

~~Master Sites and~~ (Mod. #1 Rev.) VSP Communications Centers

~~MASTER SITES AND~~ (MOD. #1 REV.) VSP COMMUNICATIONS CENTERS

9.1 OVERVIEW

To support the functionality of the Statewide Agencies Radio System (STARS) identified elsewhere in this contract, the Commonwealth of Virginia requires construction of a complete and useable facility for both the STARS Network Operations Center (NOC) Zone 1 Master Site located at State Police Headquarters (SPHQ), and for the new Virginia State Police (VSP) Division 6 Communication Center and Zone 2 Master site located in Salem, Virginia. *Construction of the STARS NOC, Division 6 Communication Center and the Zone 2 Master Site located in Salem, Virginia, will be the responsibility of the Commonwealth of Virginia. (Mod. #1 Rev.)* Upgrades to existing buildings are required for the VSP Communications Centers. The first part of this section describes the scope of services that Motorola will provide to accomplish ~~the construction and~~ (Mod. #1 Rev.) facility upgrades. The second part of this section describes the design basis for Motorola's work under this contract at ~~SPHQ and~~ (Mod. #1 Rev.) each of the *four (4)* VSP Divisions. (Mod. #1 Rev.)

9.2 SCOPE DESCRIPTION

Motorola will provide the Commonwealth with design-build construction services to ~~construct the STARS NOC which includes the Zone 1 Master facility and the VSP Division 6 Communication Center which includes the Zone 2 Master equipment, and~~ (Mod. #1 Rev.) upgrade the ~~seven (7)~~ *four (4)* (Mod. #1 Rev.) VSP Communications Centers. The STARS NOC and Zone 1 Master facility will be located in the old warehouse at SPHQ. This facility will be renovated for its intended purpose. (Mod. #1 Rev.) *Four (4)* ~~Six (6)~~ (Mod. #1 Rev.) of the VSP Communications Center upgrades will be constructed as additions to existing VSP Division Headquarters buildings, and ~~one (1) will be constructed as a new, stand alone building on Commonwealth owned property adjacent to existing VSP Sixth Division Headquarters facility. The new building at the Sixth Division will be sized to approximately 5100 square feet to support the VSP dispatch requirements and the Zone 2 Master Site equipment room.~~ (Mod. #1 Rev.)

Motorola will ~~renovate the NOC and Zone 1 Master facility and~~ (Mod. #1 Rev.) upgrade the *four (4)* existing VSP communications centers in accordance with the guidelines contained in the design basis portion of this section. These facilities will be ~~constructed or~~ (Mod. #1 Rev.) upgraded in coordination with the migration schedule provided in this document and will support the systems specified in other sections of this contract.

9.2.5 Professional Licenses, Certifications, and Personnel Qualifications

Design and construction personnel will have appropriate training, experience, and certifications to complete assigned tasks. Motorola will oversee Motorola-controlled personnel, including subcontractors. Design and construction subcontractors will be registered professionals licensed to perform business in the Commonwealth of Virginia. Professional registration is required for design submittals. Motorola or their subcontracted personnel that work on site will successfully pass a VSP background check prior to entering a Communications Center or other VSP site as described in the Terms and Conditions. Motorola will provide the information required for background checks of its personnel and contractors to the Commonwealth. The Commonwealth will be responsible for processing such information and providing approvals (or denials) within 30 days of a complete submission. Motorola will coordinate with the Commonwealth for access to sites by Motorola and subcontractor personnel. Motorola and subcontractor personnel will follow local Commonwealth procedures with respect to site access, including sign-in and sign-out procedures. Motorola or its subcontractors will not bring visitors to any STARS site including Communications Centers or other VSP sites.

Geotechnical investigations and reports will be provided by Geotechnical Engineers registered in the Commonwealth of Virginia with at least ten (10) years' experience.

Qualified professional tradesmen will perform the construction and renovation work.

A structural engineer licensed in the Commonwealth of Virginia will design the building foundations.

9.2.6 Design Services

Motorola will design and engineer the construction in accordance with the applicable design standards and codes described elsewhere in this contract ("9.2.4 Standards and Codes for Design and Construction"), including the Commonwealth's Virginia Construction and Professional Services Manual for Architects/Engineers (A/E Manual). The design tasks that Motorola will perform are described as part of the following design submittals:

- **Facility Program:** Motorola will meet with the Commonwealth STARS PD to validate the space requirements and programmatic requirements presented in Section 9.4 "Design Basis" herein for ~~the STARS NOC and Zone 1 Master facility,~~ and **(Mod. #1 Rev.)** each Communications Center (including the facility space required for Zone 2 equipment) facility upgrade. ~~The space for Zone 2 Master Site equipment will be assumed to be part of any reference in this Contract to Communications Centers or specifically Division 6 Communication Center.~~ **(Mod. #1 Rev.)**
- **Conceptual Design:** Motorola will **review and/or (Mod. #1 Rev.)** develop a design concept for ~~the STARS NOC and Zone 1 Master facility,~~ and **(Mod. #1 Rev.)** each Communications site from the validated space requirements.

9.3.2 Permits, Permissions, & Services

Motorola will obtain permits, permissions, and services. Fees and costs associated with facility permits, permissions, and services will be the responsibility of Motorola without cost to the Commonwealth unless specifically noted elsewhere.

9.3.3 Construction

Motorola will construct ~~the STARS NOC and Zone 1 Master facility, and the seven (7)~~ **four (4) (Mod. #1 Rev.)** Communications Centers ~~(including the Zone 2 space in Division 6 Communication Center)~~ **(Mod. #1 Rev.)** in accordance with this section of the Contract.

