Correctional Service Canada
Technical Services Branch
Electronic Security Systems

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ELECTRONICS ENGINEERING STATEMENT OF WORK

PROCUREMENT & INSTALLATION OF ELECTRONIC SECURITY SYSTEMS

AUTHORITY

This Statement of Work is approved by Correctional Service Canada for the procurement and installation of all telecommunications and electronic security systems, subsystems, and equipment in Canadian penal institutions.

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RECORD OF REVISIONS

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4		General re-write
5		Minor updates

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ABBREVIATIONS

The following abbreviations are used in this specification:

ATP	Acceptance Test Plan
CM	Corrective Maintenance
COTS	Commercial-Off-The-Shelf
CSC	Correctional Service Canada
DA	Design Authority
DCR	Design Change Request
DESS	Director, Electronic Security Systems
DL	Deficiency List
FDR	Final Design Report
MRT	Mean Response Time
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
PDR	Preliminary Design Report
PM	Preventative Maintenance
PW&GSC	Public Works & Government Services Canada
QA	Quality Assurance
RFP	Request For Proposal
SOW	Statement of Work
STR	Statement of Technical Requirement

DEFINITIONS

The following definitions are used in this specification:

Design Authority	Director, Electronic Security Systems (DESS) - Correctional Service Canada (CSC) is responsible for all technical aspects of the system design and implementation.
Contract Authority	Public Services and Procurement Canada (PSPC) is responsible for all contractual matters associated with the system design and implementation.
Contractor	The Company selected as the successful bidder.
Project Officer	A CSC employee or a contracted person designated by DESS to be responsible for the implementation of the project.
Off-the-shelf	Equipment currently on the market with available field reliability data, manuals, engineering drawings and parts price list.
Custom Equipment	Equipment designed and/or manufactured specifically for a specific contract.

1.0 INTRODUCTION

This Statement of Work (SOW) defines the work and responsibilities for the design, procurement, installation, test and integration of all operational communications and electronic security equipment in CSC Institutions.

The SOW provides guidelines, procedures and responsibilities to the Contractor for the implementation of all operational, communications and electronic security systems in CSC facilities.

All work performed must adhere to this SOW, CSC Specifications, Standards and Statement of Technical Requirements (STRs).

1.1 Commercial-Off-The-Shelf Equipment

The Contractor must use commercial off-the-shelf (COTS) equipment and proven designs to the maximum extent possible. All new equipment must meet the specified lifespan requirements. All new equipment that does not meet the COTS criteria must be approved in writing by the CSC project technical authority. New equipment designs must be restricted to unique interfaces and common control console.

Any equipment used shall be capable of being maintained and serviced by a qualified electronics technician.

All equipment or material shall be CSA certified. Other Canadian certification organizations such as ULC, cETL, Intertek, cRU, cULC, etc. are acceptable as well. The contractor shall provide a proof of certification by a Canadian agency as part of his submittals.

Where CSA (or Canadian equivalent) certified equipment / material is not available, submit such material / equipment to inspection authorities for special approval before delivery to site. Carry all associated fees.

1.2 Technical Acceptability

The Correctional Service Canada (CSC) operational environment is unique for its diversity of locations, climate exposures and the physical restrictive construction techniques of correctional facilities. Maintaining national security, the safety of staff and offenders is part of CSC's commitment to public safety. Electronic security systems operating in this unique environment must maintain very high standards of dependability and reliability.

The CSC Engineering Services Division has established technical specifications and equipment standards for specific electronic security systems which are based on very specific and restrictive operational performance criteria as detailed in its Electronic Engineering Standard. Technical acceptability of these systems means that provided equipment complies with the pertinent CSC specifications and standards as well as the CSC Technical Criteria Document.

The technical acceptance process must involve system and subsystem evaluation in accordance with the applicable CSC specifications. They may also be tested (field trialed) in a CSC facility to verify the effectiveness of the proposed technologies when subjected to the restrictive operational environment.

CSC must also verify in depth any of the system technical specifications called up. CSC may when it deems necessary, request the supplier to arrange for a full site demonstration. CSC may rely on manufacturer's test results for specific areas of the specification where an independent test facility has conducted the test, and the facility is deemed acceptable to CSC.

It is the supplier’s responsibility to make new developments in products available to CSC for evaluation. Equipment qualification is an ongoing process and can be initiated at any time by a vendor. Any vendor can have access to the CSC specifications and standards.

