
RMF - DTIS has a GMC
CRS - DTIS has a GMC.

Five Lap Top PC's are supplied for remote monitoring with dial-up features and diagnostic software. The Lap Tops are configured as Remote MOSCAD Centrals which rely on the GMC for real-time database information and alarm status.

The MOSCAD Front End Processor (FEP) is the bridge between the GMC and the MOSCAD Remote Terminal Units. The FEP is interfaced to the communication

backbone via the Harris M/W radio service channel (Primary Link) via the RS-232 (9.6 Kbps) communication port. The FEP also provides a Dial-up Modem to interface to the PSTN to act as a Secondary Link to the remote M/W sites. A FEP is provided for all GMC(s) in the system. The FEP is an application specific device dedicated to RTU interrogation and to the routing of data messages to/from the GMC(s) as well as maintaining a real-time database of the MOSCAD system.

Seventeen (17) Remote Terminal Units (RTU), are provided for monitoring the CERS equipment, one each at; eight TRS sites, CCE2, DTIS, HOJ, San Bruno Jail, Moscone Center, San Francisco International Airport, three MUNI Tunnel sites. The RTU monitors and relays status and alarm information to the Centrals. The RTU is interfaced to the communication backbone via the Harris M/W radio service channel (Primary Link) via the RS-232 (9.6 Kbps) communication port. The RTU also provides a Dial-up Modem to interface to the PSTN to act as a Secondary Link to the remote M/W Orderwire link. The RTU(s) consists of Central Processor Units (CPU) housed in a 19" rack mount chassis, operating from a -48VDC source. The RTU utilizes a motherboard incorporating CPU(s) RS-232 and RS-485 interface ports dedicated to each of the site hardware electronics, together with local I/O modules for discrete hardwire alarm/status.

2.6 MICROWAVE TRANSMISSION SYSTEM MANAGER (MTSM)

The Microwave Transmission System Manager (MTSM) is an integral part of the MOSCAD Master Graphic Central at DTIS. The MTSM retrieves status and alarm information from all MTS sites via local MOSCAD Front End Processor and the built-in monitoring features of the Harris Microwave SCAN supervisory control and alarm network via a MTS Orderwire circuit. SCAN permits monitoring, control, and overall visibility of the microwave system. MOSCAD displays MTS alarm and status conditions of any local or remote Harris Digital VersaTility microwave equipment. Also, Harris M/W features a local SCAN Alphanumeric display and keyboard Test Panel and a parallel RS-232 port. The Test Panel is used to locally interrogate and control any other equipment in the M/W Network. Secondly, the MTS equipment parallel port interfaces to a MOSCAD Remote Terminal Unit for the communicating of all TRS site alarm/status to the CERSM/MTSM Centrals via a dial-up PSTN circuit.

2.7 MOBILE RADIOS

A mixture of 955 Analog and Digital mobile radios are provided to meet the specifications for User Equipment as listed in Exhibit C. Exhibit C specifies Type A and Type B mobile units supplied. The Type A are mobiles defined as units without Keypad features and with 8-Character Display, and Type B are units are defined as units with Keypad features and 8-Character Alphanumeric Display. The Analog type mobile is the Motorola 15-Watt MCS2000 Model; Model II for Type A, and Model III

for Type B. The digital type mobile is the Motorola 35 Watt ASTRO Digital Spectra Model; Model W4 for Type A, and Model A7 for Type B.

The mobile units are provided in Dash Mount and Trunk Mount configurations. The Control Units have a Mode System Selector, On/Off Power Switch, Power On Indicator, Transmit Indicator, Volume Control, System Busy Indicator - LED/Conventional, Audible/Trunking, Emergency Button, Select Call, Scan Control, External Speaker, Palm Microphone and 1/4 Wavelength Antenna. The control units of the same model are similar for both Dash Mount and Trunk Mount configurations.

Both the MCS2000 and ASTRO Digital Spectra mobile units are fully functional with the mobile Type TRS operations specified herein. The ASTRO Digital Spectra mobiles have the capability for digital Encryption operations and can be upgraded to APCO-25 CAI.

For the Special Operations Vehicles Motorola is providing ASTRO Digital Spectra Model III mobile units as above with additional features of; PTT input, Remote Mic (hand-held, mobile type), foot-switch and headset jack box.

2.8 PORTABLE RADIOS

A mixture of 3100 Analog and Digital portable radios are provided to meet the specifications for User Equipment as listed in Exhibit C. Exhibit C specifies the Type A and Type B portable units supplied. The Type A portables are defined as portables without Keypad and Display and Type B are portables with Keypad and 14-character Alphanumeric Display. The Analog portable is the Motorola 3-Watt MTS2000 Portable; Model I for the Type A portables, and Model III for the Type B portables. The digital portable is the Motorola 3-Watt ASTRO Digital XTS3000 Portable; Model I for the Type A portables, and Model III for the Type B portables.

For SFFD the Motorola Ruggedized ASTRO Digital Saber Model III portable units and batteries are provided. The ruggedized units are water-resistant and meet the requirements of the Performance Specifications for SFFD portables.

All portable units are equipped with Side PTT Bar, Transmit Indicator, Internal Microphone, (3) programmable Side Buttons, (1) Top Mounted Programmable Two Position Concentric Switch, Orange Emergency Button, (1) Top Mounted Programmable Three Position Toggle Switch, Illuminated 16 Position Mode Rotary Select Switch, Weather Sealed Universal Connector, Angled On/Off/Volume, Bi-Colored LED Indicator, Earphone Jack, Low Battery Alert Tone, Ruggedized (SFFD only) Ultra-High capacity Nickel Cadmium Battery, 1/2 Wavelength Whip (Flex) antenna, Black Leather Swivel Mount Carrying Case with T-strap.

All three portable models are fully functional with the portable Type TRS operations specified herein. The ASTRO Digital XTS3000 and ASTRO Digital Saber portables have the capability for Encryption operations.

Portable accessories supplied are Speaker/Microphones (would result in lower talk-back radio coverage reliability), Battery Chargers (single and multi-unit), Spare Ultra-High capacity Nickel Cadmium Battery (standard and ruggedized), Battery Tester, and swivel case (would result in lower radio coverage reliability). Additional portable equipment supplied is 32 vehicular adapters with accessories for Water Department.

2.9 CONTROL STATION RADIOS

A mixture of 147 Analog and Digital Control Stations are provided to meet the specifications for User Equipment as listed in Exhibit C. Those agencies requiring analog only operations are supplied Motorola Spectra Control Stations. Those agencies requiring digital operations are supplied Motorola ASTRO Digital Spectra Control Stations. Control stations are configured for local or wireline remote control. Those stations requiring rack mounting are supplied with 19-inch mounting panel. All stations are supplied with antenna and cables with "N" connectors.

The Local Control Stations are supplied with a front display/keyboard panel with control features to meet TRS requirements. The Remote Control Stations shall be Motorola DGT9000 Digital Remote Control consoles requiring 4-wire circuits to the stations. A maximum of six remotes in parallel are possible per Control Station.

3. GENERAL PROVISIONS

All equipment supplied and work performed shall be in accordance with the Performance Specifications.

All work shall be performed in a manner consistent with high quality commercial practice and in accordance with Motorola's R56 "Quality Standards," and as detailed in Appendix F, Facilities Requirements.

Notwithstanding the materials and equipment list contained herein, Motorola shall furnish all necessary mounting hardware, fasteners, fixtures, cabling, connectors, and other equipment and hardware necessary to install the Motorola-supplied equipment, except where portions of the system are to be supplied by the City.

3.1 MOTOROLA RESPONSIBILITIES

Motorola shall supply, install, optimize, and test the equipment, as ordered.

Motorola shall provide a secure warehouse, classroom, and mobile installation facility suitable for all seasons.

Motorola shall search, coordinate, and prepare licenses for the microwave frequencies to be implemented by the CERS. Motorola shall appoint a Program Manager to manage the implementation of the CERS. The Program Manager shall serve as a single point of contact for the City. All Motorola engineering, technical, and installation personnel shall report to the Program Manager.

The Motorola Program Manager shall prepare a detailed schedule based on Exhibit E, the Master Project Schedule. The Program Manager shall update the detailed schedule as the implementation progresses and provide the City with monthly progress reports.

3.2 SUBSTITUTE EQUIPMENT

In the Exhibits to the Master Agreement, Motorola has identified all major equipment required to implement the system. If the City desires to supply substitute equipment, such equipment must be approved by Motorola as being compatible with the overall system design.

3.3 STANDARDS OF WORK

All equipment provided for each site and the installation techniques used by Motorola for that equipment shall protect the system against earthquake damage and shall comply with the Uniform Building Code (UBC), Motorola Quality Standard-FNE Installation,

National Electric Code (1990), NFPA 1221, and as detailed in Appendix F, Facilities Requirements.

3.4 SYSTEM AND EQUIPMENT LAYOUT

The overall system configuration shall be presented in the detailed design phase.

The specific layout of fixed equipment within each facility shall be provided by Motorola on a site-by-site basis during the detailed design phase and shall require both the City's and Motorola's approval prior to actual installation.