9.3.3.1 General Contractor

Motorola will be employing a design/build contractor for the construction and upgrade efforts of the ~~STARS NOC and Zone 1 Master facility, and the seven (7)~~ **four (4) (Mod. #1 Rev.)** Communications Centers. The contractor will hold a Commonwealth of Virginia Class A Building Contractor's License. Motorola's design/build will also team with a Commonwealth of Virginia firm qualified in the design of state communications facilities. The design firm will have at least 10 years experience in designing facilities similar to the proposed buildings and will be readily available throughout all phases of the design and construction. The design firm will be licensed in the Commonwealth with registered personnel licensed to design and engineer in the Commonwealth.

9.3.3.2 Site Coordination, Non-Disturbance, & Migration

At each of the ~~six (6)~~ **four (4) (Mod. #1 Rev.)** Communications Center sites where building additions will be constructed, Motorola will furnish temporary facilities and relocate existing communications center operations for the duration of the construction of the building addition. Motorola will not affect operations in a Communications Center or in a Division Headquarters facility without the previous coordination with the STARS PD.

Motorola will exercise care to reduce inconvenience and disruption of facility employees, and to shield existing areas from dust and noise during the renovation. All system outages for plumbing, HVAC, and power will be coordinated with the facility manager to avoid disruption to the facility's operation. Motorola will send, in writing (also sent via email), an impact analysis of the possible disturbance, maximum possible duration, and a backup plan for restoring full operations.

9.3.3.3 Construction Phasing

At each of the additions to existing buildings, Motorola will perform the construction in two phases. During the first phase, Motorola will perform the primary construction of the addition including the site work, the building construction from footings to roof system and all of the interior system additions and enhancements. Motorola's work during this phase will be primarily focused outside of the existing building. Some work will involve areas of the existing facility as tie-ins to existing structures and systems are made.

During the second phase, Motorola will perform the demolition of the existing demising wall between the existing and new spaces and perform the finishing of the floor, walls and ceiling where the demising wall is removed. During this phase, VSP dispatching personnel will relocate to a Motorola provided temporary dispatch trailer to allow them to continue dispatching over the existing LMR system. Information on the temporary dispatch trailer can be found in the Statement of Work (SOW) Section 1 of the contract.

9.3.3.4 Site Construction and Earthwork

Motorola will perform the following subject to the conditions stated in "Conditions for Additional Site Construction Reimbursements":

- Clear and grub the site area associated with the construction
- Grade and fine-grade for the building pad
- Waste all excavated soils on-site

9.3.3.4.1 Conditions for Additional Site Construction Reimbursements

At the STARS NOC and Zone 1 Master site and at (Mod. #1 Rev.) each Communications Center site, the following site construction conditions will require additional work that is not part of this contract. The Commonwealth will reimburse Motorola for the additional work through adjustments to the contract as required.

- Tree removal
- Rock excavation
- Removal of all unsuitable material from the site in accordance with federal, state, and local requirements
- Removal of excess excavated soil from the site where existing grades exceed +/- .5 feet of final finished grade

9.3.6 Training

At the ~~Zone 1 Master site, and at each of the seven (7)~~ **four (4) (Mod. #1 Rev.)** Communications Center sites, Motorola will furnish on-site training for up to six (6) Commonwealth-designated personnel in the design, operation, and maintenance of facility components and systems directly associated with the facility upgrades. Motorola will furnish printed training materials for each student. The Commonwealth will make available an on-site training room of sufficient capacity for up to two consecutive days, including tables, chairs, and a projection screen.

9.3.7 As-Built & O&M Documentation

After construction is complete, as-built drawings will be provided within sixty (60) days. Motorola will provide two (2) hard copies and two (2) electronic copies of drawings and specifications to the STARS PD.

9.3.7.1 Fire Protection Systems

Sixty (60) days prior to system installation, Motorola will provide, for approval by the STARS PD, five (5) sets of Operating and Maintenance Manuals for new fire protection systems. Within thirty (30) days after Commonwealth approval, Motorola will provide five (5) final sets of these manuals to the STARS PD. One (1) copy of the manuals in Adobe Acrobat Format (PDF) will be delivered to the STARS PD if available from the manufacturer at the time of production or allowed by the manuals' copyright holders.

9.3.7.2 Electrical

Sixty (60) days before the construction of the building is complete, Motorola will provide, for approval by the STARS PD, two (2) sets of electrical Operations and Maintenance Manuals for the electrical systems. These manuals will include such electrical systems as the HVAC power, fire protection power, UPS, batteries, automatic transfer switches, motor generators, and power for security systems. Within thirty (30) days after Commonwealth approval, Motorola will provide five (5) final sets of these manuals to the STARS PD. One (1) copy of the manuals in Adobe Acrobat Format (PDF) will be delivered to the STARS PD if available from the manufacturer at the time of production or allowed by the manuals' copyright holders. Motorola will perform tests on the electrical system and will submit certification to the STARS PD that the electrical system meets applicable local and national electric standards to support the radio system.

At design review, and with as-built documentation, Motorola will provide, for each site, one-line electrical diagrams and electrical load calculations that incorporate service entrance, branch-circuit panels, circuit equipment, and emergency power systems.

9.3.8 Hazardous Materials

It is assumed that there is no lead paint, asbestos, or other hazardous material present at any of the sites. If hazardous material is encountered, the Commonwealth will be responsible for the remedy of conditions as an adjustment to the contract.

9.3.9 Reuse of Existing Facilities

In order to certify that existing facilities reused for the Commonwealth system will meet the specifications herein, Motorola will analyze the existing facilities it proposes to use for the new system. Such certification will be issued after the analysis of existing facilities has been completed and the Commonwealth approves any additional costs required to meet the specifications.