1.3 Equipment Procurement

Any ordering of equipment/material before the approval of the final design report will be undertaken at the Contractor's own risk. The Design Authority may authorize the procurement of certain long lead items at, or shortly after the preliminary design review.

1.4 Quantity of Equipment

The quantity and location of the equipment required for CSC institutions will be contained in the specification identified in the STR.

2.0 APPLICABLE DOCUMENTS

CSC Specifications, Standards and STRs are approved by the Director, Electronic Security Systems (DESS) for the procurement and installation of all telecommunications and electronic security systems in all CSC facilities. These documents promulgate DESS policy and must not be modified or changed without prior consultation and approval of the Director. The documents of the issue in effect will form part of the Request for Proposal (RFP) issued by the contract authority.

2.1 Supporting Documentation – CSC

Statements of Work (SOW) – list is not inclusive

- SW0101R4E Procurement and Installation (this document)
- SW0102R6E Quality Control
- SW0110R1E Structured Cable Systems
- SW0302R0E Monitoring Repair Overhaul and Maintenance
- SW0502R2E Test and Evaluation Guidelines

Specifications – list is not inclusive

- SP0006R2E Conduit Space and Power
- SP0102R2E Data Logger

2.2 Supporting Documents – Industry Standards

- Canadian Electrical Code
- International Telecommunications Union
- Electronic Components Industry Association (ECIA) – ex EIA/TIA

2.3 Supporting Documents – Manufacturers Specifications

3.0 REQUIREMENTS

The Contractor must:

Design, procure or manufacture, install, test and document the installation of all electronic security and telecommunications systems in accordance with the CSC specifications, standards and STR;

Be responsible for the integration of the proposed system to any existing telecommunications and electronic security systems, as specified in the STR.

Provide the operator and maintenance training in accordance with the CSC requirements;

Provide quality assurance (QA) to ensure equipment performance and reliability are in accordance to CSC requirements;

Provide the maintenance support and spares in accordance with the CSC maintenance requirements;

Provide warranty coverage to include spare parts provision and equipment repair; and

Provide a project schedule to show timings of all major deliverables from a contract award to expiration of the support period. Project elements may include some or all of the following components:

- Design
- Procurement
- Installation
- Testing
- Training
- End of Warranty
- End of Support (equipment end of life)

4.0 SYSTEM DEVELOPMENT

The Contractor must design systems and equipment to meet all of the requirements stipulated in the applicable CSC specifications. The system design must be modular and address the following criteria:

a. ease of operation and maintenance;
b. optimize and concentrate control functions and capabilities;
c. evolution to an IP to the Edge strategy, simplifying connectivity and network management
d. enhance the security of the working environment, extend staff capabilities to observe and control;
e. minimize the number and types of display and control devices;
f.i nclude green technologies and practises in all aspects of project implementation; and
g. employ recognized industry standardized communications and signalling protocols.

4.1 Site Assessment

As soon as practical after receipt of the STR, the Contractor must conduct a preliminary site assessment to validate the installation environment, the requirements of the STR, and any Facility requirements (floor / cabinet space, power, cooling, etc.).

The site assessment is to include validation of documentation for all existing affected systems equipment and software.

Any subsequent Contractor visits of a Site Assessment nature are to be conducted within the envelope of the Contract.

4.2 Preliminary Design

The preliminary design baseline must be established by the review and approval of the preliminary design report (PDR) by the Design Authority (DA) or his designate. Specifications, drawings and the approved PDR must make up the preliminary design baseline.

The PDR review meeting must be convened by the Contractor to review the PDR contents. The Contractor must provide the venue and all of the necessary facilities. The purpose of the PDR is to establish an agreement that the proposed design meets requirements as specified in the STR. The Design Authority will identify any portions of the PDR that are missing or not acceptable to CSC.

Discrepancies and observations are to be recorded on the approved CSC Comments & Disposition Sheet.

4.3 Preliminary Design Report [33%]

The PDR must be prepared to good commercial practice. As a minimum the document should be Spell and Grammar checked. One (1) electronic copy must be submitted to the Design Authority at least ten (10) working days before the PDR meeting. For transmission and storage purposes, files should not exceed 10 Mb in size or the contractor will provide an internet accessible portal for file download.

An intermediate design report (IDR) [66%] may be convened, where previously unidentified issues arise from the initial PDR review; and necessitate changes in scale or scope of work. In these instances, the interval between the PDR's should not exceed a maximum of 10 working days.