3.5 SYSTEM IMPLEMENTATION

System implementation includes civil construction, system engineering, equipment manufacture, staging, equipment delivery, installation, program management, and performance verification.

3.6 EXISTING CITY-OWNED EQUIPMENT

The City may identify existing City-owned hardware to be used within the radio system. Motorola shall use that hardware to the fullest possible extent.

3.7 RADIO COVERAGE

Coverage Maps

The shaded areas of the attached coverage maps show predicted coverage at ninety-five (95) percent reliability on the street and in areas that have 30db, 23 dB and 15 dB above the street level coverage to meet specified levels for in building coverage. The areas that may have less than 95% reliability are shown as non- shaded (white) areas. These areas are defined as follows: The 30 dB Area is that area enclosed by the Leavenworth Street on the west; the combination of Turk Street, Fifth Street and Howard Street on the south; the Embarcadero on the East; and Broadway on the North. The 23 dB Areas are defined in three parts. The first part is that area outside 30 dB area and bounded by the combination of Lyon Street, West Pacific Avenue, Arguello Boulevard, Fulton Street, Stanyan Street, Fell Street, Webster Street, Oak Street, Buchannan Street, Herman Street, Guerrero Avenue, on the West; Caesar Chavez Street (Army Street) on the South; the San Francisco Bay on the East and North. The second part is the area surrounding University of California at San Francisco (Medical Center) and is bounded by 7TH Avenue on the West; the combination of Kirkham Street and Medical Center boundary on the South; the combination of Medical Center boundary, Parnassus Avenue, and Stanyan Street on the East; and Lincoln Way on the North. The third part is the area surrounding San Francisco State University and bounded by the combination of Middlefield Drive and Lake Merced Boulevard on the West; the combination of Vidal Drive, Pinto Avenue, and Holloway Avenue on the South; 19 TH Avenue on the

East; and Eucalyptus on the North. The 15 dB Area is the areas of the City and County of San Francisco not inside the defined 30 dB and 23 dB areas, or areas in the 23 dB area where predicted coverage is greater than 15 dB and less than 23 dB. This is the area bounded on the West by the Pacific Ocean and on the North and East by the San Francisco Bay and by the South by the San Francisco - San Mateo County Line.

3.8 CITY RESPONSIBILITIES

1. The City is to perform the following services: Provide complete A & E Drawings for civil construction, and supply any changes as may be required to the A&E Drawings for the sites defined in 6.3.

2. Provide equipment facilities at the console and control station locations.

3. Ensure all department-provided sites meet applicable codes and standards and accommodate specified equipment.

4. Provide all electrical power to control station equipment locations so as not to require extension cords to any Motorola-supplied equipment. Motorola shall provide specific power requirements in the Detailed Design Document.

5. Provide technical information on existing systems to facilitate interfacing to the new system.

6. Provide all 800 MHz FCC licenses.

7. Provide backup AC power systems other than what is provided in the equipment list.

4. PROJECT EXECUTION

4.1 CONTRACT AWARD

Motorola shall begin the final order, planning, and implementation process of the CERS as soon as Motorola is provided with a completed "Request to Commence". Shipment of ordered equipment shall be according to the Master Project Schedule.

4.2 PROJECT IMPLEMENTATION

The Motorola Program Manager shall coordinate, manage, and direct the implementation of the Project. The Program Manager shall provide on-site coordination to Motorola and the City during the entire system implementation process. Specifically, the Motorola Program Manager shall:

1. Develop, manage, and update the System Implementation Plan.
2. Conduct a complete inventory of all received equipment to ensure complete delivery.
3. Inspect the physical condition of all equipment to ensure that none has been damaged during shipment.
4. Ensure that all site preparation is complete and that all subsystems not provided by Motorola are operational and accepted by Motorola, prior to installing Motorola-provided equipment on site.
5. Coordinate between the City and the Motorola field implementation teams ensuring all on-site installation and integration/optimization tasks are performed within Project requirements.
6. Obtain City sign-off acceptance for the completed installation of each site
7. Verify that a given subsystem has been properly optimized and is ready for acceptance testing.
8. Keeping the City Project Manager appraised of current Project implementation status.
9. Provide progress reports as agreed to by Motorola and the City.
10. Participate in City Meetings as required.
11. Participate in and coordinate acceptance testing.

12. Ensure the execution of the Project according to the Master Project Schedule.

4.3 PROJECT PHASING

Motorola shall install the CERS Project in Phases. Phase 1 shall consist of the 8 site civil work, the 8 site fixed network equipment, console equipment, control station equipment, mobile units, portable units, mandatory special areas of coverage fixed equipment, system management equipment, training and test equipment as purchased by the City for inclusion into Phase 1. Phase 2 shall include all activities as required to implement all user equipment listed in Exhibit C and not previously purchased in Phase 1. An optional Coverage Enhancement Phase shall include optional backbone radio site upgrade and Fixed Network Equipment for radio sites at Potrero Hill Water tower, 22nd and Carolina, a radio site at Presidio, 314 Deems Rd; special areas of coverage as defined in Appendix D as "optional", and the CERSM. There is also an optional five channel 800 MHz Wireless Data Network (WDN) Phase that will be detailed in a WDN performance specification. Motorola shall acquire, construct, and deliver Phases 1 and 2, the Optional Coverage Enhancement Phase, and the WDN Phase in accordance with this SOW and the Master Agreement. This SOW shall be the guiding force for the implementation for all phases. All standards, requirements, procedures, activities, and processes described in this statement of work shall apply to all phases of this Project.

4.4 PROJECT KICK-OFF MEETING

Upon contract award, Motorola shall schedule a Project Kick-off Meeting with the City.

4.5 DETAILED DESIGN DOCUMENT

Motorola shall prepare and deliver to the City for approval, a Detailed Design Document in accordance with Exhibit E, Master Project Schedule. The Final Detailed Design Document as approved by the City and as thereafter modified in accordance with the change order process, shall automatically become part of this SOW.

The Detailed Design Document shall incorporate the following infrastructure and subscriber implementation task summaries:

1. Contract award
2. System order
3. Project administration
4. Civil work/tower installation
5. Factory staging

6. Trunked system backbone installation
7. Microwave system installation
8. Acceptance Testing
9. Mobile and portable installation
10. Dispatch console installation
11. Dispatch console phaseover
12. Training
13. Department installation
14. Department transition
15. Department training
16. Interfaces to CAD, 911, PSTN, Recorders long term, instant recall recorders
17. Console and User Cutover Plan

4.6 FACTORY ORDER WRITE UP AND RELEASE

Upon City approval of the final system design and detailed equipment list, Motorola shall begin placing orders for equipment. This process ensures that equipment orders are consistent with equipment lists approved by the City. Although order is made upon contract award, shipment of equipment is based upon contract terms, the implementation plan and the, Master Project Schedule.

The equipment ship dates as detailed in the Master Project Schedule in the are planned around predetermined factory manufacturing duration's, factory staging and scheduled field installation for each subsystem.

4.7 SITE DOCUMENTATION

Site equipment floor plans and layouts shall be determined during the site planning process. Upon contract award, Motorola and the City will jointly determine the final site plans for all currently specified sites. Motorola shall submit the final site plans to the City for approval as part of the detailed design process. Upon signed approval of the final site plans for all sites Motorola shall incorporate the plans as appendices to the Statement of Work.

4.8 FIXED EQUIPMENT STAGING AND TEST

Prior to shipping, Motorola shall factory stage designated fixed equipment at Motorola's staging facility in Schaumburg, IL. A detailed list of the equipment to be staged shall be included in the factory staging documentation. Functional tests shall be conducted, and levels shall be optimized and documented prior to equipment breakdown and shipment. This task is intended to facilitate efficient on-site installation and is considered part of the system or subsystem acceptance test. System parameters and features shall be demonstrated to City personnel. All equipment shipped from staging shall be bar coded and labeled as required. Motorola shall stage the TRS, MTS, RCS and the MOSCAD systems

4.9 STAGED EQUIPMENT DELIVERY

At the conclusion of factory staging, the equipment racks shall be transported to the local receiving/storage facility in San Francisco, CA. Motorola shall not ship any equipment to a site without City approval.

4.10 FIXED EQUIPMENT INSTALLATION

Motorola shall provide, install, test, and cut-over the Citywide 800 MHz Radio System (CERS) City based on the final equipment list and detailed design as agreed upon by Motorola and the City.

All Motorola-supplied equipment shall be installed in accordance with Motorola's Fixed Equipment Quality Standards (R-56), and as detailed in Appendix F, Facilities Requirements. All buildings shall be in accordance with Zone 4 earthquake requirements.

5. EQUIPMENT REQUIREMENTS

5.1 MOUNTING PROVISIONS

Motorola-provided equipment, base stations, repeaters and central controllers shall be mounted in cabinets or racks designed for the product. All equipment racks shall be mounted and installed in accordance with UBC Zone 4 earthquake requirements.

5.2 TECHNICAL REQUIREMENTS

All equipment furnished for all systems and subsystems shall meet or exceed FCC requirements. Equipment supplied by Motorola shall be new and unused, except where new City equipment is used for training or any other use designated by the City, then converted to permanent use.