9.3.10 Quality Control

9.3.10.1 Control of Measuring and Test Equipment

Measuring and test equipment used for installation and/or for determining compliance with quantitative values will be part of a documented calibration control program.

Multimeters used for checking continuity will not be included in the calibration program; however, multimeters used for measuring quantitative values will be included in the calibration program.

9.4 DESIGN BASIS

This section defines the design requirements for the ~~STARS NOC and Zone 1 Master facility,~~ and the ~~seven (7)~~ **four (4) (Mod. #1 Rev.)** Communications Center upgrades. The conceptual designs and maximum facility sizes for each site were based upon previously provided information from the Commonwealth. This information was provided in the form of the attached figures included at the end of this section, along with a table of specifications, and these form the basis for building upgrade design and construction under this contract. The figures and tables for the ~~STARS NOC and Zone 1 Master Site and~~ **(Mod. #1 Rev.)** Division Communication Centers are listed below:

Motorola Figure	Attachment Reference
Figure 9-1	Figure 11-2, Renovated Prime Site (Mod. #1 Rev.)
Figure 9-2	Figure 11-3, Renovated Prime Site 2nd Floor (Mod. #1 Rev.)
Figure 9-3	Figure 11-4, Concrete Pad and Foundation Slab Detail
Figure 9-4	1st Division Headquarters Richmond
Figure 9-5	1st Division Headquarters Richmond Phase 2
Figure 9-6	2nd Division Headquarters Culpeper (Mod. #1 Rev.)
Figure 9-7	2nd Division Headquarters Culpeper Phase 2 (Mod. #1 Rev.)
Figure 9-8	3rd Division Headquarters Appomattox (Mod. #1 Rev.)
Figure 9-9	3rd Division Headquarters Appomattox Phase 2 (Mod. #1 Rev.)
Figure 9-10	4th Division Headquarters Wytheville
Figure 9-11	4th Division Headquarters Wytheville Phase 2
Figure 9-12	5th Division Headquarters Chesapeake
Figure 9-13	5th Division Headquarters Chesapeake Phase 2
Figure 9-14	7th Division Headquarters Fairfax
Figure 9-15	7th Division Headquarters Fairfax Phase 2
Table 9-1	Table 12-2 Concrete Schedule
Table 9-2	Table 11-2 Zone 1 Master Site Building Schedule (Mod. #1 Rev.)
Table 9-3	Table 12-1 Division Headquarters Addition Building Schedule

Motorola will design and construct ~~the STARS NOC and the Zone 1 Master facility), and each~~ **four (4) (Mod. #1 Rev.)** of the Communications Center upgrades to resist the effects of severe weather and forces of nature in accordance with the Virginia Statewide Building Code (BOCA National Building Code) and all applicable local and national regulations, including the effects of hurricanes, earthquakes, storms, snow and ice accumulations. The physical facilities will protect the radio system from the public and protect the public from potentially hazardous parts or emissions of the radio system.

Motorola will use construction materials (exterior walls, roof, interior finishes, doors, and windows) that conform to the specifications in Table 9-2 included at the end of this section. Motorola will install inside finishes similar to the adjacent existing finishes at the ~~six (6)~~ **four (4) (Mod. #1 Rev.)** Division Communication Center building additions. ~~For the stand alone construction at Salem, the interior finishes will match the interior of the existing facility using more modern components. The exteriors of the Zone 1 Master facility, and all Communications Centers will match the exteriors of existing adjacent buildings as closely as possible. At the 6th Division Headquarters, the exterior of the new facility will be a brick that matches the newer portion of the existing building.~~ **(Mod. #1 Rev.)**

9.4.1 General Building Descriptions

The ~~Zone 1 Master facility and each of the seven (7)~~ **four (4) (Mod. #1 Rev.)** Communications Center upgrades will be a complete package. The Communications Center upgrades will provide more space than currently exists for dispatch communications. The new Communications Center space constructed by Motorola will be at least the same quality and standard as the existing dispatch space at each site. Motorola will design and construct the new dispatch areas as shown in the table on the following page:

Site	Approximate Footprint	Stories	Primary Features
STARS NOC and Zone 1 Master Site	TBD	TBD	• Renovated Stand-alone Structure (Mod. #1 Rev.)
Zone 2 Master Site / Sixth Division Headquarters /	5421 Sq. ft. (dimensions TBD after design review)	TBD	• New Stand-alone Structure (Mod. #1 Rev.)
First Division Headquarters Communications Center	22' x 19'	1	• Building addition
Second Division Headquarters Communications Center	20' x 17'	1	• Building addition (Mod. #1 Rev.)

Third Division Headquarters Communications Center	20' x 17'	1	• Building addition (Mod. #1 Rev.)
Fourth Division Headquarters Communications Center	27' x 16'	1	• Building addition
Fifth Division Headquarters Communications Center	40' x 25'	1	• Building addition
Seventh Division Headquarters Communications Center	22' x 19'	1	• Building addition

9.4.2 Site Work

Motorola will perform the following site construction where applicable:

- Stripping and grading for construction activities
- Earthwork to form and contour the facility site
- Site work where required to bring utilities to the building pad
- Site work required to make provisions for at-grade building equipment such as an above ground fuel storage tank and standby generator
- Landscaping

For each site, Motorola will develop a site plan that conforms to the figures at the end of this section.

For each site, Motorola will design and install landscaping to meet minimum zoning requirements in the area, and to be comparable to the landscaping design of buildings in the area. Motorola's price does not include design, engineering, or installation of landscape irrigation.

9.4.5.2 Exterior Doors & Windows

For the STARS NOC and Zone 1 Master facility and for *(Mod. #1 Rev.)* each Communications Center site (with exception of Divisions *2, 3, and (Mod. #1 Rev.) 6*), Motorola will specify and install exterior windows in accordance with the corresponding conceptual elevation diagrams at the end of this Section.