The PDR must consist of:

a. Functional block diagrams of the proposed system with performance specifications. The technical analysis and equipment performance data must verify system requirements;
b. preliminary equipment layouts and elevation including control consoles and racks;
c. preliminary user interface design and layout
d. commercial system software; quantities, versions and licensing requirements for :

    i. operating system
    ii. management software
    iii. supporting applications

e. Custom application specific software;

    i. Block diagram and design methodology
    ii. model / part number and quantity for each item

f. Preliminary floor plans at scale showing equipment locations;
g. Identify all 120V power source;
h. Show size for new conduits and conductors. Show proposed routing for conduits & raceways;
i. Preliminary wiring diagram, schematic, riser, etc.;
j. Legend;
k. list of commercial-off-the-shelf equipment with part number, model number, manufacturer, the quantity of each item and manufacturer literature. Manufacturer literature shall identify exact proposed model numbers;
l. list of custom designed equipment with model number and the quantity of each item;
m. functional schematics for all custom designed equipment;
n. conceptual drawings for all custom designed equipment;
o. a proposed product assurance plan;
p. a proposed maintenance plan;
q. a proposed sparing plan; and
r. a proposed training plan.

4.4 Final Design Report [99%]

The final design must be based upon the preliminary design, and any changes or amendments arising from the PDR. The time interval between the PDR and the final design report (FDR) should not normally exceed 10 working days.

The final design baseline must be established by the review and approval of the Design Authority of the FDR. It establishes the start of change control in equipment design and performance. The FDR must consist of:

a. all elements of the preliminary design baseline;
b. design changes identified as part of the PDR
c. proposed control console mock-ups, user interfaces, ergonomics considerations, etc., as necessary;
d. drawings and operational descriptions for the custom designed equipment including interface specifications for:

   i. hardware
   ii. software and API's

e. Installation drawings and instructions showing: rooms layout, equipment locations, conduit & raceway routings, wirings/ conduits size and quantity, supporting systems, diagrams, control schematic, elevations, sections, details, source of power, bill of materials, etc. to provide a complete system;
f. All drawings including floor plan layout or conduits routing shall be at scale;
g. All drawings shall include proper title block with relevant project information;
h. availability model and analysis updates to reflect the final system design and hardware selection.

The FDR must be prepared to good commercial practice. As a minimum the document should be Spell and Grammar checked. One (1) electronic copy must be submitted to the Design Authority at least ten (10) working days before the FDR meeting. For transmission and storage purposes, files should not exceed 10 Mb in size or the contractor will provide an internet accessible portal for file download.

The FDR review meeting must be convened to review the contents of the FDR. The Contractor must provide the venue and all of the necessary facilities.

The Contractor must identify key team members who will be present (H/W & S/W design, installation, Program Mgmt, etc.) Representatives of the Contractor's development team responsible for the system/equipment design and engineering must be available for the review.

4.5 Site Audit

When existing systems are to be upgraded or replaced as part of the Project, a site audit may be required to establish existing functionality and connectivity for all affected network elements, to include:

4.5.1 Hardware:

a. Servers
b. Communications infrastructure
c. Edge devices
d. Any other network element

Network elements are to be inventoried as:

a. Operational,
b. element defective,
c. element no connectivity; or
d. element not found or missing

4.5.2 Software:

To be inventoried as:

a. OS name and version
b. Application name(s), version(s), and Supplier
c. Quantities and Licenses for (a) & (b)
d. Annual licensing costs (if applicable) per software instance

4.6 Design Change Request

Design Changes Requests (DCR) are defined as any significant changes post FDR sign off. The Contractor must create and maintain a DCR Log, which is to be shared on a regular basis with the Design and Contract Authorities.

DCR's must be classified in accordance with the following criteria:

4.6.1 Type I

Changes that affect cost, schedule, reliability, maintainability, or availability must be submitted as a design change request (DCR). Changes must not be actioned until specifically authorized in writing by the Design Authority through the Contract Authority.

4.6.2 Type II

Changes to correct a design error without affecting cost, schedule, reliability, maintainability, or availability must not require a DCR.

Changes must be reported to the Design Authority and the final design baseline must be updated by the Contractor. The Design Authority will review and acknowledge the change.

4.7 Design Change Control

Type I changes must be forwarded to the Design Authority through the Contract Authority on DCRs initiated by either the Contractor or the Design Authority.

DCRs must be reviewed and approved before implementation and must include:

a. specification requirement being effected;
b. final design baseline element being changed;
c. description of the design change;
d. reason for the change;
e. impact on cost, schedule, reliability, maintainability and availability; and
f. trade-off recommendations.