5.3 ENVIRONMENT

All FNE furnished under this Project operates in the temperature range of 0°C to +50°C except computer equipment which operates in the temperature range of +5°C to + 35°.

5.4 INTERFACES

Motorola shall identify the physical interface points where external systems shall connect to the CERS: i.e., punch block, connector, port, etc. Where applicable, Motorola shall define the interface protocol. Motorola shall not be responsible for the operation or performance of equipment or systems not provided and installed by Motorola. The point of demarcation shall be the aforementioned physical interface points.

5.5 AC POWER REQUIREMENTS

City provided AC outlets will be three prong, twist-lock, grounded receptacles providing dedicated 115 VAC, 60 Hz, 20-amp service at Dispatch Center sites. Final detailed site power requirements and outlet locations and types shall be determined during final site plan approval, or as deemed necessary during Project implementation.

5.6 GROUNDING

Equipment provided by Motorola shall be grounded as detailed in Appendix F, Facilities Requirements.

5.7 ANTENNA SYSTEMS

Antenna systems (antennas, microwave dishes, transmission lines, antenna mounts and peripheral hardware) shall be installed at the sites by Motorola or its sub-contractors. Motorola shall install the antennas in accordance with the RF coverage design. Connectors utilized in all applications in this system are those connectors which the cable manufacturer recommends for the specific cable and application. All manufacturers' recommendations shall be strictly adhered to in the assembly of the system antenna equipment.

Weatherproofing of all connections shall meet or exceed manufacturer's recommendations and shall be in accordance with the recommendations contained in Motorola National Service Publication R56, "Quality Standards—FNE Installations".

6. RADIO SITE DEVELOPMENT

There are two specific divisions of site activities associated with the installation of the CERS. The first of these is site development in which the sites are prepared by the installation of shelter, tenant improvements, towers, electrical supply, HVAC, etc. The work associated with site development is defined in this section. The second division is the installation of Fixed Network Equipment at these sites and other locations.

6.1 COMBINED TASK LIST

The development work to be performed at the radio sites will be performed by a combined effort of the City and Motorola. In general, A&E design packages will be prepared by the City and provided to Motorola to receive fixed price construction bids. With City acceptance of the pricing, Motorola shall proceed with the construction.

6.2 TERMS AND CONDITIONS

The City will prepare and deliver to Motorola all Architectural and Engineering Drawing (A&E's) required for this Project for the sites defined in 6.3.
Final and approved Architectural and Engineering Drawings will define final work packages.

Conduits, cable trays/troughs and site preparations, including availability of AC power is the responsibility of the City in facilities they provide.

Deviations from the scope of work and/or these terms and conditions shall be subject to the change order process.

It is agreed that all sites should conform to Motorola's R56 Installation and Quality Standards and as detailed in Appendix F, Facilities Requirements. Motorola reserves the right to inspect each location, not provided by Motorola, to ensure that it is in accordance with this agreement. Motorola shall not be required to bring any such areas up to standards.

6.3 RADIO EQUIPMENT SITES

The description of work and services for Radio Site Development is provided as a basis for the current understanding of Motorola's cost estimate. The City will provide Motorola with a complete set of A&E construction plans for the Radio Sites described below, and Motorola shall provide construction bids for the work. The A&E construction plans provided by the City shall replace this description for Site Development Construction and cost estimates shall be replaced in total with the construction bids.

6.3.1 Transmitter Receiver Site Prime Site — CRS

Central Radio Station Remodel

The City is responsible for the following item in regards to Central Radio Station (CRS).

1. The City will obtain all required CRS plans.
2. The city will provide all Architectural and Engineering drawing (A&E's).
3. The City will obtain all access and construction agreements with CRS
4. The City will relocate existing equipment to another location within the building.
5. The City to obtain all permits required for construction.
6. City to provide sufficient floor space for equipment racks.

Motorola is responsible for the following item in regards to CRS.

1. Motorola shall complete bid package for remodel work
2. Motorola shall provide general improvements and remodeling of interior walls to create a technician work area with windows looking into transmitter room, a storeroom and adjustable shelving, walls extended from floor to ceiling, and static resistant floor covering.
3. Motorola shall provide remodeling of Men's and Ladies rest room areas to meet ADA codes.
4. Motorola shall provide a HVAC system for facility ventilation.
5. Motorola shall provide improvement of interior lighting, electrical power system, plumbing, fire protection, and security to accommodate architectural improvements and false ceiling replacement.
6. Motorola shall provide construction of a radio room to accommodate KALW radio station.
7. Motorola shall provide painting of the exterior and interior
8. Motorola shall provide external site improvements including fencing, storage container, and landscaping.

9. Motorola to review alternatives to leaving existing trunking system at it present location.

10. Motorola shall provide new cable trays and seismic bracing to UBC zone 4 requirements.

11. Upgrade electrical service and provide new service panels appropriately sized. Remove two existing 200 Amp service panels

12. Motorola shall provide new halo ground ring around equipment room.

13. Motorola shall provide new external grounding field.

General Assumptions regarding CRS.

1. Existing building and foundations do not require seismic analysis or strengthening.

2. CRS is free from hazardous materials

3. Final and approved A&E's will define final work packages.

The City is responsible for the following item in regards to Tower #3.

1. City to provide lead and asbestos test results. Motorola acknowledges tower and concrete wall contain lead paint.

2. Provide tower lighting waiver from FAA.

Motorola is responsible for the following item in regards to Tower #3.

1. Evaluate tower for corrosion and replace any corroded bolts to the extent that replacement can be accomplished during a normal inspection.

2. Evaluate tower cleaning/painting for 10-year life.

3. Evaluate tower for new loads, if necessary, one analysis.

4. Realign and install cable anchorage for existing cabling.

5. Pull temporary cable through existing 5-in. conduit to Tower #3 vault, if required.

6. Remove six antennas and coax from tower that are not in use.

The City is responsible for the following items in regards to Tower #1.

1. City to provide lead and asbestos test results. Motorola acknowledges tower and concrete wall contain lead paint.

2. City will remove corrugated asbestos wall around existing tower.

Motorola is responsible for the following item in regards to Tower #1.

1. Demolish tower, concrete walls, slab and tower foundations to 6 in. below grade.

2. Erect new 150-ft. tower consistent with Tower #3 adjacent to existing Tower #1 location.

3. Relocate existing Tower #1 and #2 antennas and dish to new tower.

4. Construct similar slab and wall 14 ft. high around new tower similar to walls around existing towers.

5. Provide electrical vault with ten 4-inch conduits from tower to building.

6. Provide 36-in. metal security door to wall for entry to tower.

7. Provide chain link fencing ceiling over wall area similar to existing structure.

8. Underground conduit with cable shall be removed to 6 in. below grade.

9. All demolition materials shall be removed to an approved dump site.

10. Relocate any active antennas to either Tower #3 or new Tower #1

The City is responsible for the following item in regards to Tower #2.

1. City to provide lead and asbestos test results Motorola acknowledges tower and concrete wall contain lead paint.

2. City will remove corrugated asbestos wall around existing tower.

Motorola is responsible for the following item in regards to Tower #2.

1. Demolish tower, concrete walls, slab and tower foundations to 6 in. below grade.

2. Underground conduit with cable shall be removed to 6 in. below grade.

3. All demolition materials shall be removed to an approved dump site.

4. Relocate any active antennas to either Tower #3 or new Tower #1

The City is responsible for the following item in regards to the Generators.

1. City to verify the existing diesel underground storage tanks are adequate for new generators, and that the all required pumping equipment is in proper working order.

2. City to leave the two existing day tanks and tank pumping systems at CRS.

Motorola is responsible for the following item in regards to the Generators.

1. Motorola shall provide two 180 KVA diesel generators with foundations. Motorola shall remove the two existing 75KVA/60 kW generators for installation at other sites with indoor facilities.

2. Motorola shall convert existing garage door into exhaust area for the two new generators.

3. Motorola shall install two forced air intake systems for generators and mount on ceiling.

4. Install two new generator transfer panels.

General assumptions regarding CRS.

1. Existing buildings do not require seismic analysis or strengthening.

2. No landscaping or irrigation requirements.

3. Building plans and generator foundation plans are available.

4. Existing Towers #1, 2, and 3 structure, foundation, slab and wall plans are available.

5. CRS is an essential facility. No service interruptions are allowed unless pre-approved by City.

6.3.2 Transmitter Receiver Site Remote Site — Ft. Miley

The City is responsible for the following item in regards to Ft. Miley.

1. The City will acquire all necessary access and construction agreements with Ft. Miley.

Motorola is responsible for the following item in regards to Ft. Miley.

1. Motorola shall provide a prefabricated concrete shelter with dual, redundant HVAC at grade within 100 ft. of water tank, 30 ft. x 12-ft. standard building package.

2. Motorola shall provide a75 KVA/60 kW Generator (relocated from CRS) and a skid mounted 60 gallon fuel tank and an automatic transfer panel.