The general window quantities included under this contract are summarized as follows: All figures may be changed.

Site	Number of Windows	Figures
STARS NOC and Zone 1 Master Site	As Shown	Figure 9-1 <i>(Mod. #1 Rev.)</i> Figure 9-2
First Division Headquarters	2	<ul style="list-style-type: none"> Figure 9-4 Figure 9-5
Second Division Headquarters	2	<ul style="list-style-type: none"> Figure 9-6 Figure 9-7
Third Division Headquarters	2	Figure 9-8 Figure 9-9 <i>(Mod. #1 Rev.)</i>
Fourth Division Headquarters	1 large	<ul style="list-style-type: none"> Figure 9-10 Figure 9-11
Fifth Division Headquarters	4	<ul style="list-style-type: none"> Figure 9-12 Figure 9-13
Seventh Division Headquarters	1	<ul style="list-style-type: none"> Figure 9-14 Figure 9-15

~~At the STARS NOC and Zone 1 Master Site, the building windows will be pre-finished aluminum non-operable windows with tinted tempered insulated glass in accordance with Table 9-2. Windows for the Division 6 Communication Center / Zone 2 Master Site will be determined during the design review process for each individual site. *(Mod. #1 Rev.)*~~

At each of the Communications Center sites, the new windows will:

- Match windows on the existing or adjacent building as closely as possible
- Match header, sill and general window arrangement on the existing or adjacent building as closely as possible
- Incorporate bullet-resistant glazing
- Motorola will not be responsible for repairing or upgrading existing windows or window glazing under this contract.

For each of the new Communications Centers and Master Site buildings (*Mod. #1 Rev.*) under this contract, Motorola will specify and install exterior doors as follows:

Site	Door	Opening	Descriptive Features
Master Sites	Front Entrance	6-0 x 7-0	Pre finished aluminum storefront system with tinted tempered glass Automatic handicap open system Provision for card access entry system Entrance canopy (see Figure 9-2) <i>(Mod. #1 Rev.)</i>
	Rear Entry/Exit	6-0 x 7-0	1-3/4 inch thick door leaf Fully flush design Painted metal Grade III - Extra Heavy Duty (SDI-100) Welded hollow metal door frames Thermal insulation <i>(Mod. #1 Rev.)</i>
Division Headquarters	Entry/Exit	6-0 x 7-0	1-3/4 inch thick door leaf Fully flush design Painted metal Grade III - Extra Heavy Duty (SDI-100) Welded hollow metal door frames Thermal insulation

Motorola will specify and install interior doors as follows:

- 3-0 x 7-0 x 1-3/4” solid wood core, flush, plain sliced stain-grade birch veneer, finished on-site
- Knockdown hollow metal door frames
- Commercial-grade hardware of comparable quality and finish to existing building and/or campus door hardware, with keyways compatible with existing or adjacent building key systems.

9.4.6.2 Interior Finishes

Motorola will specify and install the following standard commercial-grade finish materials:

- Gypsum wallboard paint finish
- Acoustic wall panels in Communications Centers ~~and STARS NOC~~ **(Mod. #1 Rev.)**
- Vinyl composition tile (VCT) on concrete slab in kitchen and restroom areas
- Vinyl cove wall base in the Control Room, kitchen and restroom areas
- Raised access floor with 24” x 24” static-proof carpet tile in the Communications Centers ~~and STARS NOC~~ **(Mod. #1 Rev.)**
- 2’ x 2’ suspended acoustic ceiling system with 15/16” exposed “T” grid and Armstrong Cortega Tegular lay-in ceiling panels in all new occupied (non-service) areas

During the design phase for each new building and building addition to be constructed under this contract, Motorola will develop a finish schedule, to be approved by the Commonwealth, specifying the following:

- Paint and paint color(s)
- Carpet style, pattern, and color
- Vinyl composition tile (VCT) style, pattern, and color
- Acoustic ceiling style and pattern
- Vinyl wall base color

9.4.7 Utilities

Motorola will extend existing building utilities at each of the building addition sites under this contract, and install new utility service at each new building site as required, including:

- Domestic water as required
- Fire suppression sprinkler system
- Building sanitary sewer as required
- Telephone and communications
- Electric service
- Natural gas service as required
-

9.4.8 Power Systems

The Electrical Systems for the zone master sites will each be designed as a fully integrated and functional system. Motorola will size the electrical equipment during the design and engineering phase of this project. Enhanced electrical systems at the ~~six (6)~~ **four (4) (Mod. #1 Rev.)** Division building additions will be designed around the needs of the addition. At each ~~zone master and~~ **(Mod. #1 Rev.)** Division site, a UPS will be provided for the new STARS communication system equipment being installed as part of the overall project. The UPS will be provided with a manual bypass switch for complete isolation of the UPS for maintenance or replacement of the unit without affecting the rest of the system. An exterior backup 1800 rpm generator will be included complete with an automatic transfer switch and sound attenuation package. The generator and the UPS will be sized to meet the needs of the Motorola equipment being installed for the project. Motorola will design the electrical system for each site following all applicable codes.

The electrical work for ~~the zone master sites and~~ **(Mod. #1 Rev.)** the **four (4) six (6) (Mod. #1 Rev.)** Division building additions (including existing dispatch facilities) will be based on the three-bus system where:

1. Critical systems are RED which are the radio and other critical equipment supported by the UPS;
2. Protected systems are ORANGE which includes items such as the HVAC and other critical equipment with their own battery backup, which will have backup generator backup;
3. Service systems are IVORY which are the general power and lighting needs of the addition.