4.7.1 Design Change Control Log

The Contactor must maintain a Design Change Control Log which tracks the status of all submitted DCR's by:

a. Type (I or II)
b. Brief description
c. Status
    i. Submitted
    ii. Approved
    iii. Pending
    iv. Completed
d. Project Impact

4.8 Factory Testing

Details of factory tests are contained in the ES/SOW-0102, Statement of Work, Section 6.0. Factory tests must be performed according to the Design Authority approved procedures.

4.8.1 Factory Test Plans

Factory Test Plans must detail as a minimum:

a. Description of the component or function being tested

b. Description of the test environment (physical, electrical, operational, etc.)
c. Test procedure(s)
d. Pass / Fail criteria

Equipment with deficiencies as the result of the factory tests must be subject to retest. The Design Authority reserves the right to add or modify tests.

4.8.2 Factory Test Acceptance Reports

The Contractor must provide the Design Authority or his designated representative, fully completed and signed copy of the Factory Test Acceptance Reports.

5.0 SYSTEM INSTALLATION

The Contractor must be responsible for coordinating with the Assistant Warden Management Services, or the designated representative, to ensure that sufficient site utilities (power, floor space, conduit, etc.) are available. No work will be permitted at the site before the approval of the Design Authority. All installation activities must be conducted in accordance with ES/SOW-0102, Statement of Work.

5.1 Schedule

Upon Design Acceptance, the Contractor must provide a detailed work schedule for the installation activities. This schedule must reflect the complete implementation plan by identifying the nature of the work to be performed and the area affected. As a minimum the Master Schedule should identify:

a) Major milestones.
b) Time estimates.
c) Logical sequences.
d) Contingency time.

Schedule to indicate all calendar dates from the commencement to completion of all work within the time stated in the accepted proposal. Submit schedule to Design Authority for approval.

The schedule may be provided electronically, or alternately be made available online through a Contractor hosted project management portal.

5.2 On-Site Inspections

Design Authority or an appointed CSC representative must perform ongoing inspections of the Contractor's activities. These inspections must verify compliance with the project requirements, the quality of work performed, and assess the Contractor's progress in relation to the approved schedule. Installation deficiencies requiring corrective action will be brought immediately to the Contractor's attention in writing. Progress inspections will be conducted on site on a regular recurring schedule, the contractor project manager and the CSC project manager will review work accomplished, issues, work planned, prerequisites for planned work, and project time line. The contractor will publish progress inspection meeting minutes within 3 working days of the inspection.

5.3 On-Site Coordination

Design Authority must be responsible for the appointment of an on-site CSC representative. Typically this would be the Chief Electronic Security Systems (EL project manager), or his/her designated representative. This representative will handle all site related manners and will periodically inspect the installation.

When electronic system installations are part of a construction program or a major redevelopment that involves Public Services and Procurement Canada (PSPC), the electronic system installation Contractor must coordinate all activities with the relevant site manager and must comply with this SOW.

5.4 Installation Design

The system installation design and planning must be based on providing new raceway and new supporting system for the new system. Wirings and conduits shall meet the Canadian Electrical Code requirement as well as local codes, local standards and local utilities requirement in the province of work.

Reuse of existing cable tray or existing spare conduits is subject to the Design Authority approval.

The contractor may not pull new cabling into an existing conduit that contains existing conductors. The contractor may reuse conduits that meet specifications that have been rendered surplus from the removal of old conductors from the system being replaced.

When installing new circuit breakers in existing panels, new circuit breaker interrupting capacity shall match existing panel interrupting capacity. Circuit breaker size shall meet Canadian electrical Code requirement. Installed circuit breakers will be of the same manufacturer as the electrical panel.

All new panels, cabinets, racks, enclosures shall be located in accessible locations.

Each new cabinet shall be bonded to ground. Provide new and separate #6 RW90 copper Green jacket bonding conductor from the rack to nearest grounding bus bar.

5.5 Sub-Contractor Supervision

The Contractor must provide on-site supervision of all sub-contractors. The sub-contractors must abide by the regulations of this Statement of Work and the conditions in the contract.

6.0 QUALITY ASSURANCE (QA)

The QA program must include quality control and system tests/verification programs to verify that new design and off-the-shelf equipment requirements have been met. System tests/verification will be conducted by the Contractor in-plant and on-site, and may be witnessed by the CSC representatives where appropriate. The system must pass all tests before approval will be given to commence the operator and maintenance training programs and warranty period.

