

Part 1 General**1.01 SECTION INCLUDES**

- .1 Programmable Logic Controllers.
- .2 Graphical User Interfaces
- .3 Network Equipment
- .4 System Software
- .5 Magnetic Door Switches
- .6 Terminal Cabinets and Block
- .7 End of Line Resistors
- .8 Local Alarm

1.02 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CSA C22.1-09, Canadian Electrical Code, Part 1 (21st edition) Safety Standard for Electrical Installations.
 - .2 CAN/CSA-C22.2 No. Nos. 14, 40 and 94, Non-hazardous enclosures
- .2 National Fire Protection Association (NFPA)
 - .1 NFPA 70 National Electric Code.
 - .2 NFPA 101 Life Safety Code.
- .3 Electronic Industries Association (EIA)
 - .1 EIA-310-C Electronic Industries
- .4 Underwriters Laboratories of Canada (ULC)
 - .1 ULC-S317 (1996) Installation and Classification of Closed Circuit Video Equipment (CCVC) Systems for Institutional and Commercial Security Systems.
 - .2 Underwriters' Laboratories (UL)
 - .3 UL 294 (1999) Standard for Safety for Access Control System Units.
 - .4 UL 1076 (1995) Standard for Safety for Proprietary Burglar Alarm Units and Systems.
- .5 Association Standard for Racks, Panels and Associated Equipment
- .6 Standards Video Display Unit Electronic Systems
- .7 PWGSC Specifications
 - .1 *{to be determined}
- .8 Drawings

- .1 T01-1
- .9 CSC Telecommunications Standards:
 - .1 ES/SOW-0101 – Procurement & Installation of Electronic Security Systems (Revision 3)
 - .2 ES/SOW-0102 – Quality Control for Procurement and Installations of Electronic Security Systems (Revision 5)
 - .3 ES/SPEC-0006 – Conduit, Space, and Power Requirements for Security Systems Use in Federal Correctional Institutions (Revision 2)
 - .4 ES/SPEC-0303 – Limited Call Intercom System for Use in Federal Correctional Institutions (Revision 2)
 - .5 ES/SOW-0404 Electronic System/Equipment Evaluation Criteria Guidelines
 - .6 ES/STD-0803 Electronics Engineering
 - .7 ES/SPEC-0900 – Door/Barrier/Gate Control System for Use in Federal Correctional Institutions (Revision 2)

1.03 SYSTEM DESCRIPTION

- .1 System to consist of alarm control panel, motion detectors and intrusion switches located at door to be supervised.
- .2 System to interface to the CCTV and intercom systems to send messages to each one and allow for interactive audio and video information when processing door calls.
- .3 System to interface with fire hose cabinet solenoid valves for alarm monitoring.
- .4 System to have the capability to review and print the data archive.

1.04 WARRANTY

- .1 Manufacturer's Warranty: Submit, for Consultant's acceptance, manufacturer's standard warranty document executed by authorized company official.
- .2 Provide one year warranty on defective parts and installation labour, commencing on the date of system acceptance by CSC.

1.05 PERFORMANCE REQUIREMENTS

- .1 Security Clearance
 - .1 No employee of the Contractor will be permitted to enter or work in the Institution without a current valid security clearance issued by CSC.
- .2 Precedence of Institutional Operations
 - .1 While working on this project, it is essential that Contractors take every precaution to reduce any disturbance to normal institutional operations to a minimum. Onsite work may have to be performed at night or during other periods set by the Institution. The Contractor must recognize that it is essential that his personnel working onsite cooperate fully with the security staff at the institution by conforming to operational security requirements.
- .3 All work shall be coordinated with the Technical Authority and the institutional staff.
- .4 Service Response Capability

- .5 Contractor shall provide service response capability within 24 hours both during and after the system warranty period.

1.06 SUBMITTALS

- .1 General: Submit two sets hardcopy (paper) plus one set softcopy (computer files) documentation at each submittal.
- .2 Preliminary Design Report (PDR): Provide documentation defined by ES/SOW-0101 Section 4.1
- .3 Final Design Report (FDR): Provide documentation defined by ES/SOW-0101 Section 4.3
- .4 Acceptance Testing Plan (ATP): Provide documentation defined by ES/SOW-0101 Sections 6.1 and 7.2. ATP shall also include test procedure and certificate for fibre optic communications channels.
- .5 Training Plan and Course Materials: Provide documentation defined by ES/SOW-0101 Section 8.2
- .6 Operator Manual: Provide generic manual for touch-screen operation, as well as system-specific information summarizing the operator-training course content.