3. Motorola shall provide commercial electrical power from existing VA underground vault approximately 200 ft. away. Approximately 100 ft. will be across AC pavement parking lot.

4. Motorola shall provide an exterior grounding system.

5. Motorola shall provide an overhead coax cable tray from the building to the water tower.

6. Motorola shall provide a cable tray mounted on the water tank leg, with required coaxial cable attached to this tray. The cable tray shall strapped to the tank leg.

7. Motorola shall mount the Microwave dishes on two legs of the water tank.

8. RF antenna mounts shall be mounted to the tank legs. An appropriately sized pipe structure shall extend to two feet above the top of the tank for antenna mounting.

General Assumptions regarding Ft. Miley.

1. Water tank support structure will not require strengthening.

2. Building site is acceptable to the site owner and there are no major underground structures.

3. Water tank structure and foundation plans are available.

6.3.3 Transmitter Receiver Site Remote Site — One Market Plaza

The City is responsible for the following item in regards to One Market Plaza.

1. The City will obtain all required One Market Plaza plans.

2. The City will obtain all access and construction agreements with One Market Plaza.

Motorola shall install the following to these general scope definitions.

1. Ground system as required

2. Motorola shall provide seismic bracing for equipment and cable trays.

3. Motorola shall provide cable trays.

4. Motorola shall provide cut-out with 16 knockouts for cabling through wall.

5. Motorola shall provide cabling and cable for approximately 50 feet from equipment room to roof top antenna locations.

6. Motorola shall provide conduit and cabling from the generator equipment room in the basement to the new equipment room on the roof.

6.3.4 Transmitter Receiver Site Remote Site — Forest Hill

The City is responsible for the following item in regards to Forest Hill.

1. The City will obtain all required Forest Hill plans.

2. The City will remove/relocate existing on site power/phone lines to existing buildings.

3. The City will provide commercial power to the existing PG&E pole.

4. The City will obtain all access and construction agreements for the Forest Hill site.

5. The City will determine if temporary burial of overhead air lines is acceptable.

6. The City will relocate temporarily the existing City communications building

Motorola is responsible for the following item in regards to Forest Hill.

1. 10 ft. X 12 ft. generator room located on the designated Sprint foot print

2. Motorola shall provide a prefabricated concrete building, 30 ft. x 12 ft.

3. Motorola shall provide 110 KVA generator and a skid mounted 60 gallon fuel tank.

4. Motorola shall provide an 80-ft. self-supporting monopole tower and relocate any active antennas to new monopole from existing tower.

5. Motorola shall remove existing 80-ft. tower, remove 8 ft. x 8-ft. foundation to 6 in. below grade, and remove tower and rubble from Forest Hill.

6. Motorola shall provide underground commercial power to the prefabricated building from the PG&E pole.

7. Motorola shall provide a grounding system for new communications building and monopole.

8. Motorola shall remove from site a total three existing buildings and foundations.

   A. Two existing operational communications buildings.

   B. One City existing non-operational communications building.

   C. Motorola plans to reuse one existing City abandoned building during installation and transition to the new communications building. It shall be removed at the completion of the installation.

9. Motorola shall provide new coaxial cabling to existing City communications building during decommissioning of existing two communications buildings.

10. Motorola shall remove existing tree as shown on Sprint plans.

11. Motorola shall provide 6 in. of Class II base with geotechnical fabric for a 10 ft. wide access road to site and monopole site for construction.

12. Motorola shall provide overhead cable trays/coax from building to monopole over existing air tanks.

13. Motorola shall provide temporary burial of overhead air lines and replacement overhead after construction complete.

14. Motorola shall provide plywood to cover air tank during construction.

15. Motorola shall provide the following as required for access to the monopole:

16. Relocate two ¾" copper air lines

17. Raise 4 ft. x 5 ft. concrete vault 18 in. and add H-20 Bilco cover.

18. Raise five valve covers approximately 18 in.

19. Gravel area with 6 in. Class II with Geotechnical fabric.

General assumptions regarding Forest Hill.

1. City will allow prefabricated building to be several feet above the existing water mains if necessary for approximately 12 ft.

2. Existing tree can be removed.

3. Monopole, building and site do not require more than 12 in of recompaction.

4. Monopole, building and site do not require retaining walls.

5. Existing water tanks and air tank foundation plans are available.

6.3.5 Transmitter Receiver Site Remote Site — SF State University

The City is responsible for the following item in regards to SF State University.

1. The City will obtain all required SF State University plans.

2. The City will obtain all access and construction agreements with SF State University.

3. The City will provide a conduit path from the generator pad to the Motorola supplied automatic transfer switch to be located in the CERS equipment room (Thornton Hall, Room 138), approximately 50 feet.

4. The City will provide 208 VAC, 300 Amp. 3-phase commercial power to the CERS equipment room, with circuit breaker panel and utility outlets to be specified by Motorola.

Motorola shall install the following to general specifications, as this site is not completely defined at this date.

1. Motorola shall provide a concrete pad for installation of emergency generator and fuel tank, on ground level, adjacent to SFSU emergency generator.

2. Motorola shall provide cabling and any necessary conduit from equipment room to Thornton Hall rooftop antenna locations (Approximately 200 feet). Where required, cabling shall be plenum rated.

3. Motorola may install microwave radios and associated equipment in an additional space provided in Thornton Hall elevator penthouse, north side. This equipment shall be housed in outdoor cabinets, or equivalent, to provide isolation from the elevator control room environment.

4. Motorola shall install required microwave dishes on north wall to Thornton Hall elevator penthouse, to minimize visual impact to campus and surrounding community, and painted to match the building exterior.

5. Motorola shall install a concrete pad and redundant split system HVAC units adjacent to the new emergency generator pad. Condenser lines and associated HVAC shall be installed on the east wall of Room 138.

6. Motorola shall provide equipment racks and cable trays, with seismic bracing per UBC Zone 4.

7. Motorola shall provide a 50 KVA/40 kW diesel generator, an automatic transfer switch, and a dual wall sub-base or skid mounted fuel tank. The tank shall be 60 gallons.

6.3.6 Transmitter Receiver Site Remote Site — Bernal Heights

The City is responsible for the following item in regards to Bernal Heights.

1. The City will obtain all required Bernal Hts. plans.

2. The City will obtain all access and construction agreements with Bernal Hts.

3. The City will relocate existing equipment to another location within the room to make room for new system as required.

Motorola is responsible for the following item in regards to Bernal Hts.

1. Motorola shall provide a new lighting system

2. Motorola shall provide equipment racks and cable trays seismically braced per UBC zone 4.

3. Motorola shall provide split-dual HVAC systems.

4. Motorola shall provide cut-out with 16 knockouts for cabling through wall.

5. Motorola shall provide cabling and cable for 175 ft. from equipment room to tower. Cable will be coiled at tower for AT&T installation.

6. Motorola shall provide materials for AT&T installation.

7. Motorola shall provide conduit and cable for new electrical service and emergency power service from existing generator room to equipment room (approximately 150 ft.).

8. Motorola shall provide grounding system for equipment room.

General Assumptions regarding Bernal Hts.

1. Existing building and foundations do not require seismic analysis or strengthening.

2. Existing AT&T tower does not require analysis or strengthening.

3. AT&T will allow City to connect to the existing commercial and emergency power services.

6.3.7 Transmitter Receiver Site Remote Site — South Hill

The City is responsible for the following item in regards to South Hill.

1. The City will obtain all required South Hill plans.

2. The City will obtain all access and construction agreements for South Hill.

Motorola is responsible for the following item in regards to South Hill.

1. Motorola shall provide a pre-fabricated concrete building with a generator room. The building shall be 40 ft. x 12 ft. with two doors.

2. Motorola shall provide a 60-ft. triangular frame tower, foundation and lighting per FAA requirements. Tower shall be designed for 4 Daly City radio antennas, 3 CERS antennas and 4 microwave dishes (2 for CERS, 2 for Daly City) as per City provided drawings.

3. Motorola shall provide a cable bridge between building and tower.

4. Motorola shall provide a grounding system for the building and tower.

5. Motorola shall provide underground commercial power from existing pump house to the building via the access road. A trench shall be cut in the existing access road, conduit placed and trench filled and the access road restored.

6. Motorola shall provide a 75 KVA/60 kW generator and a skid mounted 60 gallon fuel tank (relocated from CRS) and an automatic transfer panel.

General assumptions regarding South Hill.

1. Normal soils.

6.3.8 Transmitter Receiver Site Remote Site — Presidio (Optional Site - Coverage Enhancement Phase)

The City is responsible for the following item in regards to the Presidio.

1. Assist Motorola/Contractor in working with National Park Service, as they have their own building criteria and requirements. Develop the final scope of remodel as well as attending any subsequent workshops as required.

Motorola is responsible for the following item in regards to the Presidio Tower.

1. Motorola shall provide corrosion and paint inspection, replace corroded bolts, and remove corroded mounting brackets to the extent that replacement can be accomplished during a normal inspection.

2. Motorola shall provide structural analysis for strengthening the tower if required. Any tower strengthening work is NOT included.