~~At the STARS NOC and Zone 1 Master Site, and Zone 2 Master Site building at the 6th Division Headquarters site in Salem, Motorola will coordinate, obtain, and pay installation fees for electric power through the local electric utility, and will obtain separate metering and pay new facility electric bills until Facility Substantial Completion or Owner Occupancy, whichever occurs first. Motorola will extend the lines, if necessary, up to a maximum of fifty (50) feet (running average for all sites) to the Master Site building and the 6th Division Headquarters building for installation and connection by Motorola, with the assumption that all required utilities currently exist at the property road frontage right(s) of way. (Mod. #1 Rev.)~~

At the headquarters sites for Divisions **1, 4, 5, and 7**, ~~1-5 and Division 7,~~ (Mod. #1 Rev.) where building additions will be constructed, Motorola will extend electric service as required from the existing building service to the location of the new addition, up to a maximum of fifty (50) feet (running average for all sites) of the location for installation and connection by Motorola, with the assumption that existing building services is adequate for temporary service and for new permanent sub-feeder service for the expanded dispatch center. Since temporary and permanent power at these locations will be derived from existing electric service without sub metering, the Commonwealth will pay electric utility bills during construction.

Motorola will provide a complete and workable electrical system in accordance with applicable local authorities and codes. In general, existing power and lighting system will be extended to new additions, ~~except at 6th Division Headquarters, Salem,~~ (Mod. #1 Rev.) which will be a new system.

~~New service into the new Zone 1 Master site and 6th Division facilities will be underground in conduit. (Mod. #1 Rev.)~~

Motorola will adhere to the Commonwealth's essential design requirement specifying that all end equipment will be associated with one of the following buses:

- Critical (Red) Bus: Radio and other critical equipment powered from the UPS
- Protected (Orange) Bus: Required peripherals, such as HVAC, with only backup generator backup or critical equipment having its own battery backup, such as emergency lights
- Service (Ivory) Bus: Equipment, outdoor lighting, and maintenance power receptacles that are not required for radio system operation. This bus will be de-energized upon loss of off-site, commercial power. Cable for service bus equipment or receptacles cannot be run in the same conduit or raceway with critical or protected bus cable.

Manual switches will be provided to allow complete bypass and isolation of the UPS cabinet and the automatic transfer switch cabinet. Switches will be configured to allow parallel electrical supply prior to isolating the components. This feature will allow major maintenance or complete replacement of these single-point-failure components without prolonged downtime for the radio site. Out-of-position switches (that is, bypass operation) will be an input to radio system alarms.

The service entrance and standby generator output will each have independent, appropriately designed surge-suppression devices installed. Additionally, because of potential operation with the UPS bypassed, critical (red) bus branch circuits will be supplied with TrippLite or Commonwealth-approved equivalent surge-protection devices at the equipment end. Selected surge protection devices will have a history of reliable operation and will include lifetime equipment protection coverage of at least \$50,000. Any warranty or financial protection will be transferred to the Commonwealth upon conclusion of Motorola's Division warranty period.

Minimum conduit size will be 3/4 inch, and all except underground conduit will be of metal with a zinc coating (EMT or heavier construction). Conduits exposed to outdoor elements will be rigid, not EMT. Underground conduit will be two (2) inches or larger rigid PVC with a minimum of twenty (20) percent excess capacity over code limits, or spare underground conduits will be provided.

9.4.8.1 General Distribution and Lighting

At Divisions 1, ~~2, 3~~, (*Mod. #1 Rev.*) 4, 5, and 7, additional light fixtures will be provided to match the existing in type, control, and lighting level for those spaces being expanded. For all construction, fluorescent fixtures will be provided in any new areas to light the area to a minimum of 50 foot-candles at a working plane of 30 inches above the floor. Exterior lighting for building additions, new buildings and (or) parking areas will be provided or reconfigured to assure that a building's exterior remains sufficiently lighted.

The lighting design for the interior will consist of fluorescent lighting throughout the building. Fixture sizes and locations will be designed based on the functionality of the area/room and will meet all applicable codes and regulations.

Electrical receptacles, switches, conduit, and panel boxes will be installed to meet the functionality of the building. Motorola will provide conduit and boxes for phone cabling and TV cable; however, the Commonwealth is responsible for installing any required primary phone systems or TV Cable infrastructure. All electrical materials will be commercial grade and installed on the project to meet the National Electrical Code (NEC) and will be installed as per the agreed upon design and local building codes.

9.4.8.2 Uninterruptible Power Source

9.4.8.2.1 System Requirements

Motorola will provide UPS systems sized as shown in the table below for ~~the STARS NOC and Zone 1 Master Site and~~ **(Mod. #1 Rev.)** the Division Communication Centers. The UPS will meet the requirements of the National Electric Code (NFPA 70), Article 700, for Emergency Systems. The system will also meet the requirements for an emergency power system as defined in the latest edition of the Standard on Stored Electrical Energy Emergency and Standby Power Systems (NFPA 111):

The UPS will meet or exceed the functional requirements for a Type 0 (no interruption of power), Class 0.25 (functions for 15 minutes at full load), Level 1 (protection of human life) device as specified in NFPA 111.

Motorola will provide a UPS unit at each of the ~~Master Sites and~~ **(Mod #1 Rev.)** Division Headquarters sites that will continuously protect and condition power for a fully loaded critical bus during normal operation. Upon loss of offsite and standby generator power, it will supply uninterrupted operation for a minimum of 15 minutes under full design load to facilitate an orderly transfer of data operations and shutdown of systems. The system will be designed to facilitate on-site full-rated load testing of the UPS unit. Motorola will support on-site full-rated loading testing by using the actual load provided by the existing equipment and facilities. Motorola will not include any load banks for full-rated load testing.