All equipment and materials shall be certified by recognized Canadian certification agency such as: CSA, cUL, ULC, etc. Where CSA certified material and equipment is not available, obtain and pay for special approval from inspection authorities before delivery to site and submit such approval to Design Authority for approval.

6.1 Quality Control Program

The Contractor must provide a description of their internal quality control programs for CSC review and approval. CSC reserves the right to audit and verify that all materials destined for use in CSC systems have been thoroughly inspected and that QA procedures are applied during production and testing.

7.0 SYSTEM ACCEPTANCE

System acceptance will occur when the acceptance testing has been completed according to the ES/SOW-0102, Statement of Work and when all of the other requirements of the contract have been completed to the satisfaction of the Design Authority. A final acceptance certificate signed by the Design Authority must certify the system acceptance.

On-site system acceptance testing must not begin until all of the on-site installation activities have been completed unless the installation is staged into separate phases. The Design authority and the contractor will identify and both concur to all staging phases within the FDR before installation begins. The contractor will have developed a separate acceptance testing plan for each phase upon completion. Phase acceptance procedures and testing will not supersede a complete system test during final acceptance testing procedures.

7.1 System Test Program

The Contractor must prepare and provide the documents describing: number, type and details of equipment, subsystem and system tests for CSC review and approval. These documents must be approved before any formal testing and will consist of the following:

7.1.1 System Test Plan

This plan must contain the test philosophy, the tests to be conducted, the pass-fail criteria, the retest requirements, and the instructions for the validation and the sign-off of all final design baseline requirements.

Before witnessing these tests, the CSC representative will perform a visual and mechanical inspection to ensure that the system installation meets the requirements of ES/SOW-0102, Statement of Work.

7.1.2 Test Procedures

These procedures must ensure that:

a. all equipment supplied meets the performance specification;
b. each subsystem meets the applicable performance requirements;
c. the overall system meets the performance requirements.
d. test procedure contains the step sequence for each test to be conducted, and the expected results.

7.2 Acceptance Test Plans (ATPs)

The Contractor must provide ATPs for all system, subsystem and equipment tests for Design Authority review and approval. The requirements for the ATP are detailed in the ES/SOW-0102,

Statement of Work.

An initial or preliminary ATP must be provided as part of the Final Design Review (FDR)

7.3 System Testing

All tests are conducted by the Contractor and may be witnessed by an appointed CSC representative. Tests are conducted as stipulated in the approved plan and procedures. The Contractor must inform CSC at least five (5) working days before the test start date.

7.3.1 Contractor Testing (Pre-ATP)

Before conducting the formal on-site testing for the CSC acceptance, the Contractor must conduct and document a system checkout to assure the system readiness for formal testing and on-line operations. Contractor Testing must include 100% (one hundred percent) of the procedures identified in the final Acceptance Test Plan.

The test sheets used for the system checkout must be provided to the Design Authority at least fourteen (14) days prior to the scheduled date of the testing.

The Design Authority will verify readiness through a review of the checkout report.

The Contractor Test report format should be consistent with that used for the formal witnessed testing for Final Acceptance (7.3.3).

7.3.2 Contractor Test Reports

The Contractor must submit typed and signed final copies of the test results for CSC review and approval within ten (10) working days of the completion of the testing. Two copies of the report must be submitted and must include:

a. a summary description of the tests;
b. test results consisting of completed test procedures as verified by a CSC representative;
c. incident reports, including analysis and corrective action; and
d. results of any retest.

After a review of the Test Reports, the DA may request the Contractor to repeat some or all of acceptance tests.

7.3.3 Final Acceptance Test Plan (ATP)

Any discrepancies arising from the Contractor Testing must be rectified before the Final ATP. The system(s) must “soak” for a minimum of two (2) weeks after all Contractor Test deficiencies have been cleared.

When the Contractor is ready to conduct the final ATP he must coordinate with the Design Authority to set a mutually convenient date.

The final tests and acceptance must be conducted with the Design Authority or an appointed CSC representative present.

ATP testing shall be done during normal working hours, 08:00 to 16:00, Monday to Friday. ATP testing at other times as requested by the institution shall be coordinated with designated CSC representative. Some testing may be required to be done at night time due to safety and security concerns.

All tests and results must be documented in a typed format and signed off by both the Contractor and the Design Authority or the designated CSC representative.