3. Motorola shall provide new dual mode lighting for the tower if required by the FAA

4. Motorola shall provide removal of four non-essential existing antennas and cables.

5. Motorola shall provide installation of coax for Project with no painting or cleaning of tower.

Motorola is responsible for the following item in regards to the Presidio building.

1. Motorola shall provide emergency power in the garage space, and install a 60 KVA generator OR place an outdoor generator and a skid mounted 60-gallon fuel tank on a concrete slab in a walled area.

2. Motorola shall provide a concrete pad for a commercial power transformer, and two air-conditioning condensers in a walled area adjacent to existing building.

3. Motorola shall provide three insulated walls in center garage space with a 3 ft. x 6 ft 8 in metal door inside the garage area. The room shall be 20 ft. x 10 ft. with two air-conditioning units. NO ceiling treatment.

4. Motorola shall provide cable trays within equipment room.

5. Motorola shall provide a raised floor three to four in. with concrete and tile with a waterproof membrane below the new slab.

6. Motorola shall provide a new lighting system for the equipment room.

7. Motorola shall provide a fire wall between equipment room and generator room if the indoor generator is selected.

8. Motorola shall provide removal of asbestos on hot water piping within the garage area only.

9. Motorola shall provide seismic analysis for essential building facility usage.

10. Motorola shall provide building strengthening for seismic retrofit up to a value of 118,685 dollars.

11. Motorola shall provide commercial electrical service to the Presidio radio site.

12. Motorola shall provide a grounding system for the equipment and tower.

13. Motorola shall provide a cable bridge between tower and building or underground conduit for transmission lines.

General assumptions regarding the Presidio.

1. UBC is recognized building requirements.

2. The City has no jurisdiction over construction at the Presidio.

3. Existing building and foundation plans are available.

4. Existing tower and foundation plans are available.

5. Asbestos removal is limited to hot water pipe insulation only.

6. Painting is limited to interior of building in renovation area.

7. No other improvements to buildings are included except for the renovation of garage area.

6.3.9 Transmitter Receiver Site Remote Site — Potrero Hill (Optional Site – Coverage Enhancement Phase)

The City is responsible for the following item in regards to Potrero Hill.

1. The City will obtain all required Potrero Hill plans.

2. The City will obtain all access and construction agreements for Potrero Hill.

3. The City will provide commercial power to the PG&E pole at the northeast corner of the site.

Motorola is responsible for the following item in regards to Potrero Hill.

1. Motorola shall provide a 30 ft. x 12 ft. (20x12 ft for equipment, 10x12 ft for generator) prefabricated reinforced concrete shelter building with an emergency generator room.

2. Motorola shall provide a 100 KVA generator and a skid mounted 60 gallon fuel tank.

3. Motorola shall provide an 8-ft. security fence with two 7-ft. gates.

4. Motorola shall provide a cable bridge between building and tank leg.

5. Motorola shall provide a cable ladder strapped to existing water tank leg.

6. Motorola shall provide commercial power. Power shall be acquired from northeast corner of site, PG&E overhead pole, and run underground 200 ft. to building.

7. Motorola shall provide microwave dish mounts below tank walk way.

8. Motorola shall provide RF antenna mounts above the water tank and attached to the tank as conditions allow.

9. Motorola shall provide clips and hangers for mounting of coax below walkways.

General Assumptions regarding Potrero Hill.

1. Water tank support structure will not require strengthening.

2. Building site is acceptable without major underground structures.

3. Water tank structure, foundation and reservoir plans are available.

6.3.10 901 Rankin Street Radio Shop Remodel

The City is responsible for the following item in regards to Rankin.

1. The City will obtain all required Rankin plans.

2. The city will provide all Architectural and Engineering drawing.

3. The City will obtain all access and construction agreements with Rankin

4. The City will relocate existing equipment to another location in order to facilitate new construction.

5. The City to obtain all permits required for construction.

Motorola is responsible for the following item in regards to Rankin.

1. Motorola shall provide general improvements and remodeling of interior walls to create a technician work area, supervisors offices, immediate parts room, staging room, and training room with drop ceilings, sheet rock walls, insulation, effective lighting, and a static resistant floor covering.

2. Motorola shall provide electrical and communications renovations to accommodate architectural improvements.

3. Motorola shall provide remodeling of Men's and Ladies rest room areas to meet ADA codes.

4. Motorola shall provide floor and wall painting of interior of building.

5. Motorola shall provide a HVAC system for new office areas.

6. Motorola shall provide for replacement of the heating system for the shop area.

7. Motorola shall provide creation of a customer counter and receiving area with adjustable shelving.

8. Motorola shall provide construction within the technician's work area 3'x6' benches with 18"x 48" storage cabinets.

General Assumptions regarding Rankin.

1. Existing building and foundations do not require seismic analysis or strengthening.

2. Rankin is free from hazardous materials

3. Rankin will be completed at the conclusion and acceptance of all other civil work associated with this Project.

4. Final and approved A&E's will define final work packages.

6.4 SITE DESIGN

Motorola's system design is predicated upon the successful acquisition and A&E design of all sites. In the event that alternate sites are necessary, Motorola shall review these alternative sites and make changes to the SOW and Detailed Design in accordance with section 6.07e of the Master Agreement.

The City will be responsible for acquiring all building permits necessary to support the implementation of the described work. The City will be responsible for the generation of all Environmental Impact Reports or Statements and for obtaining all and other approvals which may be necessary to support the Site acquisition, Site Development and radio tower installations required to complete the work herein.

Unless otherwise stated in this Statement of Work, the soil condition at the work site shall be considered as "Normal Soil" as defined in EIA/TIA-222-E.

The City shall pay all fees attached to said permits. The City will pay plan check fees, permit fees, water district fees, electrical service fees, sewer fees and permit application processing fees. Motorola shall pay for costs associated with the legal operation of the contractor's business including City business license fees, contractors license fees, general liability insurance, and workers compensation insurance in accordance with the Master Agreement.

Motorola's response does not provide for any environmental remediation at existing sites relating to contaminated soils, asbestos, and lead paint beyond what is specifically mentioned in this SOW.

Motorola-supplied fixed equipment shall be installed in accordance to Motorola's Fixed Equipment Quality Standards (R-56) and Appendix F, Facilities. Deviations from the (R-56) Quality Standards necessary to resolve site, lease, or economic restrictions, shall be made with the express knowledge and approval of the City.

Motorola shall prepare tower loading and structural analysis documentation of existing towers selected for use in the implementation of the new system. Current State of California PE stamped drawings will be available from the City for all existing towers.

Motorola presumes that all sites and locations where work will be taking place will be free of all Federal, State, or Local Agency identified hazardous waste, including, but not limited to: Asbestos, Gasoline, Oil, Diesel, PCBs, Industrial and Biological waste. Motorola shall make every reasonable effort to identify to the City any areas that it feels may contain any of this material, and upon seeing evidence that such material exists, will stop work on that site, provide written notice to the City, and work with the City to remediate the condition in accordance with section 6.07c of the Master Agreement.

Motorola shall prepare site plans and drawings for review and approval of the City and submit them with the detailed design. Unless specified elsewhere in the Statement of Work, site design documentation for Motorola provided equipment and services shall include the following:

1. Rack and main distribution frame installation details including seismic methods.
2. Equipment rack placement including footprints of floor mounted equipment and wall locations if required.
3. Antenna placements and loading on existing buildings and towers. Documentation for new towers shall include this information.
4. Grounding rod and bus drawings that shall indicate connection to the City's existing grounds or the ground systems provided by Motorola.
5. Termination backboards.
6. Electrical (As applicable to Motorola-supplied equipment and services).
7. AC and DC power distribution panel details for system functions.
8. Circuit breaker location and load assignment.
9. AC and DC power wiring diagrams.
10. Site grounding bus, common ground point.
11. Battery placement and wiring details.
12. Emergency generators including transfer panels to distribution panel.
13. Warning signs in four languages warning of exposure to hazardous radiation in accordance with FCC rules.

Following successful completion of applicable inspections required by the City of San Francisco construction permit process, Motorola shall notify the City Project Manager in writing that the facility upgrade(s) and/or new sites are complete and ready for verification of compliance with the approved SOW, the Performance Specifications, and installation plans. An inspection of the work will be conducted by the City Project Manager or his authorized representative within 10 workings days

Any deviations from the approved Statement of Work or installation plans shall be addressed in accordance with the "punch list " process. Upon notification of the correction of the punch list items, the City Project Manager or his authorized

representative will verify correction of these punch list items within 10 working days. Verification of compliance with the approved Statement of Work, Performance Specifications, and installation plans shall be recorded and shall constitute site acceptance.

City building completion and site acceptance shall not be subject to the installation of equipment or hardware provided under other phases of the Project.

