4.6 DETAILED SCOPE OF WORK

4.6.1 Implementation Overview

This section describes Motorola Solutions' (Motorola) implementation plan and serves as a Statement of Work ("SOW"). Motorola is highly skilled at deploying systems of the size and complexity of the one we are implementing for the SFPUC. For the duration of the implementation and acceptance periods, the SFPUC project manager will have the full support from Motorola's project team, consisting of systems engineers, field technical representatives, product and systems consultants, radio technicians, the resources of Motorola's product organizations, and Motorola's defined subcontractors—all focused, to design, build, install, optimize, test, and assist in the transition of the SFPUC's dispatch operations and users to the system.

This Implementation Plan defines the principal activities and responsibilities of all parties for the implementation of the Water Enterprise Land Mobile Radio System Replacement Project (SFPUC), a Project 25 Phase 2 Time Division Multiple Access (TDMA) 800 MHz communications system, referred herein as "the system." Unless otherwise indicated from the context in which it is used, the word "system" will be used herein to refer to the compilation of the subsystems, interfaces, and ancillary systems. Through TDMA, the system will provide 4 talk paths.

This section will address key aspects of the implementation process including:

- High-level implementation process.
- Statement of Work (SOW).
- Timeframe for implementation.
- High-level migration description.
- High-level testing description.
- High-level training plan.
- High-level system support plan.

4.6.1.1 System Design Summary

Motorola's solution for SFPUC will be a sub-system add-on to the full redundant San Francisco ASTRO 25 platform with Integrated Voice and Data (IV&D). The system will be comprised of the following:

1. Capacity Licenses for the San Francisco ASTRO 25 Master Site:
    - Nine (9) ASTRO 25 RF Radio Sites
    - Presence and Location Services for up to 1000 devices.
    - (2,000) Subscriber Licenses
    - A1Text Messaging for up to 1000 devices.
    - Eleven (11) Dispatch Positions.
    - Network Management Capacity Licenses.
2. 800 MHz P25 Phase 2 TDMA trunked radio system:
    - Hetch Hetchy Simulcast Cell:
        - Three sites (Duckwall, Burnout Ridge, Poopenaut) with 3

channels.
- Prime Site location will be determined during design review post contract.
- Geo-redundant Prime Site located at Burnout Ridge.
  - Six ASTRO Standalone Trunked Repeater Sites (ASR), 3 Channels each (Sawyer Ridge, Kings Mountain, Mount Allison, ACITD, CCWD, Moccasin Peak)
3. Conventional Channel at the SVWTP Site.
4. Conventional Channel at the Intake Radio Site.
5. Fixed DVRS Conventional Repeaters at:
   - San Antonio Watershed Cottage.
   - San Andreas Cottage.
   - Harry Tracy Water Treatment Plant.
   - Upper CS Cottage.
   - Sunol Valley Water Treatment Plant.
6. Dispatch Console System:
   - Moccasin Dispatch:
     - 5 MCC7100 Operator Positions.
   - Kirkwood Powerhouse Dispatch:
     - 1 Remote MCC7100 Operator Position.
   - PUC (Newcomb) Dispatch Center:
     - 2 MCC7100 Operator Positions.
   - El Camino Real Dispatch Center:
     - 3 MCC7100 Operator Positions.
7. Network Management Terminals located at Moccasin Dispatch Site, Sunol and Millbrae.
8. 13 Remote Terminal Units (RTUs) for Environmental Alarms.
9. Microwave System to connect to San Francisco System to the SFPUC Microwave. Backhaul:
   - Nine (9) Redundant Microwave Hops:
     - Forest Hill to Sawyer Ridge.
     - Sawyer Ridge to Kings Mountain.
     - Kings Mountain to Mt. Allison.
     - Mt. Allison to ACITD.
     - ACITD to CCWD.
     - CCWD to Pelican Ridge.
     - Moccasin Peak to Duckwall.
     - Duckwall to Intake Radio Site.
     - Poopenaut Hop to one of the sites above.

10. **540 APX 1000 Portable Radios:** Final count to be determined during the project via change order. If additional radios are needed, the SFPUC will pay the additional charges that exceed those of 540 units. If less radios are needed, a credit will be applied for other work required to complete the project.
    - Radio Management.
11. **51 APX 1500 Mobile Radios** Final count to be determined during the project via **change** order. If additional radios are needed, the SFPUC will pay the additional charges that exceed those of 51 units. If less radios are needed, a credit will be applied for other work required to complete the project.
    - Remote Mount Installation
12. Spare Equipment.

13.   Site Development and Improvements:
  –   Sawyer Ridge:
        •   80' Tower.
        •   35 KW Outdoor Generator.
  –   Burnout Ridge:
        •   Battery Bank.
  –   Kings Mountain:
        •   195' Tower.
  –   Duckwall:
        •   25 KW Generator.
        •   Battery Bank.
  –   All other radio sites (Poopenaut, Moccasin Peak, Mt. Allison, Intake, Sunol Valley Water Treatment Plant and ACITD) are deemed to be "ready to go" for installing Motorola equipment, including antennas. These site are expected to have minimal site preparation work. If this assumption is not correct, a change order will be negotiated.
14.   Warranty and Post Warranty Services (starting at system acceptance)
15.   Asset Management Subsystem with 5 User Licenses .
16.   Quantity One Spare Vehicular Repeater System (DVRS)
17.   Quantity One Spare Control Stations with Antenna System
18.   Quantity One Spare MCD5000 Deskset

4.6.1.2 Assumptions

1.   SFPUC will provide site access to Motorola personnel to all facilities where the system is to be installed during the Project. Temporary identification cards will be issued to Motorola personnel if required for access to SFPUC facilities. SFPUC will ensure that Motorola has site access and site keys necessary for access and to prevent delays. Each site will require access multiple times during the course of the Project and access will be provided in accordance with the Project Schedule. Access must be available after business hours where required by Motorola, or as necessary to meet the Project Schedule.

2.   SFPUC will provide any required parking permits to Motorola personnel for restricted access entry and/or parking.

3.   Clear and stable site access road and sufficient space for Motorola vehicles exists at all sites. Motorola assumes communication sites are accessible throughout the dates set on the Project Schedule using 4 wheel drive vehicles. Any means of site access above and beyond 4 wheel drive vehicles will require a change to adjust transportation costs. SFPUC may, at its option, provide transportation for Motorola personnel to its facilities and sites. **Note:** Access to Duckwall is very limited and Motorola must access this site when the roads are accessible.

4.   SFPUC is responsible for ensuring that appropriate and adequate power is available to power the Motorola-provided equipment.

5.   SFPUC to provide maps and keys for all site locations.

6.   Most equipment installation work may be conducted between 8:00 AM and 5:00 PM. Some systems may require after-hours installation.

7.   Any local codes and jurisdictions requirements that impact the scope of work or schedule have not been taken into account and may result in a change in scope to the extent

provided in the Master Agreement.

8. Relocation of power or utilities is not included in the scope of work.

9. Motorola is not responsible for interference caused or received by the Motorola provided equipment except for interference that is directly caused by the Motorola-provided transmitter(s) to the Motorola-provided receiver(s). Should SFPUC system experience interference, Motorola will assist the SFPUC to remedy interference issues and can be contracted to take responsibility to investigate the source and recommend solutions to mitigate the issue.

10. Not all sites were visited during the creation of this system design and not all information was available. For these reasons, certain assumptions were made in the creation of this SOW for SFPUC. Incorrect assumptions or modifications to these assumptions may result in a change order to the project. These assumptions include:

11. Internal electrical work at the sites (e.g. running AC outlets above rack locations, adding breakers to electrical panels) will be the sole responsibility of SFPUC.

12. Existing towers, upon which Motorola will be installing antennas, have as-builts and documentation regarding their existing loading in order for Motorola to perform loading analysis on these towers prior to installation of antennas.

13. Solar sites in which Motorola will be modifying the site power system are in good working order and the power system modifications can be made. A detailed analysis of these will be performed post-sale.

14. The SFPUC users operating on the current City of San Francisco system will be migrated to the new system on the schedule of the City and county of San Francisco system replacement project. System interoperability will be addressed during the SFPUC Design Review of the Migration Plan.

15. The proposed Microwave links appear to have clear paths. However, link viability surveys will be performed post-sale to ensure viability.

16. The proper way to model in-building coverage is to apply a loss to the area to be covered that represents the loss for buildings. Motorola has chosen to model the in-building coverage with this method instead of the raising of reliability to 97%.

17. For the Burnout Ridge and Duckwall sites, Motorola has included rack mounted batteries to supply up 8 hours of battery backup for the new P25 system equipment only.

18. Motorola will assist SFPUC with negotiating agreements for the Kings Mountain, CCWD, and ACITD sites, and will assist with re-negotiating the lease agreement for the Mount Allison site. Motorola cannot ensure that site owners will accept SFPUC terms. SFPUC is responsible for securing the site leases. The actual costs for the lease themselves are not included with this SOW and remain as responsibility of SFPUC.

19. During contract negotiations, the parties agreed to replace the Marcial Peak site with ACTID site and moved the Moccasin Peak from the Simulcast Cell to an ASR Repeater Site. The parties have documented these changes in this SOW. These changes will also be incorporated into the System Description and Equipment List during the detailed design review process, which shall commence upon contract execution.

4.6.1.3 Experience Counts

Motorola has been the leader in the design and implementation of business-critical wireless

communications systems for over 85 years. Our systems integration team has successfully implemented over 1,000 mission-critical standards-based voice and data networks, including 34 of 40 statewide systems in the United States. Of particular importance to the SFPUC is Motorola's proven capability to deliver Project 25 Phase 2 TDMA systems. Motorola has delivered and achieved customer acceptance of P25 Phase 2 systems, and more agencies have selected Motorola to implement their Project 25 Phase 2 systems than all other manufacturers combined.

Systems integration is one of our core businesses. This ensures that we can dedicate personnel with direct relevant experience in successfully implementing large scale communications systems of the size and complexity of the SFPUC. Customer satisfaction surveys show that our customers consistently rate themselves "very satisfied" with Motorola's implementation performance, because we deliver our projects on time and on budget, and always see our projects through to a successful conclusion.

Motorola's SOW provides systems integration and implementation services to deploy a fully functional communications system. Motorola's experience as a systems integrator, deploying large and complex communication and software systems, will provide a smooth system implementation and cutover to the new communications system.

4.6.1.3.1   Approach to Implementation

Motorola is experienced in implementing systems similar to the system provided to the SFPUC, and offers the SFPUC an implementation approach that includes the following key phases:
- Project initiation and kickoff.
- Detailed design review.
- Order processing, manufacturing.
- Site Preparation and Site Development.
- Fleet Map Development (Talkgroup Mapping).
- Factory staging and testing.
- Equipment delivery.
- Site Development Completion.
- Equipment installation.
- Systems integration and optimization.
- Subscriber Programming.
- Installation Inspection.
- Field acceptance testing.
- Coverage acceptance testing.
- Technical and System management Training.
- Radio Rollout.
- System migration and cutover.
- Project finalization including documentation.
- Burn-In Period.
- Final System Acceptance.
- Warranty support (1st year after final system acceptance).
- Post warranty maintenance support (Years 2-9).

Each of the phases is described in detail in Section 4.6.2.

4.6.1.4 Project Schedule/Timeline
See Appendix G, Project Timeline.

4.6.1.5 Project Staffing

The local project team, reporting to our California-based senior management, will have the day to day responsibility for ensuring Motorola fulfills its obligations for a smooth and on-time implementation. Key team structure for this project is identified in Figure 4-38.
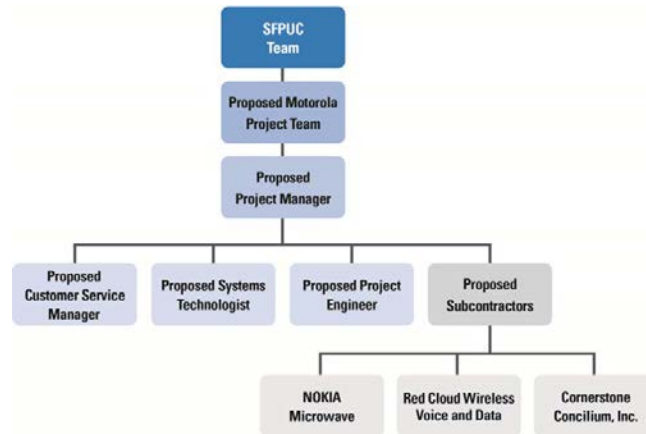

Figure 4-38: Key Team Structure for SFPUC's System

Motorola's dedicated team, identified in Figure 4-39, will be led by Jim Hardimon, who will be the overall Project Manager, and the single point of contact. The Project Manager holds overall responsibility for delivery and implementation of the system and management of Motorola responsibilities pursuant to the performance schedule and budget. The key personnel on our project team are local residents of the Bay Area and, in some cases, of SFPUC itself. Their actual locations are shown in Figure 4-39.

Figure 4-39: Your Local Motorola Team

Motorola Project Manager is assigned to SFPUC project throughout the project implementation

phase. Motorola Engineer and Motorola Technicians will be dedicated to SFPUC project during tasks assigned to them throughout the implementation phase of the project. If any team member is absent for any period of time during project implementation, Motorola Project Manager will communicate that with SFPUC Project Manager and will introduce a replacement resource to keep project schedule on track. Team member changes or temporary replacements will be communicated with SFPUC project manager in advance.

For Motorola's general processes for coordinating and managing work activities to ensure the quality and accuracy of Motorola deliverables, please refer to Section 4.6.1, Implementation Overview, Section 4.6.1.9, Change Management Objectives, Section 4.6.1.6, Communication Plan, and Section 4.6.2, Statement of Work/Work Breakdown Structure, which detail our processes to ensure the quality and accuracy of deliverables per mutually agreed design. Motorola will not start implementing the project until SFPUC approves the design, Scope of Work and Project Schedule. If any technical conflicts and variances in deliverables are discovered, are communicated to the Motorola Project Manager to formulate a plan for correction. The Motorola Field Quality Manager will be involved throughout the implementation phase to ensure adherence to quality standards described Section 4.6.1.7, Quality Assurance/Quality Control Plan.

Motorola's dedicated project manager will be coordinating and managing work activities to ensure meeting project schedule, milestones and due dates per project cost. Any project schedule variances or cost issues and the resolutions thereto will be communicated throughout the project during the bi-weekly project meetings. Please refer to Section 4.6.1.6, Communication Plan, Section 4.6.2 Statement of Work/Work Breakdown Structure, and Section 4.6.1.11, Effective Change Management Plan for more details.

4.6.1.6 Communication Plan

4.6.1.6.1 Communication Plan and Communication Channels

Motorola uses a thorough communications management process for our projects. The advantages of Motorola's communications management process to the SFPUC are:

- Accurate measure of project success.
- Continuous access to status reports, schedules, and other key documents.
- Provides the field team with immediate fast-track issue resolution information.
- Avoids costly miscommunications.

An effective communications plan between the Motorola project team and SFPUC representatives is critical to the success of project implementation. Effective team integration occurs only when everyone is operating in a timely, effective manner, based on the same information.

Our experience as an integrator has led to an effective communications management approach that includes bi-weekly project status meetings scheduled by Motorola Project Manager post kick off meeting and publish the meeting agendas to discuss the status of project deliverables, status reporting, stakeholder oversight, risks or issues and the mitigation plans, any changes to the project, plans for next period, action items and assignments, punchlist review, document classification, and, online tools and repositories. The communication plan will define and formalize key meetings, their frequency and required attendees. This will provide SFPUC with

meaningful and focused meetings that accomplish the goals and objectives set prior to each meeting. Motorola Project Manager will document meeting minutes and will distribute to the SFPUC project team.

Motorola's communication plan will identify the key stakeholders and project team members on the SFPUC's project. Communication tools include email, status reports, phone, and websites. These tools will be used by the project team to inform and report on progress during the project. Motorola's extranet site will also be used to store and retrieve all project documentation. SFPUC will have online access to project documents such as schedules, status reports, risk logs, requirements documents and change requests. Version control will ensure that the most current documentation and all past versions are available for review.

Status reports will highlight any potential issues and identify the action being taken to mitigate them. Action items will be assigned to individuals and completion dates will be tracked to ensure the items are completed. Status Reports will also be used to provide SFPUC with an accurate assessment of the progress of the project and give visibility to the resource requirements to complete the near term tasks. Action item lists will be maintained and updated to identify and quickly resolve identified items.

Punchlist will be created and maintained throughout the project implementation and can be related to any subsystem like site facilities, equipment, and acceptance tests. When project is about 90% complete and in optimization phase, Motorola PM and Motorola Technologist will work closely with the SFPUC team to maintain and assign items to responsible parties in order to resolve punchlist items before system acceptance. If the responsibility for resolving an item transfers to another person or group, a new entry will be added to the punchlist and the original entry will be appropriately noted. Any changes to the punchlist need to be reviewed and agreed to by both parties (Motorola and SFPUC) and updated during each bi-weekly status meeting.

4.6.1.6.2 Project Issue Tracking and Reporting Procedures

Issues identified during the project will be recorded and tracked based on the following information:

- Problem description.
- Date opened.
- Owner.
- Corrective action plan.
- Due date.
- Status.

Issues will be resolved with the direct producer or the appropriate task leader, when possible; and those that cannot be resolved with the technical team or task leader will be elevated to the project manager. Issues that have been referred to the project manager will be reviewed weekly until they are resolved and items that have not been resolved in a timely manner will be escalated to higher levels of management.

4.6.1.7 Quality Assurance/Quality Control Plan
Motorola is committed to being a trusted partner with our customers. Motorola Solution's

(Motorola) senior leadership team and the Motorola's SFPUC project team are committed to delivering products, services and solutions that will enhance SFPUC's operations and meet or exceed SFPUC's expectations. MSI promotes a quality culture by fully engaging with all stakeholders and using innovative ideas, systems, technologies and methods to ensure that the effectiveness of our quality management system continually evolves to meet the highest level of requirements and expectations. MSI's commitment to quality is rooted in our promise to ensure that customers are at the core of everything we do. MSI is committed to working with SFPUC's project team to adhere to the highest levels of quality management practices.

4.6.1.7.1 Motorola Quality Policy

Motorola has included below, an established quality manual which states the general policies governing the Motorola Quality Management System. The MSI Quality Management approach supports the commitments made in our Quality Policy and ensures that the processes required to support those commitments are in place. These global policies define management's intended arrangements for managing our operations and activities in accordance with the framework established by ISO 9001:2015. These are the top-level policies representing the company's plans and protocols for achieving quality assurance and customer satisfaction.

4.6.1.7.2 Motorola Quality Approach

A complex project like the SFPUC's is approached strategically by applying methods and measures to continually assess business performance across each project stage, including detailed system design, radio frequency coverage analysis, procurement, installation, test, and migration.

Motorola's System Integration Gates (SI-Gates) is the foundation of our strategic approach to project quality. SI-Gates is a disciplined but flexible framework supporting Motorola's project management methodology, activities and best practices across four development phases. The SI-Gates framework includes checkpoints and procedures to support:

- **Project Quality Management**–Quality management practices are embraced across the project to ensure that planning, design, configuration, testing and deployment meet agreed upon requirements. The goal is to provide objective guidance and to avoid misunderstandings that can occur in large and complex projects.

- **Quality Assurance**–Quality assurance (QA) focuses on the methods and processes being used to manage and deliver SFPUC's solution. These activities also help uncover causes of unsatisfactory results, implement corrective actions, and leverage lessons learned to avoid similar situations throughout the project's lifecycle.

- **Quality Control**–Quality control (QC) activities are performed to observe and verify that project management and project deliverables are of high quality and meet contractual obligations and applicable quality standards.

4.6.1.7.3 Quality Framework

Each one of the four phases of SI-Gates is supported by quality checkpoints, and each process within each phase is supported by SIPOC (Supplier, Input, Process, Output, Customer) models

that provide a high-level map of each process. The project team is able to use this model to ensure the completeness of each process and verify the quality of their work.

4.6.1.7.4 Monitoring and Controlling Quality

Spanning the four phases of the SI-Gates framework (phase 3 and 4 are relevant to project implementation) is the Monitor and Control work stream. Monitor and Control is not a phase. It is a comprehensive collection of mutually supporting plans, control measures, review points, documentation and activities that occur throughout the project's lifecycle. Motorola's Quality Management System is infused throughout the SI-Gates Monitoring and Controlling function and represents an end-to-end focus on Quality. The SI-Gates framework is outlined in Figure 4-40.
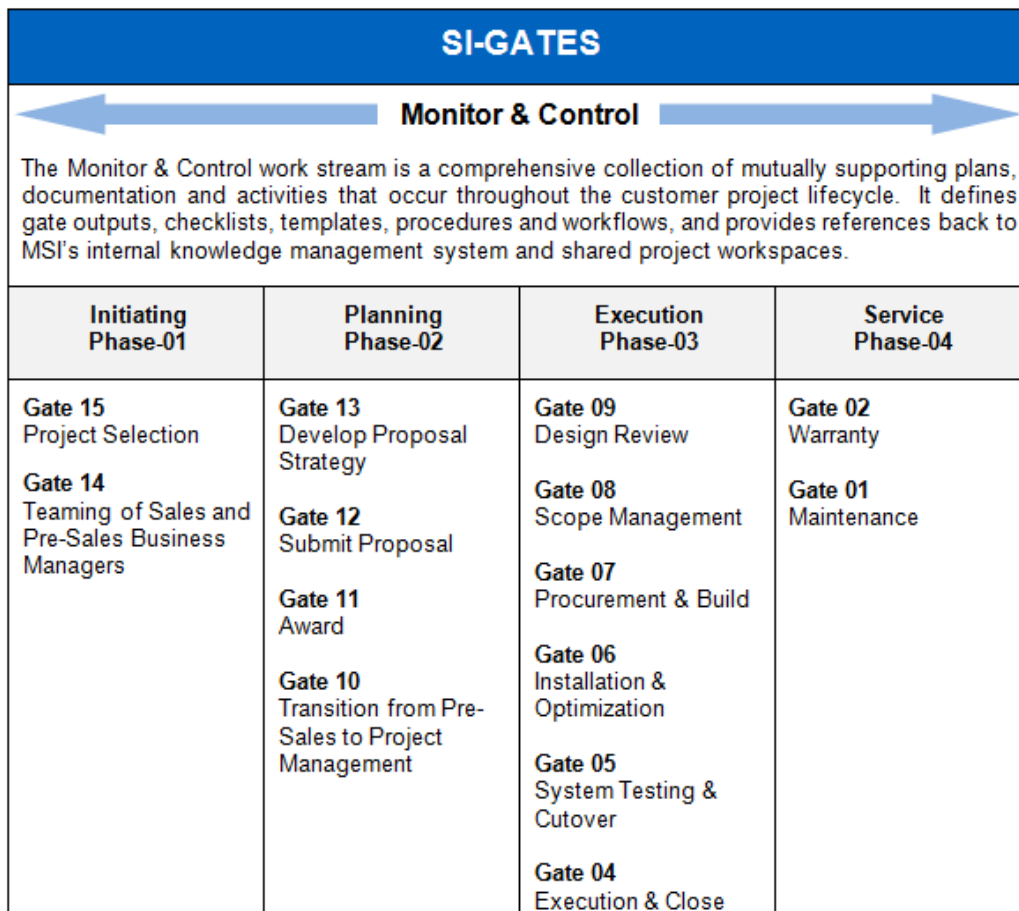

SI-GATES

Monitor & Control

The Monitor & Control work stream is a comprehensive collection of mutually supporting plans, documentation and activities that occur throughout the customer project lifecycle. It defines gate outputs, checklists, templates, procedures and workflows, and provides references back to MSI's internal knowledge management system and shared project workspaces.

Initiating Phase-01	Planning Phase-02	Execution Phase-03	Service Phase-04
Gate 15 Project Selection Gate 14 Teaming of Sales and Pre-Sales Business Managers	Gate 13 Develop Proposal Strategy Gate 12 Submit Proposal Gate 11 Award Gate 10 Transition from Pre-Sales to Project Management	Gate 09 Design Review Gate 08 Scope Management Gate 07 Procurement & Build Gate 06 Installation & Optimization Gate 05 System Testing & Cutover Gate 04 Execution & Close	Gate 02 Warranty Gate 01 Maintenance

Figure 4-40: SI-Gates Framework

This work stream defines recommended checkpoints and audit points to ensure the project meets or exceeds the minimal performance standards for quality.

4.6.1.7.5   Steps and Procedures

Since Motorola's QMS is an end-to-end quality management system, the entire span of the project is monitored continuously for adherence to quality deliverables. Quality is assured through vigilance in active management techniques. This section outlines the Quality Control Plan (QCP) steps and

procedures that will be used by Motorola in the implementation of the project from SOW through final acceptance.

The QCP for SFPUC identifies processes and activities that are monitored for quality metric compliance, represented below in Table 4-18.

Table 4-18: Processes in Place to Verify Quality in Specific Implementation and Deployment Activities.

Deployment	System	Assurance
System Design	- System Requirements - Design Review - Site Design	- Compliance to Requirements - Joint approval
Project Management	- SI-Gates - Status Reports - Status Meetings - Project Schedule - Issue Tracking Log - Risk Analysis	- Supervision - Sample Inspection - Audits - Project Reviews - PMO Governance - Dedicated Master Schedule
Civil Work/Site Construction	- Blueprints/Drawings - National and Local Codes - Motorola R56 Standards	- Supervision - Sample Inspection
Grounding/Electrical/Power Installation	- Drawings/Electrical Plan - National and Local Codes - Motorola R56 Standards	- Supervision - Sample Inspection
Network Equipment Installation	- Motorola R56 Standards - System Design Diagrams/Documentation - Optimization Procedures	- Supervision - Sample Inspection
Mobile/Portable Installation	- Programming Templates - Installation Guides	- Supervision - Sample Inspection - Installation Logs
System Acceptance	- Equipment Verification - Feature/Functionality Testing - Coverage Acceptance Testing	- Sample Inspection - Contract Review

Design Analysis and Verification

Customer Design Review (CDR) meetings will be held between Motorola and SFPUC to review the system design and project plan. The design and plan will be agreed upon and approved before the project proceeds.

Design Review and Approval

The Design Review is structured for alignment with the schedule for deployment of the LMR systems. Design agreement and approval by SFPUC and Motorola will ensure a common understanding of system parameters and expected performance.

Design Changes and Document Control

Any change in system design/project scope will be managed through a Change Order. The Change Order will be approved and signed by both Motorola and SFPUC. Key project documents will be controlled through a centralized file repository and these documents will have versioning control fields.

Procurement and Inspection

Motorola will place factory orders for the system hardware and software that is being purchased for the Telecommunications system. Multiple sets of orders will be placed for LMR system components, based on the approval of the Final System Design.

Site Inspections, Improvements, and Development

Site walks have been conducted for some of the sites. Sites that have not been walked include ACITD, CCWD, and Intake Radio site, as well as many of the optional sites like the Watershed Cottages. Motorola has included and will provide specific site improvements and site developments necessary for the sites that Motorola has had the opportunity to visit during SOW phase. The site improvements, site developments included in this project are listed in herein and were developed making specific assumptions which have also been listed herein. Variations from the improvements listed and the assumptions may result in change orders to the project depending on the size and scope of these changes.

Note: The parties have agreed to replace the Marcial Peak site with the ACTID site. Savings associated with this change are estimated by Motorola to be approximately $261,000. SFPUC shall determine how the savings will be applied to other services and equipment required by the SFPUC.

Post site improvements/development site inspections will be conducted. All equipment locations will be audited for site readiness purposes and Motorola will prepare a Site Audit Report for each location.

4.6.1.7.6 Factory Staging

A critical quality assurance step is factory staging of the LMR equipment at Motorola's Customer Center for Solutions Integration (CCSi), an ISO 9000 certified process. Staging equipment at CCSi will provide a central point, in a controlled environment, to test the functionality of the system and the

proper operation of all critical components. Access to development engineering and Motorola's lab resources further enhance the benefits of staging. Since equipment cabling is factory made and tested, field installation and optimization cycle time will be significantly reduced while the possibility of introducing cabling errors during installation is virtually eliminated. Equipment is also labeled and inventoried at CCSi in an efficient and consistent manner in compliance with SFPUC's requirements.

Material Receiving, Storage, and Shipping/Equipment Inventory and Tracking

Equipment packing list and inventory lists will be used to manage equipment logistics and warehousing. CCSi's bar coding system will be used to label all equipment shipped from CCSi. Shock sensors will be applied to sensitive equipment to determine if damage may have occurred during transit. The SFPUC Inventory and Maintenance Tracking subsystem will be used to track inventory as it moves from shipment through installation to reduce lost or missing equipment and build an asset database for keeping track of acquired assets consistent with SFPUC requirements.

Installation Personnel Training and Certification

Motorola Installation personnel are trained on Motorola R56 installation guidelines.

Field Installation and Inspection

Motorola local installation teams will install and Motorola's Quality Assurance Manager will inspect the equipment at the SFPUC sites as they are installed and commissioned.

Non-Conforming Products/Modules/Components

Equipment that is found not to be in conformance with published specifications will be tagged, repaired, and/or replaced. Each non-conformance shall have a non-conformance record that will be included in the corrective action report.

System Testing and Validation

The LMR master site equipment will be staged at Motorola's facility in Elgin, IL. Before the equipment leaves the staging facility, a number of pre-installation performance and functionality tests will be executed to verify that the system is operating properly, please see Section 4.6.5.4, Factory Acceptance Testing. After the equipment has been installed in the field, but prior to beneficial use, acceptance tests will be executed to verify that the system has been installed correctly and is ready for use. Through the use of the Requirements Traceability Matrix (RTM), the Project Team is able to correlate system design and performance parameters from design through testing and delivery for traceable requirements management.

Training and Certification of SFPUC Personnel

Motorola will conduct customized training courses to thoroughly train agency personnel on the use of the system on the operation and support of the system. Motorola's training plan is further detailed in Section 4.6.6, Training Plan.