If during the ATP testing one or more minor deficiencies are found that do not affect the operational effectiveness of the system, the ATP testing may continue. Any minor deficiency must be rectified within 30 days; an extension may be approved by the DA or his designated representative.

If a major deficiency is found during the ATP testing that does affect the operational effectiveness of the system; the testing must cease until the deficiency has been corrected.

7.3.4 Final ATP Deficiency Lists (DL)

The Contractor must prepare and submit to the Design Authority a list of deficiencies, if any, along with an action plan and schedule for correction. The DL will be divided into three categories:

a. Visual/Mechanical,
b. Operational, and
c. Technical/Functional.

7.4 Technical Acceptance

The Design Authority must issue a signed letter of Technical Acceptance within one month after verifying that all of the items on the DL have been corrected, and that the system has been stable for at least 2 (two) weeks.

8.0 Warranty

The warranty period will commence on the date of Technical Acceptance.

9.0 TRAINING

The Contractor must develop, document and conduct training for both the operational and the technical staff. The training must be conducted on-site at the institution in the period designated by the schedule.

The Contractor must deliver a complete training plan to the Design Authority for comments and approval. This plan must be submitted to CSC within fifteen (15) business days in advance of the training date to allow for CSC review.

9.1 Classroom Training

Classroom lectures and demonstrations will be conducted on-site to train operations staff in the use and technical personnel in the maintenance of the systems.

9.2 Operator Training

The contractor must prepare and present a training course (TtT) for individuals responsible to train staff for the operation of the system. The training course must concentrate on the features and proper operation of the installed system. The course must be presented on the site within two weeks of the successful acceptance testing of the system. The course must consist of two, three-hour sessions (per building, if project consists of systems being installed in multiple buildings). Provide an interactive PowerPoint presentation as a training aid for the operator's training that is suitable for use during formal training and for later use by CSC for refresher training.

Training sign-in sheets must be included in the final documentation package and they must clearly identify; name of training, date of training, location of training(institution), printed name of attendee and signature of attendee.

The Operator Training Plan must contain at a minimum:

a. course goals
b. course agenda with topics and durations;
   i. Functional description of system
   ii. Functional block diagram(s)
c. manuals for each student to add notes;
d. training aids; and
e. student materials.

Training material must be provided in the language that is dominant at the site (French in Quebec)(French and English in New Brunswick). Sufficient copies of all student materials must be provided by the Contractor at the beginning of the training course to assure one copy for each student. CSC must stipulate the number of staff who are to be trained. Upon approval by the Design Authority, two (2) copies of all material must be delivered to CSC.

9.3 Maintenance Training

The contractor must prepare and present a four-day training course with hands on training, in the language that is dominant at the site, for up to five persons responsible for the maintenance of the equipment. The course must concentrate heavily on the material contained in the technical and site manual and as-built drawings and must ensure that the Authorized Service Contractor technicians are able to provide 1st level monitoring of the equipment. The course must be presented on the site within two (2) weeks of the successful acceptance testing of the system.

The course syllabus must be presented to the project authority for approval no later than 30 days after approval of the FDR. Drafts of all manuals and as-built drawings must be available for the training sessions. Training sign-in sheets must be included in the final documentation package and they must clearly identify; name of training, date of training, location of training(institution), printed name of attendee, signature of attendee, and attendee's comments on training.

The Maintenance Training Plan must contain at a minimum:

a. course goals;
b. course agenda with topics and durations;
   i. Functional description of system
   ii. Functional Block diagram(s)
   iii. Wiring Diagrams
c. hands-on examination of the installed system;
d. practical fault isolation;
e. printed materials to be retained by each student;

10.0 MAINTENANCE, SPARES, & TEST EQUIPMENT

The Contractor must provide maintenance and spares support plans according to the ES/SOW-0102, Statement of Work for the Design Authority approval. These plans must be submitted according to the Project schedule.

10.1 Maintenance Plan

The maintenance plan must describe the philosophy, the Preventive Maintenance (PM) procedures and schedules, the Corrective Maintenance (CM) methods and response times, Mean-Time-To-Repair (MTTR) for all systems. The plan must recommend tools, jigs, and test equipment, and detail the recommended manning method for the system. Issue of the final maintenance support plan will be contingent on Design Authority approval.

10.2 Spares Plan

The spares plan must list the required spares and recommended quantities. The quantity recommendations must be supported by system availability and reliability analysis and available experience data. The bidder must identify spare parts and components by their original

manufacturer's code, cross-referenced to the equipment vendor's part number.