UPS capacities at each site have been sized by Motorola to accommodate new equipment loading as follows:

Site	UPS Capacity
STARS NOC and Zone 1 Master Site	300 kVA (Mod. #1 Rev.)
First Division Headquarters	20 kVA
Second Division Headquarters	20 kVA (Mod. #1 Rev.)
Third Division Headquarters	20 kVA (Mod. #1 Rev.)
Fourth Division Headquarters	20 kVA
Fifth Division Headquarters	20 kVA
Sixth Division Headquarters / Zone 2 Master Site	300 kVA (Mod. #1 Rev.)
Seventh Division Headquarters	20 kVA

9.4.8.3.1 General

Motorola will provide Stand-by generator systems sized as shown in the table below for the ~~STARS NOC and Zone 1 Master Site and~~ **(Mod. #1 Rev.)** the Division Communication Centers. Standby generator capacities at each site have been sized by Motorola to accommodate new equipment loading as follows:

Site	Standby Generator Capacity	Fuel Type
STARS NOC and Zone 1 Master Site	750 kW	Diesel (Mod. #1 Rev.)
First Division Headquarters	45 kW	Liquid Propane
Second Division Headquarters	45 kW	Liquid Propane (Mod. #1 Rev.)
Third Division Headquarters	45 kW	Liquid Propane (Mod. #1 Rev.)
Fourth Division Headquarters	45 kW	Liquid Propane
Fifth Division Headquarters	45 kW	Liquid Propane
Sixth Division Headquarters / Zone 2 Master Site	750 kW	Diesel (Mod. #1 Rev.)
Seventh Division Headquarters	45 kW	Liquid Propane

The fuel source at each site will be as shown in the table above. The standby generators supplied will meet the requirements for an emergency system as defined in the Standard for Emergency and Standby Power Systems (NFPA 110).

The standby generator will, at a minimum, meet the requirements under NFPA 110 for a Type 60 (initiates within 60 seconds), Level 1 (protection of human life) device, capable of functioning without refueling for seven (7) days. The automatic transfer switch will be provided with a manual bypass isolation feature to permit switch maintenance without having to shut down the system. An automatic transfer switch will be provided with a manual bypass isolation feature to permit switch maintenance without having to shut down the system. Generator Operating and Maintenance Manuals will be supplied with each generator unit. Provision will also be made for fueling the generator from an external fuel tank, should the primary fuel system be inoperable or if the primary fuel source is expended.

9.4.8.3.2 Pre-qualified Manufacturers

Standby generator will be one of the following, or a Commonwealth-approved equivalent:

- Caterpillar
- Kohler
- Onan
- All generators will be of the same manufacturer, if reasonably possible.

9.4.8.3.3 Generator Location

~~At each of the two (2) zone master sites, the standby generator, transfer switch, line surge suppressors and associated equipment will be located in an electrical equipment room inside the building. (Mod. #1 Rev.)~~ At the ~~six (6)~~ **four (4) (Mod. #1 Rev.)** Division additions, the standby generator, transfer switch, line surge suppressors, and associated equipment will be located adjacent to the existing generator if reasonably possible. This contract assumes that adequate space already exists for new standby generators, transfer switches, and fuel storage at the ~~six (6)~~ **four (4) (Mod. #1 Rev.)** Division addition sites. The system will be designed to facilitate on-site full-load testing. A receptacle will be placed outside the building to allow a mobile generator to be connected to the electrical system in case the primary standby unit experiences extended inoperability. Standby generator operating instructions will be posted in the room.

9.4.8.3.4 Starting System

Batteries will be of the maintenance-free type with sealed cells. Battery chargers will be of a float/equalize design. Where appropriate for the type of generator specified, and where approved by the generator manufacturer, a crankcase heater and a jacket water heater will be provided to facilitate cold weather starting.

9.4.8.3.5 Fuel Tank and Fuel System

Fuel tanks will be of an approved design and installed in accordance with applicable building codes and regulatory requirements. For the Division HQs, the liquid propane systems will meet the requirements of NFPA 58, Liquefied Petroleum Gas Code. ~~The STARS NOC and Zone 1 Master Site and Division 6 HQ Zone 2 Master Site fuel tanks will be installed below ground. Removable metal grating will be installed to protect vulnerable portions of fuel system from falling ice (if applicable). (Mod. #1 Rev.)~~

9.4.8.3.6 Generator Noise Abatement

Standby generators will be of a quiet design with an exhaust silencer and other devices making the unit suitable for installation in residential locations. A residential silencer will reduce the total engine exhaust noise by a level by at least 18 to 25 dB. The generator noise level will not exceed 65 dB(A) at a distance of 50 feet from the generator.

9.4.8.3.7 Instrumentation and Alarms

Remote audible safety indications listed in NFPA 110, Table 3-5.5.2(d), will be inputs to the radio alarm system. Information on standby generator run status and a fuel level “low-low” alarm (occurring when there is less than 24 hours of fuel in the tank) will also be an input to the radio alarm system. Audible alarms with a silence feature will be provided along with a local annunciator.

9.4.8.3.8 Spare Parts

To reduce the need for spare parts inventory, Motorola will specify identical model standby generators where possible. “High Mortality” spare parts referenced in NFPA 110, Section 6-2.4, will be maintained by a preferred maintenance provider during the warranty period.

9.4.9 Grounding and Lightning Protection

New portions of site grounding and lightning protection will be in accordance with the National Electric Code and the Motorola Standards and Guidelines for Communication Sites (R56), including the amendments identified in Section 11, System Integration - Statement of Work of the Contract, and herein after referred to as “R56 Standards and Guidelines.” The new portion of the grounding system at each Division headquarters (~~excluding Division 6 and Zone 1 Master facilities, which are completely new systems~~) (**Mod. #1 Rev**) will be interfaced to the building’s commercial power grounding system. Motorola will provide electrical ground plan documents.