1.07 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Consultant.
- .5 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.01 MATERIALS

- .1 Equipment to be designed and manufactured in accordance with ISO-9001 1994 Quality System Standard.
- .2 Manufacturer's quality control program to be registered in accordance with the above noted standard.

- .3 Units of the same type of equipment shall be products of a single manufacturer. All material and equipment shall be new and currently in production. Each major component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place. Material will conform to the applicable requirements of the Underwriters Laboratories and the National Standards Institute.
- .4 All system equipment and field devices to be held securely in place. Fastenings and supports shall be selected to provide a safety factor of three.
- .5 All systems equipment equipped with plug in power connectors to be connected to a dedicated receptacle. Do not use tap connectors for plugging in multiple plugs into a single receptacle.
- .6 Acceptable Manufacturer's
 - .1 PLC and software: Allen-Bradley (Rockwell Automation), 1201 South Second Street, Milwaukee WI 53204-2496 USA.
 - .2 PCs: Broadax Systems Inc., 17539 E. Rowland St, City of Industry CA 91748 USA.
 - .3 Touch Screen LCD Monitors: Elo TouchSystems Inc., 6500 Kaiser Drive, Fremont CA 94555 USA
 - .4 Computer Keyboard/Video/Mouse (KVM) Extenders: Dakota Computer Solutions LLC, 1579 Lexington Road, Green Oaks IL 60048 USA.
 - .5 Fiber-optic Hub: Cisco Systems Inc., 170 West Tasman Drive, San Jose CA 95134 USA.
 - .6 Operator Interface Software: Intellution Inc., 325 Foxborough Boulevard, Foxborough MA 02035 USA
 - .7 LAN Software: Microsoft Corporation, Redmond WA USA
 - .8 List of acceptable manufacturers is not exclusive but supplied alternates are subject to rejection by CSC's Technical Authority unless details have been submitted in advance and accepted by CSC's Technical Authority.

2.02 PROGRAMMABLE LOGIC CONTROLLERS

- .1 Enclosures:
 - .1 Employ existing cabinets.
 - .2 Allow for top and bottom entry of surface mount conduits.
- .2 Power Supplies:
 - .1 Provide 110 VAC/24 VDC power supply for door position switch contact wetting.
- .3 Modular PLC equipment:
 - .1 Use Allen-Bradley SLC-500 family components and input/output (I/O) modules as required, compatible with existing PLC in Principal Entrance.
- .4 Field Wiring Terminations:
 - .1 Use Weidmuller ZTR2.5 disconnect test terminal blocks and ZSI2.5 fuse terminal blocks assembled on DIN rails with appropriate end plates and terminal markers.
 - .2 Use Panduit wire guide to contain incoming field wiring and panel wiring.

- .3 Use heat-shrink wire markers on all cable and wire terminations.
 - .5 Network interfaces:
 - .1 Use Allen-Bradley SLC-5/05 processors incorporating Ethernet communications interface.
- 2.03 GRAPHICAL USER INTERFACES**
 - .1 Computers:
 - .1 Utilize existing computers.
 - .2 Touch-screens:
 - .1 Utilize existing LCD touch screens.
 - .3 Pointing Devices:
 - .1 Utilize existing pointing devices.
- 2.04 NETWORK EQUIPMENT**
 - .1 Fiber-optic Satellite Hub
 - .1 Utilize and/or expand existing hub as required.
- 2.05 SYSTEM SOFTWARE**
 - .1 Employ and modify existing software.
 - .2 Software licenses
 - .1 Issue software licenses to CSC authorizing the use of all supplied system software at RPC Saskatoon in perpetuity and defining the terms and conditions of post-warranty software support, including provision of software upgrades if offered.
- 2.06 DOOR HARDWARE**
 - .1 Connect to door hardware provided by other Divisions.
- 2.07 TERMINAL CABINETS AND BLOCKS**
 - .1 Terminal cabinets: Type T. In accordance with Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.
 - .2 Terminal Blocks: In accordance with Section 27 11 19 - Communications Termination Blocks and Patch Panels.
- 2.08 END-OF-LINE RESISTORS**
 - .1 Mount end-of-line resistors to control supervisory current in each circuit, in control panel.
- 2.09 LOCAL ALARM**
 - .1 Buzzer for local alarm at each door location and mount in single gang box as indicated.