10.2.1 Spares List

The spares list must identify the following:

a. the spare parts and the subassemblies with the recommended quantities;
b. the cross-reference listings between the vendors and the original manufacturer's codes;
c. the unit and extended prices for stocking; and
d. the expected life or the annual consumption of each part.

The Contractor must maintain the spares plan through to the end of the warranty period, and must ensure that any changes because of approved design changes are incorporated in the spares list.

10.3 Test Equipment

The Contractor must provide a list of test equipment required for the on-site maintenance of the system within thirty (30) days from Design Authority's acceptance of the final design.

11.0 DOCUMENTATION

11.1 Manuals and Drawings

The following items make up the minimum final documentation requirements:

a. Operator Manual,
b. Maintenance Manual,
c. Installation As-built Drawings, to include
    i. Equipment location(s)
        a. Interior / exterior edge devices (speakers, CCTV, alarm sensors, etc.)
        b. CER Rack Mount shelf occupancy
        c. locations of equipment cabinets, devices, junction boxes as well as routing of conduits and cable trays
d. Equipment As-built Drawings, to include
    i. Detailed Schematics
    ii. Assembly detail drawings
    iii. Wiring Diagrams
    iv. Cable Routing plans (including X-connect cabinets or IT’s)
    v. Conduit occupancy charts
e. Equipment Operating Software, to include
    i. Software flowchart
    ii. Configuration files
    iii. Source Code
    iv. IP Address Table(s)

f. List of spare parts
g. Compliance certificates from applicable authorities
h. Final Acceptance Test Procedures, Results and Reports
i. Copy of Technical Acceptance by the Design Authority
j. Commissioning Reports
k. Certificate of Warranty
l. Contractor Warranty, Service and Parts contact information

The Contractor must prepare and submit all manuals and drawings to the Design Authority for review and approval. The manuals and drawings will be approved when all changes have been satisfactorily incorporated. Documentation will be in the formats prescribed in Section 11.4.

11.2 As-Built Drawings

Maintain at site one set of the contract drawings and specifications to record actual as-built site conditions. Maintain up-to-date, real time as-built drawings and specifications in good condition and make available for inspection by the Design Authority upon request.

As-Built drawing must reflect the FDR and all approved DCR's.

Within one month of the Technical Acceptance, the Contractor must deliver a complete set of equipment and installation as-built drawings for Design Authority's review and approval.

Within one month after CSC approval, the Contractor must deliver two (2) complete sets of final drawings to the Design Authority. Contractor shall stamp all drawings and specification with "As-Built drawings". Label and place contractor's signature and dates

Failure to maintain as-built current and complete to satisfaction of the Design Authority shall be subject to financial penalties in the form of progress payment reductions and holdback assessments.

Any as-built submission shall include: electronic submission including CAD files and PDF in the formats prescribed in section 11.4.

11.3 List of Hardware and Software Inventory

The Contractor must provide a Bill of Material listing;

Quantity of equipment (hardware and software) itemizing the:

a. location,
b. quantity,
c. model number,
d. serial number,
e. revision level, and
f. Licence number(s) as applicable for all installed equipment and software.

11.4 Documentation Format

All manuals, documentation including as-built drawings, lists of equipment and baseline measurements must be submitted as per the following schedule:

a. Four (4) electronic versions of all documentation in an editable format to serve as a master of the documents and drawings. Electronic files are to be submitted on USB thumb drives or via secure network drive, in the following file formats:

   i. MS Word 2016 (or compatible) for print documents
   ii. AutoCad 2019 (or compatible) and PDF format for As-Built Drawings & schematics
   iii. Microsoft Excel (or compatible) for spreadsheet and tables

b. Four (4) CD, DVD, flash drive or hard drive containing the equipment operating software.

11.5 Operator Manuals

The Contractor must provide CSC approved manuals to support the operation of the system in the format as outlined in section 11.4 of this specification. These manuals must be prepared to the best commercial standards. Photo copies must not be accepted. The manuals must comply with the following format and content requirements:

Operator manuals are to be provided in Word and PDF format (or compatible) with navigation links in the table of contents. Manuals will include operations, screen shots and can include animations.

a. title page;
b. revision notice page, lined, with columns for revision numbers, dates and initials;
c. table of contents;
d. warnings and cautions;
e. introduction - general information including an overview of the equipment or system and a summary of capabilities;
f. theory of operation including an explanation of all major system components and software applications;
g. detailed description and use of all user accessible computer screens; and
h. block diagrams.