7. FIXED NETWORK EQUIPMENT INSTALLATION

Motorola shall provide a detailed equipment list based upon the final system design in the Detail Design Document as agreed upon by Motorola and the City. Motorola shall install this equipment at the sites listed below:

7.1 TRANSMITTER RECEIVER SITE PRIME SITE — CRS

Motorola shall provide, install, and optimize:

1. Smart Zone Controller
2. Trunked Terminals
3. Telco Interconnect
4. DIUs
5. Prime site controller, and Back up Prime site controller
6. T-Bar switch
7. Comparators
8. USCI equipment
9. Data Broadcast equipment
10. TeNSr Network Server
11. Simulcast test equipment
12. Remote site controller
13. GPS/RB frequency standard
14. Repeater stations
15. Antenna systems
16. Mutual Aid repeaters
17. Ambassador Electronics Bank
18. Conventional radio CEB's

19. Logging Recording equipment
20. Spares
21. Racks
22. Manuals
23. Master Clock
24. Microwave equipment
25. MOSCAD fault management system w/terminal (Optional)
26. UPS system
27. CADI interface server

7.2 TRANSMITTER RECEIVER SITE REMOTE SITE — FT. MILEY

Motorola shall provide, install, and optimize:

1. Remote site controller
2. TeNSr network server
3. Repeaters
4. GPS/RB frequency standard
5. Antenna systems
6. Racks
7. Microwave equipment
8. MOSCAD fault management component w/port for terminal (Optional)
9. UPS system

7.3 TRANSMITTER RECEIVER SITE REMOTE SITE — ONE MARKET PLAZA

Motorola shall provide, install, and optimize:

1. Remote site controller

2. TeNSr network server
3. Repeaters
4. GPS/RB frequency standard
5. Antenna systems
6. Racks
7. Microwave equipment
8. MOSCAD fault management component w/port for terminal (Optional)
9. UPS system

7.4 TRANSMITTER RECEIVER SITE REMOTE SITE — FOREST HILL

Motorola shall provide, install, and optimize:

1. Remote site controller
2. TeNSr network server
3. Repeaters
4. GPS/RB frequency standard
5. Antenna systems
6. Racks
7. Microwave equipment
8. MOSCAD fault management component w/port for terminal (Optional)
9. UPS system

7.5 TRANSMITTER RECEIVER SITE REMOTE SITE — SF STATE UNIVERSITY

Motorola shall provide, install, and optimize:

1. Remote site controller
2. TeNSr network server

3. Repeaters
4. GPS/RB frequency standard
5. Antenna systems
6. Racks
7. Microwave equipment
8. MOSCAD fault management component w/port for terminal (Optional)
9. UPS system

7.6 TRANSMITTER RECEIVER SITE REMOTE SITE — BERNAL HEIGHTS

Motorola shall provide, install, and optimize:

1. Remote site controller
2. TeNSr network server
3. Repeaters
4. GPS/RB frequency standard
5. Antenna systems
6. Racks
7. Microwave equipment
8. MOSCAD fault management component w/port for terminal (Optional)
9. UPS system

7.7 TRANSMITTER RECEIVER SITE REMOTE SITE — SOUTH HILL

Motorola shall provide, install, and optimize:

1. Remote site controller
2. TeNSr network server
3. Repeaters

4. GPS/RB frequency standard
5. Antenna systems
6. Racks
7. Microwave equipment
8. MOSCAD fault management component w/port for terminal (Optional)
9. UPS system

7.8 TRANSMITTER RECEIVER SITE REMOTE SITE — CLAY JONES

Motorola shall provide, install, and optimize:

1. Remote site controller
2. TeNSr network server
3. Repeaters
4. GPS/RB frequency standard
5. Antenna systems
6. Racks
7. Microwave equipment
8. MOSCAD fault management component w/port for terminal (Optional)
9. UPS system

7.9 TRANSMITTER RECEIVER SITE REMOTE SITE — PRESIDIO (OPTIONAL SITE – COVERAGE ENHANCEMENT PHASE)

Motorola shall provide, install, and optimize:

1. Remote site controller
2. TeNSr network server
3. Repeaters

4. GPS/RB frequency standard
5. Antenna systems
6. Racks
7. Microwave equipment
8. MOSCAD fault management component w/port for terminal (Optional)
9. UPS system

7.10 TRANSMITTER RECEIVER SITE REMOTE SITE — POTRERO HILL (OPTIONAL SITE - COVERAGE ENHANCEMENT PHASE)

Motorola shall provide, install, and optimize:

1. Remote site controller
2. TeNSr network server
3. Repeaters
4. GPS/RB frequency standard
5. Antenna systems
6. Racks
7. Microwave equipment
8. MOSCAD fault management component w/port for terminal (Optional)
9. UPS system

7.11 RCS CONSOLES—INSTALLATION AND CUT-OVER

A cut-over plan shall be developed by Motorola and the City to ensure that the interruption of communications shall be minimized during the transition. The cut-over plan shall be submitted to the City for review and approval. Upon completion of installation for each of the 2 RCS systems that portion of the RCS system shall be tested in accordance with the acceptance test plan.

7.11.1 Site 1: (CCE1) at The Prime Site

Motorola shall provide, install, and optimize:

1. Console control equipment (CCE1)
2. TeNSr network server
3. UPS system
4. MOSCAD fault manager system (Optional)
5. DTIS operator position (local)
6. RCSM terminal

7.11.2 Site 2: Combined Dispatch (CCE2) at CECC.

Motorola shall provide, install, and optimize:

1. Elite network server and LAN
2. RCS CAD interface server
3. Console control equipment (CCE2)
4. SFPD Console terminal equipment
5. SFFD Console terminal equipment
6. DPH Console terminal equipment
7. OES Console terminal equipment.
8. DTIS Console equipment.
9. PUC software and devices
10. Loop Switching equipment
11. TeNSr network server
12. MOSCAD fault management equipment w/terminal (Optional)
13. UPS system

14. Backup control stations and antenna systems
15. SmartZone user terminal
16. Long term recording system

7.11.3 Site 3: DPT

Motorola shall provide, install, and optimize:

1. Console terminal equipment (remote)
2. Elite LAN network
3. UPS system

7.11.4 Site 4: Sheriff

Motorola shall provide, install, and optimize:

1. Console terminal equipment (remote) to CCE1
2. UPS system

7.11.5 Site 5: Water

Motorola shall provide, install, and optimize:

1. Console terminal equipment (remote)to CCE1
2. Remote control units
3. Elite LAN network
4. Console furniture
5. UPS system
6. Integration of existing CCTV, paging, and PA systems

7.11.6 Site 6: Rankin Maintenance Facility (DET)

Motorola shall provide, install, and optimize:

1. CCE1 Console terminal equipment (remote)
2. Elite LAN network
3. TeNSr network server
4. TRSM terminal
5. RCSM terminal
6. MOSCAD fault management equipment w/terminal (Optional)
7. SmartZone terminal

7.12 COVERAGE ENHANCEMENT AREAS

7.12.1 Hall of Justice

Jail Annex

Motorola shall provide, install, and optimize:

1. A Prism Plus bi-directional amplifier
2. An antenna into each floor of each pod
3. A MicroFill amplifier and leaky-feeder on the ground floor
4. Roof donor antenna

Underground Parking

Motorola shall provide, install, and optimize:

1. Prism Plus bi-directional amplifier
2. MicroFill amplifier
3. Leaky-feeder in an "S" configuration
4. Roof donor antenna

7.12.2 San Bruno Jails

Jail #3

Motorola shall provide, install, and optimize:

1. Parabolic grid antenna
2. Prism Plus bi-directional amplifier
3. Parabolic grid antenna feeder for Jail #7 and Annex building
4. MicroFill amplifier
5. Panel antennas on each floor
6. Leaky-feeder in the basement area

Jail #7

Motorola shall provide, install, and optimize:

1. Prism Plus bi-directional amplifier
2. Antennas for each floor
3. Roof donor antenna

Annex

Motorola shall provide, install, and optimize:

1. Prism Plus bi-directional amplifier
2. Antennas spaced throughout the annex
3. Roof donor antenna

7.12.3 Moscone Center

Motorola shall provide, install, and optimize:

1. Prism Plus bi-directional amplifiers distributed throughout the center
2. Roof donor antenna

7.12.4 MUNI Tunnel Network

Motorola shall provide, install, and optimize:

1. A MicroLite system with single mode 1310 dark fiber running from the Civic Center Station to the Portals at Twin Peaks, Sunset Tunnel, and Civic Center Station.

2. 3/4 in. leaky-feeder with bi-directional amplifiers at 1200 ft intervals throughout the tunnels.

3. Antennas and amplifiers located in the stations

4. Andrew Corporation alarm modules tied to the BART alarm system.

5. An 8-hour UPS system

7.12.5 San Francisco Airport

City will provide circuits from the airport to CRS.

Motorola shall provide, install, and optimize:

1. Two 800 MHz Mutual Aid stations and related Antenna Systems

2. Two BIMS at CRS CEB

8. SYSTEM INTEGRATION/SYSTEM OPTIMIZATION TASKS

For the purpose of this document, the terms System Integration and System Optimization are considered synonymous. The term optimized is used to define the desired final status of a site or subsystem.