Implementation/Migration

A detailed project schedule and migration plan will be created to document system installation and commissioning steps and milestones. The project schedule will describe how and when the site/equipment installations will occur. The migration plan will describe how and when users will transition to the new system and when it will be put into service.

Project Documentation

Various documents will be used throughout the project lifecycle. The actual project templates and documentation used to verify the adequacy of the actual processes and procedures used to develop and/or deliver products/services will vary based on specific project needs.

4.6.1.7.7 Monitoring Methods

Quality Monitoring

Quality monitoring is performed throughout the project lifecycle. This section details monitoring methods employed by Motorola to ensure a consistent quality focus during the project.

Quality Monitoring

During the project, our Project Manager with the help of our QA management team will audit the project team to ensure processes are being followed. The following audit information is monitored and reported on a regular basis by Motorola Project Manager to the project team.

- Manage and track daily progress of team members and subcontractors.

- Identify potential risks or issues that may cause delays and assure that mitigation plans are identified.

- Monitor risk items and to determine the status.

- Conduct lessons learned reviews at prescribed points during the project to improve the project performance.

- Monitor the SFPUC training plans.

- Additionally, Motorola's Project Manager will be directly involved in the Risk Management, Problem Resolution, and Failure Review Board processes.

Quality Audits

Quality Audits will be performed by the Motorola Project Manager on at least a bi-monthly basis. The quality audits will be used to verify that the project team is following prescribed processes/procedures and to develop corrective/preventative actions. The audit takes into consideration the status and importance of the processes and areas to be audited, as well as the results of previous audits.

Table 4-19: Quality Audits and Review Opportunities.

Project Quality Audit Review	Purpose	Planned Frequency
Documentation Reviews	Review of the projects' management plans and other project documentation to determine if the project's documentation standards are being followed.	Bi-Monthly (more frequently if needed)
Quality Audits	Project deliverables subject to quality audits and reviews • Master Project Plan • Risk Management Plan • Communication Management Plan • Document Management Plan • Configuration Management Plan • Cost Management Plan	Bi-Monthly (more frequently if needed)

Other reviews and audits may be held throughout the course of the project. Such reviews will be held on an as-needed basis and may include reviews of contractor plans and processes.

Testing

For this project the key final products are the final fully functional LMR system. System quality will be verified by testing the parameters agreed to in the final System Design, as specified in this Appendix F.

Factory Staging and Test

Motorola's staging process was introduced in 1994 and has proven to be a value-added process for both Motorola and our customers. By staging customers systems in a controlled environment and executing system functionality tests prior to shipment, Motorola and our customers have been able to capitalize on the benefits of reduced implementation cycle time, decreased costs, higher quality, and improved satisfaction with our solutions.

Site Audits

Following the completion of work--i.e. installation of the required system--a member of the Motorola field team shall audit each site to confirm workmanship standards have been adhered to. The audit activity shall be conducted against the Compliance Audit documentation and records of findings retained as Quality Records.

System Acceptance Tests

Motorola and SFPUC representatives will perform agreed-upon System Acceptance Tests to confirm that the system functions as expected. Deficiencies and/or non-conformances found during the test will be recorded and tracked via Punchlist until resolution. Note: This test is not the equivalent to the CATP.

Coverage Acceptance Test Plan

Motorola and SFPUC representatives will perform tests as detailed in the Coverage Acceptance Testing section of this SOW (Section 4.6.5.6) to confirm that the system coverage meets the coverage requirements in the SFPUC Service area. The SFPUC Service area is outlined in Appendix D, Coverage Maps, of this contract. If any coverage deficiencies found during the test will be recorded and tracked via Punchlist until resolution verified by fully retesting.

Software Regression Testing

General Regression testing occurs in a lab environment for each release to verify functionality inherited from prior releases. This testing verifies existing or prior functionality is maintained as new features and repairs are added to the system. This testing is spread across all supported site types, bands, and platforms.

User Transition

Preparation for transition to operation on the new SFPUC system began in the SOW phase, with a high level user transition plan. Additional details and modifications are made to this plan during the Design Review, providing sufficient detail for SFPUC to proceed with a deeper understanding of the impact to users on the transition process. Final details of the transition to service plan will be finalized prior to the commencement final system acceptance. SFPUC and Motorola will conduct a Readiness Review prior to moving users to the new system to ensure the transition to the new system is smooth.

Corrective Action

Because the Quality Control Plan is integral with all phases of the SFPUC project, the quality assurance team's intimate involvement with each project phase will keep them immediately aware, in real-time, of all potential quality assurance issues and the process each is following toward resolution. In this manner they will be able to perform on-site validation in a non-intrusive manner.

Performance Reliability Test Period

The Final System Acceptance Test shall include a Performance Reliability Test in the agreed period of actual use by SFPUC to verify that system availability and all other requirements set forth in this agreement for the SFPUC Solution have been met or exceeded. The Final System Acceptance Test shall include, but is not necessarily limited to verification of the following criteria:

- Non-Critical Failure.
- Critical Failure.
- Major Critical Failure.
- Non-System Operational Failure.

The complete SFPUC system will be tested and monitored for the entire performance reliability test duration. The Project Team will respond to and resolve any problems, according to the agreed period. The problems will be categorized as major and minor, based upon agreed

definitions. If a major failure occurs, correct the problem and re-start the test. If a minor failure occurs, correct the problem, and continue the performance reliability test period. A final written report will be submitted to SFPUC after the successful completion of the Performance Reliability Test. All items on SFPUC's punchlist, plus all failures uncovered during this test, will be prioritized, and an Action Plan will be generated which addresses each failure. For the description of the failures, please refer to Section 4.6.2.16, 90-Day Operational Burn In.

Final Acceptance will occur after System Acceptance and when all deliverables and other work identified on the punchlists have been completed. When Final Acceptance occurs, the parties will memorialize this final event by so indicating on the System Acceptance Certificate.

Problem Resolution Process

The Motorola Team has a rigorous Global Motorola Technical Notification (MTN, formerly known as Failure Review Board or FRB) process to resolve product issues effectively and to avoid schedule delays. The MTN process provides for both hardware and software problem technical issue identification and continuously tracks their resolution from design changes through upgrades to delivered systems.

The MTN is the mechanism triggered whereby systemic product or system defects without an immediately known solution are identified, tracked, prioritized and communicated to insure a timely resolution. A three-phase process of characterization, resolution, and implementation identifies the solution that is then certified through box-level regression testing and actual system integration testing. Then MTN delivers the solution to apply it to the original complaint. Proactive documentation modification occurs, and other systems and customers who may be affected are alerted via Technical Notification Bulletins and Service Repair Notes.

The initial and parallel performance of an Impact Study and a Root Cause Study prioritize the issue in both pending and completed work and assess the issue for systemic nature. The outcome of these steps generates a Punch List for hardware re-work, documentation revision, re-training, and possible referral to the MTN Board. Upon resolution, the issue is closed upon SFPUC's approval.

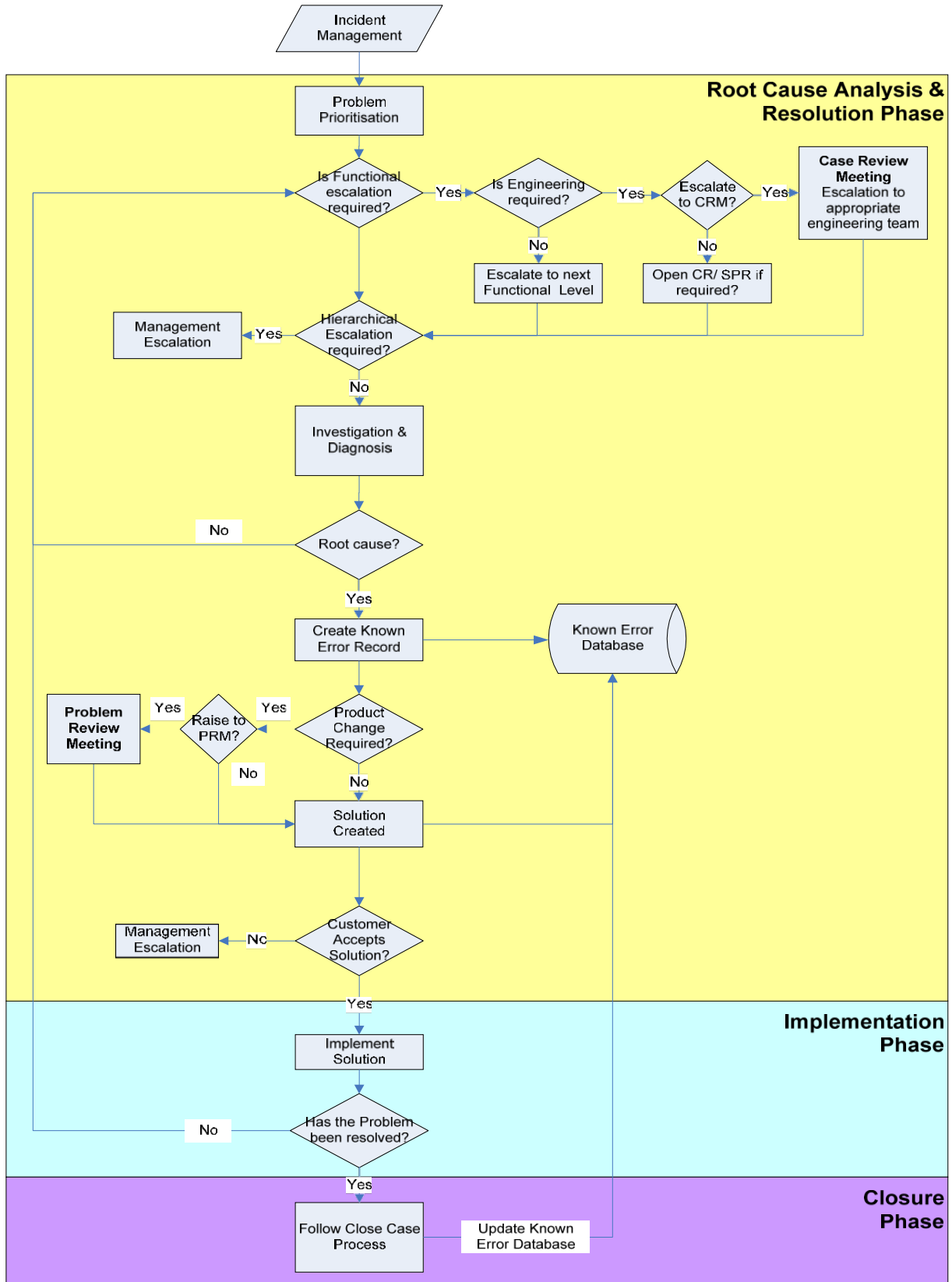Motorola's Problem Resolution Process is shown in Figure 4-41.

Figure 4-41: Motorola's Problem Resolution Process.

Frequency of Monitoring

Quality is monitored continuously by the quality team with formal quality audits conducted at least on a bi-monthly basis. If results dictate, more frequent audits can be scheduled.

4.6.1.7.8 Samples of Monitoring Forms

QA Checklists

The QA Checklist contains a list of key deliverables and the status of the respective deliverable. A detailed checklist shall be maintained though the SI-Gate process/tools.

Risk Mitigation Plan

The responsibility for development and implementation of a mitigation plan as needed to reduce the risk to an acceptable level lies with Motorola's Project Manager. Motorola's approach to risk management and mitigation is to proactively anticipate risks and identify mitigation plans before the risks are realized. Risk mitigation plans will address the following:

- Description of risk.

- Impact statement.

- Workarounds/alternative courses of action.

- Fallback positions.

- Recommended course of action.

The Risk Mitigation Plan will be jointly developed and managed by SFPUC and Motorola, and will include SFPUC-only risks that could impact the successful completion of the project.

Issues/Non-Conformance Tracking and Reporting Procedures

- Issues/non-conformances identified during the project will be recorded and tracked. Tracking information should include the following minimum information: problem description, date opened, owner, corrective action plan, due date, status.

- Issues/non-conformances will be resolved with the direct producer or the appropriate task leader, when possible.

- Issues/non-conformances that cannot be resolved with the technical team or task leader will be elevated to the project manager.

- Issues/non-conformances that have been referred to the project manager will be reviewed weekly until they are resolved. Items that have not been resolved in a timely manner will be escalated to higher levels of management.

Motorola uses the RTM to ensure design requirements are present and functional in the delivered system (Figure 4-42).

CUSTOMER NAME AND PROJECT NUMBER											
Requirement Traceability Matrix											
Req. Number	Requirements	Source Document	Section Number or Page Number	Status	Inspection	Demonstration	Test	Analysis	Verification Document	Verification Test Procedure

Figure 4-42: Motorola's Standard Requirements Traceability Matrix Ensures that each RFP Specification is Tracked and Included in the System Design.

This process will clearly identify the SFPUC technical requirements, their conversion to hardware and subsystem design modules, and the resultant test procedures. Motorola will use the RTM to track the RFP requirements to the acceptance test procedures. Motorola will work with SFPUC to identify and define the Acceptance Test Procedures during detailed design review phase of the project.

Table 4-20: Fields of a Typical Requirements Traceability Matrix.

Field	Function
Requirement Number	Requirement tracking number
Requirement Statement	Verbiage explaining requirement
Source Document	Reference to the document from which the requirement was stated
Section Number or Page Number	Section or page number in the source document where the requirement exists
Status	Status of the requirement at a given date
Verification Method	How the requirement will be verified (i.e. inspection, demonstration, test, or analysis)
Verification Document	The document used to verify the requirement (i.e. specification sheet, acceptance test plan, etc.)
Verification Test Procedure	If a requirement can be proven through a test procedure, this references the actual test

The fields of the RTM can be modified or expanded to provide more detail depending on SFPUC's needs and the finalized scope of work. This SFPUC-specific RTM will be produced during the Design Review Phase of the project. As different phases of the project progress, the RTM

will be updated to document the status of each requirement, as well as any changes that have occurred.

Quality Tools and Process Improvement

Upon the detection of a product or process issue, Motorola will engage the appropriate resources and leverage various quality tools (8D, FMEA, Process Mapping, DMAIC, etc.) to identify and implement a solution. Lessons-learned meetings will be conducted, as needed, and the QA manager will document results from an independent perspective. Follow up work sessions will be scheduled with the Project Team to assure that any identified improvement opportunities are adequately addressed and the lessons learned are incorporate Motorola's overall continuous improvement activities.

In addition, process variances that are identified and discussed during the aforementioned meetings, reviews, quality checkpoints, and quality assurance audits will be incorporated into the appropriate process improvement channels such as Motorola's Technical Notification process, Product/Program Management processes, SI-Gates Framework Maintenance, and the Services DSS Continuous Improvement Project Process.

The project team will identify and leverage overall Motorola best practices and other resources available nationally to assist with issues they are or will face during the project.

Method of Recordkeeping

The QA team will continuously measure and track performance against the program's documented requirements. These reports will consist of the following:

- Regular reports regarding project status.

- Monthly risk meetings with SFPUC stakeholders, immediate response if a risk item becomes an issue.

- Executive status meetings with SFPUC stakeholders as determined by the SFPUC project team.

Additionally, discovered deficiencies will generate an immediate report to initiate the Problem Resolution Process. Constant reporting will focus on possible project schedule impact, requirement changes, failures, and corrective action plans.

4.6.1.8 Change Management Plan

Motorola's Change Management Plan includes elements of Scope, Cost, Schedule, Risk, Quality, Communications, and Subcontract Management to minimize the need for changes and is utilized on all of our projects, regardless of size. At a high level, Motorola's approach to Change Management is focused on the consistent application of the elements that make up Motorola's Project Management Methodology:

- **Quality Management**: The project and its deliverables meet Motorola's exacting standards and all SFPUC requirements for quality and performance.

- **Scope Management**: The scope of the project will be managed through the

change management process to ensure that any changes in scope are identified and the impact of those changes are communicated and approved prior to implementation. Motorola will manage the scope of the SFPUC's project following the same rigorous scope and change management processes to ensure the SFPUC's project is completed on time and on budget.

- **Risk Management**: Motorola's risk management process keeps the potential risks highlighted during the project. As a risk item is eliminated, it is removed from the list, any new risks are added and mitigation plans are developed to minimize the impact of an event to the project.

- **Schedule Management**: Schedules are utilized to manage resources, equipment, subcontractors, and tasks on the project. The schedule management process shows the status of each task and allows the project manager to allocate resources as needed to ensure timely completion of all tasks. This allows optimal use of project resources and reduces the possibility of delays.

- **Communications Management**: Keeps all project stakeholders informed of the status of the project and enables them to get timely information regarding the project progress. Communications Management ensures all team members are kept informed of the upcoming tasks and assignments so they can provide feedback to improve the project performance.

- **Subcontractor Management**: Motorola's subcontractors are critical to the success of the SFPUC's project and are managed as team members and key contributors. Their experience and expertise enables Motorola to provide SFPUC with world-class technologies and implementation while keeping the project cost- effective and predictable. Motorola will do the best job possible to understand the requirements and needs of the SFPUC and its users up front so that a system solution is designed to meet those needs and requirements with as little need for change as possible. For the SFPUC, that process already began with this SOW, and will continue with regular meetings and dialog through all system design, design review, and design approval phases, implementation, testing, acceptance, initiation into service, and the maintenance phase. With even the most rigorous process, some changes are inevitable, and Motorola has a comprehensive Change Management Plan in place to streamline the change management process. This section will detail Motorola processes used to manage change during implementation of the SFPUC System.

4.6.1.9   Change Management Objectives

Motorola's project philosophy is to invest in the pre-contract efforts to understand the SFPUC's objectives from the initiation phase of the SOW and to utilize our proven advanced tools to develop a system design, scope of work, and realistic schedule that matches these objectives up front. This will minimize change orders that can improve cost and schedule performance during implementation. The objective of Motorola's Change Management Plan is to manage the project scope and ensure compliance to project timelines and budgetary requirements. We ensure our understanding of SFPUC needs, goals, objectives, and any special circumstances which need to be addressed to ensure the success of the project.

4.6.1.10 Stakeholder Participation Strategies in Proposing and Prioritizing Changes

During the design review, SFPUC and Motorola will optimize the phased implementation approach to save time and cost while meeting the needs and requirements of the SFPUC. Motorola will provide guidance and cost-effective solutions that anticipate not only the current needs and requirements but also allow for enhancements to meet the SFPUC's future needs.

Throughout this interactive process, SFPUC will be afforded opportunities for participative involvement in cost savings, risk mitigation, and the change management process. SFPUC will have ongoing visibility to the project schedule with the ability to make informed decisions regarding any requested changes during the project.

4.6.1.11 Effective Change Management

Once the project design review is completed and design is approved by SFPUC, Motorola will maintain effective change management during the project to capture the impact of any proposed changes to the requirements during implementation. Motorola will collaborate with SFPUC to determine the impact of any change request with respect to scope, cost, and schedule. Our approach (Figure 4-43) enables us to respond quickly to project changes, adapting our delivery schedule, resource allocation scheme, and individual task assignments when a scope change is required.
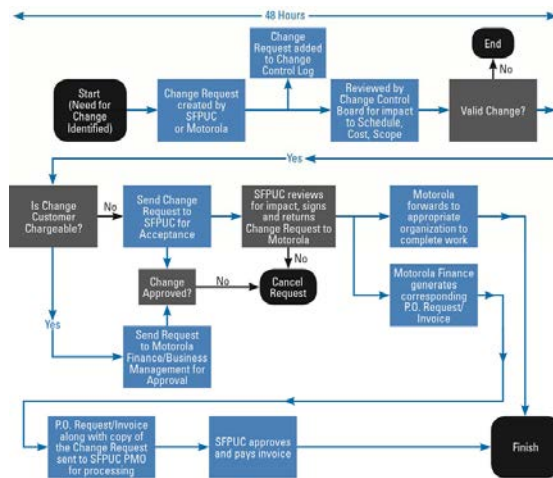

Figure 4-43: Change management process flow

4.6.1.12 Change Order Plan

During execution of a project, contract modifications may arise to accommodate changes in scope. Either party may request changes within the general scope of the contract. If a requested change causes an increase or decrease in the cost or time required to perform the contract, Motorola and SFPUC will agree upon an equitable adjustment of the Contract Price, Performance Schedule, or both, and document it as a part of the Change Control Plan.

If a requested change causes an increase or decrease in the cost or time required to perform the contract, Motorola and SFPUC will agree upon an equitable adjustment of the contract price, performance schedule, or both, and will reflect such adjustment in a Change Order. Neither party

is obligated to perform requested changes unless both parties agree to the written and signed executed Change Order.

The Change Order will contain the following information: change order number, contract number, and date of the contract, detailed description of the change, contract price adjustment, and contract schedule adjustment. Once either party submits a Change Order request, the receiving party will have 10 business days to respond to the request.

4.6.2 Statement of Work/Work Breakdown Structure

The following sections define in detail the expected project phases for the planning, design, manufacture, installation, optimization, and testing of the infrastructure and radio subscribers purchased by the SFPUC. Each phase of the project defined by this Implementation Plan includes a Responsibility Matrix. These matrices define the responsibilities both of Motorola and of SFPUC, and details the tasks and deliverables for each phase. Tasks described in this Statement of Work are meant to define the Stage or order in which each task or group of tasks occurs. In some cases, such as installation, tasks for one subsystem occur in different Stages of the project, depending on which subsystem is being installed. The scheduled dates of tasks are depicted in the detailed project schedule located in Appendix G.

This SOW will serve as the baseline SOW for post-contract activities. During the detailed design development process, Motorola will work with SFPUC to finalize the Statement of Work. Deviations and changes to this Implementation Plan are subject to mutual agreement between Motorola and SFPUC, and will be addressed in accordance with the change provisions of the Contract.

4.6.2.1 Project Initiation and Kickoff Meeting

The project initiation phase includes the kickoff meeting, Preliminary Design Review, post-kickoff meeting activities, and the Detailed Design Review process, all of which will enable SFPUC and Motorola to develop the final system design. Once the contract is executed, Motorola's Project Manager will initiate the implementation process with a project kickoff meeting. The objectives of this meeting include:

- Introduction of the Motorola and SFPUC's Project Manager as the single point of contact with authority to make project decisions.
- Introduction of all project participants.
- Review of the overall project scope and objectives.
- Review of the resource and scheduling requirements.
- Review the project schedule addressing milestones and key deliverables.
- Review of the Project Management Plan and processes.

Motorola will confirm all site locations and complete all site permitting (if required). Site Acquisition and Zoning for all sites used in this SOW will be provided by SFPUC.

Motorola will assist SFPUC with negotiate leasing with site owners. Motorola cannot ensure site owners will accept SFPUC terms. SFPUC is responsible for securing the sites lease. The cost of the

lease will be paid by SFPUC and is not part of this SOW .

This task is considered complete when the Project Kickoff Session has been held with Motorola and SFPUC representatives in attendance, and when project scope, schedules, procedures, roles and responsibilities have been documented and agreed upon. After the kickoff meeting, Motorola will meet with SFPUC's project team to review in detail and agree upon the overall system design, identify any special product requirements and their impact on system implementation, and refine the system implementation plan and detailed documentation. During the Design Review, Motorola will work with SFPUC to confirm the design and provide the following deliverables for review and approval:

- Project Schedule.
- Statement of Work.
- System Description.
- Site Improvement and Development.
- Site Layout Drawings.
- Shelter floor plan drawings.
- Rack Elevation Drawings.
- System Block and Level Diagrams.
- Power Calculations.
- Antenna Network Diagrams.
- Coverage Maps.
- TX Combiner Plan.
- Preliminary Transition Plan.
- Equipment List, including Subscriber Radios & Accessories.
- FATP and CATP.
- Training Plan.

Responsibilities and deliverables for Motorola and SFPUC during the Design Review phase are defined in Table 4-21.

Table 4-21: Responsibility Matrix

Task	Responsibility	Deliverable
Initiate SFPUC project with a Kick Off Meeting.	Motorola and SFPUC	Documented project personnel names, responsibilities, contacts, and project review procedures.
Begin creating Change Management Plan.	Motorola	Initial Change Management Plan.
Define format of the Issues and Action Item Log.	Motorola	Initial Issues and Action Item Log.
Review change control procedures with SFPUC Project Manager.	Motorola	Initial Change Control Plan.
Work with Motorola personnel in finalizing and approving the Change Control Plan.	SFPUC	Approved Initial Change Control Plan.
Develop a communication plan to address the types of communication that will be established such as the weekly status meetings and status reports. The communication plan will also indicate the appropriate points of contact for different types of communication.	Motorola and SFPUC	Communications Plan.
Provide current system documentation.	SFPUC	SFPUC's Existing System Documentation.

Completion Criteria

This task is considered complete when the Project Kickoff Meeting has been held with Motorola and SFPUC representatives in attendance, and when project scope, schedules, procedures, roles and responsibilities have been documented and agreed upon.

4.6.2.2 Customer Detailed Design Review

The Customer detailed design review's goal is to finalize the design of the P25 network, including backhaul. The steps outlined below are included in this effort.

After the Project Initiation and Kickoff Meeting, Motorola will meet with the SFPUC's project team to achieve written agreement on the final system design, identify any special system or product requirements and their impact on system design or implementation, identify final radio subscriber unit counts and configurations, and refine the system implementation plan and documentation.

Motorola's comprehensive system design in this SOW will serve as the baseline design for the Design Review. SFPUC and Motorola will review and finalize the system design through analysis of the system functionality, and end-user requirements, as mutually agreed upon by Motorola and SFPUC.

4.6.2.2.1 Document List

Motorola will provide draft and final versions of the following documents to SFPUC for review and approval:

- Document index.
- Project schedule.
- Implementation Plan (Statement of Work).
- System description.
- Site Improvement and Development Plan.
- Final design of backhaul system:
  - Microwave system description.
  - Microwave network maps.
  - Microwave path analysis for each hop.
  - DC power consumption data (based on measured values).
  - Traffic cutover plan.
- Final design of land mobile radio system.
- Equipment lists.
- Information only coverage prediction maps of the SFPUC Service Area based on final site selection and quantity.
- A detailed SFPUC Water Enterprise Service area map that defines the Coverage Acceptance Testing area, which can be found in Appendix D, Coverage Maps.
- Frequency plan.
- FCC licensing.
- System block and level diagrams.
- Drawings:
  - Site layout drawings.
  - Shelter floor plan drawings.
  - Tower elevation/antenna placement diagrams.
  - Antenna System diagrams, including combiners, tower top amplifiers and receiver multi-coupler systems.
  - Rack elevation drawings.
- Site equipment Information:
  - Power consumption data (based on measured values).
  - Site heat output data (based on measured values).
  - Site alarm definition.
- Radio subscriber design:
  - Radio subscriber equipment lists.
  - Draft subscriber programming templates.
- DC power system description.
- Radio Management Subsystem Description.
- Asset Management Subsystem Description.
- Conventional Repeater Sites Description.

- Fixed DVRS Conventional Repeater Sites Description).
- Testing plans:
- Land mobile radio system factory acceptance test plan.
- Coverage acceptance test plan (CATP) (Section 4.6.5.6).
- Functional acceptance test plan.
- 90-day operational burn in plan.
- System optimization plan.
- Portable radio programming plan.
- System administrator documentation and system programming parameters.
- Final implementation plan.
- User manuals.
- Site and installed equipment survey.
- Training plan.
- Final transition plan–FNE and radio subscribers.
- Quality assurance and quality control plan.
- System operation and maintenance manuals.
- User training plan and sample of training materials.

During this period, Motorola and SFPUC will have the following responsibilities as shown in Table 4-22.

Table 4-22: Responsibility Matrix

Task	Responsibility	Deliverable
Review baseline design with SFPUC. Motorola and SFPUC will participate in a series of meetings where the baseline design will be reviewed.	Motorola	Review of Baseline Design.
Finalize the design. Based on the design feedback from SFPUC, Motorola will present the final design documents listed above.	Motorola	Final Design.
SFPUC will approve the Final Design.	SFPUC	Final Design Approval.

Completion Criteria

This activity is complete when all documentation and detailed documents have been delivered to SFPUC, reviewed and approved by SFPUC, and signed by the designated representative from SFPUC. After acceptance, Motorola will schedule all factory orders for shipment to meet the approved project schedule. Each of the specific design activities associated with developing these design documents is described in the following section. Some detailed design development activities will involve the review and finalization of

multiple documents.

Note: The following sections provide additional details for finalizing the major deliverables for the detailed design document

4.6.2.2.2   Finalize Backhaul System Design

Motorola will finalize the microwave design based on the final site configurations and physical path surveys. Design activities will include development of final equipment lists, site specific drawings (including rack profiles and wiring diagrams), traffic plans, network management system plans, and system synchronization plans, as well as DC power requirements.

Motorola will explain and document all engineering assumptions and performance validation data for site links. This will include software modeling for path engineering, review of map or topographic data used in the model, and all assumptions used in determining optimal path configuration.

Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-23.

Table 4-23: Responsibility Matrix

Task	Responsibility	Deliverable
The microwave design will be adjusted based on the physical site locations and dish locations on the towers.	Motorola	Microwave Design.
Motorola will conduct a single set of physical path surveys for new microwave links. The microwave design will be finalized and guaranteed once physical path surveys have been conducted. Any changes resulting from the physical path surveys are considered a change in scope from the baseline.	Motorola	Physical Path Surveys.
Motorola will consult with SFPUC to establish existing traffic requirements and circuiting technology presently being used, and establish the NMS plans for the microwave radio network. Planning for both the bandwidth requirements of the P25 radio system and supporting systems.	Motorola	NMS Plan.
Motorola will work with SFPUC to develop a comprehensive provisioning plan for the microwave transport overlay. The microwave infrastructure equipment in the system will be configured based on this provisioning plan. During system implementation Motorola will revise the provisioning plan as necessary.	Motorola	Backhaul Provisioning Plan.
Development of all programming templates for the microwave equipment.	Motorola	Backhaul Programming

		Templates.
Motorola will create site plan drawings with major landmarks shown, provide final path calculations and path profiles for each hop, identify locations of possible sources of spectral reflection or interference and identify the required antenna size, type and mounting height.	Motorola	Site plan drawings. Path Calculations and Profiles. Antenna specifications and Mounting Heights.
Motorola will submit the final design to SFPUC for approval.	Motorola	Final Microwave Design.
Review and approve the final Backhaul Design.	SFPUC	Approval of Final Microwave Design.