Motorola will conduct testing after interfacing to the existing, commercial ground system for the facility. The new grounding system will perform at the same standards as the existing commercial power grounding system. NEC and Motorola's R56 Standards and Guidelines require that non-transmitter sites should meet a ground resistance of 5 ohms or less. Should the tests indicate that a ground resistance of 5 ohms or less has not been achieved, Motorola will provide a change order proposal for implementing a reasonable effort to improve the grounding resistance to 5 ohms or less. Motorola's reasonable effort to comply with this 5 ohm requirement includes: Provide and install up to 8 chemical rods and 25 cubic yards of ground enhancement material as engineered at each site where required. Motorola will assist the Commonwealth in establishing a "not to exceed" ground system upgrade cost per site that represents a reasonable effort to comply with the requirement of 5 ohms. Since ground resistivity data for each site is not available at this time, Motorola cannot determine that a ground resistance of 5 ohms or less can be met by installing the ground system in accordance with the National Electric Code and Motorola's R56 Standards and Guidelines.

Existing below-grade grounding components that are reused will be tested to verify that their grounding resistance does not exceed 5 ohms, and plans will be drawn to document where the existing grounding system is interfaced to new grounding systems. ~~For the new building at Zone 1 Master Site and at the 6th Division / Zone 2 Master Site in Salem, and where required for extending protection to building additions, the lightning protection will be installed to provide the Commonwealth with UL Master Label C LPI certifications.~~ (Mod. #1 Rev)

The grounding and lightning protection systems will provide necessary protective measures to limit equipment damage and minimize personnel hazards against lightning strikes and power surges. The Commonwealth will be responsible for grounding any communications cable that they bring inside the buildings.

Motorola will provide R56 Standards and Guidelines compliant Transient Voltage Surge Suppression systems for main power.

9.4.10 HVAC Systems

At the **Communications Centers** ~~STARS NOC and Zone 1 Master Site in Richmond and the Division 6 Headquarters / Zone 2 Master Site in Salem,~~ (Mod. #1 Rev.) Motorola will design an HVAC system per the 2001 ASHRAE standards pertaining to each location for a system to maintain 70 degrees Fahrenheit +/-3 degrees. The systems will incorporate outside air per building codes and will allow for 20% future building equipment load expansion. The humidity in the buildings will be controlled at 20-60% relative humidity.

The Control Room and communications equipment room will have a totally redundant system as a backup system. Lead lag control equipment will be used with alternating timers that allow equal operating times for each of the units. The building backup generator will support these HVAC systems.

~~Offices, work areas, administrative and meeting rooms, telephone closet, vendor space and corridors will be cooled with packaged heat pumps using LP gas or electric backup heat depending on the final design agreement. The building backup generator will not support the HVAC systems in these areas. (Mod. #1 Rev.)~~

~~The elevator equipment room, mechanical room, generator room, electrical room, and toilets, will be ventilated with exhaust fans and heated with electric, LP, or natural gas unit heaters depending on the final design agreement. The building backup generator will not support the exhaust fans and unit heaters. (Mod. #1 Rev.)~~

~~The main entrance will be heated with electric unit heaters, which will not be supported by the building backup generator. (Mod. #1 Rev.)~~

At the Headquarters building at Divisions 1, ~~2, 3,~~ (Mod. #1 Rev.) 4, 5, and 7, HVAC systems will either be packaged units or direct expansion split systems with electric heat. Ventilation will be provided for areas that contain batteries. Sixty (60) days prior to HVAC installation, Motorola will provide two (2) sets of Operating and Maintenance Manuals for approval by the STARS PD for mechanical systems. Within thirty (30) days after Commonwealth approval, Motorola will provide five (5) final sets of these manuals to the STARS PD. One (1) copy of the manuals in Adobe Acrobat Format (PDF) will be delivered to the STARS PD if available from the manufacturer at the time of production or allowed by the manuals' copyright holders.

9.4.10.1 Design Conditions and General Systems

HVAC systems will be sized and selected for ambient conditions at one (1) percent summer and 99.6 percent winter as indicated in the 2001 ASHRAE Fundamentals Handbook for the nearest city listed. Equipment will be capable of maintaining an interior temperature of 70 degrees Fahrenheit +/- 3 degrees. Cooling systems at Divisions 1, ~~2, 3,~~ (Mod. #1 Rev.) 4, 5, and 7 will be capable of cooling the dispatch center plus the addition with equipment (present and future) up and running. Motorola will include heat-load calculations with the design reviews and with as-built documentation. Outside-air quantities will be provided to meet applicable building codes. Motorola will provide adequate ventilation to areas where batteries are located. HVAC systems will be connected to the backup generator.

9.4.11 Plumbing

This section applies only to the Communications Center upgrade construction at Division Headquarters 1, 4, 5, 6, and 7, ~~and the Zone Master Sites. There are no plumbing requirements for Division Headquarters 2 and 3.~~ *(Mod. #1 Rev.)*

9.4.11.1 Divisions 1, 4, 5, & 7 Headquarters Additions

A complete and workable interior and exterior plumbing system will be provided in accordance with applicable local authorities and codes. Utilities will be extensions of the facilities' existing systems. Electric heaters will be used to heat domestic water. Location of the heaters will be considered to serve hot water locally. Roof drains or scuppers will be provided with an overflow system.

A new handicapped restroom having one toilet and one lavatory will be included in the addition areas. The fixtures will conform to water saving requirements and will be standard commercial grade by American Standard, Kohler or approved equal. An exhaust fan and one light will be provided for the restroom. Toilet accessories include a commercial grade mirror, a soap dispenser, a paper towel dispenser and a toilet paper holder. The floor will be vinyl composite tile.