8.1 GENERAL SYSTEM INTEGRATION TASKS

System Integration for all systems includes the following tasks:

1. Install all required hardware and/or software.
2. Install, verify, and document all Product Service Directives (PSDs) as required.
3. Install, verify, and document all required board jumpers as required.
4. Verify and document the proper configuration and interconnection of all site components and interfaces.
5. Verify and document testing of all telco and/or microwave circuits.
6. Test all spare boards.
7. Verify that Department-supplied backup AC power systems (as available) conform to published Motorola equipment specifications and load requirements.
8. Adjust and document all end-to-end audio and data levels per manual.
9. Verify all system features and parameters.
10. Produce interface control document as described in the Performance Specifications

Any City equipment that requires replacement or removal shall be delivered to a City-identified location within the City and County of San Francisco.

8.2 CENTRAL CONTROLLER INTEGRATION

The following System Integration tasks shall be performed for SmartZone central controllers:

1. Verify card cage configurations are correct.
2. Test and verify all required interfaces (repeater, telco, modem, system manager, etc.).

3. Adjust and document all levels per manual.
4. Test manual operation of each board.
5. Test all boards under control of system software.
6. Test central channel selections.
7. Test voice channel selections.
8. Test call processing.
9. Test manual reset function.
10. Verify failsoft operation.
11. Test automatic reset function.
12. Test customer software options (including fleet map).
13. Test all switch over functions in the redundant controller configuration.

8.3 REPEATER INTEGRATION

The following System Integration tasks shall be performed for SmartZone Trunked Repeaters:

1. Test repeater functions.
2. Set and document repeater levels (audio, RF and control).
3. Test call processing.
4. Test failsoft operation.
5. Test interconnect operation.
6. Test control channel operation.

Tasks 1, 2, and 3 shall be performed for all Mutual Aid stations in the analog mode.

8.4 INTEGRATION OF OTHER EQUIPMENT

The following System Integration tasks shall be performed for the described equipment associated with the SmartZone Trunked System:

1. Modems/Channel Bank Equipment
2. Test and ensure the functional operation of the microwave on an end to end basis.
3. Verify Astro-Tac mounting configuration
4. Set all module levels on Astro-Tac subsystem
5. Verify and document all cross connections
6. Verify all LED functions
7. Test repeater control functions
8. Test central controller responses
9. Set and document levels on simulcast digital equipment.
10. System Phasing
11. Set, test, and document all audio delay parameters to minimize distortion due to destructive interference.
12. Phase all transmitters in the system to minimize destructive interference with the GPS/frequency standard.
13. Set console audio levels
14. Test Secure operations if applicable
15. Test console priority

8.5 RCS INTEGRATION

The following Systems Integration tasks shall be performed for console systems:

Central Electronics Bank

1. Test all new CEB interfaces for proper performance.
2. Test and document all CEB diagnostics.
3. Test all new console options at CEB.
4. Verify all new punch block assignments and cross connects.

Operator Positions

1. Test all operator position for proper performance.
2. Test and document all operator diagnostics.
3. Test all console options at all operator positions.
4. Test operation of PUC at each position
5. Test 911 I/F
6. Test Recorder I/F
7. Test PSTN I/F
8. Test I/OS
9. Test RTS/CTS
10. Test CAD Interface
11. Test conventional channels

8.6 FIXED NETWORK EQUIPMENT TESTING

8.6.1 Central Controllers

Motorola shall complete the following tasks:

1. Install the site controller
2. Test repeater interface cables
3. Test telco interface cables
4. Test data modem interfaces
5. Install controller grounding
6. Terminate all necessary connections
7. Install and verify all board jumpers and straps
8. Ensure card cage configuration is correct

9. Make sure repeater interfaces are correct
10. Verify telco interface is correct
11. Install and verify correct software
12. Install modifications
13. Install and verify all Product Service Bulletins (PSBs)
14. Measure and set DC power supplies
15. Test manual operation of each board
16. Test all spare boards
17. Test all boards under software control
18. Test control channel selections
19. Test voice channel selections
20. Test call processing
21. Test manual reset
22. Verify failsoft operation
23. Test auto reset
24. Test and verify modem interfaces
25. Test customer software options available at time of optimization
26. Test system manager's interface
27. Test centralized telephone interface shelf
28. Test console wireline interface
29. Test cross patch operations
30. Complete documentation (final package to the City)
31. Verify proper configuration of all software versions

8.6.2 Repeaters

Motorola shall complete the following tasks:

1. Install repeaters
2. Install all repeater interfaces
3. Install repeater grounding
4. Verify repeater configuration
5. Install all modifications
6. Install and verify all Product Service Bulletins (PSB)
7. Test repeater functions
8. Set repeater levels
9. Set system levels
10. Test all repeater interfaces
11. Test call processing
12. Test failsoft operation
13. Test control channel operation
14. Test end-to-end levels
15. Test data deviation
16. Complete documentation—(final package to the City)
17. Verify proper configuration of all software versions

8.6.3 Data Modems

Motorola shall complete the following tasks:

1. Install modems
2. Install modem interfaces

3. Install modem grounding
4. Set modem strapping
5. Test modem operation
6. Test end-to-end communications
7. Complete documentation—(final package to the City)
8. Verify proper configuration of all software versions

8.6.4 AstroTac 3000

Motorola shall complete the following tasks:

1. Install card cages in rack
2. Install all cross-connects
3. Install Astro-Tac grounding
4. Verify rack configuration
5. Install all modifications
6. Install and verify all PSBs
7. Set system program/parameters
8. Set system end-to-end levels
9. Test data to and from Astro-Tac
10. Test Console Priority Interface (CPI) functions
11. Complete documentation—(final package to the City)
12. Verify proper configuration of all software versions

8.6.5 Audio Processing Shelves (USCI—DSM II)

Motorola shall complete the following tasks:

1. Install audio processing shelves

2. Install all cross connects
3. Install grounding
4. Verify rack configuration
5. Install all modifications
6. Install and verify all PSBs
7. Set system end-to-end levels
8. Set system delays and audio phasing
9. Test all rack interfaces
10. Test call processing
11. Complete documentation—(final package to the City)

8.6.6 Console Interface Unit (CIU)

Motorola shall complete the following tasks:

1. Install console interface units (CIUs)
2. Install all cross-connects
3. Install system grounding
4. Install all modifications
5. Install and verify all PSBs
6. Test key loader
7. Test and set clear audio
8. Test and set coded audio
9. Test call processing
10. Complete documentation—(final package to the City)

8.6.7 Microwave

Motorola and its subcontractor shall complete the following tasks:

1. Install multiplex card units
2. Install power supply
3. Install all cross-connects
4. Install system alarms
5. Apply AC power
6. Install microwave grounding
7. Verify rack configurations
8. Verify all microwave interfaces
9. Test power supplies
10. Test radio, mux and alarm functions
11. Set radio and mux levels
12. Set system levels
13. Install and test loop switching equipment
14. Install dehydration system (if required)
15. Install all modifications
16. Install and verify all PSBs
17. Verify complete system end-to-end levels
18. Verify termination level strapping
19. Complete documentation—(final package to the City)

8.6.8 GPS Frequency Standard

Motorola shall complete the following tasks:

1. Install standard
2. Install all cabling and interfaces required
3. Install grounding
4. Run diagnostics
5. Install all modifications
6. Run and optimize
7. Complete documentation—(final package to the City)

8.6.9 Consoles

Motorola shall complete the following tasks:

1. Install all CEB interfaces and AEB equipment
2. Install console options
3. Install RCS interfaces
4. Install BIM and BIM interfaces
5. Install console grounding
6. Install all modifications
7. Install and verify all PSBs
8. Program CEB and operator positions
9. Test CEB diagnostics
10. Test operator position diagnostics
11. Install and Test all RCS0 interfaces
12. Test all console options
13. Set end-to-end trunked system levels
14. Complete documentation—(final package to the City)

9. USER EQUIPMENT INSTALLATIONS

9.1 CONTROL STATIONS FOR USER DEPARTMENTS

The City shall provide, install and optimize:

1. Emergency power
2. Space adequate to house control stations
3. Electrical outlets as specified by Motorola
4. Earth ground within 5' of control station location, if desired by Department
5. Environmental conditions for proper equipment operation

Motorola shall provide, install, and optimize:

1. Spectra Consolette and Astro Spectra Consolette
2. Remote Deskset DGT 9000
3. 800 MHz antenna
4. Antenna feed line and connectors (50 ft. average of feed line per site)
5. PolyPhaser lightning protection
6. AC power routing
7. Spare equipment

All control station radio checkout and programming tasks associated with control stations shall be performed by Motorola as detailed in Appendix F, Facilities Requirements. Motorola shall assist the City in developing its fleet map and radio configuration. Each user groups shall be limited to one template per control station type. Template revisions shall be limited to one per department control station type. The City Departments shall provide the required information in accordance with the Master Project Schedule. Once the template and configuration have been approved by City Project Manager, Motorola shall program all control stations. Any changes to the radio programming or template after City approval, due to City requested changes, will require a change order.