Completion Criteria

This task is considered complete upon SFPUC's acceptance and approval of the Microwave design.

4.6.2.2.3 Finalize Radio Coverage Design – This section deleted by mutual agreement of the parties

4.6.2.2.4 Frequency Plan and Loading Analysis

Motorola and SFPUC will work together to finalize the frequency plan and loading requirements for SFPUC system. Motorola will evaluate frequency compatibility based on the frequency assets identified for use within the system based on the desired coverage and loading. These steps will be a defined process to aid SFPUC in finalizing the system configurations.
Responsibilities and deliverables for Motorola and SFPUC during the frequency plan and loading analysis activities are defined in Table 4-25.

Table 4-25: Responsibility Matrix

Task	Responsibility	Deliverable
SFPUC will confirm the list of frequencies identified by Motorola for use within the system	Motorola and SFPUC	Agreement on the frequency list.
Motorola will evaluate each site within the coverage design for its compatibility with the identified frequencies. Frequency compatibility with the identified sites will drive the configuration of the final antenna systems.	Motorola	Evaluation of Frequency Compatibility with Sites.
Motorola will execute an intermodulation analysis, based on a computer model, and identify any IM hits based on that analysis. Motorola will make recommendations to SFPUC to alleviate IM problems that are discovered through this process.	Motorola	Computer Based Intermodulation Analysis & Other SFPUC Frequency Recommendations.
Motorola will recommend a frequency plan based on the analysis of the channels provided for use within the system, the coverage requirements, and the loading requirements.	Motorola	Frequency plan for SFPUC
SFPUC will provide a list of agencies and a radio count for the initial system build out and the eventual SFPUC radio count.	SFPUC	Unit count for SFPUC
Motorola and SFPUC will mutually agree upon loading parameters for use in the loading analysis. Parameters may be based on data from SFPUC system or typical public safety parameters.	Motorola and SFPUC	Loading Parameters.
Motorola will update the loading analysis based on the coverage and frequency plans, together with the loading requirements and parameters. Motorola will review the loading analysis with SFPUC.	Motorola	Loading Analysis.

Completion Criteria

This task is considered complete when the frequency plan is finalized and ready for the preparation of the FCC licenses.

4.6.2.2.5 Finalize Space, Power and HVAC Requirements

Motorola will work with SFPUC to finalize space and power requirements for the sites based on the agreed upon design as a part of finalizing the backhaul and LMR designs.

Prior to the finalization of space and power, requirements, Motorola will have finalized the system design jointly agreed upon by SFPUC and Motorola, including:

- The overall system configuration and architecture.
- The number of microwave sites and their location.
- The DC power systems.

Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-26.

Table 4-26: Responsibility Matrix

Task	Responsibility	Deliverable
Provide floor layout and rack elevation drawings with associated transition plans for each site.	Motorola	Floor Layout and Rack Drawings. Site Transition Plans.
Provide actual measured power consumption and heat output data rather than specification sheet data in order to comply with the requirements of this task.	Motorola	Power Consumption and Heat Output Calculations.

Completion Criteria

This task is considered complete upon SFPUC's acceptance and approval of the space, power requirements.

4.6.2.2.6 Site Surveys

Motorola will work with SFPUC to facilitate final site surveys in order to finalize the system design. In some instances these sites walks will occur in a later Stage to verify site readiness after site improvements and site development activities are completed. Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-27.

Table 4-27: Responsibility Matrix

Task	Responsibility	Deliverable
Site Walks: Motorola will conduct site walks for all sites including the Dispatch Centers to make sure sites are ready for SFPUC System installation.	Motorola with SFPUC participation	Site Audits.

Completion Criteria

This task is considered complete upon SFPUC's acceptance and approval of the space and power requirements.

4.6.2.2.7 Finalize Design for all Offerings

Motorola will work with SFPUC to finalize the requirements and design of the subsystems purchased. Final design documents will be submitted to SFPUC for review and approval.

Responsibilities and deliverables for Motorola and SFPIC are defined in Table 4-28.

Table 4-28: Responsibility Matrix

Task	Responsibility	Deliverable
Motorola will finalize and submit the design documents for the Asset Management Subsystem to SFPUC for approval.	Motorola	Asset Management Subsystem Design
Motorola will finalize and submit the design documents for the Radio Management Subsystem to SFPUC for approval.	Motorola	Radio Management Subsystem Design
Motorola will finalize and submit the design for the Conventional Repeater at SVWTP and Intake Radio Site.	Motorola	Conventional Repeater Sites
Motorola will finalize and submit the design for the Fixed DVRS Conventional Repeater Sites.	Motorola	Fixed DVRS Conventional Repeater Sites
SFPUC will review and approve the final Asset Management Design.	SFPUC	Approval of Final Design for Asset Management

4.6.2.2.8 Finalize Transition Plan (Cutover Plan)

The implementation of SFPUC radio system will require a detailed transition plan for a smooth transition from the existing radio systems of SFPUC to the new radio system. During the Design Review, a detailed cutover plan will be developed. As the implementation proceeds, further detail will be incorporated into the transition plan.

Individual cutover plans will be developed for the system including:
- Fixed radio equipment.
- Connection to the San Francisco Master Core.
- Microwave network equipment.
- Dispatch operations.
- User radio fleets.

Responsibilities and deliverables for Motorola and SFPUC during the Develop Cutover Plan phase are defined in Table 4-29.

Table 4-29: Responsibility Matrix

Task	Responsibility	Deliverable
SFPUC will provide existing system, dispatch, vehicle, and user information which must be taken in to account in developing the detailed cutover plan.	SFPUC	Existing system, dispatch, vehicle, and User Information.
A frequency cutover plan will be mutually agreed upon, which identifies when specific channels will be moved from operation within the existing system to operation on the new system (if any is in operation).	Motorola and SFPUC	Frequency Cutover Plan.
The high-level SFPUC System cutover plan will be developed. It will take into account the need to minimize the impact to users migrating to the new SFPUC system.	Motorola	Cutover Plan.

Completion Criteria

This task is considered complete when the high-level cutover plan is mutually agreed upon by SFPUC and Motorola.

4.6.2.2.9 Finalize Acceptance Test Plan (ATP) Procedures and Quality Assurance and Control Plan.

Note: These tests do not constitute or substitute the Coverage Acceptance Test Plan (Section 4.6.5.6).

Motorola will finalize ATP documents in the detailed design development and review to provide the required procedures to be used for testing the functionality and performance of the system for the SFPUC approval. The ATP includes the acceptance criteria to ensure the equipment operates in accordance with the specifications, design and standards identified in the SOW.

In addition, in cooperation with SFPUC, Motorola will finalize the Quality Assurance and Control Plan submitted as part of this SOW.

Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-30.

Table 4-30: Responsibility Matrix

Task	Responsibility	Deliverable
Work with SFPUC in finalizing the ATPs. Review the overall approach to testing including hardware, software and final system acceptance criteria. The review will be based on the Acceptance Test Plan included with this SOW.	Motorola	Finalize ATPs and Methodology.
Work with SFPUC to finalize the Quality Assurance and Control Plan submitted as part of this SOW for use during project implementation.	Motorola	Finalize Quality Assurance Plan.

Task	Responsibility	Deliverable
Work with Motorola in finalizing the ATPs, using the ATPs submitted with this SOW as a baseline. Provide related information requested by Motorola to assist Motorola in completing the ATP. Review the baseline ATP document and identify in writing any specific deficiencies found within ten business days.	SFPUC	Review ATPs, provide written information and feedback.
Submit a final ATP document to SFPUC for approval.	Motorola	Final ATPs.
Review and approve the final ATP.	SFPUC	Approval of Final ATPs.

Completion Criteria

This task is considered complete upon SFPUC's acceptance and approval of the ATP.

4.6.2.2.10 Finalize Project Schedule and Implementation Plan

Motorola and SFPUC will finalize the Project Schedule and Implementation Plan based upon the requirements identified in the Detailed Design Development Review, taking into account the project objectives, plans, schedules, approvals, priorities, and inter-dependencies among tasks. These tasks will be finalized through the change order process and mutually agreed upon between the parties at the end of the Design Review. The resulting document defines the specific project tasks to be completed and documents the final Project Schedule for implementation of the SFPUC System.

Responsibilities and deliverables for Motorola and SFPUC during the Finalize Project Schedule phase are defined in Table 4-31.

Table 4-31: Responsibility Matrix

Task	Responsibility	Deliverable
Review with SFPUC personnel the identified implementation tasks, priorities, inter-dependencies and other requirements needed to establish the final Project Schedule. The final Project Schedule is dependent upon the finalization of radio sites, and cannot be complete with a high degree of certainty until the radio sites are secured and permitted for construction, where necessary. Leases for sites where SFPUC will be a tenant are also required and leases will be negotiated with Motorola's assistance. Motorola cannot ensure site owners will accept SFPUC terms. SFPUC is responsible for securing and paying for sites lease. The Project Schedule will identify key project milestones, in addition to tasks that will require interruption of existing communications in order to move the new system into live operations.	Motorola	Project Schedule and Implementation Plan Review.

Task	Responsibility	Deliverable
Analyze the identified requirements and make such implementation decisions as are reasonably required to finalize the Project Schedule and Implementation Plan.	SFPUC and Motorola	Project Schedule and Implementation Plan Review.
Prepare the final Project Schedule and Implementation Plan documents and deliver them to SFPUC as a deliverable of the Design Review. Review the Project Schedule with SFPUC personnel and make changes and/or corrections that are mutually agreed upon through the change order process.	Motorola	Project Schedule Finalization.
Review the final Project Schedule and identify in writing any specific deficiencies found within ten business days of receipt.	SFPUC	Project Schedule Approval.

Completion Criteria

This task is considered complete upon mutual agreement of the parties to implement in accordance with the final Project Schedule that has been developed within the Design Review. The accepted Project Schedule will become the governing Project Schedule incorporated into the contract, and is subject to change only upon mutual agreement of Motorola and SFPUC. The acceptance of the project schedule will be the final activity of detailed design development and review process.

4.6.2.2.11 Portable Radio, Mobile Radio and Control Station Installation Plan

Motorola will work with SFPUC to develop the portable Programming and mobile radio and control station installation plans.

Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-32.

Table 4-32: Responsibility Matrix

Task	Responsibility	Deliverable
Identify portable radio deployment plan and locations and develop subscriber logistics for distribution. The SFPUC will make available adequate quantities of end-users to accept the new radios to maintain the project schedule.	SFPUC and Motorola	Portable Distribution Locations
Identify mobile installation locations; determine number of simultaneous installation locations and quantities of radios per location if SFPUC purchases more than one mobile radio. The SFPUC must make adequate quantities of vehicles available each day to maintain the project schedule. SOW	SFPUC and Motorola	Mobile Installation Locations & Mobile Installation Plan.

Identify locations for control station installations and develop an installation plan for the control station installs if SFPUC purchases more than one control station. SOW	SFPUC and Motorola	Control Station Installation Locations & Control Station Installation Plan.

Completion Criteria

This task is considered complete when the Mobile Installation plan, Control Station Installation plan and Portable Programming Plan are mutually agreed upon by SFPUC and Motorola.

4.6.2.2.12 Develop Fleetmap

Motorola will work with SFPUC to develop the preliminary fleetmap for the system and the participating agencies during the Detailed Design Development. The fleetmap will be refined as necessary during system implementation. Motorola will conduct meetings with SFPUC to define fleetmapping, discuss effective organization of talkgroups, and detail how to set up the fleetmap to operate in the system.

Based on the system fleetmap, the configurations for the consoles (talkgroups by operator position, conventional and auxiliary interfaces), logging talkgroups and trunked system controller database (talkgroup and radio ID ranges) will be developed by Motorola for programming into the fixed equipment. All elements of subscriber radio programming will be done using only the SFPUC-approved and signed fleetmap and programming templates.

During system implementation, Motorola will support and guide SFPUC in its efforts to define the fleetmapping and programming requirements. The infrastructure equipment, subscriber equipment, and any other fixed network equipment in the system will be configured based on this fleetmap. Motorola will include development of programming templates for the subscriber equipment.

Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-33 Responsibility Matrix.

Table 4-33: Responsibility Matrix

Task	Responsibility	Deliverable
Provide user information and details on user operations, including unit ID's, talkgroup assignments, user shifts, etc. Provide existing templates as a baseline for new templates	SFPUC	User Information/Data.
Create preliminary fleetmap. Motorola will development portable radio templates as part of this project (not to exceed 10 templates).	Motorola	Preliminary Fleetmap.
SFPUC will test radios to confirm programming parameters meet the needs of the users.	SFPUC	Fleetmap/Template Validation.

Motorola will develop final templates for subscriber equipment for SFPUC, based on recommended adjustments from the Preliminary Fleetmap and Templates	Motorola	Final Fleetmap and Templates.

Completion Criteria

This task is considered complete when the final fleetmap and final radio templates are mutually agreed upon by SFPUC and Motorola.

4.6.2.2.13 Maintenance Plan

Details for maintenance services included in the SOW can be found in Section 4.6.7, System Support Plans.

4.6.2.2.14 Finalized Training Plan

Motorola will work with SFPUC to develop the finalized training plan. Changes made to the quantities of classes are considered a change in scope. Details for training included in the SOW can be found in Section 4.6.6, Training Plan.

Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-35.

Table 4-35: Responsibility Matrix

Task	Responsibility	Deliverable
Review all training requirements, training classes included, and the Training Schedule.	SFPUC and Motorola.	Review of the Training Plan and Schedule.
Finalize the Training Plan and the schedule for class delivery.	SFPUC and Motorola.	Final Training Plan and Schedule.

Completion Criteria

This task is considered complete when the Training Plan and Schedule are mutually agreed upon by SFPUC and Motorola.

4.6.2.2.15 FCC Licensing and Coordination

Motorola will develop all of the applications and technical attachments necessary to modify the existing FCC licenses or applying for new frequencies and FCC licenses, following the finalization of the frequency plan. It is anticipated that the FCC licenses may be granted in advance of the installation and testing of the LMR and microwave systems; however, if the FCC does not proceed in a timely manner, Motorola will submit applications for STAs in order to allow the project continue according to schedule.

Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-36.

Table 4-36: Responsibility Matrix

Task	Responsibility	Deliverable
Complete all FCC license applications and technical exhibits necessary to license the LMR system and the Microwave System.	Motorola	License Applications
Coordinate frequency licenses and pay coordination fees	Motorola	Frequency Coordination
Submit licenses to the FCC and pay licensing fees.	Motorola	FCC License Applications

Completion Criteria

This task is considered complete when the FCC applications have been submitted to the FCC for licensing.

4.6.2.3 Site Preparation and Scope

Motorola actively participated in the site walks that were conducted by SFPUC as part of the RFP process. Motorola inspected the sites to determine the site's feasibility of transition and migration to the new system, and assess the existing site's current condition for installing the new equipment.

From the information gathered on these site walks and from the SFPUC RFP requirements, Motorola has included the following site improvements and site developments in this SOW.

Any site improvements mutually agreed on during Design Review will need to be completed prior to installation of system equipment. If it is determined that further improvements are desired or necessary, SFPUC can issue a change order to Motorola to perform the work.

At a minimum, for a site to be considered "Site Ready," it must have adequate room in an existing building or shelter to accommodate the equipment to be installed, and electrical service and internal distribution in place. Based on the communications with SFPUC during the site walks, SFPUC will be responsible for power improvements within the sites and with bringing power within 50' of the equipment shelter.

If required, Motorola will assist SFPUC with leasing agreement with the site owners. Motorola cannot ensure that site owners will accept SFPUC's terms. SFPUC will be responsible for securing the sites and lease payments. Leasing cost is not included in this SOW.

A summary of the requiring site improvement or site development are provided in Table 4-37.

Table 4-37: Summary of the Site Improvements/Developments

Site Name	Responsibility	Deliverables
Sawyer Ridge Site	Motorola	80' Self-Supported Tower & 35 KW Outdoor Generator
Duckwall Site	Motorola	35 KW Generator with ATS Switch Battery Backup
Kings Mtn. Site	Motorola	195' Guyed Tower
Burnout Ridge Site	Motorola	Battery Backup

Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-38.

Table 4-38: Responsibility Matrix

Task	Responsibility	Deliverable
Perform additional site upgrades at existing sites (if necessary)	Motorola per Change Order	As-built documentation for new site improvements
Site Ready–Responsible party will deliver sites meeting Site Readiness criteria in accordance with the Project Schedule.	Motorola	Sites Meeting Site Ready Criteria

Completion Criteria

This task is considered complete when the sites are ready for equipment installation by SFPUC and Motorola.

4.6.2.4 Site Access

SFPUC shall provide site access and any security or escorts if required (Table 4-39) for scheduled site walks, site improvements/developments, installation, optimization, system troubleshooting and completion of ATP during the duration of the project. The SFPUC Project Manager and Motorola Project Manager shall coordinate and schedule access to each site when required. SFPUC shall use its best efforts to provide site access. This Phase is considered complete when sites are available to Motorola team per the mutually agreed to project schedule.

Table 4-39: Site Preparation Task and Deliverables Matrix

Task	Responsibility	Deliverable
Provide access to sites	SFPUC	Access to sites

4.6.2.5 Order Processing and Manufacturing

After the Design Review and as a predecessor to factory staging, Motorola will process orders for equipment and begin equipment manufacturing. Motorola will place factory orders for the system hardware that is being purchased for the communications system. Motorola will place orders for required third-party equipment and execute major subcontracts. Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-40.

Table 4-40: Responsibility Matrix

Task	Responsibility	Deliverable
Factory orders placed for all Motorola manufactured equipment.	Motorola	Orders for Motorola manufactured equipment.

Order placed for all third-party equipment.	Motorola	Third-party equipment orders.
Motorola will execute major subcontracts.	Motorola	Subcontracts in place.

Completion Criteria

This phase is considered complete when all equipment orders have been placed.

4.6.2.6 Subscriber Radio Programming and Rollout

4.6.2.6.1 Motorola Provided Subscriber Radios

Motorola is providing a fleet of portable radios and mobile subscriber radios for the SFPUC. Motorola will develop the templates for the P25 system as defined by the fleetmap. When the users transition to the new P25 network, Motorola will use the mutually agreed on templates to program into each radio as they come on to the network.

During the deployment of subscriber radios, Motorola will program and distribute portable radios based upon a mutually agreed upon schedule and count of the portable radios per agency. Mobile radios will be installed using remote mount configuration. SFPUC will provide vehicles per mutually agreed schedule for installation by Motorola crew. This scope does not apply to any subscribers purchased from vendors other than Motorola.

Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-41.

Table 4-41: Responsibility Matrix

Task	Responsibility	Deliverable
Motorola will program Portable and Mobile Radios using the mutually agreed on templates.	Motorola	Portable and Mobile Radio Programming
Optimize each radio subscriber individually. All performance parameters (modulation fidelity, frequency error, TX & RX BER etc.) will be checked to verify factory settings.	Motorola	Subscriber Optimization
Portable Radios are ready to be distributed to fleet when system is ready for cutover per mutually agreeable schedule and count of portables per agency provided by SFPUC.	Motorola and SFPUC	Delivery of Portable Radios
Remote Mount Installation of the Mobile Radios per the mutually agreed schedule.	Motorola and SFPUC	Installation and Delivery of Mobile Radios

4.6.2.7 Factory Acceptance Testing

Staging is a unique opportunity for to test the operation of the radio network in one location, and be able to walk from site to site in a matter of just a few feet. Motorola will provide this factory staging for all major fixed-end equipment, as well as a representative sampling of user radio units included in this SOW.

CCSi is a unique facility consisting of approximately 43,000 square feet of staging space where Motorola stages and demonstrates customer systems both large and small. Motorola's CCSi has been in operation for more than 20 years and has staged hundreds of systems for the

U.S. Federal Government, State and Local Governments, Foreign Governments and numerous Fortune 500 Companies. The CCSi staging process was introduced in 1994 and has proven to be a value-added process for both Motorola and our customers. By staging radio systems in a controlled environment and inviting our customers to participate in system functionality testing, Motorola and customers have been able to capitalize on the benefits of reduced implementation cycle time, decreased costs, and improved system satisfaction.

Staging will provide SFPUC with the opportunity to see the equipment assembled and working. Most functionality and features of the communication system that are capable of operation in a factory environment will be tested and verified using Motorola's master core owned by Motorola CCSi.

Factory staging will allow testing of the functional capabilities of the communications system. This process will enable SFPUC to witness factory testing in a controlled environment, with the same equipment that will be used in the field, in order to provide a smooth and easy field installation.

Motorola will assemble the full LMR system hardware at a single location. Physical setup, racking, and location of hardware will comply with SFPUC's approved equipment layout plans. Cables will be cut and labeled with information to clarify interconnection for field installation and to fit the room layout plan specifications. All provided inter-rack and inter-equipment cables will have connectors attached and tested. No DC power systems, Microwave Backhaul system, or RF Antenna systems will be staged at the factory location.

After assembling the equipment, Motorola's staging team will power it up, load software, set levels, program, configure and optimize the equipment. System parameters will be set according to inputs from Motorola's design team. System software and system features will be tested and validated. All system levels will be set according to specifications to verify proper end-to-end connectivity. These settings will be recorded and documented to provide baseline information to the field integration team.

During testing, all measurements or outcomes will be recorded within the test script, as indicated in the test. The result of a test procedure will be "Pass", "Fail", or a measured value. The passing of acceptance testing will be the determination that the equipment is ready to be shipped to the field.

At completion of the system staging factory acceptance test procedures, Motorola will inventory the equipment. Motorola will also update the inventory database with this information to assist in tracking on delivery to the field. While all applicable feature tests will be performed at the factory, Motorola will work with SFPUC to determine which tests they would like to witness for system acceptance.

Motorola manufactured equipment will be insured and shipped to a storage location provided by Motorola. Other equipment from Motorola's third party equipment supply base is also insured and

shipped via the most appropriate means to ensure timely and damage-free arrival (See Table 4-42).

Table 4-42: Staging Task and Deliverables Matrix

Task	Responsibility	Deliverable
Staging of system components.	Motorola Systems Engineering.	The system is staged in Schaumburg, IL for SFPUC to witness live operation.
Functional Performance Testing: • Motorola will perform a Functional Performance Test in order to verify the functionality of the communications system. The Functional Performance Test will include the following: • Physical inspection. • Thorough exercise of the hardware and software. • Testing of the voice communications features.	Motorola to perform. The SFPUC to witness test.	Functional Performance Tests Using CCSi Owned Master Core
Select a local storage facility to temporarily house equipment.	Motorola.	Storage location is selected and secured.
Equipment packed and shipped to local storage facility.	Motorola Staging Team, 3rd party equipment providers.	Equipment arrives at Motorola provided storage facility and verifies equipment delivery.

Completion Criteria

This task is considered complete when SFPUC signs a certificate of acceptance of the factory acceptance test.

4.6.2.8 Site Improvements and Development

Motorola will work with SFPUC to finalize site improvements and developments required for implementation of SFPUC LMR Radio System. Details for site improvements and developments included in the SOW can be found in Section 4.6.3, Site Development and Improvement Plan. Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-35.

Table 4-24: Responsibility Matrix

Task	Responsibility	Deliverable
Review Site Development and Improvement Plan.	SFPUC and Motorola.	Review of the Site Improvement and Development Plan
Finalize the Site Improvement and Development Plan.	SFPUC and Motorola.	Final Site Improvement and Development Plan

Completion Criteria

This task is considered complete when the Site Improvement and Development Plan is mutually

agreed upon by SFPUC and Motorola.

4.6.2.9 Fixed Network Equipment Installation

Motorola will be responsible for warehousing and delivery of equipment to the sites. Motorola will be responsible for all installation of Motorola furnished equipment and will be responsible for bolting the racks to the floor, providing earthquake bracing to attach equipment racks to cable ladders and to adjacent racks, and ensuring that all equipment is properly secured. Equipment racks will be rated for seismic Zone 4. The hardware and the method used to secure the racks to the floor will also meet seismic Zone 4. All equipment will be installed in a neat and professional manner, employing a standard of workmanship consistent with the SOW. Infrastructure and antenna systems will be installed per quantities and at locations identified in the SOW, and subsequent design changes approved by SFPUC. Motorola will cable the equipment and furnish and install radio and microwave antenna systems and provide any required cable management materials including entry boots, tower cable boots or other cable management items, ice shields for sites above 2000', and all required antenna mounts. Installation of the Fixed Network Equipment (FNE) will consist of installing the radio communications infrastructure and computer equipment at the dispatch and control centers. During field installation of the equipment, any required changes to the installation will be noted and assembled with the final as-built documentation of the system. The as-built documents will be provided at the end of the project along with the maintenance and operator manuals. Upon completion of the installation, Motorola will perform final site inspections to verify proper physical installation and operational configurations of each individual site. Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-43.

Table 4-43: Responsibility Matrix

Task	Responsibility	Deliverable
Site Ready: Motorola will prepare the site for equipment installations, resolving site deficiencies identified in the Site Audit Reports. Sites will be ready according to the project schedule for equipment installation.	Motorola	Sites Meeting Site Preparation Requirements for Installation
Provide access to all facilities for system equipment installation. SFPUC will provide reasonable site access for scheduled site walks, installation, optimization, system troubleshooting and performance of acceptance testing for the duration of the project. The SFPUC's Project Manager and Motorola's Project Managers will coordinate and schedule access to each site 72 hours in advance of desired visit. SFPUC will use its best efforts to provide site access.	SFPUC	Site Access

General Installation Responsibilities: • Motorola will install the new system equipment that is provided in the equipment list. • Motorola will ground and bond the site equipment to the ground system, in accordance with the R56 site installation standards. • Motorola will furnish all cables for power, audio, control, and microwave transmission to connect the supplied equipment to the power panels or receptacles and the audio/control line connection point. • All cabling will be cut to length, properly connected and terminated per City and County installation standards and clearly labeled at both ends. All associated punch block connections will be properly labeled. • Motorola will ground and bond all provided equipment during installation and is responsible for connecting all equipment to the common ground system at the existing facilities. All cabinets, racks, enclosures, telephone circuit surge protectors, and transmission line surge protectors provided will be connected to the single point ground. Motorola will connect all ground connections using approved non-reversible crimp or clamp connections. • All punch blocks used will be 66 block style. All associated punch block connections will be properly labeled. • Motorola will remove and dispose of any debris that is a result of the project activities from the site. This does not include the removal or relocation of any existing SFPUC equipment. • Removal and disposal of existing equipment was not required by RFP and not included as part of this SOW. • All cabling, port assignments, and punch block connections will be recorded into the final system as-built documentation.	Motorola	New Equipment Installations per Motorola's Site Quality Standards
Install and Test DC Power: • Motorola will deliver, bolt to the floor and provide earthquake bracing for the DC power system. Motorola will connect the DC power to the AC power panel provided by SFPUC. Motorola will perform startup services on the DC power equipment.	Motorola	DC Power System Installation Audit/Inspection and Test Results

• DC Power System components will be installed per quantities and at locations identified in the Design Review, and subsequent SFPUC approved design changes. Motorola will cable the equipment and provide any required cable management materials. • AC and DC primary power wiring will not be exposed and will be installed within conduit as per the National Electrical Code, and any applicable Local Codes. • Motorola will test, verify, and document proper operation of the DC Power systems and adherence to Industry Standards installation guidelines. Any issues and their resolution will also be documented.		AC Panel Demarcation
Install and Test Backhaul Equipment and Software: • Motorola will install all new microwave equipment. • All microwave antennas will be installed. All antennas and antenna feed lines will be swept for return loss and results reviewed with SFPUC. • Motorola will test, verify, and document proper operation of the backhaul systems and adherence to Industry Standards installation guidelines. Any issues and their resolution will also be documented.	Motorola	Radio System Installation Audit/Inspection and Test Results
Existing Microwave Equipment: • SFPUC-provided site links will be in accordance with specifications provided by Motorola during the Design Review.	SFPUC	Existing Site Links
I**nstall & Test Backhaul Central Control Equipment & Software** • Motorola will install Backhaul Central Control Equipment & Software in accordance with the Design Review Scope of Services and Equipment Lists • Motorola will test, verify, and document proper operation of the backhaul central control equipment and adherence to Industry • Standards installation guidelines. Any issues and their resolution will also be documented.	Motorola	Radio System Installation Audit/Inspection and Test Results
Install and Test LMR Central Control Equipment & Software • Connect the SFPUC LMR System to the existing San Francisco Master Core and test the connection. • Network Management Terminals will be installed and tested in accordance with the Design Review Scope of	Motorola	Radio System Installation Audit/Inspection and Test Results

Services and Equipment Lists • Simulcast Prime Site equipment will be installed and tested in accordance with the Design Review Scope of Services and Equipment Lists • Motorola will test, verify, and document proper operation of the LMR system connection to Master Site, Network Management, and Prime Site and Simulcast subsystems and adherence to Industry Standards installation guidelines. Any issues and their resolution will also be documented. • SFPUC Network Management access to monitor the system will be established.		
Install and Test LMR Trunked Base Station Equipment and Software: • Motorola will install ASTRO 25 Trunked Repeater Site equipment in accordance with the Design Review Scope of Services and Equipment Lists. Motorola will install the 800 MHz GTR 8000 base station equipment in accordance with the Design Review Scope of Services and Equipment Lists. • Motorola will test, verify, and document proper operation of the 800 MHz GTR 8000 base radio equipment. Antennas and lines will be included in the testing process. Any issues and their resolution will also be documented.	Motorola	Radio System Installation Audit/Inspection and Test Results
Install any subsystems purchased.	Motorola	Subsystems Purchased
SFPUC will sign installation acceptance certificates after system inspection and check out of FNE on a site-by-site, subsystem-by- subsystem basis and in accordance with SFPUC identified Milestones and adherence to the Industry Standards for Installation.	SFPUC	Signed Installation Acceptance Documents

Completion Criteria

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

4.6.2.10 Systems Integration and Optimization

Motorola will configure, optimize, and program all system equipment. Motorola will integrate all of the Motorola provided subsystems, as well as integrate SFPUC radio system with San Francisco Master Core. Motorola will verify that all equipment is operating properly and that all levels are properly set, once installation in the field is complete. Motorola will optimize each subsystem individually.