An electronic draft version of the manual(s) must be submitted for CSC approval on or before the date given in the schedule. Upon acceptance and approval by the Design Authority, a copy must be provided for use during the warranty period. The Contractor must update this manual through the warranty period and provide revision bulletins to record manufacturers' recommended modifications, etc. during the life of the equipment.

Within thirty (30) days of the warranty expiry date the Contractor must submit one (1) set of final, updated manuals for CSC approval. Following the final CSC approval, the required number of sets of operator manuals must be delivered to the Design Authority in the format as specified in section 11.4 of this Statement of Work.

The provided manual will be the exclusive property of the crown with unlimited distribution, copying and modification rights.

11.6 Maintenance Manuals

The Contractor must provide CSC approved manuals to support the maintenance of the system in the format as outlined in section 11.4 of this specification. These manuals must be prepared to the best commercial standards. Photo copies must not be accepted. The manuals must comply with the following format and content requirements:

Maintenance manuals are to be provided in Word and PDF format (or compatible) with navigation links in the table of contents. Manuals will include all maintenance procedures, screen shots and can include animations.

a. title page;
b. Contractor/Sub-Contractors/Suppliers list
c. warranty page - explaining the warranty period and expiry dates;
d. revision notice page, lined, with columns for revision numbers, dates and initials;
e. table of contents;
f. introduction - general information including an overview of the equipment or system, technical summary, specifications, and detailed block diagrams;
g. theory of operation including a detailed explanation of all circuits and parts;
h. alignment and test procedures;
i. repair procedures including step by step fault finding or fault localizing;
j. block diagrams;
k. circuit schematics (clear, easy to read, foldout type);
l. complete parts list including part specification and information;
m. mechanical drawings, chassis layout illustrations and wiring data lists; and
n. drawings including as-built and as-installed drawings.

An electronic draft version of the manual(s) must be submitted for CSC approval on or before the date given in the schedule. Upon acceptance and approval by the Design Authority, a copy must be provided for use during the warranty period. The Contractor must update this manual through the warranty period and provide revision bulletins to record manufacturers' recommended modifications, etc. during the life of the equipment.

Within thirty (30) days of the warranty expiry date the Contractor must submit one (1) set of final, updated manuals for CSC approval. Following the final CSC approval, the required number of

sets of maintenance manuals must be delivered to the Design Authority in the format as specified in section 11.4 of this Statement of Work.

The provided manual will be the exclusive property of the crown with unlimited distribution, copying and modification rights.

12.0 PROJECT SCHEDULING & COMMUNICATIONS

12.1 Daily Communications Log

Each day before 09:00, the Contractor On-Site Supervisor or Project Manager must submit to the Design Authority and designated on-site CSC representative a progress report of the previous day's activities. The report should include as a minimum:

a. Work completed
b. Work underway
c. Incidents
d. Anything worthy of mention with respect to the installation schedule

12.2 Monthly Progress Reports

The Contractor must provide to both the Design and Contract Authority a Monthly Progress Report and update by the 5th working day of each month. The Report must take into account activities completed or delayed for whatever reason, as well as all approved and pending DCR's.

Monthly reports must contain the following:

a. summary of the month's activities;
b. scheduled shortfalls and rescheduled dates;
c. problem areas and proposed solutions;
d. review of next month's activities;
e. summary of meetings held during the month; and
f. cash flow forecast.

The schedule update may be provided electronically, or alternately be made available online through a Contractor hosted project management portal.

12.3 Monthly Review Meetings

Review meetings must be held monthly. They may be convened at the Contractor's premises, Design Authority's office, Contract Authority's office, or the site depending on the need. The Contractor must make the design staff members available upon request by the Design Authority.

12.4 Project Master Schedule Update

The Project Master Schedule will be updated on a monthly basis to reflect the progress and delays reported in the Monthly Progress Report. The Updated Schedule will be issued by the 10th working day of each month.

12.5 Maintenance Support

During the installation and up to the Technical Acceptance letter being received; the Contractor must provide maintenance support. This support is expected to be not less than on-site coverage during the normal working day.

12.6 Shipment and Delivery

Contractor must be responsible for the shipment and delivery of equipment and materials to the site. Packing, crating, and shipment of equipment must be to good commercial practice, and any damage to, or loss of equipment must be repaired or replaced by the contractor to the satisfaction of CSC. The Contractor must properly label all shipments to assure correct identification and disposition on arrival at the site, as specified in ES/SOW-0102, Statement of Work.