A new kitchen area with a single bowl stainless steel sink and single lever faucet will be included in the addition areas. Standard commercial grade laminated base and wall cabinets with a laminated counter top will be included as well. An electric water heater will be used to heat water for the new kitchen and restroom, the heater may be located in the ceiling area or under the new kitchen sink. Motorola assumes that for pricing purposes that the building water and sewer lines are adequately sized to accommodate the new plumbing fixtures.

9.4.11.2 ~~STARS NOC and Zone 1 Master Site & Division 6 / Zone 2 Master Site~~ *(Mod. #1 Rev.)*

~~Motorola will design the plumbing systems for the STARS NOC and Zone 1 Master Site around the building design depicted in the Figure 9-1 and 9-2, with similar plumbing systems at the Division 6 / Zone 2 Master Site in Salem. Plumbing systems will include handicap accessible men's and women's toilets on both the first and second floors (if applicable). The sizes of the restrooms will be decided in the final building design based on the building code. All toilets, lavatories and urinals will be standard grade American Standard or Kohler products. All toilets, flush valves and faucets will conform to water saving standards per the building code. Hot water heating will be through electric hot water heaters with the location of the heating equipment and distribution piping to be determined in the final design.~~ *(Mod. #1 Rev.)*

~~The janitor closets on both first and second floors will be equipped with a mop sink and hot and cold water. Mop racks will also be provided in each janitor closet. (Mod. #1 Rev.)~~

~~Handicap accessible water coolers on first and second floors will be included in the final building design. (Mod. #1 Rev.)~~

~~Exterior freeze proof hose bibs will be adequately spaced for ease of use and access around the building. (Mod. #1 Rev.)~~

9.4.12 Fire Protection Systems

9.4.12.1 Divisions 1, ~~2, 3,~~ (Mod. #1 Rev.) 4, 5, & 7 Headquarters Additions

Fire protection systems will be designed in accordance with the applicable requirements of local authorities and codes. Existing FM 200 systems serving the existing dispatch centers will be enhanced to serve the existing dispatch center plus the addition. This Contract assumes existing FM-200 systems have been installed in accordance with all applicable codes and standards and that they are in proper working condition at the time modifications will be made to them. Unprotected Dispatch Centers will be provided with an FM-200 system covering both the new and existing facilities. ~~The new 6th Division Dispatch Center will be provided with an FM 200 System. (Mod. #1 Rev.)~~ Systems will be designed and certified by a NICET Level 3 certified individual. Design calculation and layouts will be submitted for review at the final design submission. The following is a tabulation of the current status of each Communications Center where an addition will be constructed:

- First Division Headquarters – Richmond – Has FM 200 System
- ~~Second Division Headquarters – Culpeper – Currently not protected (Mod. #1 Rev.)~~
- ~~Third Division Headquarters – Appomattox – Currently not protected (Mod. #1 Rev.)~~
- Fourth Division Headquarters – Wytheville – Has FM 200 System
- Fifth Division Headquarters – Chesapeake – Has FM 200 System
- Seventh Division Headquarters – Fairfax – Has FM 200 System

The fire suppression system for existing dispatch facilities and their additions will be FM200. A NICET level 3 certified individual will design the system. Design layout and calculations will be submitted for review with the final design drawings. All modifications and additions to the fire alarm and controls system will be fully tested prior to turning the system over.

In conjunction with the fire suppression system, Motorola will tie into the buildings existing fire alarm system. Smoke heads and heat sensors will be designed and located in the new area to meet the current building and electrical codes.

9.4.12.2 ~~Zone 1 Master Site & Division 6 / Zone 2 Master Site~~ (Mod. #1 Rev.)

~~A NICET level 3 certified individual will design the Fire Suppression for the Zone 1 Master Site. The design calculations will be provided to the Commonwealth with the final design of the entire building. (Mod. #1 Rev.)~~

~~In each building, an FM200 fire suppression system will provide fire suppression in the Control Room and in the communications equipment room. (Mod. #1 Rev.)~~

~~A wet pipe sprinkler system will provide fire suppression throughout the building except where FM200 fire suppression system covers the space. Motorola assumes the use of a wet pipe system and that there will be sufficient water available from the existing site water supply. During the initial design phase, Motorola will perform a system evaluation to determine the suitability of the existing water utilities for the addition of a new wet pipe system. In the event that additional fire pumping or water mains are required, the cost will be borne by the Commonwealth. (Mod. #1 Rev.)~~

~~In conjunction with the fire suppression system, a fire alarm and control system will be designed and built into the building. The alarm and control system will be designed in zones and will tie the wet pipe sprinklers with the FM200 systems for a complete and functional system throughout the building. Remote alarm contacts will be available for notification to other facilities in the event of alarm. The fire alarm system will be a fully addressable system with dial up connection to the local fire department. Smoke heads and heat sensors will be designed and located in the new facility to meet the current building and electrical codes. (Mod. #1 Rev.)~~

9.4.13 Site Security (Mod. #1 Rev.)

~~At the STARS NOC and Zone 1 Master Control Site and the Sixth Division Headquarters / Zone 2 Master Control Site in Salem, a card access security system will be installed at all exterior doors, generator rooms, radio equipment rooms, and electrical rooms to monitor after hours access to the building. The card key access system will have the capability of programming keys on-site and with different accessing parameters. (Mod. #1 Rev.)~~

~~A closed circuit TV system will be designed and installed to monitor access to the front entrance of building and provide security to the personnel and systems in the building. This camera will be monitored at the building receptionist's desk and operations center areas. A magnetic lock will be installed at the front entrance store front door, which may be released by either a card key or by a release button installed at the receptionist's or dispatchers desk. (Mod. #1 Rev.)~~