- All audio and data levels will be checked to verify factory settings.
- All voltage and current levels will be checked to verify factory settings.
- All audio will be checked to verify factory settings.
- All radio equipment will have forward and reflected power checked by Motorola after connection to the antenna systems, to verify that they meet the FCC requirements and are within Motorola design tolerances.
- All communication interfaces between devices will be verified for proper operation.
- All features and functionality will be tested by Motorola to ensure that they are functioning according to the manufacturer's specifications and per the final configuration established during system staging.

The Motorola system technologist will maintain a punchlist of items that need resolution. SFPUC will be responsible for directing the activities of non-Motorola subcontractors and supporting agencies. SFPUC is also responsible to coordinate all on-site integration activities including assistance to Motorola for system testing requiring participation from non-Motorola subcontractors. Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-44. Motorola and SFPUC will each ensure that any of their subcontractors perform in accordance with the implementation schedule.

Table 4-44: Responsibility Matrix

Task	Responsibility	Deliverable
• Provide and install all communication lines and equipment that are not Motorola provided deliverables. • Provide all required liaison support with the agencies and vendors required to support the solution. • Ensure that the necessary technical support is made available for installation and testing with third party vendors and interfaces.	SFPUC	SFPUC provided equipment and interfaces required for integration
Install, integrate and test the hardware, software and interfaces as specified in the contract at a system level.	Motorola	Installation and integration of equipment

Maintain a punchlist of items that need resolution. Manage the resolution of punchlist items.	Motorola	Punchlist resolution

Completion Criteria

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

4.6.2.11 *System Acceptance Testing*

Motorola's acceptance testing process complies with SFPUC's requirements and prescribed milestones. This process provides checkpoints for SFPUC to oversee the overall progress that is being made as the system implementation progresses. This testing is composed of test procedures, equipment installation acceptance, equipment measurement verification, functional acceptance tests, coverage acceptance tests, and a 90-day operational burn in test that are described in the sampled test plans provided in the SOW.

System acceptance defined in this SOW will be performed when the system optimization is complete. These tests will verify the entire system in operation, including radio system roaming and subscriber affiliation.

Motorola will submit the draft acceptance test plan, defined during the Design Review, for approval 60 calendar days prior to the beginning of acceptance testing. Any system testing that SFPUC wants performed that is not specified in this SOW must be reviewed by Motorola for feasibility and acceptability. Any additional tests will represent a change in the project's scope.

Motorola will provide to SFPUC at least 10 days notice before the acceptance tests   acceptance test plan defined in this SOW.

Motorola will work with SFPUC to resolve punchlist items documented during radio subscriber unit installation and testing in order to meet all criteria for final acceptance. SFPUC will approve resolution of all punchlist items.

4.6.2.12 *Equipment Installation Acceptance*

Description

Equipment installations will be inspected to ensure adherence to quality standards and include measurement of all equipment levels, settings and input/output values by Motorola and review of all measured values by SFPUC. Some measurements may be witnessed by SFPUC representative technical staff. Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-45. Equipment installation acceptance will occur on a site-by-site, system-by-system basis.

Table 4-45: Responsibility Matrix

Task	Responsibility	Deliverable
Control Site Installation Inspection.	Motorola and SFPUC	Installation inspection audit
Fixed Equipment Subsystem Installation Inspections.	Motorola and SFPUC	Installation inspection audit

| Dispatch Site Installation Inspections. | Motorola and SFPUC | Installation inspection audit |

Completion Criteria

This task is considered complete when the installation inspections are complete and signed off by SFPUC and Motorola.

4.6.2.13 System Functional Tests

Description

Operational and Functional System Test includes the system functional acceptance tests, which will be performed when the system optimization is complete. The functional acceptance tests verify the functionality tested at factory testing. These tests will verify the entire system in operation. Successful completion, with open items, will constitute system acceptance. Final project acceptance will be granted when all open items are closed. A complete list of functional acceptance tests is included in this SOW in Section 4.6.5, Test Plans.

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

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

Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-46.

Table 4-46: Responsibility Matrix

Task	Responsibility	Deliverable
Motorola will perform functional ATPs for the communications system. During each test, test results will be recorded for review and approval of the test.	Motorola	Execution of functional acceptance testing
Upon successful completion of each Acceptance Test, SFPUC and Motorola will sign acceptance certificates documenting acceptance.	SFPUC	Written approval of successful functional acceptance testing

4.6.2.14 Coverage Acceptance Tests

The Coverage Acceptance Tests will be performed on the new trunked P25 network when the RF site and control equipment installations and optimization are complete. The coverage acceptance tests verify the coverage performance of the system. The Coverage Acceptance Test Overview is included in this SOW.

Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-47.

Table 4-47: Responsibility Matrix

Task	Responsibility	Deliverable
Motorola will perform Coverage ATPs for SFPUC System. During each test, test results will be recorded for review and approval of the test.	Motorola	Execution of coverage acceptance tests
Upon successful completion of each coverage acceptance test, SFPUC and Motorola will sign acceptance certificates documenting acceptance.	SFPUC	Written approval of successful coverage acceptance testing

Completion Criteria

This task is considered complete upon SFPUC approval and sign-off of the equipment installation acceptance, functional test and coverage acceptance test.

4.6.2.15 *Transition to New System Operations (Cutover Plan)*

Motorola will develop a comprehensive migration plan that demonstrates the strategy for transitioning the existing radio system to the new SFPUC Trunked radio system. In developing the migration plan, Motorola will work with SFPUC to develop a transition to the new system that minimizes the operational impact to system users. Motorola will work directly with the SFPUC Project Manager, the SFPUC user agencies, as well as departments and communications center dispatchers and supervisors. These meetings will address how to deal with the technical issues, communication impact to users, and general operational issues and planning that need to be accommodated for SFPUC's various agencies. The mutually agreed upon methodology for migration will ensure that a safe, effective, and efficient transition occurs from the old radio system to the new system with minimum impact on user operations.

A migration plan timetable listing the chronological orders and time frames also will be developed. The migration plan will consider, at a minimum, site readiness, site equipment and RF system migration (spectrum management, and tower and equipment space considerations).

The migration plan will detail timelines, sequence of events, resources involved, potential downtime, operational details, which departments move to the new system, and the order in which they will migrate. The migration plan will also detail how communications will occur for each department during the transition process with minimal impact to SFPUC users.

The migration plan will consider, at a minimum, the following components:

- Site equipment and RF system cutover (backhaul, spectrum management, and tower and equipment space considerations).
- Site power-management strategy (managing peak loads with both systems active).
- Dispatch console and cutover.
- Radio subscriber fleet migration approach (programming).

- Site "turn up" sequencing.

The transition plan and specific responses to the RFP requirements can be found in Section 4.6.4, Migration Plan (Cutover Plan).

Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-48.

Table 4-48: Responsibility Matrix

Task	Responsibility	Deliverable
Motorola will review the communications system acceptance status, migration plan, and schedule system migration with SFPUC.	Motorola	Completed Migration Checklist
SFPUC will review the Migration Checklist and request any modifications for approval.	SFPUC	Written Approval of Migration Check List
Motorola and SFPUC will execute the migration plan.	Motorola and SFPUC	Migration to New System Operations
Where an existing system is being taken out of service, Motorola will reconfigure new Motorola provided equipment as necessary to delete access to the old equipment.	Motorola	Post Migration Reconfiguration

Completion Criteria

This task is considered complete when users are fully cut over to operation on the new system.

4.6.2.16 *90-Day Operational Burn In*

The 90-day Operation Burn In test on the new trunked P25 network will be conducted upon when the system testing is complete. The 90-day test will provide an opportunity for the system to be exercised under load. SFPUC is encouraged to migrate all users to the new system before or during the Burn-in period. The loading requirements for this operational burn in will be determined during the design review. A description of the 90-day operational test plan is located in 4.6.5.8, 90-Day Operational Burn-In Test Plan and Methodology. Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-49.

Table 4-49: Responsibility Matrix

Task	Responsibility	Deliverable
90-Day operational burn in on SFPUC system will commence. The results of this operational burn in will be documented.	Motorola and SFPUC	Execution of 90-day operational

		burn in
Upon successful completion of 90-Day operational burn in, SFPUC and Motorola will sign acceptance certificates documenting acceptance.	SFPUC	Written Approval of Successful 90-Day operational burn in

4.6.2.17 *System Acceptance*

System acceptance will occur upon successful completion of the acceptance tests. Upon system acceptance, Motorola and SFPUC will memorialize the event by promptly executing a system acceptance certificate. If the acceptance test plan includes separate tests for individual subsystems or phases of SFPUC, acceptance of the individual subsystem or phase will occur upon the successful completion of the acceptance tests for the subsystem or phase, and Motorola and SFPUC will promptly execute an acceptance certificate for the subsystem or phase.

If SFPUC believes the system has failed the completed acceptance tests, SFPUC will provide Motorola a written notice that includes the specific details of the failure. If SFPUC does not provide to Motorola a failure notice within 30 days after completion of the acceptance tests, system acceptance will be deemed to have occurred as of the completion of the acceptance tests. Minor omissions or variances in SFPUC system that do not materially impair the operation of SFPUC as a whole will not postpone system acceptance or subsystem acceptance, but will be documented on a punchlist and corrected according to a mutually-agreed schedule.

SFPUC acknowledges that Motorola's ability to perform its implementation and testing responsibilities may be impeded if SFPUC begins using the system before system acceptance. Therefore, SFPUC will not commence beneficial use before system acceptance or without Motorola's prior written authorization, which will not be unreasonably withheld. Motorola is not responsible for system performance deficiencies that occur during unauthorized beneficial use. Upon commencement of beneficial use, SFPUC assumes responsibility for the use and operation of the system.

4.6.2.18 *Technical and Operational Training*

The purpose of the training program is to provide SFPUC with a core set of technical training sessions that will ensure the successful integration of the system into daily fleet operations. Technician, dispatcher, and subscriber radio user training will be provided for technical personnel, dispatcher personal, and end-users per the selected training courses identified Section 4.6.6, Training Plan.

Motorola will conduct courses to thoroughly train the SFPUC radio system users and dispatch personnel on use of the system, and the SFPUC technical personnel on operation and support of the system.

The training will take place at two locations within SFPUC. The optimum timing of training will be established by SFPUC and Motorola.

All provided training materials will be customizable electronic media and will be for use at SFPUC's discretion. Upon completion of the training program, the SFPUC personnel will be able to operate and

manage the system. Responsibilities and deliverables for Motorola and SFPUC are defined in the responsibility matrix in Table 4-50.

The training scope is defined in detail in Section4.6.6, Training Plan.

Table 4-50: Responsibility Matrix

Task	Responsibility	Deliverable
Motorola will schedule the training classes defined in the training plan with the SFPUC personnel and the training provider.	Motorola	Scheduled Training Classes
SFPUC will provide the facility for all scheduled training classes.	SFPUC	Training Facility
Motorola will provide access to the system equipment required for training, as defined in the Technician Training that will be delivered as outlined in the Training Plan.	Motorola	Equipment for Training
SFPUC will provide access to the system equipment required for all field training, as defined in the Training Plan.	SFPUC	Equipment for Training
Upon approval of Field Performance Tests, Motorola will provide training to designated personnel in accordance with the Training Plan.	Motorola	Deliver Training

Completion Criteria

This task is considered complete when the training has been delivered as described in the Training Plan.

4.6.2.19 Project Finalization

The finalization phase of the project consists of ensuring that all criteria for final project completion have been met. Responsibilities and deliverables for Motorola and SFPUC are defined in Table 4-51.

Table 4-51: Responsibility Matrix

Task	Responsibility	Deliverable
Motorola will resolve punchlist items documented at System Acceptance.	Motorola	Approved Punchlist Resolution
Motorola will ensure that the project team and the Service organization work closely together to provide a seamless transition to the warranty phase of the project.	Motorola	Service Transition Certificate and Customer Support Plan
All documents listed in the System Manual–"As-Built" Documentation Section will be submitted, as they become ready.	Motorola	System Manual–"As-Built" Documents

| Final approvals of all System Manual– "As-Built" Documents. | SFPUC | Written Approval Statements |
| SFPUC will acknowledge Final Project Completion upon completion of the criteria for Final Project Completion for the communications system. | SFPUC | Signed Final Acceptance Documents |

Completion Criteria

This task is considered complete when SFPUC and Motorola have signed the final project completion certificate, representing the completion of the system and acknowledgement of system acceptance as described in the acceptance test plan.

Final project acceptance will occur after system acceptance when all deliverables and other work have been completed. When final project acceptance occurs, the parties will promptly memorialize this final event by so indicating on the system acceptance certificate

4.6.2.20 *System Design and Implementation Documentation*

Motorola provides documentation of the system configurations, physical installation, and system testing. Documentation will be created and updated during the project. Electronic versions of custom documentation will be provided both in a viewable format and in the documents standard format. Documentation will be provided in the SFPUC-maintainable formats (MS Office, Visio, AutoCAD or other formats), and may be provided in PDF format where the provided documentation depends on Motorola-proprietary formats.

4.6.2.20.1 Design Documentation

Motorola will create or update the following standard documents during the design phase:

- Document index.
- Project schedule.
- Statement of work.
- Radio system description.
- Coverage maps based on final site selection and quantity.
- Frequency plan.
- Loading analysis.
- Radio system IP plan.
- Microwave system description.
- Microwave network maps.
- Microwave path analysis for each hop.
- Microwave IP network plan.

- Site layout drawings.

- Shelter floor plan drawings.

- Rack elevation drawings.

- System block and level diagrams.

- Power consumption data (based on measured values).

- Antenna system diagrams, including combiners and receiver multi-coupler systems.

4.6.2.20.2 Factory Staging Documentation

Motorola will create or update the following documents of system staging:

- Programming templates.

- Interconnection drawings.

- Interconnection charts.

- Manufacturer's standard operator manuals.

- Interconnection cable description and inventory.

- Printout of equipment parameters.

- Inventory with serial numbers and installation reference.

- Software/firmware version numbers.

- Manufacturer's standard technical manuals.

4.6.2.20.3 System Manual - "As-Built" Documentation

Motorola will supply "as-built" documentation for the system. The documentation will consist of:

- Standard equipment manuals.

- System diagrams:
    - Fixed equipment documentation.
    - Plan and elevation views of the equipment installation at the radio site.
    - Equipment inter-cabling diagrams for each site.
    - Demarcation wiring lists.

- Programming and level setting data sheets.

- Equipment by site.

- Key access procedures.

- Site inventory lists.

- Remote sign-on procedures and passwords.

- Software versions and equipment wiring by equipment site.

- Radio licenses.

- Field ATP test sheets and results.

- R56 site audit.

- Maintenance records.

- Warranty information.

- Service provider.

4.6.2.21 Equipment Manuals

Motorola will provide equipment manuals in electronic version or printed copy when available, covering both standard and optional features. Manuals will be provided in sufficient quantities to meet SFPUC's requirements. Manuals will be provided as PDF documents and, where available, in printed copies. The content of these manuals is standardized and may not be specific to SFPUC system.

4.6.3   Site Development and Improvement Plan

4.6.3.1   Site Development at Sawyer Ridge Site

Site Scope Summary

- Engineering services for site drawings and regulatory approvals–Included.

- Site acquisition services–Not included.

- Zoning Services–Not included.

- New power run–50 feet, Electrical service type–Underground.

- New generator size–35 kW, Type–Outdoor.

- New tower to be used for antennas–80-foot self-supported tower.

- New tower foundation size–19 cubic yard, Type–Drilled Pier.

Motorola Responsibilities:

Site Engineering

- Prepare site construction drawings showing the layout of various new and existing site components.

- Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.).

- Perform a boundary and topographic survey for the property on which the communication site is located or will be located.

- Prepare a lease exhibit and sketch of the site to communicate to the property owner the lease space and planned development at the particular site location.

- Prepare record drawings of the site showing the as-built information.

- Perform construction staking around the site to establish reference points for construction.

  Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the construction activity. Motorola believes Environmental Impact Reports are not required for the SFPUC Radio and Microwave sites. The sites are all considered existing communication sites and have been previously disturbed and are not considered green sites. If any of the sites require Environmental Impact Reports, Motorola project team will assist SFPUC with gathering the information required for SFPUC to file the reports.

- Conduct up to 40-foot deep soil boring test at tower location and prepare geotechnical report of soil conditions at locations of the tower foundation. Grouting of boring holes or access by Automatic Traction Vehicle (ATV) - mounted rig is not included.

- Conduct construction inspection of foundation steel prior to pour, materials testing of concrete and field density tests of backfill to ensure quality construction.

- Check tower erection for plumbness, linearity and alignment after installation.

- Perform inspection of the site and the work performed by the Contractor to document that the site is built in accordance with the "Site Plans" and document any deviations or violations.

- Prepare, submit and track application for local permit fees (electrical, building etc.), prepare FAA filings and procure information necessary for filing.

- Tribal & Cultural Approval.

- Forestry Approval.

- CEQA Approval.

Site Preparation

- Obtain the permits such as electrical, building, and construction permits, and coordinate any inspections with local authorities that may be needed to complete site development work.

- Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of Motorola's control will result in additional costs.

Site Components Installation

- Construct 1 foundation for the 35 kW generator with reinforcing steel necessary for foundations.

- Supply and install 1 standby power generator (35 kW) located within 20 feet of the ATS, including interconnection wiring between the generator, transfer switch, and site electrical service mains.

- Supply and install a perimeter grounding system around the compound and shelter. The ground system is to tie to the fence and all new metal structures within the compound to meet current Motorola's R56 standards.

Tower Work

- Construct drilled pier type tower foundations including excavation, rebar and concrete (not to exceed 19 cubic yards).

- Erect new 80-foot self-supported tower.

- Supply and install grounding for the tower base for self-supported towers Antenna and Transmission Line Installation

- Install 2 antenna(s) for the RF system.

- Install 2 4-foot microwave dishes.

- Install up to 220 linear feet of 7/8-inch transmission line.

- Install up to 226 linear feet of EW63 waveguide for microwave dishes.

- Perform sweep tests on transmission lines.

- Perform alignment of each of 2 microwave paths to ensure that the microwave dishes are optimally positioned.

- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

Existing Facility Improvement Work

- Ground all metallic objects in the interior of the existing room, to meet current Motorola's Standards and Guidelines for Communications Sites (R56) requirements and terminate near equipment locations.

- Supply and install 1 copper ground buss bar(s).

- Supply and install 1 wall-mounted 10-pound CO_2 fire extinguisher and 1 wall-mounted 20-pound ABC fire extinguisher.

Grounding Enhancement

- Supply and install 4 chemical rods.

Miscellaneous Work

- Integration into existing solar system assuming the solar system can be integrated.

4.6.3.2 Site Development at Marcial Peak Site – *This section deleted by mutual agreement of the parties.*

4.6.3.3 Site Development at Kings Mountain Site

Site Scope Summary

- Engineering services for site drawings and regulatory approvals–Included.

- Site acquisition services–Not included.

- Zoning Services–Not included.

- New tower to be used for antennas–195-foot guyed tower-field assembled.

- New tower foundation size–15 cubic yard, Type–Base + 3 anchors.

Motorola Responsibilities:

Site Engineering

- Prepare site construction drawings showing the layout of various new and existing site components.

- Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.)

- Perform a boundary and topographic survey for the property on which the communication site is located or will be located.

- Prepare a lease exhibit and sketch of the site to communicate to the property owner the lease space and planned development at the particular site location.

- Prepare record drawings of the site showing the as-built information.

- Perform construction staking around the site to establish reference points for construction.

- Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the construction activity. Motorola believes Environmental Impact Reports are not required for the SFPUC Radio and Microwave sites. The sites are all considered existing communication sites and have been previously disturbed and are not considered green sites. If any of the sites require Environmental Impact Reports, Motorola project team will assist SFPUC with gathering the information required for SFPUC to file the reports.

- Conduct up to 35-foot deep soil boring test at tower location and prepare geotechnical report of soil conditions at locations of guyed tower base and each guy anchor point. Grouting of boring holes or access by Automatic Traction Vehicle (ATV) - mounted rig is not included.

- Conduct construction inspection of foundation steel prior to pour, materials testing of concrete and field density tests of backfill to ensure quality construction.

- Check tower erection for plumbness, linearity and alignment after installation.

- Perform inspection of the site and the work performed by the Contractor to document that the site is built in accordance with the "Site Plans" and document any deviations or violations.

- Prepare, submit and track application for local permit fees (electrical, building etc.), prepare FAA filings and procure information necessary for filing.

- Tribal & Cultural Approval.

- Forestry Approval.

- CEQA Approval.

Site Preparation

- Obtain the permits such as electrical, building, and construction permits, and coordinate any inspections with local authorities that may be needed to complete site development work.

- Provide minimal grading in a 15-foot x 30-foot compound around each of 3 guy anchors to allow anchor installation.

- Supply and install gravel surfacing to a depth of 6 inches around each of 3 guy anchors, including herbicide treatment and geotextile fabric installation.

- Supply and install 8-foot high chain-link fencing with a four-foot wide gate around a 15-foot x 30-foot compound for each of 3 guy anchors.

Tower Work

- Construct tower foundations for a guyed tower (base and three anchors) including excavation, rebar and concrete (not to exceed 8 cubic yards).Rock coring, extensive dewatering of foundations or hazardous material removal have not been included and will be considered extra.

- Erect new 195-foot guyed tower.

- Install torque arm on 3-foot guyed tower.

- Supply and install grounding for the tower base for monopole or guyed towers.

- Ground each of the 3 guy anchors using galvanized steel ground rods.

Antenna and Transmission Line Installation

- Install 2 antenna(s) for the RF system.

- Install 1 4-foot microwave dishes.

- Install 1 6-foot microwave dishes.

- Install up to 450 linear feet of 7/8-inch transmission line.

- Install up to 380 linear feet of EW63 waveguide for microwave dishes.

- Perform sweep tests on transmission lines.

- Perform alignment of each of 2 microwave paths to ensure that the microwave dishes are optimally positioned.

- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

- Install 1 automatic transfer switch and connect it to generator and electric main.

- Supply and install 12-inch-wide cable runway (up to 20 linear feet) inside the existing room.

- Supply and install 18-inch-wide cable runway (up to 20 linear feet) inside the existing room.

- Supply and install 1 cable entry panel with 6 ports.

- Ground all metallic objects in the interior of the existing room, to meet current Motorola's Standards and Guidelines for Communications Sites (R56) requirements and terminate near equipment locations.

- Supply and install 1 copper ground buss bar(s).

- Supply and install 1 wall-mounted 10-pound CO_2 fire extinguisher and 1 wall-mounted 20-pound ABC fire extinguisher.

- Supply and install "No smoking" EME signage at the site.

Grounding Enhancement

- Supply and install 4 chemical rods.

Miscellaneous Work

- Integration into existing solar system assuming the solar system can be integrated.

4.6.3.4   Site Development at Duckwall Site

Site Scope Summary

- Engineering services for site drawings and regulatory approvals—Included.

- Site acquisition services—Not included.

- Zoning Services—Not included.

- New fuel tank size—500 gallons, Type—Propane above-ground.

- New generator size—25 kW, Type—Outdoor. Note: The SFPUC will likely require Motorola to install a smaller generator with different fuel type. Should this cost less than the proposed 25kW size, Motorola will apply the credit to other services for the SFPUC.

- Existing tower to be used for antennas—60' Tower.

Motorola Responsibilities:

Site Engineering

- Prepare site construction drawings, showing the layout of various new and existing site components.

- Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.).

- Prepare a lease exhibit and sketch of the site to communicate to the property owner the lease space and planned development at the particular site location.

- Prepare record drawings of the site showing the as-built information.

- Perform a boundary and topographic survey for the property on which the communication site is located or will be located.

- Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the construction activity. Motorola believes Environmental Impact Reports are not required for the SFPUC Radio and Microwave sites. The sites are all considered existing communication sites and have been previously disturbed and are not considered green sites. If any of the sites require Environmental Impact Reports, Motorola project team will assist SFPUC with gathering the information required for SFPUC to file the reports.

- Perform four point soil resistivity testing at the time of site visit.

- Provide a structural engineering analysis for antenna support structure, if necessary, to support the antenna system. If the tower structure fails the analysis, the cost of any site relocation or modifications to the tower required to support the antenna system will be the responsibility of San Francisco Public Utilities Commission 2017.

- NOTE: This task does not include mapping, structural measurement survey, materials testing, geotechnical investigation, and/or other field investigation to acquire the data. If applicable, these tasks will be noted separately in the SOW.

- Perform the structural redesign of the tower upgrade and provide sealed construction drawings and specifications for the necessary structural modifications.

- Provide tower climbing and tower mapping services for towers up to 350 feet to collect information about structural members and existing equipment.

- Conduct site investigation necessary to develop structural analysis (cases where adequate as-built documentation is not provided).

- Conduct dispersive wave testing of foundations for a three legged self-supported tower to determine their structural details for analysis when tower drawings are not available.

- Preparation, submission and tracking of application for local permit fees (electrical, building etc.) and procurement of information necessary for filing.

Site Preparation

- Obtain the permits such as electrical, building, and construction permits, and coordinate any inspections with local authorities that may be needed to complete

site development work.

- Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of Motorola's control will result in additional costs.

Site Components Installation

- Construct 1 concrete slab for 500 gallon above-ground Liquid Propane (LP) fuel tank at 3000 psi with reinforcing steel necessary for foundations.

- Construct 1 foundation for the 25 kW generator with reinforcing steel necessary for foundations.

- Supply and install 1 500-gallon Liquid Propane (LP) fuel tank(s), fill it with fuel and connect it to the generator.

- Supply and install fuel tank monitors on the tanks to monitor low fuel in tanks and run alarm wiring to the building located within 50 feet of the tank.

- Supply and install 1 standby power generator (25 kW) located within 20 feet of the ATS, including interconnection wiring between the generator, transfer switch, and site electrical service mains.

- Supply and install a perimeter grounding system around the compound and shelter. The ground system is to tie to the fence and all new metal structures within the compound to meet current Motorola's R56 standards.

Antenna and Transmission Line Installation

- Install 2 antenna(s) for the RF system.

- Supply and install 2 6-foot side arm(s) for antenna mounts.

- Install 1 4-foot microwave dish.

- Supply 1 4-foot dish mounts.

- Install up to 180 linear feet of 7/8-inch transmission line.

- Install up to 55 linear feet of EW63 waveguide for microwave dishes.

- Perform sweep tests on transmission lines.

- Perform alignment of each of 1 microwave paths to ensure that the microwave dishes are optimally positioned.

- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

Existing Facility Improvement Work

- Install 1 automatic transfer switch and connect it to generator and electric main.

- Ground all metallic objects in the interior of the existing room, to meet current Motorola's Standards and Guidelines for Communications Sites (R56) requirements and terminate near equipment locations.

- Supply and install 1 copper ground buss bar(s).

- Supply and install 1 wall-mounted 10-pound CO2 fire extinguisher and 1 wall-mounted 20- pound ABC fire extinguisher.

- Supply and install "No smoking" EME signage at the site.

Grounding Enhancement

- Supply and install 4 chemical rods.

Miscellaneous Work

- Integration into existing solar system assuming the solar system can be integrated.

4.6.3.5   Site Development at Mt. Allison Site

Site Scope Summary

- Engineering services for site drawings and regulatory approvals—Included.

- Site acquisition services—Not included.

- Zoning Services—Not included.

- Existing tower to be used for antennas—160' Self supported Tower.

Motorola Responsibilities:

Site Engineering

- Prepare site construction drawings, showing the layout of various new and existing site components.

- Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.).

- Prepare a lease exhibit and sketch of the site to communicate to the property owner the lease space and planned development at the particular site location.

- Prepare record drawings of the site showing the as-built information.

- Perform a boundary and topographic survey for the property on which the communication site is located or will be located.

- Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be

impacted by the construction activity. Motorola believes Environmental Impact Reports are not required for the SFPUC Radio and Microwave sites. The sites are all considered existing communication sites and have been previously disturbed and are not considered green sites. If any of the sites require Environmental Impact Reports, Motorola project team will assist SFPUC with gathering the information required for SFPUC to file the reports.

- Perform four point soil resistivity testing at the time of site visit.

- Provide a structural engineering analysis for antenna support structure, if necessary, to support the antenna system. If the tower structure fails the analysis, the cost of any site relocation or modifications to the tower required to support the antenna system will be the responsibility of San Francisco Public Utilities Commission 2017. NOTE: This task does not include mapping, structural measurement survey, materials testing, geotechnical investigation, and/or other field investigation to acquire the data. If applicable, these tasks will be noted separately in the SOW.

- Perform the structural redesign of the tower upgrade and provide sealed construction drawings and specifications for the necessary structural modifications.

- Provide tower climbing and tower mapping services for towers up to 350 feet to collect information about structural members and existing equipment.

- Conduct site investigation necessary to develop structural analysis (cases where adequate as-built documentation is not provided).

- Conduct dispersive wave testing of foundations for a three legged self-supported tower to determine their structural details for analysis when tower drawings are not available.

- Preparation, submission and tracking of application for local permit fees (zoning, electrical, building etc.) and procurement of information necessary for filing.

Site Preparation

- Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of Motorola's control will result in additional costs.

Antenna and Transmission Line Installation

- Install 2 antenna(s) for the RF system.

- Supply and install 2 6-foot side arm(s) for antenna mounts.

- Install 1 4-foot microwave dishes.

- Supply 1 4-foot dish mounts.