9.2 DEPARTMENT MOBILES

The Department will provide (if installation work is completed at department provided locations):

8. Space adequate to house Department equipment, during installation

9. Electrical outlets as specified by Motorola

10. Suitable location for mobile installations for all seasons

Motorola shall provide, install, and optimize:

11. MCS 2000 Model II and Astro spectra, Model A4 (dash mount Type A basic)

12. MCS 2000 Model III and Astro spectra, Model A7 (dash mount Type B with keypad)

13. MCS 2000 Model III and Astro spectra Model A7 (dash mount Type B with keypad and encryption)

14. MCS 2000 Model II and Astro spectra Model A4 (trunk mount Type A)

15. MCS 2000 Model III and Astro spectra Model A7 (trunk mount Type B with keypad)

16. MCS 2000 Model III and Astro spectra Model A7 (trunk mount Type B with keypad and encryption)

All mobile radio checkout, installation, and programming tasks shall be performed by Motorola as detailed in Appendix F, Facilities Requirements. Motorola shall assist the City in developing its fleet map and radio configuration. Each user groups shall be limited to one template per mobile type. Template revisions shall be limited to one per department per mobile type. The City Departments shall provide the required information in accordance with the Master Project Schedule. Once the template and configuration have been approved by the City Project Manager Motorola shall program all mobiles. Any changes to the radio programming or template after City approval, due to City requested changes, will require a change order.

9.3 DEPARTMENT PORTABLE UNITS

Motorola shall provide, install, and optimize:

1. MTS 2000 Model I and Astro saber Model I (Type A basic)

2. MTS 2000 Model III and Astro saber Model III (Type B with keypad)

3. MTS 2000 Model I and Astro saber Model I (Type B with keypad and encryption)
4. MTS 2000 Model I and Astro saber Model I (Type A with encryption)
5. Ruggedized ASTRO SABER Type II
6. Battery charger—single unit, rapid rate charge
7. Battery charger—multi unit, rapid rate charge
8. Portable radio battery intrinsically safe
9. Belt clips
10. Surveillance, earpiece, microphone and PTT
11. Vehicle adapter

All portable radio checkout and programming tasks associated with portable radios shall be performed by Motorola as detailed in Appendix F, Facilities Requirements. Motorola shall assist the City in developing its fleet map and radio configuration. Each user groups shall be limited to one template per portable type Template revisions shall be limited to one per department per portable type. The City Departments shall provide the required information in accordance with the Master Project Schedule. Once the template and configuration have been approved by the City Project Manager Motorola shall program all portables. Any changes to the radio programming or template after City approval, due to City requested changes, will require a change order.

9.4 SPECIAL OPERATION VEHICLE EQUIPMENT

Motorola shall provide, install and optimize:

1. Special operations vehicle equipment

9.5 TEST EQUIPMENT

Motorola shall provide and optimize:

1. Test equipment

10. SYSTEM DOCUMENTATION

The following documentation shall be provided by Motorola for all subsystems:

1. Equipment inventory documentation, including serial numbers, physical location and final mode/channel configuration
2. Site inspection documentation
3. Equipment performance documentation
4. Copies of customer signed completion certificates
5. Drawings of all equipment rooms, layouts, wiring diagrams, punch block layouts, special circuits.
6. Supply drawings and documentation as specified in the Detail Design Document
7. Maintenance manuals including any applicable Product Service Bulletins
8. Documentation required in the CDRL

In the event a CDRL submittal is not approved, Motorola expects the City to provide sufficient dialogue detailing the document deficiencies and desired changes so Motorola can make a single revision to the document in order to obtain approval. Motorola would not expect to provide more than one revision for any CDRL submittal.

11. PROJECT CLOSE OUT

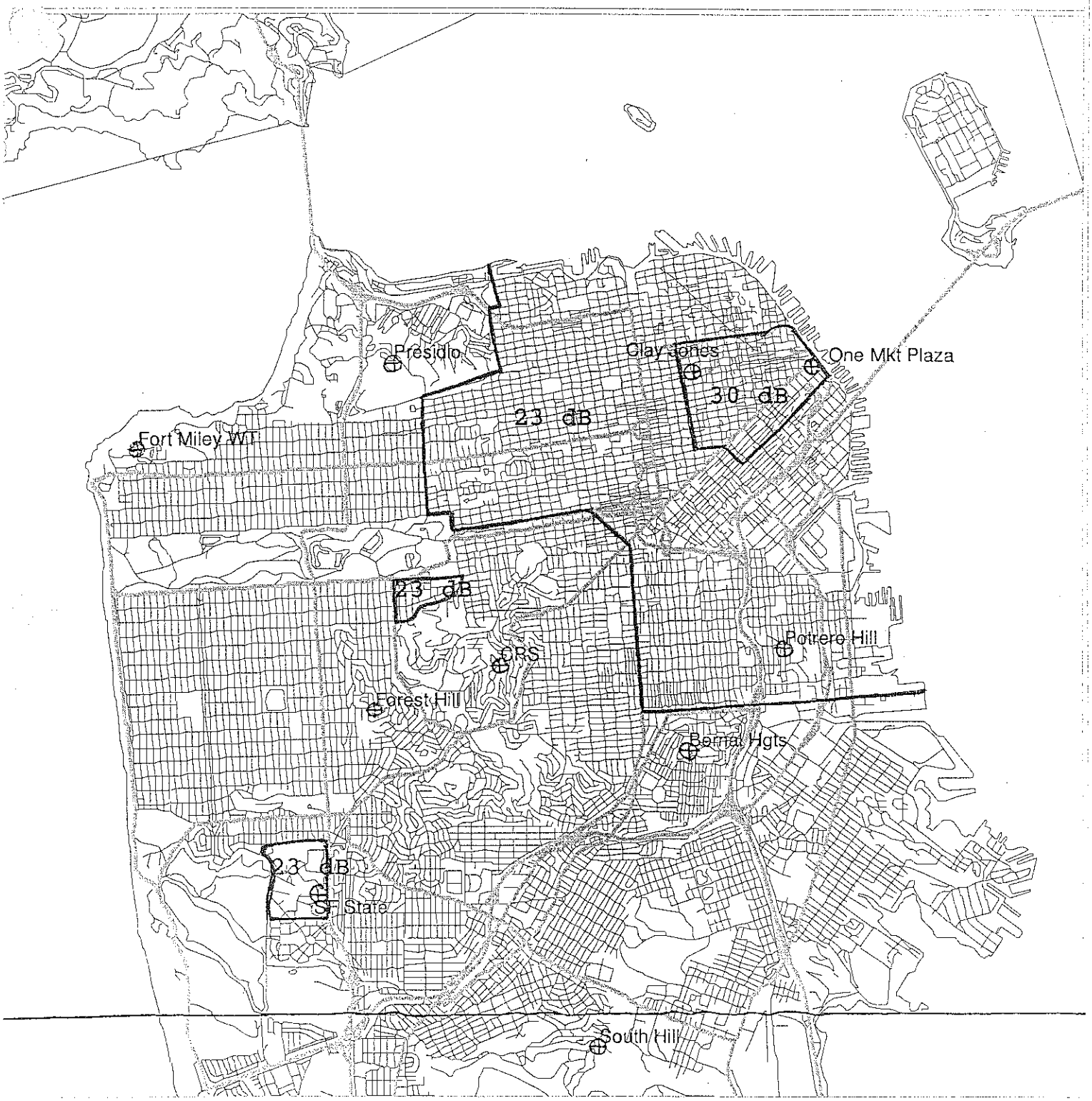
Close office/warehouse facility, and archive documents.

Coverage Maps Index

The following MOZAIK coverage maps were evaluated at 95% reliability and an audio quality of Circuit Merit 3 within the area of the City and County of San Francisco. The On Street maps show the system coverage for both portables and mobiles on the streets of the coverage area. As the city requested, the portable radios must meet specific in building requirements based on different locations within the city. These requirements are further explained below. There are four situations illustrated for both the on street and the in building coverage. The 8 site coverage area includes Clay Jones, One Market Plaza, CRS, Bernal Heights, South Hill, Forest Hill, SF State and the Fort Miley Water Tower. There are 2 different 9 site situations, both including the above 8 sites. One includes Potrero Hill and the other includes Presidio. The last site combination is all 10 sites. The Central Radio Mutual Aid site coverage map is the final set of maps included in each of the mobile and portable sections.

The portable in building composite maps are put together using three different building losses based on the City's recommendations. An area of 30 dB building loss is shown in the financial district. This area encompasses the Clay Jones and One Market Plaza Sites. 23 dB building losses cover the dense areas of San Francisco, including the Potrero Hill site, a small area by San Francisco State University, the vicinity of the Stonestown Shopping Center and the area surrounding the UC Medical Center. The remainder of the City has in building coverage predicted for 15 dB buildings.

The specific areas affected by each of these different building coverages are outlined on the detailed street map, and clearly labeled based on which building loss was used to predict coverage. The composite coverage maps show borders around each of these areas, as well as different color schemes to differentiate the three types of building loss. If it is not marked otherwise, the coverage predicted is for 15 dB buildings.



0 1.0 2

SCALE : 1.25 MILES PER INCH

Calculated values are derived using average loss values for surroundings. Some low lying heavily wooded or urban areas may result in lower values than those indicated.