- Install 1 6-foot microwave dishes.

- Supply 1 dish mounts for 6-foot microwave dishes.

- Install up to 380 linear feet of 7/8-inch transmission line.

- Install up to 220 linear feet of EW63 waveguide for microwave dishes.

- Perform sweep tests on transmission lines.

- Perform alignment of each of 2 microwave paths to ensure that the microwave dishes are optimally positioned.

- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

4.6.3.6   Site Development at CCWD Site

Site Scope Summary

- Engineering services for site drawings and regulatory approvals—Included.

- Site acquisition services—Not included.

- Zoning Services—Not included.

- Existing tower to be used for antennas—100' Self supported Tower.

Motorola Responsibilities:

Site Engineering

- Prepare site construction drawings, showing the layout of various new and existing site components.

- Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.).

- Prepare a lease exhibit and sketch of the site to communicate to the property owner the lease space and planned development at the particular site location.

- Prepare record drawings of the site showing the as-built information.

- Perform a boundary and topographic survey for the property on which the communication site is located or will be located.

- Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the construction activity. Motorola believes Environmental Impact Reports are not required for the SFPUC Radio and Microwave sites. The sites are all considered existing communication sites and have been previously disturbed and are not considered green sites. If any of the sites require Environmental Impact Reports, Motorola project team will assist SFPUC with gathering the information required for SFPUC to file the reports.

- Perform four point soil resistivity testing at the time of site visit.

- Provide a structural engineering analysis for antenna support structure, if

necessary, to support the antenna system. If the tower structure fails the analysis, the cost of any site relocation or modifications to the tower required to support the antenna system will be the responsibility of San Francisco Public Utilities Commission 2017. NOTE: This task does not include mapping, structural measurement survey, materials testing, geotechnical investigation, and/or other field investigation to acquire the data. If applicable, these tasks will be noted separately in the SOW.

- Perform the structural redesign of the tower upgrade and provide sealed construction drawings and specifications for the necessary structural modifications.

- Provide tower climbing and tower mapping services for towers up to 350 feet to collect information about structural members and existing equipment.

- Conduct site investigation necessary to develop structural analysis (cases where adequate as-built documentation is not provided).

- Conduct ultrasonic measurements of tubular members of towers up to 350' to determine the wall thickness.

- Conduct dispersive wave testing of foundations for a three legged self-supported tower to determine their structural details for analysis when tower drawings are not available.

- Preparation, submission and tracking of application for local permit fees (zoning, electrical, building etc.) and procurement of information necessary for filing.

Site Preparation

- Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of Motorola's control will result in additional costs.

Antenna and Transmission Line Installation

- Install 2 antenna(s) for the RF system.

- Supply and install 2 6-foot side arm(s) for antenna mounts.

- Install 2 4-foot microwave dishes.

- Supply 2 4-foot dish mounts.

- Install up to 260 linear feet of 7/8-inch transmission line.

- Install up to 220 linear feet of EW63 waveguide for microwave dishes.

- Perform sweep tests on transmission lines.

- Perform alignment of each of 2 microwave paths to ensure that the microwave dishes are optimally positioned.
- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

4.6.3.7 Site Development at Pelican Site

Site Scope Summary

- Engineering services for site drawings and regulatory approvals—Included.

- Site acquisition services—Not included.

- Zoning Services—Not included.

- Existing tower to be used for antennas—45' Self supported Tower.

Motorola Responsibilities:

Site Engineering

- Prepare site construction drawings, showing the layout of various new and existing site components.

- Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.).

- Prepare a lease exhibit and sketch of the site to communicate to the property owner the lease space and planned development at the particular site location.

- Prepare record drawings of the site showing the as-built information.

- Perform a boundary and topographic survey for the property on which the communication site is located or will be located.

- Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the construction activity. Motorola believes Environmental Impact Reports are not required for the SFPUC Radio and Microwave sites. The sites are all considered existing communication sites and have been previously disturbed and are not considered green sites. If any of the sites require Environmental Impact Reports, Motorola project team will assist SFPUC with gathering the information required for SFPUC to file the reports.

- Perform four point soil resistivity testing at the time of site visit.

- Provide a structural engineering analysis for antenna support structure, if necessary, to support the antenna system. If the tower structure fails the analysis, the cost of any site relocation or modifications to the tower required to support the antenna system will be the responsibility of San Francisco Public Utilities Commission 2017.

- NOTE: This task does not include mapping, structural measurement survey, materials testing, geotechnical investigation, and/or other field investigation to acquire the data. If applicable, these tasks will be noted separately in the SOW.

- Perform the structural redesign of the tower upgrade and provide sealed construction drawings and specifications for the necessary structural modifications.

- Provide tower climbing and tower mapping services for towers up to 350 feet to collect information about structural members and existing equipment.

- Conduct site investigation necessary to develop structural analysis (cases where adequate as-built documentation is not provided).

- Conduct ultrasonic measurements of tubular members of towers up to 350' to determine the wall thickness.

- Conduct dispersive wave testing of foundations for a three legged self-supported tower to determine their structural details for analysis when tower drawings are not available.

- Preparation, submission and tracking of application for local permit fees (zoning, electrical, building etc.) and procurement of information necessary for filing.

Site Preparation

- Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of Motorola's control will result in additional costs.

Antenna and Transmission Line Installation

- Install 2 antenna(s) for the RF system.

- Supply and install 2 6-foot side arm(s) for antenna mounts.

- Install 1 4-foot microwave dishes.

- Supply 1 4-foot dish mounts.

- Install up to 150 linear feet of 7/8-inch transmission line.

- Install up to 95 linear feet of EW63 waveguide for microwave dishes.

- Perform sweep tests on transmission lines.

- Perform alignment of each of 1 microwave paths to ensure that the microwave dishes are optimally positioned.

- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

4.6.3.8   Site Development at Burnout Ridge Site

Site Scope Summary

- Engineering services for site drawings and regulatory approvals—Included.
- Site acquisition services—Not included.
- Zoning Services—Not included.
- Existing tower to be used for antennas—180' Self supported Tower.

Motorola Responsibilities:

Site Engineering

- Prepare site construction drawings, showing the layout of various new and existing site components.
- Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.).
- Prepare a lease exhibit and sketch of the site to communicate to the property owner the lease space and planned development at the particular site location.
- Prepare record drawings of the site showing the as-built information.
- Perform a boundary and topographic survey for the property on which the communication site is located or will be located.
- Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the construction activity. Motorola believes Environmental Impact Reports are not required for the SFPUC Radio and Microwave sites. The sites are all considered existing communication sites and have been previously disturbed and are not considered green sites. If any of the sites require Environmental Impact Reports, Motorola project team will assist SFPUC with gathering the information required for SFPUC to file the reports.
- Perform four point soil resistivity testing at the time of site visit.
- Provide a structural engineering analysis for antenna support structure, if necessary, to support the antenna system. If the tower structure fails the analysis, the cost of any site relocation or modifications to the tower required to support the antenna system will be the responsibility of San Francisco Public Utilities Commission 2017.
- NOTE: This task does not include mapping, structural measurement survey, materials testing, geotechnical investigation, and/or other field investigation to acquire the data. If applicable, these tasks will be noted separately in the SOW.

- Perform the structural redesign of the tower upgrade and provide sealed construction drawings and specifications for the necessary structural modifications.

- Provide tower climbing and tower mapping services for towers up to 350 feet to collect information about structural members and existing equipment.

- Conduct site investigation necessary to develop structural analysis (cases where adequate as-built documentation is not provided).

- Conduct ultrasonic measurements of tubular members of towers up to 350' to determine the wall thickness.

- Conduct dispersive wave testing of foundations for a three legged self-supported tower to determine their structural details for analysis when tower drawings are not available.

- Preparation, submission and tracking of application for local permit fees (zoning, electrical, building etc.) and procurement of information necessary for filing.

Site Preparation

- Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of Motorola's control will result in additional costs.

Antenna and Transmission Line Installation

- Install 2 antenna(s) for the RF system.

- Supply and install 2 6-foot side arm(s) for antenna mounts.

- Install up to 420 linear feet of 7/8-inch transmission line.

- Perform sweep tests on transmission lines.

- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

4.6.3.9 Site Development at Intake Radio Site S

Site Scope Summary

- Engineering services for site drawings and regulatory approvals—Included.

- Site acquisition services—Not included.

- Zoning Services—Not included.

- Existing towers to be used for antennas —60' Self supported Tower.

Motorola Responsibilities:

Site Engineering

- Prepare site construction drawings, showing the layout of various new and existing site components.

- Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.)

- Prepare a lease exhibit and sketch of the site to communicate to the property owner the lease space and planned development at the particular site location.

- Prepare record drawings of the site showing the as-built information.

- Perform a boundary and topographic survey for the property on which the communication site is located or will be located.

- Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the construction activity. Motorola believes Environmental Impact Reports are not required for the SFPUC Radio and Microwave sites. The p sites are all considered existing communication sites and have been previously disturbed and are not considered green sites. If any of the sites require Environmental Impact Reports, Motorola project team will assist SFPUC with gathering the information required for SFPUC to file the reports.

- Perform four point soil resistivity testing at the time of site visit.

- Provide a structural engineering analysis for antenna support structure, if necessary, to support the antenna system. If the tower structure fails the analysis, the cost of any site relocation or modifications to the tower required to support the antenna system will be the responsibility of San Francisco Public Utilities Commission 2017.

- NOTE: This task does not include mapping, structural measurement survey, materials testing, geotechnical investigation, and/or other field investigation to acquire the data. If applicable, these tasks will be noted separately in the SOW.

- Perform the structural redesign of the tower upgrade and provide sealed construction drawings and specifications for the necessary structural modifications.

- Provide tower climbing and tower mapping services for towers up to 350 feet to collect information about structural members and existing equipment.

- Conduct site investigation necessary to develop structural analysis (cases where adequate as-built documentation is not provided).

- Conduct ultrasonic measurements of tubular members of towers up to 350' to determine the wall thickness.

- Conduct dispersive wave testing of foundations for a three legged self-supported

tower to determine their structural details for analysis when tower drawings are not available.

- Preparation, submission and tracking of application for local permit fees (zoning, electrical, building etc.) and procurement of information necessary for filing.

Site Preparation

- Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of Motorola's control will result in additional costs.

Antenna and Transmission Line Installation

- Install 2 antenna(s) for the RF system.

- Supply and install 2 6-foot side arm(s) for antenna mounts.

- Install 1 4-foot microwave dish.

- Supply 1 4-foot dish mounts.

- Install up to 180 linear feet of 7/8-inch transmission line.

- Install up to 85 linear feet of EW63 waveguide for microwave dishes.

- Perform sweep tests on transmission lines.

- Perform alignment of each of 1 microwave paths to ensure that the microwave dishes are optimally positioned.

- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

4.6.3.10 Site Development at Foresthill- Site

Site Scope Summary

- Engineering services for site drawings and regulatory approvals—Included.

- Site acquisition services—Not required.

- Zoning Services—Not required.

- Existing tower to be used for antennas—60' Self supported Tower.

Motorola Responsibilities:

Site Engineering

- Prepare site construction drawings, showing the layout of various new and existing site components.

- Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.)

- Prepare a lease exhibit and sketch of the site to communicate to the property owner the lease space and planned development at the particular site location.

- Prepare record drawings of the site showing the as-built information.

- Perform a boundary and topographic survey for the property on which the communication site is located or will be located.

- Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the construction activity. Motorola believes Environmental Impact Reports are not required for the SFPUC Radio and Microwave sites. The sites are all considered existing communication sites and have been previously disturbed and are not considered green sites. If any of the sites require Environmental Impact Reports, Motorola project team will assist SFPUC with gathering the information required for SFPUC to file the reports.

- Perform four point soil resistivity testing at the time of site visit.

- Provide a structural engineering analysis for antenna support structure, if necessary, to support the antenna system. If the tower structure fails the analysis, the cost of any site relocation or modifications to the tower required to support the antenna system will be the responsibility of San Francisco Public Utilities Commission 2017.

- NOTE: This task does not include mapping, structural measurement survey, materials testing, geotechnical investigation, and/or other field investigation to acquire the data. If applicable, these tasks will be noted separately in the SOW.

- Perform the structural redesign of the tower upgrade and provide sealed construction drawings and specifications for the necessary structural modifications.

- Provide tower climbing and tower mapping services for towers up to 350 feet to collect information about structural members and existing equipment.

- Conduct site investigation necessary to develop structural analysis (cases where adequate as-built documentation is not provided).

- Conduct ultrasonic measurements of tubular members of towers up to 350' to determine the wall thickness.

- Conduct dispersive wave testing of foundations for a three legged self-supported tower to determine their structural details for analysis when tower drawings are not available.

- Preparation, submission and tracking of application for local permit fees (zoning, electrical, building etc.) and procurement of information necessary for filing.

<u>Site Preparation</u>

- Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of Motorola's control will result in additional costs.

<u>Antenna and Transmission Line Installation</u>

- Install 1 4-foot microwave dishes.

- Supply 1 4-foot dish mounts.

- Install up to 110 linear feet of EW63 waveguide for microwave dishes.

- Perform sweep tests on transmission lines.

- Perform alignment of each of 1 microwave paths to ensure that the microwave dishes are optimally positioned.

4.6.3.11 Site Development at Moccasin Peak- Site

Site Scope Summary

- Engineering services for site drawings and regulatory approvals—Included.

- Site acquisition services—Not required.

- Zoning Services—Not required.

- Existing tower to be used for antennas—60' Self supported Tower.

Motorola Responsibilities:

<u>Site Engineering</u>

- Prepare site construction drawings, showing the layout of various new and existing site components.

- Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.)

- Prepare a lease exhibit and sketch of the site to communicate to the property owner the lease space and planned development at the particular site location.

- Prepare record drawings of the site showing the as-built information.

- Perform a boundary and topographic survey for the property on which the communication site is located or will be located.

- Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the construction activity. Motorola believes Environmental Impact Reports are not required for the SFPUC Radio and Microwave sites. The sites are all

considered existing communication sites and have been previously disturbed and are not considered green sites. If any of the sites require Environmental Impact Reports, Motorola project team will assist SFPUC with gathering the information required for SFPUC to file the reports.

- Perform four point soil resistivity testing at the time of site visit.

- Provide a structural engineering analysis for antenna support structure, if necessary, to support the antenna system. If the tower structure fails the analysis, the cost of any site relocation or modifications to the tower required to support the antenna system will be the responsibility of San Francisco Public Utilities Commission 2017.

- NOTE: This task does not include mapping, structural measurement survey, materials testing, geotechnical investigation, and/or other field investigation to acquire the data. If applicable, these tasks will be noted separately in the SOW.

- Perform the structural redesign of the tower upgrade and provide sealed construction drawings and specifications for the necessary structural modifications.

- Provide tower climbing and tower mapping services for towers up to 350 feet to collect information about structural members and existing equipment.

- Conduct site investigation necessary to develop structural analysis (cases where adequate as-built documentation is not provided).

- Conduct ultrasonic measurements of tubular members of towers up to 350' to determine the wall thickness.

- Conduct dispersive wave testing of foundations for a three legged self-supported tower to determine their structural details for analysis when tower drawings are not available.

- Preparation, submission and tracking of application for local permit fees (zoning, electrical, building etc.) and procurement of information necessary for filing.

Site Preparation

- Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of Motorola's control will result in additional costs.

Antenna and Transmission Line Installation

- Install 2 antenna(s) for the RF system.

- Supply and install 2 6-foot side arm(s) for antenna mounts.

- Install 1 4-foot microwave dishes.

- Supply 1 4-foot dish mounts.

- Install up to 180 linear feet of 7/8-inch transmission line.

- Install up to 110 linear feet of EW63 waveguide for microwave dishes.

- Perform sweep tests on transmission lines.

- Perform alignment of each of 1 microwave paths to ensure that the microwave dishes are optimally positioned.

- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

4.6.3.12 Site Development at Poopenaut Pass- Site

Site Scope Summary

- Engineering services for site drawings and regulatory approvals—Included.

- Site acquisition services—Not required.

- Zoning Services—Not required.

- Existing tower to be used for antennas—70' Self supported Tower.

Motorola Responsibilities:

Site Engineering

- Prepare site construction drawings, showing the layout of various new and existing site components.

- Conduct site walks to collect pertinent information from the sites (e.g., location of Telco, power, existing facilities, etc.)

- Prepare a lease exhibit and sketch of the site to communicate to the property owner the lease space and planned development at the particular site location.

- Prepare record drawings of the site showing the as-built information.

- Perform a boundary and topographic survey for the property on which the communication site is located or will be located.

- Perform NEPA Threshold Screening, including limited literature and records search and brief reporting, as necessary to identify sensitive natural and cultural features referenced in 47 CFR Chapter 1, subsection 1.1307 that may potentially be impacted by the construction activity. Motorola believes Environmental Impact Reports are not required for the SFPUC Radio and Microwave sites. The sites are all considered existing communication sites and have been previously disturbed and are not considered green sites. If any of the sites require Environmental Impact Reports, Motorola project team will assist SFPUC with gathering the information required for SFPUC to file the reports.

- Perform four point soil resistivity testing at the time of site visit.

- Provide a structural engineering analysis for antenna support structure, if necessary, to support the antenna system. If the tower structure fails the analysis, the cost of any site relocation or modifications to the tower required to support

the antenna system will be the responsibility of San Francisco Public Utilities Commission 2017.

- NOTE: This task does not include mapping, structural measurement survey, materials testing, geotechnical investigation, and/or other field investigation to acquire the data. If applicable, these tasks will be noted separately in the SOW.

- Perform the structural redesign of the tower upgrade and provide sealed construction drawings and specifications for the necessary structural modifications.

- Provide tower climbing and tower mapping services for towers up to 350 feet to collect information about structural members and existing equipment.

- Conduct site investigation necessary to develop structural analysis (cases where adequate as-built documentation is not provided).

- Conduct ultrasonic measurements of tubular members of towers up to 350' to determine the wall thickness.

- Conduct dispersive wave testing of foundations for a three legged self-supported tower to determine their structural details for analysis when tower drawings are not available.

- Preparation, submission and tracking of application for local permit fees (zoning, electrical, building etc.) and procurement of information necessary for filing.

Site Preparation

- Provide one-time mobilization costs for the construction crews. Any remobilization due to interruptions/delays that are out of Motorola's control will result in additional costs.

Antenna and Transmission Line Installation

- Install 2 antenna(s) for the RF system.

- Supply and install 2 6-foot side arm(s) for antenna mounts.

- Install up to 200 linear feet of 7/8-inch transmission line.

- Perform sweep tests on transmission lines.

- Supply and install 1 ground buss bar at the bottom of the antenna support structure for grounding RF cables before they make horizontal transition.

4.6.3.13 SFPUC Responsibilities and Assumptions

Customer Responsibilities, as required:

- If required, prepare and submit Electromagnetic Energy (EME) plans for the site (as a licensee) to demonstrate compliance with FCC RF Exposure guidelines.

- As applicable, coordinate, prepare, submit, and pay for all required permits and

inspections for the work that is the SFPUC's responsibility.

- Pay for all utility connection, pole or line extensions, and any easement or usage fees. All power to be delivered to with 50' of the compound.

- Review and approve site design drawings within 7 calendar days of submission by Motorola or its subcontractor(s). Should a re-submission be required, the SFPUC shall review and approve the re-submitted plans within 7 calendar days from the date of submittal.

- Pay for the usage costs of power, leased lines and generator fueling both during the construction/installation effort and on an on-going basis.

- Pay for application fees, taxes and recurring payments for lease/ownership of the property.

- Provide personnel to observe construction progress and testing of site equipment according to the schedule provided by Motorola.

- As applicable (based on local jurisdictional authority), the SFPUC will be responsible for any installation or up-grades of the electrical system in order to comply with NFPA 70, Article 708.

- Provide property deed or existing lease agreement, and boundary survey, along with existing as-built drawings of the site and site components to Motorola for conducting site engineering.

- Provide a right of entry letter from the site owner for Motorola to conduct field investigations.

- Maintain existing access road in order to provide clear and stable entry to the site for heavy- duty construction vehicles, cement trucks and cranes. Sufficient space must be available at the site for these vehicles to maneuver under their own power, without assistance from other equipment.

- Conduct all the testing and documentation (balloon tests, photo simulations, expert testimony, etc.) required for the new tower sites.

- Secure power connection to the site, associated permitting and installation of a meter and disconnect within 50 feet of the shelter location.

- Provide additional temporary space for staging of the construction equipment during the construction of new site facilities (tower, shelter, generator, fuel tank etc.)

- All work is assumed to be done during normal business hours as dictated by time zone (Monday thru Friday, 7:30 a.m. to 5:00 p.m.)

- All recurring and non-recurring utility costs [including, but not limited to, generator fuel (except first fill), electrical, Telco] will be borne by the SFPUC or site owner.

- All utility installations shall be coordinated and paid for by the site owner and located at jointly agreed to location within or around the new communications shelter or equipment room.

- Site will have adequate electrical service for the new shelter and tower. Utility transformer, transformer upgrades, line, or pole extensions have not been included.

- Pricing has been based on National codes such IBC or BOCA. Local codes or jurisdictional requirements have not been considered in this SOW.

- Hazardous materials are not present at the work location. Testing and removal of hazardous materials, found during site investigations, construction or equipment installation will be the responsibility of the customer.

- A maximum of 30 days will be required for obtaining approved building permits from time of submission.

- No improvements are required for concrete trucks, drill rigs, shelter delivery, and crane access.

- If extremely harsh or difficult weather conditions delay the site work for more than a week, Motorola will seek excusable delays rather than risk job site safety.

- In the absence of geotechnical test data at the sites, normal soil conditions have been assumed. Normal soil is defined as per TIA/EIA 222-F guidelines.

- The new tower location will pass the FAA hazard study, FCC and environmental permitting.

- The restoration of the site surroundings by fertilizing, seeding and strawing the disturbed areas will be adequate.

- Tower and foundation sizing is based on the tower loading requirements as a result of the RF Antenna System design and the Microwave Antenna System design (i.e. - dish sizes and locations obtained from paper path studies). If after physical path studies, the dish sizes and locations change, then Motorola will then review the impact to tower structure and foundations and revise applicable costs.

- If as a result of NEPA studies, any jurisdictional authority should determine that a communications facility "may have a significant environmental impact", the environmental impact studies or field testing and evaluation related to such determination have not been included.

- For new towers greater than 200 feet in overall height, FAA obstruction lighting has been included. Painting or dual lighting of any new towers has not been included.

- The site location can be finalized and lease agreement can be reached with the property owner by SFPUC within 60 calendar days after the start of the site acquisition effort.

- The soil resistivity at the site is sufficient to achieve resistance of ten (10) ohms or less. Communications site grounding will be designed and installed per Motorola's Standards and Guidelines for Communications Sites (R56).

- Underground utilities are not present in the construction area, and as such no relocation will be required.

- Spoils from the tower foundations can be dispersed on the property and will not be

required to be transported to a dump location.

- Foundations for the shelter, generator and fuel tank are based "normal soil" conditions as defined by TIA/EIA 222-F. Footings deeper than 30 inches, raised piers, rock coring, dewatering, or hazardous material removal have not been included.

Assumptions, as applicable:

- All work is assumed to be done during normal business hours as dictated by time zone (Monday thru Friday, 7:30 a.m. to 5:00 p.m.).

- All recurring and non-recurring utility costs [including, but not limited to, generator fuel (except first fill), electrical, Telco] will be borne by the Customer or site owner.

- All utility installations shall be coordinated and paid for by the site owner and located at jointly agreed to location within or around the new communications shelter or equipment room.

- Site will have adequate electrical service for the new shelter and tower. Utility transformer, transformer upgrades, line, or pole extensions have not been included.

- Pricing has been based on National codes such IBC or BOCA. Local codes or jurisdictional requirements have not been considered in this SOW.

- Hazardous materials are not present at the work location. Testing and removal of hazardous materials, found during site investigations, construction or equipment installation will be the responsibility of the customer.

- A maximum of 30 days will be required for obtaining approved building permits from time of submission.

- No improvements are required for concrete trucks, drill rigs, shelter delivery, and crane access.

- If extremely harsh or difficult weather conditions delay the site work for more than a week, Motorola will seek excusable delays rather than risk job site safety.

- The existing ground system and soil resistivity at the site is sufficient to achieve resistance of 10 ohms or less. Communication site grounding will be designed and installed per Motorola's R56 standards.

- The existing site has adequate room to expand and install the shelter, including lay-down and staging areas, without encroaching on wetlands, easements, setbacks, right-of-ways, or property lines.

- AM detuning or electromagnetic emission studies will not be required.

- Protective grating over microwave dishes or the communications shelter has not been included in this SOW.

- Structural and foundation drawings of the antenna support structure will be made available to preclude the need for ultrasonic testing, geotechnical borings or mapping of existing tower structural members.

- Lead paint testing of existing painted towers has not been included.

- On the existing tower, the antenna locations for the antenna system design will be available at the time of installation.

- The new shelter can be located within 20 feet of the existing tower location and the generator/fuel tank can be located within 25 feet of the shelter.

- Restoration of the site surroundings by fertilizing, seeding, and strawing the disturbed areas will be adequate.

- The site has adequate utility service to support the equipment loading. Utility transformer upgrades or step-up or down transformers will not be required.

- Underground utilities are not present in the construction area and as such no relocation will be required.

- The existing antenna support structure is structurally capable of supporting the new antenna, cables, and ancillary equipment and will not need to be removed or rebuilt at the existing site. The tower or supporting structure meets all applicable EIA/TIA- 222 structural, foundation, ice, wind, and twist and sway requirements. Motorola has not included any cost for structural or foundation upgrades to the antenna support structure.

- The existing cable support facilities from the antenna to the cable entry port can be used for supporting the new antenna cables.

- Structural analyses for towers or other structures that have not been performed by Motorola will relinquish Motorola from any responsibility for the analysis report contents and/or recommendation therein.

- Foundations for shelter, generator, and fuel tank are based on "normal soil" conditions as defined by TIA/EIA 222-F. Footings deeper than 30 inches, raised piers, rock coring, dewatering, or hazardous material removal have not been included.

- Alarming at existing sites will be limited to new component installations and will have to be discussed and agreed to on a site-by-site basis.

- The site will have adequate room for installation of equipment, based on applicable codes and Motorola's R56 standards.

- The existing utility service and backup power facilities (UPS, generators) have sufficient extra capacity to support the new equipment load.

- A clear obstruction-free access exists from the antenna location to the equipment room.

- The Customer does not desire upgrade of the existing site to meet Motorola's R56 standards.

- The floor can support the new loading. Physical or structural improvements to the existing room will not be required.

- Existing solar system can be integrated into new electrical system described herein.

- As Built documentation for existing tower structures is available so that MSI can complete the structure analysis. Should there be no as built documentation available; MSI can provide a menu of tasks to reverse engineer the tower design with a negotiated change order.

4.6.3.14 Site Development and Improvement Completion Criteria

Site development completed per issued for construction (IFC) construction drawings, project requirements, contractual obligations (including any customer/Motorola approved changes) and approved by San Francisco Public Utilities Commission.

- This shall be confirmed by contractor and reviewed with Motorola construction manager and project manager before inspections occur.

- All jurisdictional and contractual required testing and inspections to be performed by the contractor. (Contractual testing and inspections defined and agreed to with project team and customer prior to project kick off; vendor solely responsible for conducting, coordinating and paying for all jurisdictional testing and inspections.)

- Motorola site development checklist shall be completed and signed off by contractor prior to customer inspection. (Review with project team and customer and amend checklist as required at project kick off or before work begins.)

- Site turn-over package completed and turned over to Motorola (As defined and agreed to with project team and customer.)

- All punchlist and deficiencies shall be completed prior to customer and Motorola inspections.

4.6.4   Migration Plan (Cutover Plan)

This Migration Plan details the steps necessary to transition the SFPUC users to the new P25 radio infrastructure. Motorola has experience on migrating our customers to P25 systems on hundreds of systems throughout the world. This plan has been written to minimize the impact to the SFPUC end-users based on Motorola's extensive experience.

There are many ways to migrate the SFPUC system and users successfully, and this migration plan represents one possible strategy. Finalizing the plan will necessarily include the direct input provided by SFPUC's project team, departments, and communications center dispatchers and supervisors. Motorola will work with SFPUC to conduct several cutover meetings to address both how to deal with the technical and communication impact to the users, and the general operational issues and planning that needs to be accommodated for the various agencies impacted. Once agreed-upon by all stakeholders, the full migration methodology will be mutually agreed upon to ensure that an effective and efficient transition occurs from the old radio system to the new system with minimum impact on user operations.

This plan considers all of the components of the system including:

- Subscriber radios.

- Site upgrades & power systems.

- Microwave & backhaul integration.

- Land mobile radio infrastructure.

- Dispatch systems.

- Coverage Fill-in solutions.

This preliminary migration plan is divided in three phases:

- Phase 1 - Pre-cutover preparation.

- Phase 2 - Cutover execution.

- Phase 3 - Post-cutover activities.

For the final migration plan, Motorola will prepare an Impact Timeline (ITL). The ITL will detail timelines, sequence of events, resources involved, any potential downtime, operational details, and the order in which departments will move to the new system. It will also detail how communications will occur for each department during the migration process. Technical details will also be prepared involving identification of locations of all equipment locations, port numbers, configurations, and dependencies to ensure that each phase is completed successfully. This migration plan is based on Motorola's unique ability to distribute new public safety subscribers that can be programmed to operate on the San Francisco's existing radio system in the interim period as well as operate on the new radio system at the moment of cutover.

4.6.4.1   Phase 1: Pre-Migration Preparation

The pre-cutover phase is the most important phase. This is where all the planning of the detailed migration plan occurs for a successful migration. The following outline establishes the starting point for cutover planning to aid SFPUC and Motorola in the crafting of a viable strategy.

Careful, up-front planning will enable SFPUC and Motorola to work closely with end-users to ensure that their activities are minimally disrupted.

During the Design Review phase of the project, SFPUC and Motorola project teams will commence activities to transform this preliminary Migration Plan outline into a comprehensive and detailed cutover plan, complete with a timeline of events that will guide the collective actions leading up to, during, and following the actual transition from SFPUC current systems to the new ASTRO 25 Project 25 system. The preliminary plan is as follows:

- **Site Preparation**–Motorola will perform all site civil work, including ensuring power systems, rack space, and R56 work is completed. This work also includes ensuring that the power is available for each piece of equipment being installed as well as rack space cleared and ready for rack installation.

- **Backhaul Preparation**–The first step will be to implement the microwave backhaul and integrate it with the existing SFPUC backhaul. Motorola will test the backhaul links to ensure the link performance for utilization in the P25 system.

- **Training and Template Development**––Motorola will perform training per the Training Plan included in Section 4.6.6, Training Plan. Motorola will create the programming templates for the system and subscribers with input from end-users.

- **System Installation and Testing**–Motorola will install the radio and dispatch equipment at each site and integrate it with the San Francisco P25 system. Motorola will be able to install and fully test the new P25 RF and dispatch infrastructure system in parallel with the existing low-band infrastructure, which will allow for full testing of the system prior to placing SFPUC users onto the system. This step will include the Acceptance Testing of the system.

- **Training and System Configuration**–Motorola will work with SFPUC to perform the proper training on all components of the new system. Motorola will also work with SFPUC in development of the appropriate configuration templates for the dispatch and subscriber radios. Proper training is essential to ensure for a smooth transition.

4.6.4.2   Phase 2- Migration Execution

Phase 2 of the plan is where users of the system are placed onto the system. The presumed parallel installation of the new and existing systems should allow for this to be an easy transition. Once the system is ready for use subscriber radios will be placed in the hands of the field users and dispatchers will begin dispatching utilizing the new system. Motorola will monitor closely this migration activity to ensure that the transition is smooth and the expectations of SFPUC users are met.

4.6.4.3   Phase 3- Post Migration Activities

After the successful execution of the migration plan, post-migration activities will commence. These will include

- Commencement of 90 day burn-in test.

- Monitoring the system for any indications of issues.

- Site cleanup.

- Warranty Begins.

4.6.5 Test Plans

Under the direction of the Motorola Project Manager, teams consisting of representatives from San Francisco Public Utility Commission (SFPUC) and Motorola will execute agreed-upon test procedures in this SOW to confirm that the system has been designed and installed to meet all of the features and performance capabilities agreed upon in the contract. This section is a comprehensive Acceptance Test Plan written to meet the particular requirements of SFPUC.

4.6.5.1 Acceptance Tests

Motorola will verify the SFPUC system using the following types of tests:

- **Factory Acceptance Test (FAT)**—The purpose of a FAT is to demonstrate the features and functionality of the system prior to site installation. This testing is completed at Motorola's Customer Center for Solutions Integration (CCSi). CCSi testing provides SFPUC with the ability to see their equipment assembled under one roof, to witness the functional testing

phase prior to shipment to the site, and to have the satisfaction of seeing the equipment operate before it leaves the facility for site installation. The P25 system is a compilation of RF sites and dispatch sites which will ultimately be connected to the San Francisco system that may already be deployed. If this is the case the actual testing of the system may be limited in scope. The Microwave Backhaul System and Antenna Systems will not be staged at CCSi and will not be part of the FAT.

- **System Acceptance Test (SAT)—**Motorola will test SFPUC system by conducting System Acceptance Testing (SAT). The purpose of a SAT is to demonstrate the features and functionality of the system after installation in the field. This field functional testing takes place at the designated system installation location and verifies that all system features and functionality are working as described within the system description.

- The SAT includes testing of the microwave backhaul as well as the P25 radio and dispatch system.

- **Coverage Acceptance Test Plan (CATP)—**A Coverage Acceptance Test defined in the SOW is conducted to verify that the voice radio system implemented by Motorola meets or exceeds the proposed coverage reliability within the SFPUC service area. The SFPUC service area is defined in Appendix D, Coverage Maps. Any coverage prediction on these maps is informational and not part of the contract. Successful completion of the Coverage Acceptance Test Plan (Section 4.6.5.6) will result in the final payment to Motorola as per the pricing schedule.

4.6.5.2 Acceptance Test Procedures (ATPs)

The test procedures reflect the extent of the testing to be provided to SFPUC. The tests to be performed will be mutually agreed upon during the Design Review phase of the project and will be conducted by representatives of SFPUC and Motorola. Motorola has included what they feel is adequate labor to complete testing of the system.

4.6.5.3 Test Conduct

Each test will begin on the date agreed upon by Motorola and SFPUC as stated within the project schedule. The following sections describe test conduct for the types of testing to be provided as part of this SOW.

4.6.5.4 Factory Acceptance Testing

Prior to FAT, major equipment serial numbers and firmware/software versions, if applicable, will be recorded to create a baseline for future reference. In the unlikely event that a change needs to be made after the start of testing to correct a deficiency, the baseline will be revised to reflect the current state of the system. After each test, the equipment will be returned to its original operating condition.

During test conduct, all measurements or outcomes will be recorded within the test procedure, if indicated. The result of a test step could be "Pass", "Fail", or a measured value. A check mark in the "Pass" field or in the appropriate box will be sufficient to indicate that a step has passed the test. When all steps in a specific test pass, a representative from Motorola and SFPUC will sign the test procedure form to indicate the system has passed that test.

If a failure occurs, a check will be placed in the fail column within the test procedure and an entry made on a Punch List Report Form. This form includes the date and time the entry was opened, the date closed, the test number and step, a description of the failure, and an exception report code. Table 4-52 shows the types of exception report codes used during FAT.

Table 4-52: Exception Procedure Codes

Exception Procedure Code	Definition
AI—Accept as Is	This exception item minor and does not require any corrective action.
CS—Pen and ink Correction to Specifications or procedures.	This is not an exception item, but is recorded for future reference. It delineates corrections to specifications or an acceptance test procedure on the punchlist.
CM—Corrective action required by Motorola as part of Contract	This exception item falls within Motorola's Contract commitment.
MA—Management Action required	This exception item reflects a disagreement on site, to be resolved between SFPUC and Motorola project management.
CR—Change Request with or without additional cost	This exception item lies beyond Motorola's Contract commitment.

In the case that the correction of variances may invalidate some or all previously completed acceptance tests (depending upon the extent of the changes made), Motorola and the SFPUC will agree as to which test must be repeated once the variance is fixed.

4.6.5.5   System Acceptance Testing

SAT is a field functional test conducted to ensure that the system meets the requirements as stated within the contract. The test is to occur at the site locations designated by SFPUC and will begin on the date agreed upon by Motorola and SFPUC as stated within the project schedule.

After the test has been completed, the test procedure documents will be submitted as part of the system manual.

During test conduct, all measurements or outcomes will be recorded within the test procedure, if indicated, resulting in either a "Pass" or "Fail".

- **Pass**—A check mark in the "Pass" field or in the appropriate box will be sufficient to indicate that a step has passed the test. When all steps in a specific test pass, a representative from Motorola and SFPUC will sign the test procedure form to indicate the system has passed that test.

- **Fail**—If a failure occurs, a check will be placed in the fail column within the test procedure and an entry made on a punchlist. The punchlist will include the date and time the entry was opened, the date closed, the test number and step, a description of the failure.

In the case that the correction of variances may invalidate some or all previously completed acceptance tests (depending upon the extent of the changes made), Motorola and SFPUC will agree as to which test must be repeated once the variance is fixed.

4.6.5.6   Coverage Acceptance Testing

The SFPUC Coverage Acceptance Test Plan (CATP) methodology will be conducted using the portable radio model provided by this contract and/or Motorola provided test equipment that the SFPUC approves. All testing shall be observed by the SFPUC.

Test Equipment: The test equipment must be calibrated to properly simulate the following two scenarios: (1) the portable radio on street at hip and at head, and (2) portable radio in a 2017 Ford F150 Crew Cab vehicle with windows closed. SFPUC shall test the calibration of all equipment to ensure it properly simulates both stated scenarios.

Test Area and Boundaries: The SFPUC service area map, the first map appearing in Appendix D, Coverage Maps, will be used to develop 0.25 X 0.25 mile test tiles or other mutually agreed upon test tile sizes. Per the TSB-88 guidelines, a random location will be selected within each tile for DAQ 3.4 inbound and outbound testing. Where TSB-88 conflicts with this Coverage Acceptance Test wording, this CATP wording will be used. If a road intersects with a tile, the test for that tile must be performed in a 2017 Ford F150 Crew Cab vehicle with the windows up. For all other tiles, testing will be conducted outside the vehicle at hip and at head.

Pass Criteria: CATP acceptance is based on DAQ 3.4 portable on street coverage within the service area and DAQ 3.4 portable in vehicle with windows closed for the tiles that have any roads on them (excluding dirt roads). For any tile, the criteria for successfully passing a test is meeting or exceeding DAQ 3.4, defined as (i) speech understandable with repetition rarely required and (ii) a minimal degree of noise/distortion audio quality in a tested grid.

If a tile fails during any given test run, that tile cannot be retested during that same test. Motorola will be allowed to perform the entire test again or, at SFPUC's approval, conduct a partial retest. In a partial retest, the SFPUC will define the boundaries for which a retest will occur and all tiles within SFPUC's defined boundaries will be retested. Motorola will be allowed to perform 4 tests, which can be any combination of full or partial tests.

The number of successful vehicle with windows up tested tiles and the number of successful on street tested tiles will be added up and divided by the total number of tested tiles in the service area to determine if the overall coverage / acceptance test has been successful which is 90% score or greater. Tiles that are inaccessible will not be counted in the numerator or the denominator.

4.6.5.7   Levels of Acceptance

There are two levels of acceptance–System Acceptance and Final Project Acceptance. When all test phases have been completed per the contract and approved by both SFPUC and Motorola, a System Acceptance Certificate will be presented to SFPUC for approval and signature. Final Project Acceptance occurs after System Acceptance and when all contract deliverables and other tasks have been executed.

4.6.5.8   90-Day Operational Burn-In Test Plan and Methodology

The 90-day Operational Burn-In test is designed to demonstrate the successful operation of the system over a period of time. The 90-day standalone test requires the ASTRO 25 system to operate within the required parameters of the final system design without major failure as described below. This test includes all infrastructure equipment installed and/or programmed prior to the

beginning of the test. This test shall run for 90 calendar days without a major failure, as identified below. The final details of the test and the methodology of the test shall be defined during the Detailed Design Review and shall include the following:

- Evaluation Period.

- Major Operational Fault Defined.

- Operational Fault Identification Procedure.

- Operational Fault Testing Procedure.

- Test Restart for Operational Fault Repair.

- Successful Completion of the 90 Day Period Test.

Motorola with the help of the SFPUC personnel shall document all communications outages or degradation to communications quality whether or not they are attributable to work or materials provided by Motorola. Documentation shall include but is not limited to:

- Test start and stop dates and times.

- Explanations for the outages or degradation and all corrective action.

A copy of the document shall be provided to SFPUC on a weekly basis during the test, and the completed original document shall be provided to SFPUC upon completion of the 90-day test. Final system acceptance of the ASTRO 25 system follows the successful completion of the test.

4.6.5.9   Evaluation Period

The evaluation period for the ASTRO 25 System shall begin at 8:00 AM on the test day decided during the Detailed Design Review, and shall run for a duration of 90 calendar days (excluding scheduled down time or maintenance). If at any time during the 90-day test period, SFPUC feels that the system has met all requirements, and is operating to SFPUC's complete satisfaction the test can be terminated and can proceed to the Final Project Acceptance phase.

4.6.5.10 *Major Operational Fault Defined*

A major operational failure is defined as the following:

- Any failure which causes a loss of 10% or more in capacity or coverage (Any failure resulting in the loss of one entire trunked site or 2 or more simulcast channels at all sites.)

- Any failure which causes a loss of simulcast capability for more than 1 minute.

- Any failure which causes the loss of the primary core.

- Any failure that causes the loss of 10% or more of the total consoles.

- Any failure that causes the loss of more than one repeater to fail at any one site.

- Concurrent failure of three or more switches and/or routers.

- Corruption of any system database.

All of the above faults will be considered major operational faults provided they are a failure of Motorola provided equipment and not SFPUC provided services/activities, equipment or networks such as existing microwave, power, backhaul, or fiber.

The following failures are not considered major operational faults and shall not be charged against the 90-day test:

- Failure of any single component that does not create a major operational fault as defined above. For example, the failure of a redundant core component.

- SFPUC provided services or activities not authorized by Motorola which contribute to an operational fault.

- SFPUC provided subsystems (i.e. power, HVAC, grounding, etc.)

- SFPUC provided links.

- SFPUC provided software.

- Communication outages or degradation to communications quality that are not attributable to the work performed or the materials provided by Motorola.

- A site/simulcast cell in Site Trunking operation for 1 minute or less does not constitute a complete failure of a simulcast cell or site.

4.6.5.11 Operational Fault Identification Procedure

If SFPUC perceives a fault, SFPUC has the responsibility for notifying Motorola within 12 hours of the fault. SFPUC shall track and summarize all problem reports related to the System and with Motorola personnel to determine if the fault is caused solely by the Motorola equipment. Motorola will then repair the fault at no charge to SFPUC. Motorola will use the Operational Fault Testing Procedure, described below, to determine the nature of the perceived fault.

4.6.5.12 Operational Fault Testing Procedure

Motorola will use proven troubleshooting and test equipment procedures as well as experienced personnel to verify the fault. Motorola will use the same equipment and procedures that were used to complete the testing and optimization of the system to verify the fault. Successful verification of the fault, as defined by the Major Operational Fault criteria, will result in the implementation of the repairs to correct the Operational Fault.

4.6.5.13 Test Restart for Operational Fault Repair

In the event of a major operational fault, the existing 90-day evaluation period will terminate. Motorola shall repair any verified Operational Fault. If a repair can't be made immediately, SFPUC will be notified of the scheduled repair time. Upon successful implementation of the repairs, Motorola shall notify SFPUC. SFPUC, in conjunction with Motorola, shall test the repairs to ensure full operations of the system. At the completion of the operational test, the 90-day test shall resume upon the following calendar day.

In the event of a catastrophic system failure, the respective Program Managers of Motorola and SFPUC will mutually agree upon the point at which the Acceptance Testing will resume.

If failures that are not considered major operational faults occur, the test shall be suspended until such time as the problem is corrected. The test shall then resume from the time it was suspended. The duration of the test suspension shall not count as part of the 90-day test.

Except as expressly listed, any other defect is not an operational fault or Motorola's responsibility. For example, everything beyond the Motorola defined demarcation points is the responsibility of SFPUC. Other Motorola components that may fail during the evaluation period will be repaired under warranty at no charge to SFPUC, but shall not be an operational fault.

4.6.5.14 Successful Completion of the 90 Day Period

At the successful completion of the 90 day Operational Period, as defined by the Key Performance Indicators, the test will be deemed successful and the Final System Acceptance shall be granted.

4.6.6 Training Plan

Motorola understands that successful implementation and use of your communications system depends on effective training. We have developed a training SOW for SFPUC to ensure a comprehensive understanding of your system and all user equipment. We are leveraging over 85 years of training experience working with customers just like you to provide recommendations for your consideration. The training SOW detailed in the following pages incorporates customer feedback coupled with a best practices systematic approach to produce effective course delivery and content.

Our commitment to SFPUC is to provide unsurpassed services that ensure the equipment operates efficiently for the life of the system. To do so, we directly train your personnel to utilize the system to its maximum potential.

The SFPUC personnel will gain in-depth understanding of the power of your new system through education and proficient daily use. Our high-quality training focuses on student needs. The training is complemented by detailed documentation and available continuing education programs.

We will collaborate with SFPUC to develop a final customized training plan that fits your needs. Our goal is to insure system administrators, technicians and end-users are skilled in using your new system.

4.6.6.1 Training Approach

Our training solutions deliver a combination of online training and field based instructor-led training in classrooms at SFPUC locations using operational equipment. Motorola will employ knowledgeable and experienced instructors to deliver well-designed courseware and integrated lab activities.

Training is based upon several key criteria:

- Course design is driven by an analysis of student needs. It focuses on specific application rather than theory.

- Learning objectives are based upon what students need to accomplish on the job.

- Hands-on lab opportunities using SFPUC specific job aids are incorporated to maximize learning and retention.

Our instructors bring invaluable experience and knowledge of customer communication solutions into their training approach. This gives them better insight and understanding into the practical aspects of SFPUC manager, technician and end-user job functions. Each instructor has the proven ability to communicate with a novice as well as expert personnel.

4.6.6.1.1 Quality of Instructors

A careful blending of background, experience and continuous training creates a grounded, intellectually stimulating, and accessible instructor that will professionally deliver your training. Understanding that, the instructor will generate a training environment where students feel empowered to learn. You can be assured that your Motorola instructor utilizes the Needs Analysis of your product or system. The process also ensures that your instructor readily understands the equipment, fashioning a smooth and effective training event.

4.6.6.1.2 *Quality of Material*

Course material performs a vital role in the training process and in the transfer of knowledge to the job site. It is not enough for the material to look professional. Course curriculum follows a design philosophy that instructors adhere to during the training event. Good course materials are easy to use and well integrated into the course design. Because Motorola follows research-driven instructional design methodology, our course materials are specifically designed for ease of use and effective transfer of knowledge to the job. Course curriculum can be tailored to reflect your individual product. We provide relevant documentation pertaining to your product during the training event. The Interactive End User Tool Kit (iEUTK) (Figure 4-44) is a revolutionary knowledge transfer tool designed to accelerate learning. Using the iEUTK allows trainers to customize operator training to match unique button, feature programming, and displays provided in the system. Each iEUTK is user friendly and menu driven. The home page in every iEUTK provides excellent navigation to the multiple areas of interest for the specific communication device. Operators select "Getting Started" to view a highly informative video overview that helps build solid foundational knowledge and quickly brings users up to speed on the operational theory of their specific device. The tailored materials are developed on-site using tool kits that allow users to modify training materials when radio or console features change. Personnel are taught how to maneuver through and tailor the iEUTK screens. The tailored selections are saved to an electronic file that the Motorola training team sends to the printer to develop the training materials. The trainers use the iEUTK to generate their instructor guides, incorporating standard operating procedures, notes, and reminders.

Figure 4-44: The iEUTK will enable San Francisco to generate training materials on an as-needed basis depicting current features and functionality.

4.6.6.2 Courses

Motorola has identified the following course(s) that are necessary to achieve the training goals for SFPUC. Course description files for the recommended courses are provided in the matrix below. Class delivery for instructor-led courses in the field will be tailored for your system and features. Specifically, our training plan addresses the following categories as identified in your request for SOW:

- System Administrators.

- Technicians.

- Radio Technicians

- Console Operator Training.

It is recommended that students bring their laptop computers for all System Administrator and Technician Classes.

4.6.6.2.1 Planning State Training Plan

Course	Target Audience	No. of Sessions	Duration	Location	Date	No. of Attendees
ASTRO 25 **Systems Fleetmapping Workshop** (Instructor-led)	System Administrators & Technicians	1	5 days	Millbrae or Moccasin, CA	Early in the system planning stage	7
Course Synopsis:						
This workshop addresses topics necessary for the effective planning and mapping of an ASTRO 25 IV&D radio system. During this course, the participants will learn about ASTRO 25 features, capabilities, and restrictions in order to effectively plan for a new or upgraded ASTRO 25 system.						

Course Descriptions

ASTRO 25 Systems Fleetmapping Workshop RDS1017

Duration:

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Delivery Method:

- ILT–Instructor-led training.

Target Audience:

- Pre-sale customers, system managers, administrators, planners and technicians.

Course Synopsis:

This workshop addresses topics necessary for the effective planning and mapping of an ASTRO 25 IV&D radio system. During this course, the participants will learn about ASTRO 25 features, capabilities, and restrictions in order to effectively plan for a new or upgraded ASTRO 25 system.

Prerequisite:

- None.

Course Objectives:

After completing the course, the participant will be able to:

- Define what a fleetmap is and why one is needed.
- Understand the methodologies used to configure radio users groups with the goal of optimizing the system resources.
- Enable participants to knowledgably assist with fleetmapping decisions.
- Discuss frequency band plan, organization, and management.
- Describe basic planning requirements.
- Complete worksheets required to create a fleetmap based on sample operational requirement information.

Course Modules:

- Module 1: Introduction.
- Module 2: ASTRO 25 System Architecture:
    - 2-1: Overview.
    - 2-2: Supported Architecture Types.
    - 2-3: ASTRO 25 IP Integration.
    - 2-4: Basic Components.
    - 2-5: Characteristics.
    - 2-6: Network Management Applications.
    - 2-7: Radio Frequency Subsystems.
    - 2-8: Repeater Site.
    - 2-9: Multisite Subsystems–Simulcast.
- Module 3: Frequency Band Plan Management:
    - 3-1: Considerations and Warnings.
    - 3-2: Overview.
    - 3-3: Elements.
    - 3-4: Foreign System Frequency Plan.
    - 3-5: Channel Assignment Methods.
    - 3-6: UNC Wizard.
    - 3-7: Channel Access.
- Module 4: Fleetmapping Technical Overview:
    - 4-1: Set Up.
    - 4-2: System Organization.

- 7-6: Radio User to Radio ID Worksheet.
- 7-7: Talkgroup IDs and Aliases Worksheet.
- 7-8: Multi-groups and Associated Talkgroups Worksheet.
- 7-9: Agency Groups and Associated Multi-groups.
- 7-10: Radio Users Assigned to Talkgroups Worksheet.
- 7-11: Communications and Radio Feature Mapping Worksheet.
- 7-12: Console IDs Worksheet.
- 7-13: Secure Keys Worksheet.
- 7-14: Talkgroup Matrix Worksheet.
- 7-15: Lab - Create a Fleetmap.
- 7-16: Course Conclusion.

4.6.6.2.2 Technical & System Management Training Plan

Course	Target Audience	No. of Sessions	Duration	Location	Date	No. of Attendees
ASTRO 25 IV&D **System Applied Networking** (Instructor-led)	System Administrators & Technicians	1	5 days	Millbrae or Moccasin, CA	Prior to remaining classes	7
Course Synopsis:						
This course provides the participant with the necessary networking information required for understanding the Network Transport subsystem components installed in an ASTRO 25 IV&D communications system. The course includes familiarization with basic networking concepts and the networking components deployed throughout the system.						
ASTRO 25 IV&D System Overview (Self-paced; On-Line) Prerequisite	System Administrators & Technicians	1	2.5 hours	Self-paced; Online	Prior to remaining classes	14
Course Synopsis:						
The ASTRO 25 IV&D System Overview course will provide participants with knowledge and understanding of the ASTRO®25 IV&D system. This course will address M, L and K Core systems. System architecture, components and features will be explained. In addition, RF and console sites and their architecture, features and components will be discussed. Finally, call processing for voice and mobile data applications will be covered, and an introduction to applications available in the ASTRO®25 system will be provided.						
ASTRO 25 IV&D **Radio System Administrator Workshop** (Instructor-led)	System Administrators	1	5 days	Millbrae or Moccasin, CA	Prior to managing the system	7
Course Synopsis:						
This workshop covers administrator functions for an ASTRO 25 Integrated Voice and Data (IV&D) System. Learning activities in this course focus on how to use the different ASTRO 25 IV&D System Management applications. Participants will be provided with an opportunity to discuss how to structure their organization and personnel for optimal ASTRO 25 IV&D system use.						

APX CPS Programming and Template Building and Radio Management (Instructor-led)	Radio Technicians	1	5 days	Millbrae or Moccasin, CA	Prior to programming radios	7

APX CPS Course Synopsis:

The APX CPS Programming and Template Building course provides communications management personnel and technicians with the knowledge and training necessary to build templates and program APX portable/mobile subscriber radio's in the most efficient way possible. The content, parameters and exercises demonstrated in this class apply to the APX portable and APX mobile.

Radio Management Course Synopsis:

Participants will learn the capabilities, features, and functions of the APX Radio Management Suite. This course will cover an APX CPS overview, APX Radio Management Overview, Basic Networking Primer, ASTRO 25/CEN Networking and UNS Overview, and APX Radio Management Installation, Configuration, and Operations. In addition, the course will contain labs that will focus on installation, configuration, and operation using both wired and POP25 updates to APX Subscriber radios in both a LAN and WAN environment

ASTRO 25 IV& GTR 8000 Repeater Site and IP Based Digital Simulcast Workshop (Instructor-led)	Technicians	1	5days	Millbrae or Moccasin, CA	Prior to maintaining	7

GTR 8000 Course Synopsis:

This workshop describes the components in the ASTRO 25 IV&D System Repeater Site with GTR 8000 expandable site subsystem. This course also presents how the GTR 8000 expandable site subsystem operates and explains the tools and methods available for troubleshooting components within the subsystem.

IP Simulcast Course Synopsis:

The ASTRO 25 IV&D IP Based Digital Simulcast workshop provides an understanding of the components that comprise the ASTRO 25 IV&D IP Simulcast subsystem, and how they operate in conjunction with each other. The workshop also explains the tools and methods available for troubleshooting components within the IP Based Simulcast subsystem.

MCC 7500 Dispatch Console Workshop (Instructor-led)	Console Technicians	1	4 days	Millbrae or Moccasin, CA	Prior to maintaining	7

Course Synopsis:

This course familiarizes participants with the installation, configuration, management and repair of MCC 7000 Series IP dispatch consoles. It also covers Archiving Interface Servers, AUX I/O servers, and Conventional Channel Gateways. The focus is on a detailed discussion of console hardware and hands-on activities with the installation and configuration of the MCC 7000 Series IP dispatch consoles.

Course Descriptions

A. ASTRO 25 Systems Applied Networking NWT003

Duration:

- 5 days.

Delivery Method:

- ILT - Instructor-led Training.

Target Audience:

- Technical system managers, technicians, and engineers.

Course Synopsis:

This course provides the participant with the necessary networking information required for understanding the Network Transport subsystem components installed in an ASTRO 25 IV&D communications system. The course includes familiarization with basic networking concepts and the networking components deployed throughout the system.

Prerequisites:

- None.

Learning Outcome:

After completing this course, the participant will be able to:

- Understand basic networking concepts.
- Describe the various Transport Network Subsystem components.
- Define the LAN topologies for each system.
- Define the WAN topologies for each system.
- Identify the expanse of Network Management across each system.
- Discuss HP switch and Motorola Series router configurations.
- Describe and perform the backup/restore procedures for the HP switch and Motorola Series routers in the ASTRO 25 system.

Course Modules:

- Module 1: Basic Networking Concepts
    - Terminology and acronyms.
    - LANS and WANS.
    - Basic protocols.
    - Network troubleshooting commands.
- Module 2: ASTRO 25 Network Transport Subsystem:
    - Call Processing:
        - Block diagram description of how a call travels through the system.
        - Identification and isolation of the network components.
    - Network Components:
    - HP switches - description and location in the network:
        - Menu-driven configuration.
        - Web-based configuration.

- Cooperative WAN Routing—description and location in the network.
- Motorola Series Routers—description and location in the network:
  - ♦ Command line interface configuration.
  - ♦ Menu-driven configuration.
  - ♦ Web-based configuration.
- Router Manager - location and application identification.
- Module 3: Network Concepts:
  - Identify the LAN portion(s) of the network.
  - Identify the LAN Protocols and describe where they are in the network.
  - Identify the WAN portion(s) of the network.
  - Identify the WAN protocols and describe where they are present in the network.
- Module 4: Hands-on practice:
  - Backup and restore HP switch configurations.
  - Backup and restore Motorola Series router configurations.
  - Create router boot configuration file.
  - Flash routers with new operating system.

B. ASTRO® 25 IV&D System Overview AST1038

Course Description

The ASTRO®25 IV&D System Overview course will provide participants with knowledge and understanding of the ASTRO®25 IV&D system. This course will address M, L and K Core systems. System architecture, components and features will be explained. In addition, RF and console sites and their architecture, features and components will be discussed. Finally, call processing for voice and mobile data applications will be covered, and an introduction to applications available in the ASTRO®25 system will be provided.

Target Audience

- Core Technicians.
- Site Technicians.
- Console Technicians.
- Core Managers.

Secondary audience: Anyone seeking general information on the ASTRO® 25 system.

Course Objectives

At the end of this course, the participant should:

- Understand the general architecture of an ASTRO®25 IV&D Radio System.
- Understand key features of available in the ASTRO®25 IV&D Radio System.
- Understand the components of the ASTRO®25 Zone Core.
- Understand site components in the ASTRO®25 system.
- Understand the features, capabilities and components of the MCC7000 series dispatch consoles.
- Understand concepts of Mobility and Call Processing in the ASTRO®25.

- Understand the applications for managing the ASTRO®25 system.

Requisite Knowledge

- None.

Delivery Method

- OLT.
- OLT = Online Training.
- ILT = Instructor Led Training.
- VILT =Live Instructor led training with remote access.

Duration

- 2.5 hours.

Course Structure

- M Core/L Core:
  - System Architecture.
  - System Features.
  - Zone Core Components.
  - Repeater Sites.
  - Simulcast Sites.
  - Console Sites.
  - Conventional Sites.
  - Site Status.
  - Information Types and Paths.
  - Voice and Data Processing.
  - Mobility Management.
  - Applications Overview.
- K Core:
  - System Architecture.
  - System Features.
  - Zone Core Components.
  - Console Sites.
  - Conventional Sites.
  - Information Types and Paths.
  - Voice and Data Processing.
  - Mobility Management.
  - Applications Overview.

C. APX CPS Programming and Template Building

Duration:

- 2 days in the field.

Delivery Method:

- ILT - Instructor-led Training.

Target Audience:

- Radio Technicians, System Managers and anyone responsible for programming APX subscriber radios.

Course Synopsis:

The APX CPS Programming and Template Building course provides communications management personnel and technicians with the knowledge and training necessary to build templates and program APX portable/mobile subscriber radio's in the most efficient way possible. The content, parameters and exercises demonstrated in this class apply to the APX portable and APX mobile.

Prerequisites:

- Knowledge of the basic features of two-way radios, and the basic concepts of conventional and trunking systems.

Course Objectives:

After completing this course, the student will be able to:

- Build APX potable/mobile templates using the APX Customer Programming Software(CPS) Program the specific parameters related to various radio system configurations: Conventional, Single Site Trunking, Simulcast, SmartZone, ASTRO 25 and ASTRO 25 X2.

- Demonstrate detailed knowledge of APX CPS navigation, tools, options and features that make efficient programming of the radio possible.

- Demonstrate a complete understanding of APX CPS efficiency tools, such as Cloning, Drag and Drop, Codeplug Comparison, Radio Flashing, Advance System Key Administration and others.

Course Outline:

- Introduction to APX portable Radio.
- Introduction to APX CPS.
- APX CPS Install, Setup and Configuration.
- Navigating APX CPS.
- APX CPS Data Transfer including POP25/OTAP.
- Understanding and Interpreting Radio Information.
- Detailed Review of Codeplug Contents.
- APX Conventional Codeplug Build.
- APX Type II Trunking Codeplug Build.
- APX ASTRO 25 Trunking Codeplug Build.
- Building Scan List.
- Additional/Advanced CPS Functionality.

APX Radio Management Workshop RDS2017.00L

Duration:

- 2.5 Days.

Delivery Method:

- ILT =

Instructor Led

Training.

- Radio Technicians, System Managers, Radio Programmers.

Course Synopsis:

Participants will learn the capabilities, features, and functions of the APX Radio Management Suite. This course will cover an APX CPS overview, APX Radio Management Overview, Basic Networking Primer, ASTRO 25/CEN Networking and UNS Overview, and APX Radio Management Installation, Configuration, and Operations. In addition, the course will contain labs that will focus on installation, configuration, and operation using both wired and POP25 updates to APX Subscriber radios in both a LAN and WAN environment.

Prerequisite:

Completion of the following courses or equivalent experience in radio communications:

- APX CPS Programming and Template Building Overview (APX7001-V).

Course Objectives:

After completing this course, the student will be able to:

- Describe the APX Radio Management Suite operations and required software and hardware components.

- Describe all deployment options for APX Radio Management Suite.

- Configure a basic APX Radio Management system using a single PC, multiple PCs on a LAN, and multiple PCs on a WAN.

- Troubleshoot common APX Radio Management installation, configuration, and operation issues.

- Use Best Practices to implement and optimize Radio Management Performance.

D. ASTRO 25 IV&D GTR 8000 Repeater Site Workshop ACS716208

Duration:

- 3 days.

Delivery Method:

- ILT = Instructor Led Training.

Target Audience:

- GTR 8000 Site Technicians.

This workshop describes the components in the ASTRO 25 IV&D System Repeater Site with GTR 8000 expandable site subsystem. This course also presents how the GTR 8000 expandable site subsystem operates and explains the tools and methods available for troubleshooting components within the subsystem.

Prerequisite:

Completion of the following courses or equivalent experience:

- Bridging the Knowledge Gap–Technicians (ACT100).

- Networking Essentials in Communication Equipment (NST762).

- ASTRO® Systems Applied Networking (NWT003).

Take one of the following depending on system supporting:

- ASTRO 25 IV&D with M core System Overview (ACS715200).

- ASTRO 25 IV&D with L core System Overview (ACS715430).

- ASTRO 25 IV&D Introduction to Radio System Management Applications (ACS715201).

Course Objectives:

After completing this course, the participant will be able to:

- Describe the ASTRO 25 IV&D Repeater Site with GTR 8000 Expandable Site Subsystem configurations and components.

- Identify the GCP 8000 Site Controller functions and configuration requirements.

- Describe the connections and interfaces to the GCP 8000.

- Diagnose and troubleshoot the GCP 8000.

- Describe the functionality of the GTR 8000 Expandable Site Subsystem.

- Configure and troubleshoot the ASTRO 25 Repeater Site with GTR 8000 Expandable Site Subsystem.

- Configure and troubleshoot the Network Transport subsystem.

Course Modules:

- Module 1: Course Introduction.

- Module 2: GTR 8000 Repeater Site:
  – Topic 2-1: GTR 8000 Repeater Site Overview.

- Topic 2-2: Operational Modes.
- Topic 2-3: Site Configurations.
- Topic 2-4: Site Components.
- Topic 2-5: Time Synchronization and Frequency Reference.
- Test Your Understanding Exercise.

- Module 3: GCP 8000 Site Controller:
  - Topic 3-1: GCP 8000 Overview.
  - Topic 3-2: GCP 8000 Physical Description.
  - Topic 3-3: GCP 8000 Configuration.
  - Topic 3-4: GCP 8000 Diagnostics and Troubleshooting.
  - Test Your Understanding Exercise.

- Module 4: GTR 8000 Expandable Site Subsystem:
  - Topic 4-1: GTR 8000 Expandable Site Subsystem Overview.
  - Topic 4-2: GTR 8000 Expandable Site Subsystem Theory of Operation.
  - Topic 4-3: GTR 8000 Expandable Site Subsystem Configuration.
  - Topic 4-4: GTR 8000 Expandable Site Subsystem Diagnostics and Troubleshooting.
  - Test Your Understanding Exercise.

- Module 5: Radio Frequency Distribution System (RFDS):
  - Topic 5-1: RFDS Overview.
  - Topic 5-2: RFDS Physical Description.
  - Topic 5-3: RFDS Configuration.
  - Topic 5-4: RFDS Diagnostics and Troubleshooting.
  - Test Your Understanding Exercise.

- Module 6: Network Transport Subsystem:
  - Topic 6-1: Network Transport Subsystem Overview.
  - Topic 6-2: Ethernet Switch Diagnostics and Troubleshooting.
  - Topic 6-3: Site Gateways.
  - Topic 6-4: Gateway Diagnostics and Troubleshooting.
  - Test Your Understanding Exercise.

- Module 7: GTR 8000 Site Maintenance and Troubleshooting:
  - Topic 7-1: Unified Event Manager.
  - Topic 7-2: Troubleshooting Tools.
  - Topic 7-3: Troubleshooting Methodology.
  - Topic 7-4: Troubleshooting Repeater Site Link.
  - Topic 7-5: Motorola Support Centers.

E. ASTRO 25 IV&D IP Based Digital Simulcast Workshop ACS716217

<u>Duration:</u>

- 3 days.

<u>Delivery Method:</u>

- ILT = Instructor Led Training.

- Simulcast Site Technicians.

Course Synopsis:

The ASTRO 25 IV&D IP Based Digital Simulcast workshop provides an understanding of the components that comprise the ASTRO 25 IV&D IP Simulcast subsystem, and how they operate in conjunction with each other. The workshop also explains the tools and methods available for troubleshooting components within the IP Based Simulcast subsystem.

Prerequisite:

Completion of the following courses or equivalent knowledge:

- Bridging the Knowledge Gap–Technicians (ACT100).

- Networking Essentials in Communication Equipment (NST762).

- ASTRO® Systems Applied Networking (NWT003). Take one of the following depending on system supporting:

- ASTRO 25 IV&D with M core System Overview (ACS715200).

- ASTRO 25 IV&D with L core System Overview (ACS715430).

Course Objectives:

After completing this course, the participant will be able to:

- Recognize the flow of message and control data within an ASTRO 25 IV&D IP Digital Simulcast subsystem.

- Identify the major components and connections within an ASTRO 25 IV&D IP Digital Simulcast subsystem prime and remote sites.

- Recognize how calls are processed within an ASTRO 25 IV&D IP Digital Simulcast subsystem.

- Perform maintenance and troubleshooting of select components in an ASTRO 25 IV&D IP Digital Simulcast subsystem.

- Module 2: Repeater Site:
  – Topic 2-1: Simulcast Review.
  – Topic 2-2: IP Simulcast with GTR 8000 Subsystem Overview.
  – Topic 2-3: Site Configurations.
  – Topic 2-4: IP Simulcast–Integrated Voice and Data.

- Module 3: GCP 8000 Site Controller:

- Topic 3-1: GCP 8000 Overview.
- Topic 3-2: GCP 8000 Physical Description.
- Topic 3-3: GCP 8000 Configuration.
- Topic 3-4: GCP 8000 Diagnostics and Troubleshooting.

- Module 4: GTR 8000 Comparator:
  - Topic 4-1: GCM 8000 Overview.
  - Topic 4-2: GCM 8000 Physical Description.
  - Topic 4-3: GCM 8000 Configuration.
  - Topic 4-4: GCM Diagnostics and Troubleshooting.

- Module 5: IP Simulcast Network:
  - Topic 5-1: Ethernet LAN Switches:
    - 5-1.1: Ethernet Switch–Overview.
    - 5-1.2: Ethernet Switch–Physical Description.
    - 5-1.3: Ethernet Switch–Configuration.
    - 5-1.4: Ethernet Switch–Diagnostics and Troubleshooting.
  - Topic 5-2: Prime Site Routers/Gateways:
    - 5-2.1: Prime Site Routers/Gateways–Overview.
    - 5-2.2: Prime Site Routers/Gateways–Physical Description.
    - 5-2.3: Prime Site Routers/Gateways–Configuration.
    - 5-2.4: Prime Site Routers/Gateways–Diagnostics and Troubleshooting.
  - Topic 5-3: Remote Site Routers/Gateway:
    - 5-3.1: Remote Site Routers/Gateway–Overview.
    - 5-3.2: Remote Site Routers/Gateway–Physical Description.
    - 5-3.3: Remote Site Routers/Gateway–Configuration.
    - 5-3.4: Remote Site Routers/Gateway–Diagnostics and Troubleshooting.

- Module 6: TRAK 9100 Site Reference:
  - Topic 6-1: TRAK 9100 Site Reference Overview.
  - Topic 6-2: TRAK 9100 Site Reference Physical Description.
  - Topic 6-3: TRAK 9100 Site Reference Installation and Configuration.
  - Topic 6-4: TRAK 9100 Site Reference Diagnostics and Troubleshooting.

- Module 7: GTR 8000 Base Radio Subsystem:
  - Topic 7-1: GTR 8000 Base Radio Subsystem Overview.
  - Topic 7-2: GTR 8000 Base Radio Subsystem Physical Description.
  - Topic 7-3: GTR 8000 Base Radio Subsystem Configuration.
  - Topic 7-4: GTR 8000 Base Radio Subsystem Diagnostics and Troubleshooting.

- Module 8: IP Simulcast Subsystem Maintenance and Troubleshooting:
  - Topic 8-1: Maintenance and Troubleshooting Overview.
  - Topic 8-2: Unified Event Manager.
  - Topic 8-3: Device Fault Management.
  - Topic 8-4: Troubleshooting Process.
  - Topic 8-5: Troubleshooting Site Links.
  - Topic 8-6: Motorola Support Centers.

F. MCC 7000 Series Dispatch Consoles Workshop CON012

Duration:

- 4 Days.

Target Audience:

- System Administrators and Console Technicians.

Course Synopsis:

This course familiarizes participants with the installation, configuration, management and repair of MCC 7000 Series IP dispatch consoles. It also covers Archiving Interface Servers, AUX I/O servers, and Conventional Channel Gateways. The focus is on a detailed discussion of console hardware and hands-on activities with the installation and configuration of the MCC 7000 Series IP dispatch consoles.

Prerequisite:

Completion of the following courses or equivalent knowledge:

- Bridging the Knowledge Gap (ACT100-E or ACT101-E).
- Networking Essentials in Communication Equipment (NST762).
- Advanced Networking in Motorola Communications Equipment (NWT003).

Required:

- MCC 7000 Series Console Overview (CON014).
- ASTRO 25 IV&D with M Core System Overview (ACS714200).
- Introduction to Radio System Management Applications (ACS713201).

Course Objectives:

After completing the course, the participant will be able to:

- Install and configure the hardware and software components of the MCC 7000 Dispatch Console Subsystem.
- Perform MCC 7000 Series site connectivity and bandwidth management.
- Perform System Administrator functions using the Elite Administrator software.
- Troubleshoot installation and configuration problems for the MCC 7000 Series Dispatch Consoles.

Lab Requirements:

- AIS.
- AUX I/O servers.
- Network Management Terminals at a ratio of 1 for every 4 students to ensure proper hands- on training.

- Module 2: Dispatch Console Overview:
  - 2-1: Features.
  - 2-2: System Views.
  - 2-4: Call Processing.

- Module 3: Dispatch Console Hardware:
  - 3-1: Dispatch Console Configuration.

- Module 4: AUX I/Os:
  - 4-1: Auxiliary Inputs/Outputs (Aux I/Os).

- Module 5: Conventional Communication:
  - 5-1: Conventional Communication.

- Module 6: Domain Controllers:
  - 6-1: Domain Controllers and Active Directory.

- Module 7: Administrator Functions:
  - 7-1: Editing Current Configurations.
  - 7-2: Setting Up Folders and Resources.
  - 7-3: Setting Up Auxiliary I/Os.
  - 7-4: Configuring Toolbars.
  - 7-5: Editing Preferences.
  - 7-6: Auto Starting the MCC 7500 Dispatch Console.
  - 7-7: Setting up Inbound Event Display.
  - 7-8: MKM 7500 Console Alias Manager.

- Module 8: Troubleshooting:
  - 8-1: Troubleshooting with UEM.
  - 8-2: Troubleshooting MCC 7000 Series Components.

4.6.6.2.3 Radio Subscriber Training

Course	Target Audience	No. of Sessions	Duration	Location	Date	No. of Attendees
APX 1000 and **APX 4000 Portable Radio Operator Training** Utilizing the Interactive End User Tool Kit Train-the-Trainer (Instructor-led)	Trainers	1	1 day	Millbrae, CA	Prior to training users	Up to 10

Course Synopsis:
This course provides APX radio trainers with an introduction to their radio, its basic operation and tailored job aids available for assistance in operation. The learning experience is a mix of facilitation and hands-on activities to help users perform common tasks associated with their radio operation. Segmentation between user groups (i.e. Police, Fire/EMS, and Public Service) is encouraged to help focus instruction on the specific operational issues of the individual user group. This course is geared for customers who have an experienced dedicated training staff in their organization. It provides the customer's identified training personnel with the knowledge and practice applying training techniques that will enable them to successfully train their students. Trainers will use audio visual (Interactive End User Toolkits—iEUTK), facilitation and "hands-on" activities to facilitate learning events supported by tailored or customized training materials and job aides. They will become proficient in discussing common tasks associated with the operation of the customer's radios. **Note:** The first half of the class is the operator portion. How to redeliver this training for the users training and how to utilize the Interactive End User Tool Kit are covered in the second half of the day.

A. APX Portable and APX Mobile - Train the Trainer

Duration:

- Up to 8 hours.

Delivery Method:

- ILT - Instructor-led training.

Target Audience:

- APX Trainers, Supervisors and Support Personnel.

Course Synopsis:

This course provides APX radio trainers with an introduction to their radio, its basic operation and tailored job aids available for assistance in operation. The learning experience is a mix of facilitation and hands-on activities to help users perform common tasks associated with their radio operation. Segmentation between user groups (i.e. Police, Fire/EMS, and Public Service) is encouraged to help focus instruction on the specific operational issues of the individual user group. This course is geared for customers who have an experienced dedicated training staff in their organization. It provides the customer's identified training personnel with the knowledge and practice applying training techniques that will enable them to successfully train their students. Trainers will use audio visual (Interactive End User Toolkits–iEUTK), facilitation and "hands-on" activities to facilitate learning events supported by tailored or customized training materials and job aides. They will become proficient in discussing common tasks associated with the operation of the customer's radios.

Required Pre-work:

- None.

Recommended Prerequisite:

- Previous two-way radio and

training experience.

Course Objectives:

- High-level overview of the customer system configuration.
- General radio operation.
- Proper operating procedures for specific customer features.
- Perform basic operational tasks of the radio.
- Utilize the provided job aids to perform specific tasks associated

with the radio.

Course Outline:

- Basics.
- Controls.
- Top and Side Buttons.

- Switches.
- 3 Position toggle.
- 2 Position Concentric.
- Home key.
- Data Key.
- Display.
- Front Display.
- Top Display.
- Display light.
- Intelligent Lighting.
- Push to Talk or Accessory PTT found on the microphone.
- Hub, hang up box (Mobile).
- Menu.
- Menu Screen Anatomy.
- Navigating Menu Screen.
- Recent Call List (Model 3.5).
- Unified Call List - Contacts (Model 3.5).
- Dual Sided Radio (Model 3.5).
- Dual Mics.
- Dual Speakers.
- Accessory Connector.
- Specific Features.
- Changing Talkgroups/Channels.
- Changing Zones.
- Mute tones of keypad.
- Talkgroup Call.
- Private Call.
- Accessing Private Call Feature.
- Initiating Private Call.
- Call List Programming.
- Announcement/All Call (Calls involving Multiple Talkgroups).
- Initiating Announcement/All Call.
- Direct/Talkaround.
- Failsoft.
- Radio Profiles.
- Accessing and changing Radio Profile.
- Optional Features.
- Scan.
- Scan program.
- Priority Scan.
- Dynamic Priority.
- Telephone Interconnect.
- Accessing Telephone Interconnect Feature.
- Initiating a Phone Call.
- Phone List Programming.
- Data Services.
- Text Messaging.
- Accessing the Text Messaging Feature.
- Creating a Free Form Text Message
- Sending a "Canned Text Message.

- GPS.
- OTAP.
- Encryption.
- Emergency.

B. Interactive End User Tool Kit

The Interactive End User Tool Kit (iEUTK) is a revolutionary knowledge transfer tool designed to accelerate learning. Using the iEUTK allows trainers to customize operator training to match unique button, feature programming, and displays provided in the system. Each iEUTK is user friendly and menu driven. The home page in every iEUTK provides excellent navigation to the multiple areas of interest for the specific communication device. Operators select "Getting Started" to view a highly informative video overview that helps build solid foundational knowledge and quickly brings users up to speed on the operational theory of their specific device. The tailored materials are developed on-site using tool kits that allow users to modify training materials when radio or console features change. Personnel are taught how to maneuver through and tailor the iEUTK screens. The tailored selections are saved to an electronic file that the Motorola training team sends to the printer to develop the training materials. The trainers use the iEUTK to generate their instructor guides, incorporating standard operating procedures, notes, and reminders. This dynamic tool allows the customer to generate training materials on an as-needed basis depicting current features and functionality.

4.6.6.2.4 Console Operator–Administrator Training

Course	Target Audience	No. of Session s	Duration	Location	Date	No. of Attendes
MCC 7500 Console Operator and Admin Utilizing the Interactive End User Tool Kit. 3 training consoles (Instructor-led)	Supervisors	1	1 day	Dispatch Location 1	Prior to cutover	3
MCC 7500 Console Operator and Admin Utilizing the Interactive End User Tool Kit. 3 training consoles (Instructor-led)	Supervisors	1	1 day	Dispatch Location 2	Prior to cutover	3
MCC 7500 Console Operator and Admin Utilizing the Interactive End User Tool Kit. 3 training consoles (Instructor-led)	Supervisors	1	1 day	Dispatch Location 3	Prior to cutove r	3
Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the consoleoperation.						

Admin Course Synopsis:

This course provides participants with the knowledge and skills to manage and utilize the MCC 7500 console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens. **Note:** The first half of the class is the operator portion. The Admin training and how to utilize the Interactive End User Tool Kit are covered in the second half of the day.

Course Descriptions

A. MCC 7500 Console Operator

Duration:
- 4 hours.

Delivery Method:
- ILT - Instructor-led training.

Target Audience:
- Dispatch Console Operators, Supervisors, System Administrators, and Support Personnel.

Course Synopsis:

This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation.

Course Objectives:
- Perform basic operational tasks of the dispatch console.
- Utilize the provided job aids to perform specific tasks associated with the console.
- Understand a high level view of the system configuration.
- High-level overview of the customer system configuration.
- General console operation.
- Proper operating procedures for specific customer features.

Recommended Prerequisites:
- None.

Key Topics:
- Overview.
- Communicating with Radios.
- Advanced Signaling Features.
- Resource Groups.

- Working with Configurations.
- Working with Aux IOs.
- Troubleshooting.

B. MCC 7500 Console Supervisor

Duration:

- 4 hours Operator, plus.
- 4 hours Admin.

Delivery Method:

- ILT - Instructor-led training.

Target Audience:

- Dispatch Supervisors and System Administrators.

Admin Course Synopsis:

This course provides participants with the knowledge and skills to manage and utilize the MCC 7500 console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens.

Course Objectives:

- Understand the menu items and tool bar icons
- Edit folders, multi-select/patch groups, auxiliary input output groups, windows and toolbars
- Add/delete folders

Recommended Prerequisites:
- None.

Key Topics:

- Introduction
- Configurations
- Folders and Resource Setup
- Customizing Folders
- Auto Starting the MCC 7500 Dispatch Console
- Editing Preferences
- Configuring the Toolbar
- Setting Up Aux IOs
- Resource Groups

4.6.7 System Support Plans

The warranty and post-warranty maintenance plan purchased by the SFPUC will be comprised of services designed to maintain and support the SFPUC System. SFPUC will have complete access to Motorola's support services provided by our Systems Support Center (SSC), Radio System Security Updates, Onsite Support Services, Annual Preventative Maintenance Services, , System Lifecycle (Hardware, Software and Upgrade Services) services, and our Motorola System Technical Support to assist SFPUC's technical staff with warranty and maintenance services during the life of the contract. This proven methodology and collaboration will provide the optimal level of local and remote support to maximize system performance and minimize system downtime. Motorola's service portfolio will provide SFPUC the required warranty services and Post Warranty Maintenance Services for years 1-9 . The subscribers include a nice year SfS Lite support from system acceptance for years 1-9.

4.6.7.1   Summary of RFP Warranty and Post Warranty Maintenance Services

Below, in Table 4-53 is the list of required services:

Table 4-53: Warranty and Post Warranty Maintenance Description of Services

Description	Warranty Package Year 1	Post Warranty Maintenance
Dispatch Service and Case Management	√	√
Technical Support Service	√	√
Onsite Support Services	√	√
Annual Preventative Maintenance	√	√
Subscriber Services (SfS Lite)	√	√
Local Customer Support Manager	√	√
Customer Support Plan	√	√
Security Update Services (SUS)	√	√
Lifecycle Plan	√	√

4.6.7.2   Motorola's System Support Center

The Motorola System Support Center is the heart of Motorola's central support operations. The SSC will provide remote support to the SFPUC. Motorola continues to invest a significant amount of time and resources to develop new processes and tools designed to enhance the service delivery process for our mission-critical customers. Our Dispatch and Case Management team works hand-in-hand with our Network Operations Center (NOC) and internal engineering and technical support teams to deliver the comprehensive services necessary to provide maximum system uptime and network availability. The SSC is an ISO9001 certified network support and operations center staffed with factory certified personnel specifically trained for mission-critical networks. Our central support services, provided by the SSC, can be customized to meet the SFPUC's needs. Motorola's technical support and engineering teams will be available around the clock to support

the maintenance and operations of SFPUC's ASTRO 25 system.

Highlights of the Systems Support Center include the following:
- 24x7 Dispatch and Case Management Service.
- Factory certified engineering and technical support specialist.

4.6.7.3   Dispatch and Case Management

The front-end call process begins with a notification sourced either from an automatic alarm or through a scheduled maintenance notification. The Motorola Call Center will assign a case number to each incident and triage the issue with the appropriate support team. Motorola's time- driven escalation process tracks contracted response and restore times to ensure that all open issues are managed to resolution with a positive verification (Table 4-54).

Table 4-54: Dispatch and Case Management Services

Dispatch and Case Management
Provide a single toll-free telephone number that answers 24 hours a day, seven days a week, 365 days a year, for service requests and warranty claims.
Dispatch the proper repair facility personnel during any event that requires a servicer to be on-site.
Coordination and tracking of case activity.
Dispatch of SFPUC field technical personnel.
Notification and escalation of customer and management personnel.
Final resolution and case closure.
Review all cases on a monthly basis with SFPUC.

The Call Center will track the technician's progress in effecting the repair and restoration, and notify the SFPUC of the status. Once the case has been resolved, the Call Center will contact the SFPUC to advise that the issue has been resolved and the case is ready to be closed. Dispatch Service allows the SFPUC to follow the progress of an issue from inception to resolution. Automated notification emails or text messages can also be set up to alert SFPUC personnel of changes in case status. Motorola uses the Case Management System for all issues reported to the Systems Support Center. Case notes and progress reports are reviewed at the highest levels in the Quality and Engineering organizations to determine specific case resolution and identify inherent defects that may affect systems worldwide.

4.6.7.3.1   Case Tracking Process

The Motorola Call Process (Figure 4-45) tracks an event or service call through each milestone, verifying that service obligations are met and provides a database of maintenance, failure and restoration history that is reviewed to identify trends or repeated events.

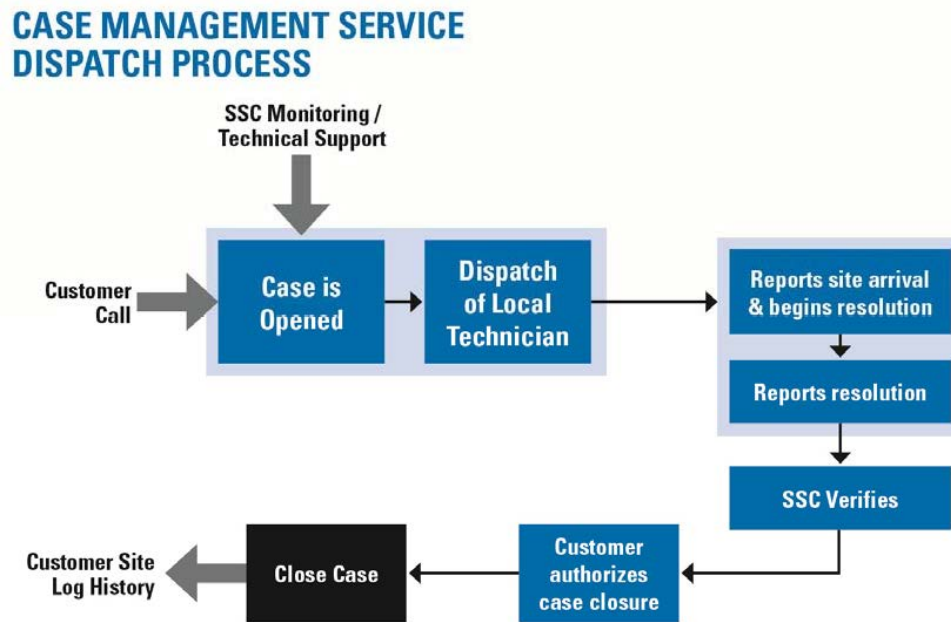The Case Management Dispatch Process and subsequent Case Activity Reports for SFPUC calls are shown below:

CASE MANAGEMENT SERVICE DISPATCH PROCESS

Figure 4-45: Case Management Service Dispatch Process

4.6.7.3.2   Technical Support Service

Motorola's Technical Support Operation is manned 24 hours per day, 365 days a year to ensure prompt responses to technical issues and questions regarding deployed systems. This operation is staffed with technologists who specialize in the diagnosis and resolution of system performance issues. The technologists will remotely access the affected system or replicate the problem in the system laboratory to get the system back up and running as quickly and efficiently as possible. When needed, the

technologists will provide troubleshooting guidance over the telephone and work with the local service technician to affect an efficient resolution. Motorola's Technical Support Team will work in close partnership with factory and design engineers, enabling rapid engagement of higher level technical support staff. Our teams will conduct weekly quality meetings to review open cases. This review board, consisting of engineering, technologists, quality, and operations management, assesses every case to determine appropriate action plans and ensure proper resources are available to assist with case resolution. Motorola will perform the activities to deliver Technical Support Services as shown in Table 4-55.

Table 4-55: Technical Support Services

Technical Support Operations
Respond to requests for Technical Support for the Restoration of failed Systems and diagnosis of operation problems.
Advise caller of procedure for determining any additional requirements for issue characterization, Restoration, including providing a known fix for issue resolution when available.
Coordinate technical resolutions with agreed upon third party vendors as needed.

Escalate and manage support issues, including systemic issues, to Motorola engineering and product groups, as applicable.
Provide Configuration Change Support and Work Flow changes to Systems that have dial-in or remote access capability.
Determine when a Case requires more than the Technical Support services described here and notify Customer of an alternative course of action.

4.6.7.3.3 Onsite Service through a Field Service Team

Onsite maintenance and repair of SFPUC system will be provided by Motorola's local team of service personnel. Motorola will provide SFPUC with a Customer Support Plan (CSP) that outlines the details of each service, provides escalation paths for special issues, and any other information specific to SFPUC service agreement. Some of these details will include items such as access to sites, response time requirements, severity level definitions, and parts department access information. Local technicians will be dispatched for on-site service by the Motorola's Solution Support Center (SSC), who will inform the technician of the reason for dispatch. This will enable the technician to determine if a certain component or field replacement unit (FRU) will be needed from inventory to restore the system. Once on site, the field technician will notify the SSC and begin to work on the issue. The technician will review the case notes to determine the status of the issue, and begin the troubleshooting and restoration process. Once the system is restored to normal operation, the field technician will notify the SSC that the system is restored. The SSC, in turn, will notify SFPUC that the system is restored to normal operation and request approval to close the case.

4.6.7.3.4 Annual Preventative Maintenance Service

Annual Preventive Maintenance Service provides proactive, regularly scheduled operational testing and alignment of infrastructure and network components to ensure that they continually meet original manufacturer specifications. Certified field technicians perform hands-on examination and diagnostics of network equipment on a routine and prescribed basis.

4.6.7.3.5 Subscriber Radio Warranty and Services Repair Bank

Warranty for the Motorola APX radios purchased through this contract will begin upon system acceptance and lasts for five years. Support for years 6-9 are included in this SOW. Service from the Start (SfS Lite) gives you the support you need to help you keep your subscriber radios operating in peak condition. When repair is required, the Motorola Depot tests, repairs, and returns the radio to original factory specifications. Firmware is also upgraded to the latest version. SfS adheres to a proven process of analysis and restoration, backed by a 90-day warranty. Equipment covered under service agreements also receives higher service priority, which results in quicker repair times.

4.6.7.4 Local Customer Support Manager (CSM)

Your local Customer Support Managers, Brandon Burke, will provide coordination of support resources over the lifecycle of the system. .They will manage all warranty and post-warranty maintenance support services and serve the role of the SFPUC's technical team. Brandon will also be the defined point of contact for issue resolution and escalation, monitoring of Motorola contractual performance, and providing review and analysis of process and metrics. The customer support manager develops a documented Customer Support Plan (CSP) that will define the commitments and manage expectations for both SFPUC and Motorola. The CSP will be developed in conjunction

with the appropriate SFPUC personnel.

4.6.7.5   Customer Support Plan

Upon system acceptance, SFPUC will be provided with a Project Transition Certificate, which officially transitions the project from implementation to warranty. At the same time, Motorola will provide a Customer Support Plan that has been discussed and agreed upon regarding your specific requests and responsibilities throughout the service contract. All of the service products described above will be outlined and the CSP will be your "directory" of services during warranty and post-warranty maintenance period. Also included will be specifics on escalations in the event of special problems and any pertinent information required specifically to SFPUC. Some of these details would include items such as Disaster Preparedness Plan, access to sites, response time requirements, severity level definitions, and parts department access information.

4.6.7.6   Security Update Services

The Security Patch Installation Service will provide SFPUC with pre-tested security updates, pre-tested and ready to be installed on SFPUC's system. When appropriate, Motorola will make these updates available to outside vendors in order to enable them to test each patch, and will incorporate the results of those third-party tests into the updates before providing the patches to be installed on SFPUC's network. Once an update is fully tested and ready for deployment in SFPUC system, SFPUC team or Motorola System Manager/Engineer can install it on the system. If there are any recommended configuration changes, warnings, or workarounds, Motorola will provide detailed documentation along with the updates on the website.

4.6.7.7   Software and Firmware Upgrade Support

Motorola is committed to supporting the ASTRO 25 platform for an extended period of time. Support coverage for the platform is aligned with the typical system lifespan customers' experience which can span across multiple decades. To sustain the platform lifespan, Motorola makes on-going investments to regularly refresh the underlying components to address normal technology obsolescence and apply security safeguards. A primary goal of technology refresh is to maximize backwards compatibility thereby mitigating the need to replace the entire platform.

Motorola works closely with SFPUC to ensure that solutions offered meet stated requirements and regulations. The product development process for the ASTRO 25 platform is designed to coordinate with standards bodies, regulatory agencies, customer needs and technology advancements. As a result the ASTRO 25 platform is designed with Project 25 standards to ensure fully interoperable digital communications.

Motorola also works with its technology partners to incorporate new product versions into the ASTRO 25 platform through a system certification process, thus ensuring compatibility of new third-party products. As products are discontinued due to technology obsolescence, Motorola incorporates replacement versions thereby avoiding the need to replace the entire platform. The certification process also enables Motorola to continue support for discontinued third-party products, in some cases several years beyond the last general availability date from the OEM.

To address system software upgrades and technology refresh, Motorola provides periodic software updates that are aligned with OEM update schedules and planned Motorola system enhancement timelines. Additionally, Motorola integrates hardware updates that are aligned with OEM cancellations and technology advancements. All system updates are pre-tested and certified in a systems integration test lab to ensure the transition between releases can be

executed with the least amount of interruption to the system operation.

The Motorola lifecycle management portfolio includes several levels of offering to address system software upgrades and technology refresh. Motorola has included SUAII lifecycle plan for years 2-9 for SFPUC that fully complies with the requirements of the RFP. SUA II plan will keep SFPUC's LMR system at current release and includes hardware, software, and system integration services. Motorola Engineers and technologists will be involved in planning and delivery of system upgrades. The ASTRO 25 System Upgrade Agreement II (SUA II) is attached hereto as Exhibit 1.

4.6.7.7 System Upgrade Agreement and Servicer Statement of Work

A.   ASTRO 2 System Upgrade Agreement (SUA II)

1.1 Description of Service and Obligations

1.1.1   As system releases become available, Motorola agrees to provide the Customer with the software, hardware and implementation services required to execute up to one system infrastructure upgrade in a two-year period for their ASTRO 25 system. At the time of the system release upgrade, Motorola will provide applicable patches and service pack updates when and if available. Currently, Motorola's service includes 3rd party SW such as Microsoft Windows and Server OS, Red Hat Linux, Sun Solaris and any Motorola software service packs that may be available. Motorola will only provide patch releases that have been analyzed, pre-tested, and certified in a dedicated ASTRO 25 test lab to ensure that they are compatible and do not interfere with the ASTRO 25 network functionality. Additionally, if purchased, the Security Update Service (SUS) coverage is defined in Appendix C to this Exhibit 1.

1.1.2   The Customer will have the choice of having Motorola perform the SUA2 infrastructure upgrade in either the beginning of Year 1 or end of Year 2 of the coverage period. To be eligible for the ASTRO 25 SUA II, the ASTRO 25 system must be at system release 7.7 or later.

1.1.3   ASTRO 25 system releases are intended to improve the system functionality and operation from previous releases and may include some minor feature enhancements. At Motorola's option, system releases may also include significant new feature enhancements that Motorola may offer for purchase. System release software and hardware shall be pre-tested and certified in Motorola's Systems Integration Test lab.

1.1.4   The price quoted for the SUAII requires the Customer to choose a certified system upgrade path from the list of System Release Upgrade Paths available to the Customer as per the system release upgrade chart referenced and incorporated in Appendix A to this Exhibit 1. Should the Customer elect an upgrade path other than one listed in Appendix A to this Exhibit 1, the Customer agrees that additional costs may be incurred to complete the implementation of the certified system upgrade. In this case, Motorola agrees to provide a price quotation for any additional materials and services necessary.

1.1.5   ASTRO 25 SUA II entitles a Customer to past software versions for the purpose of downgrading product software to a compatible release version.

1.1.6   The following ASTRO 25 certified system release software for the following products are covered under this ASTRO 25 SUA II: base stations, site controllers, comparators, routers, LAN switches, servers, dispatch consoles, logging equipment, network management terminals, Network Fault Management ("NFM") products, network security devices such as firewalls and intrusion detection sensors, and associated peripheral infrastructure software.

1.1.7   Product programming software such as Radio Service Software ("RSS"), Configuration Service Software ("CSS"), and Customer Programming Software ("CPS") are also covered under this SUA II.

1.1.8   ASTRO 25 SUA II makes available the subscriber radio software releases that are shipping from the factory during the SUA II coverage period. New subscriber radio options and features not previously purchased by the Customer are excluded from ASTRO 25 SUA II coverage. Additionally, subscriber software installation and reprogramming are excluded from the ASTRO 25 SUA II coverage.

1.1.9   Motorola will provide certified hardware version updates and/or replacements necessary to upgrade the system with an equivalent level of functionality up to once in a two-year period. Hardware will be upgraded and/or replaced if required to maintain the existing feature and functionality. Any updates to hardware versions and/or replacement hardware required to support new features or those not specifically required to maintain existing functionality are not included. Unless otherwise stated, platform migrations such as, but not limited to, stations, consoles, backhaul, civil, network changes and additions, and managed services are not included.

1.1.10   The following hardware components, if originally provided by Motorola, are eligible for full product replacement when necessary per the system release upgrade :

- Servers

- PC Workstations

- Routers

- LAN Switches

1.1.11   The following hardware components, if originally provided by Motorola, are eligible for board-level replacement when necessary per the system release upgrade. A "board-level replacement" is defined as any Field Replaceable Unit ("FRU") for the products listed below:

- GTR 8000 Base Stations

- GCP 8000 Site Controllers

- GCM 8000 Comparators

- MCC 7500 Console Operator Positions

- STR 3000 Base Stations

- Quantar Base Stations

- Centracom Gold Elite Console Operator Interface Electronics

- Centracom Gold Elite Central Electronics Banks

- Ambassador Electronics Banks

- Motorola Gold Elite Gateways

- ASTROTAC Comparators

- PSC 9600 Site Controllers

- PBX Switches for Telephone Interconnect

- NFM/NFM XC/MOSCAD RTU

1.2 The ASTRO 25 SUA II does not cover all products. Refer to section 3.0 for exclusions and limitations.

1.3 Motorola will provide implementation services necessary to upgrade the system to a future system release with an equivalent level of functionality up to once in a two-year period. Any implementation services that are not directly required to support the certified system upgrade are not included. Unless otherwise stated, implementation services necessary for system expansions,   platform migrations, and/or new features or functionality that are implemented concurrent with   the certified system upgrade are not included.

1.4 As system releases become available, Motorola will provide up to once in a two-year period the following software design and technical resources necessary to complete system release upgrades:

  1.4.1 Review infrastructure system audit data as needed.

  1.4.2 Identify additional system equipment needed to implement a system release, if applicable.

  1.4.3 Complete a SOW defining the system release, equipment requirements, installation plan, and impact to system users.

  1.4.4 Advise Customer of probable impact to system users during the actual field upgrade implementation.

  1.4.5 Program management support required to perform the certified system upgrade.

  1.4.6 Field installation labor required to perform the certified system upgrade.

  1.4.7 Upgrade operations engineering labor required to perform the certified

system upgrade.

1.5 ASTRO 25 SUA II pricing is based on the system configuration outlined in Appendix B to this Exhibit 1. This configuration is to be reviewed annually from the contract effective date. Any change in system configuration may require an ASTRO 25 SUA II price adjustment.

1.6 The ASTRO 25 SUA II applies only to system release upgrades within the ASTRO 25 7.x platform.

1.7 Motorola will issue Software Maintenance Agreement ("SMA") bulletins on an annual basis and post them in soft copy on a designated extranet site for Customer access. Standard and optional features for a given ASTRO 25 system release are listed in the SMA bulletin.

2.1 **Upgrade Elements and Corresponding Party Responsibilities**

    2.1.1   Upgrade Planning and Preparation: All items listed in this section are to be completed at least 6 months prior to a scheduled upgrade.

    2.1.2   Motorola responsibilities

        2.1.2.1   Obtain and review infrastructure system audit data as needed.

        2.1.2.2   Identify additional system equipment needed to implement a system release, if applicable.

        2.1.2.3   Complete a SOW defining the system release, equipment requirements, installation plan, and impact to system users.

        2.1.2.4   Advise Customer of probable impact to system users during the actual field upgrade implementation.

        2.1.2.5   Inform Customer of high speed internet connection requirements.

        2.1.2.6   Assign program management support required to perform the certified system upgrade.

        2.1.2.7   Assign field installation labor required to perform the certified system upgrade.

        2.1.2.8   Assign upgrade operations engineering labor required to perform the certified system upgrade.

        2.1.2.9   Deliver release impact and change management training to the primary zone core owners, outlining the changes to their system as a result of the upgrade path elected. This training needs to be completed at least 12 weeks prior to the scheduled upgrade. This training will not be provided separately for user agencies who reside on a zone core owned by another entity. Unless specifically stated in this document, Motorola will provide this training only once per system.

    2.1.3   Customer responsibilities

2.1.3.1   Contact Motorola to schedule and engage the appropriate Motorola resources for a system release upgrade.

2.1.3.2   Provide high-speed internet connectivity at the zone core site(s) for use by Motorola to perform remote upgrades and diagnostics. Specifications for the high-speed connection are provided in Appendix D to this Exhibit 1. High-speed internet connectivity must be provided at least 12 weeks prior to the scheduled upgrade. In the event access to a high-speed connection is unavailable, Customer may be billed additional costs to execute the system release upgrade.

2.1.3.3   Assist in site walks of the system during the system audit when necessary.

2.1.3.4   Provide a list of any FRUs and/or spare hardware to be included in the system release upgrade when applicable.

2.1.3.5   Purchase any additional software and hardware necessary to implement optional system release features or system expansions.

2.1.3.6   Provide or purchase labor to implement optional system release features or system expansions.

2.1.3.7   Participate in release impact training at least 12 weeks prior to the scheduled upgrade. This applies only to primary zone core owners. It is the zone core owner's responsibility to contact and include any user agencies that need to be trained or to act as a training agency for those users not included.

2.2   System Readiness Checkpoint: All items listed in this section must be completed at least 30 days prior to a scheduled upgrade.

2.2.1   Motorola responsibilities

2.2.1.1   Perform appropriate system backups.

2.2.1.2   Work with the Customer to validate that all system maintenance is current.

2.2.1.3   Work with the Customer to validate that all available patches and antivirus updates have been updated on the customer's system.

2.2.2   Customer responsibilities

2.2.2.1   Validate system maintenance is current.

2.2.2.2   Validate that all available patches and antivirus updates to their system have been completed.

2.3   System Upgrade

2.3.1   Motorola responsibilities

2.3.1.1　Perform system infrastructure upgrade in accordance with the system elements outlined in this SOW.

2.3.2　Customer responsibilities

2.3.2.1　Inform system users of software upgrade plans and scheduled system downtime.

2.3.2.2　Cooperate with Motorola and perform all acts that are reasonable or necessary to enable Motorola to provide software upgrade services.

2.4　Upgrade Completion

2.4.1　Motorola responsibilities

2.4.1.1　Validate all certified system upgrade deliverables are complete as contractually required.

2.4.1.2　Deliver post upgrade implementation training to the customer as needed, up to once per system.

2.4.1.3　Obtain upgrade completion sign off from the customer.

2.4.2　Customer Responsibilities

2.4.2.1　Cooperate with Motorola in efforts to complete any post upgrade punch list items as needed.

2.4.2.2　Cooperate with Motorola to provide relevant post upgrade implementation training as needed. This applies only to primary zone core owners. It is the zone core owner's responsibility to contact and include any user agencies that need to be trained or to act as a training agency for those users not included.

2.4.2.3　Provide Motorola with upgrade completion sign off.

3.1 Exclusions and Limitations

3.1.1　The parties agree that Systems that have non-standard configurations that have not been certified by Motorola Systems Integration Testing are specifically excluded from the ASTRO 25 SUA II unless otherwise agreed in writing by Motorola and included in this SOW.

3.1.2　The parties acknowledge and agree that the ASTRO 25 SUA II does not cover the following products:

- • MCC5500 Dispatch Consoles
- • MIP5000 Dispatch Consoles
- • Plant/E911 Systems
- • MOTOBRIDGE Solutions
- • ARC 4000 Systems
- • Motorola Public Sector Applications Software ("PSA")

- Custom SW, CAD, Records Management Software

- Data Radio Devices

- Mobile computing devices such as Laptops

- Non-Motorola two-way radio subscriber products

- Genesis Products

- Point-to-point products such as microwave terminals and association multiplex equipment

3.1.3 ASTRO 25 SUA II does not cover any hardware or software supplied to the Customer when purchased directly from a third party, unless specifically included in this SOW.

3.1.4 ASTRO 25 SUA II does not cover software support for virus attacks or other applications that are not part of the ASTRO 25 system, or unauthorized modifications or other misuse of the covered software. Motorola is not responsible for management of anti-virus or other security applications (such as Norton).

3.1.5 Upgrades for equipment add-ons or expansions during the term of this ASTRO 25 SUA II are not included in the coverage of this SOW unless otherwise agreed to in writing by Motorola.

4.1 Special provisions

4.1.1 Customer acknowledges that if its System has a Special Product Feature, additional engineering may be required to prevent an installed system release from overwriting the Special Product Feature. Upon request, Motorola will determine whether a Special Product Feature can be incorporated into a system release and whether additional engineering effort is required. If additional engineering is required Motorola will issue a change order for the change in scope and associated increase in the price for the ASTRO 25 SUA II.

4.1.2 Customer will only use the software (including any System Releases) in accordance with the applicable Software License Agreement.

4.1.3 ASTRO 25 SUA II services do not include repair or replacement of hardware or software that is necessary due to defects that are not corrected by the system release, nor does it include repair or replacement of defects resulting from any nonstandard, improper use or conditions; or from unauthorized installation of software.

4.1.4 ASTRO 25 SUA II coverage and the parties' responsibilities described in this Statement of Work will automatically terminate if Motorola no longer supports the ASTRO 25 7.x software version in the Customer's system or discontinues the ASTRO 25 SUA II program; in either case, Motorola will refund to Customer any prepaid fees for ASTRO 25 SUA II services applicable to the terminated period.

4.1.5   If Customer cancels a scheduled upgrade within less than 12 weeks of the scheduled on site date, Motorola reserves the right to charge the Customer a cancellation fee equivalent to the cost of the pre-planning efforts completed by the Motorola Solutions Upgrade Operations Team.

4.1.6   The SUA II annualized price is based on the fulfillment of the two year term. If Customer terminates, except if Motorola is the defaulting party, Customer will be required to pay for the balance of payments owed if a system release upgrade has been taken prior to the point of termination.

ASTRO 2 System Upgrade Agreement (SUA II)
Appendix A – ASTRO 25 System Release Upgrade Paths

Platform Release	Certified Upgrade Paths	
Pre-7.7	Upgrade to Current Release	
7.7		
7.8		
7.9		
7.11	NA	7.14
7.13	7.14	7.15
7.14	7.15	7.16
7.15	7.16	7.17
7.16	7.17	7.18 (Planned)
7.17	7.18 (Planned)	7.19 (Planned)

The information contained herein is provided for information purposes only and is intended only to outline Motorola's presently anticipated general technology direction. The information in the roadmap is not a commitment or an obligation to deliver any product, product feature or software functionality and Motorola reserves the right to make changes to the content and timing of any product, product feature or software release.

The most current system release upgrade paths can be found in the most recent SMA bulletin.

ASTRO 2 System Upgrade Agreement (SUA II)
Appendix B - System Pricing Configuration

This configuration is to be reviewed annually from the contract effective date. Any change in system configuration may require an ASTRO 25 SUA II price adjustment.

Core	
Master Site Configuration	0
Zones in Operation (Including DSR and Dark Master Sites)	0
Zone Features: IV&D, TDMA, Telephone Interconnect, CNI, HPD, CSMS, IA, POP25, Text Messaging, Outdoor Location, ISSI 8000, InfoVista, KMF/OTAR	0
RF System	
Voice RF Sites & RF Simulcast Sites (including Prime Sites)	0
Repeaters/Stations (FDMA)	0
Repeaters/Stations (TDMA)	0
HPD RF Sites	0
HPD Stations	0
Dispatch Console System	
Dispatch Sites	0
Gold Elite Operator Positions	0
MCC 7500 Operator Positions (GPIOM)	0
MCC 7500 Operator Positions (VPM)	0
Conventional Channel Gateways (CCGW)	0
Conventional Site Controllers (GCP 8000 Controller)	0
Logging System	
Number of AIS Servers	0
Number of Voice Logging Recorder	0
Number of Logging Replay Clients	0
Network Management and MOSCAD NFM	
Network Management Clients	0
MOSCAD NFM Systems	0
MOSCAD NFM RTUs	0
MOSCAD NFM Clients	0
Fire Station Alerting (FSA)	
FSA Systems	0
FSA RTUs	0
FSA Clients	0
Fire Station Alerting (FSA)	
Voice Subscribers non-APX	0

Voice Subscribers APX	0
HPD Subscribers	0
Computing and Networking Hardware (for SUA / SUA II, actual replacement qty. may be less than shown)	
Workstations - High Performance	0
Workstations - Mid Performance	0
Servers - High Performance	0
Servers - Mid Performance	0
LAN Switch - High Performance	0
LAN Switch - Mid Performance	0
Routers	0

ASTRO 2 System Upgrade Agreement (SUA II)
Appendix C – Security Update Service (SUS) Statement of Work

Security Update Service Overview

To verify compatibility with your ASTRO system, Motorola's Security Update Service (SUS) provides pre-tested 3rd party software (SW) security updates.

This service was formerly called Pre-tested Software Subscription (PTSS). Additionally, SUS Platinum has been eliminated. The additional SUS Platinum features have been merged into this one SUS offering.

This Statement of Work ("SUS SOW") is subject to the terms and conditions of Motorola's Professional Services Agreement, Service Agreement or other applicable agreement in effect between the parties ("Agreement"). Motorola and Customer may be referred to herein individually as a "Party or together as "Parties"

1.0   Description of Security Update Services

Motorola shall maintain a dedicated vetting lab for each supported ASTRO release for the purpose of pre-testing security updates. In some cases, when appropriate, Motorola will make the updates available to outside vendors, allow them to test, and then incorporate those results into this offering. Depending on the specific ASTRO release and customer options, these may include updates to antivirus definitions, OEM vendor supported Windows Workstation and Server, Solaris and Red Hat Linux (RHEL) operating system patches, VMware ESXi Hypervisor patches, Oracle database patches, PostgreSQL patches, and patches for other 3rd party Windows applications such as Adobe Acrobat and Flash.

Motorola has no control over the schedule of releases. The schedule for the releases of updates is determined by the Original Equipment Manufacturers (OEMs), without consultation with Motorola. Antivirus definitions are released every week. Microsoft patches are released on a monthly basis. Motorola obtains and tests these updates as they are released. Other products have different schedules or are released "as-required." Motorola will obtain and test these updates on a quarterly basis.

Once tested, Motorola will post the updates to a secured extranet website and send an email notification to the customer. If there are any recommended configuration changes, warnings, or workarounds, Motorola will provide detailed documentation along with the updates on the website. Motorola will also provide labels on the extranet site that can be printed and applied to DVD's. The customer will be responsible for the download and deployment of these updates to their ASTRO System.

2.0   Scope

Security Update Service supports the currently shipping Motorola ASTRO System Release (SR) and strives to support 4 releases prior. Motorola reserves the right to adjust which releases are supported as business conditions dictate. Contact your Customer Service Manager for the latest supported releases.

SUS is available for any L or M core system in a supported release.

Systems that have non-standard configurations that have not been certified by Motorola Systems Integration and Testing (SIT) are specifically excluded from this Service unless otherwise agreed in writing by Motorola. Service does not include pre-tested intrusion detection system (IDS) updates for IDS solutions. Certain consoles, MOTOBRIDGE, MARVLIS, Symbol Equipment, AirDefense Equipment, AVL, and Radio Site Security products are also excluded. Motorola will determine, in its sole discretion, the third party software that is supported as a part of this offering.

3.0   Motorola has the following responsibilities:

A. Obtain relevant 3rd party security updates as made available and supported from the OEM's. This includes antivirus definition, OEM vendor available/supported operating systems patches, VMWare patches, database patches, and selected other 3rd party patches covered by SUS. Motorola does not control when these updates are released, but current release schedules are listed for reference:

> 1. McAfee Antivirus definitions– Weekly
>
> 2. Microsoft PC and Server OS patches – Monthly
>
> 3. Solaris, RHEL OS, VMware hypervisor patches – Quarterly
>
> 4. Other 3rd party patches - Quarterly

B. Each assessment will consist of no less than 36 hours of examination time to evaluate the impact each update has on the system.

C. Testing of updates to verify whether they degrade or compromise system functionality on a dedicated ASTRO test system with standard supported configurations.

D. Address any issues identified during testing by working with Motorola selected commercial supplier and/or Motorola product development engineering team. If a solution for the identified issues cannot be found, the patch will not be posted on Motorola's site.

E. Pre-test STIG recommended remediation when applicable.

F. Release all tested updates to Motorola's secure extranet site.

G. Include documentation for installation, recommended configuration changes, and identified issues and remediation for each update release.

H. Include printable labels for customers who download the updates to CD's.

I. Notify customer of update releases by email.

J. A supported SUS ASTRO release matrix will be kept on the extranet site for reference.

4.0   The Customer has the following responsibilities:

A. Provide Motorola with pre-defined information prior to contract start date necessary to complete a Customer Support Plan (CSP).

B. Submit changes in any information supplied in the Customer Support Plan (CSP) to the Customer Support Manager (CSM).

C. Provide means for accessing pre-tested files (Access to the extranet website).

D. Deploy pre-tested files to the customer system as instructed in the "Read Me" text provided.

E. Implement recommended remediation(s) on customer system, as determined necessary by customer.

F. Upgrade system to a supported system release as necessary to continue service.

G. Adhere closely to the System Support Center (SSC) troubleshooting guidelines provided upon system acquisition. A failure to follow SSC guidelines may cause the customer and Motorola unnecessary or overly burdensome remediation efforts. In such case, Motorola reserves the right to charge an additional service fee for the remediation effort.

H. Comply with the terms of the applicable license agreement between the customer and the non-Motorola software copyright owner.

5.0   Disclaimer:

Motorola disclaims any and all warranties with respect to pre-tested antivirus definitions, database security updates, hypervisor patches, operating system software patches, intrusion detection sensor signature files, or other 3rd party files, express or implied. Further, Motorola disclaims any warranty concerning the non-Motorola software and does not guarantee that customer's system will be error-free or immune to security breaches as a result of these services.

A. The minimum supported link between the core and the zone is a full T1

B. Any link must realize or a sustained transfer rate of 175 kBps / 1.4 Mbps or better, bidirectional

C. Interzone links must be fully operational when present

D. Link reliability must satisfy these minimum QoS levels:

    1. Port availability must meet or exceed 99.9% (three nines)

    2. Round trip network delay must be 100 ms or less between the core and satellite (North America) and 400 ms or less for international links o Packet loss shall be no greater than 0.3%

    3. Network jitter shall be no greater than 2 ms

E. The network requirements above are based on the SLA provided for Sprint Dedicated IP Services as of April, 2012. It is possible other vendors may not be able to meet this exact SLA, so these cases must be examined on a case-by-case basis.

B.   Servicer Statement of Work

Servicer Statement of Work

OnSite Infrastructure Response With Local Dispatch

The Servicer will provide OnSite Infrastructure Response services to the Customer. The relationship between Motorola and the Servicer shall be as set forth in this Statement of Work (SOW). Subcontracts for OnSite Infrastructure Response will be electronically posted by Motorola on Motorola's website for Servicers.

Motorola reserves the right to alter, amend or change the scope of work with 30 days written notice to Servicer. All terms or Attachment C-Service Subcontract will remain in full force and effect during the term and any subsequent terms of this SOW.

1.0   Description of Service
OnSite Infrastructure Response provides for on-site technician Response by the Servicer. The Servicer will respond to the Customer location based on pre-defined Severity Levels set forth in the Severity Definitions Table and Response times set forth in the Response Time Table in order to Restore the System. .

2.0   Motorola has the following responsibilities:
    2.1   Provide the following Customer information to Servicer:
        2.1.1   Customer name, contact and address
        2.1.2   System type and Equipment descriptions
        2.1.3   Site identification (site names, site ids, addresses and zip codes)
        2.1.4   Site access requirements
        2.1.5   Provide Equipment list including type and quantity, when available.
    2.2   Provide technical support, when requested.
    2.3   Provide Infrastructure/Component/FRU if Customer has purchased and malfunctioning Infrastructure is covered under service agreement with IDO such as Infrastructure Repair or Infrastructure Repair with Advanced Replacement

3.0   Servicer has the following responsibilities:
    3.1   Receive service request Continuously from Customer.
    3.2   Assign technical resources and provide estimated time of arrival (ETA) to Customer.
    3.3   Respond to the Customer site within Response time commitment set forth in the Response Time Table
    3.4   Maintain virus protection software, operating system patches for any equipment that may interact with the Customers System Equipment.
    3.5   Servicer will perform the following on-site:
        3.5.1   Run diagnostics on the Infrastructure or FRU.
        3.5.2   Replace defective Infrastructure or FRU, as applicable. Customer, Servicer or Motorola may provide Infrastructure or FRU. If IDO is providing the FRU, Servicer is responsible for requesting the return authorization.
        3.5.3   Provide materials, tools, documentation, physical planning manuals, diagnostic/test equipment and any other requirements necessary to perform the Maintenance service.
        3.5.4   If a third party Vendor is needed to Restore the System, the Servicer should accompany Vendor onto the Customer's premises.
    3.6   Call Customer upon Restoration and request Verification. If Customer cannot be contacted within twenty (20) minutes, the Servicer is released from the Customer site. Provide service ticket document to Customer and to Motorola representative upon request. Service ticket documentation shall include:
        3.6.1   Resolution action.
        3.6.2   Technical information on application product or system
        3.6.3   Defective FRU or part number (model #) used
    3.7   Cooperate with Motorola and perform all acts that are reasonable or necessary to enable Motorola to provide this service to Customer.

![Motorola logo]

Severity Definitions Table

Severity Level	Problem Types
Severity 1	• Response is provided Continuously • Major System failure • 33% of System down • 33% of Site channels down • Site Environment alarms (smoke, access, temp, AC power. • This level is meant to represent a major issue that results in an unusable system, sub-system, Product, or critical features from the Customer's perspective. No Work-around or immediate solution is available.
Severity 2	• Response during Standard Business Day • Significant System Impairment not to exceed 33% of system down • System problems presently being monitored • This level is meant to represent a moderate issue that limits a Customer's normal use of the system, sub-system, product, or major non-critical features from a Customer's perspective
Severity 3	• Response during Standard Business Day • Intermittent system issues • Information questions • Upgrades/Preventative maintenance • This level is meant to represent a minor issue that does not preclude use of the system, sub-system, product, or critical features from a Customer's perspective. It may also represent a cosmetic issue, including documentation errors, general usage questions, recommendations for product enhancements or modifications, and scheduled events such as preventative maintenance or product/system upgrades.

Response Times Table

Severity Level	Regular Response Time	Premier Response Time	Limited Response Time
Severity 1	Within 4 hours from Notification Continuously	Within 2 hours from Notification Continuously	Within 4 hours from Notification Standard Business Day
Severity 2	Within 4 hours from Notification Standard Business Day	Within 4 hours from Notification Standard Business Day	Within 4 hours from Notification Standard Business Day
Severity 3	Within 24 hours from Notification Standard Business Day	Within 24 hours from Notification Standard Business Day	Within 24 hours from Notification Standard Business Day