2.10 EQUIPMENT ENCLOSURE

- .1 Provide space for the rack mounted PC for the Door Control System in the Intercom and Public Address, Inmate Cell Call, or CCTV rack. Provide clear labeling and partitioning in the rack.

Part 3 Execution**3.01 INSTALLATION**

- .1 Installation Methods
 - .1 Install equipment so that manufacturers', ULC and CSA labels are visible and legible.
 - .2 All system components and appurtenances shall be installed in accordance with the manufacturer's instructions and as specified and shown. Units to be mounted outside or subject to inclement conditions shall be weatherproof or be mounted in weatherproof enclosures.
 - .3 Provide for and ensure that all equipment and systems will operate under the radio frequency interference at the site. Any remedial action will be at the Contractors cost.
 - .4 All wall mounted devices will be housed in steel blocks wherever there is a concrete block wall.
 - .5 Electrical Contractor (Division 26) will be responsible for installation of all control cabling, low voltage wires (cabling and wires supplied by Section 27 51 23, 28 13 27, 28 13 29 and 28 23 00 Contractor) and pneumatic tubing (supplied by Section 11 19 20 DEC Contractor) in conduit and wire trays provided by Electrical Contractor (Division 26).
 - .6 Coordinate control cabling, low voltage wires and pneumatic tubing in conduit, raceways and cable trays with Section 11 19 20 DEC Contractor and Electrical Contractor (Division 26).
 - .7 All serviceable devices such as locks and door position indicators shall have connection terminated with AMP or MOLEX type connectors provided by the hardware supplier. All connections on the controls side of the lock pigtail shall be secure and shall be terminated by Section 27 51 23, 28 13 27, 28 13 29 and 28 23 00 Contractor.

3.02 DETAILED DESIGN DEVELOPMENT

- .1 Upon Contract Award, prepare and submit PDR to CSC Design Authority
- .2 Upon CSC acceptance of PDR, prepare and submit FDR to CSC Design Authority
- .3 Upon CSC acceptance of FDR, proceed with procurement, manufacture and staging of products compliant with FDR. Prepare subsystem configurations using licensed software. Prepare and submit ATP, training course outlines and materials and operating manual to CSC Design Authority.
- .4 Conduct off-site Factory Acceptance Test (FAT) witnessed by CSC Design Authority, to demonstrate compliant subsystem operation, subsystem non-interference, system-wide control transfer and redundancy performance.

3.03 SYSTEM DESCRIPTION

- .1 The primary purpose of the Door Control System (DCS) is to provide control and status monitoring of all secure doors in the facility.
- .2 On a failure of the primary PLC the operator must be notified by an alarm that indicates the failure and what action is required. The system shall switch over to the secondary PLC and continue to operate. The system shall remain operational on the backup unit even if the primary comes back on-line. Switching back to the primary shall only occur if the secondary fails or by manual command from the maintenance terminal
- .3 Systems shall have audible tones to alert the operator as follows:
 - .1 Audible signals shall be clearly heard at any position within a Control Post.
 - .2 Audible tones shall be user selectable.
 - .3 Tones will be different and distinct for each system event.
 - .4 The volume of the tone signal shall be adjustable.
 - .5 Provide a disable function so that audible alarms can be eliminated on maintenance terminals and adjustable at each console position individually.
 - .6 Audible tone for all changes from inactive to active state, i.e. communication failure, door forced open, server failure.
- .4 The DCS shall be connected to the other components of the BSCS system to provide fully integrated operation as described in this specification.
- .5 The DCS shall be powered from UPS power and shall operate for a minimum of 30 minutes on UPS.
- .6 The system shall provide for redundant file servers.
- .7 The communications network between the PLC and the Field I/O shall be via the Ethernet network.
- .8 The DCS shall provide data entry screens for addition, deletion or modification of all input and output points and their operating characteristics. Data entry shall be customized and allow system administrators to modify points without having to understand or use traditional PLC programming techniques such as ladder logic.
- .9 The DCS shall provide data entry screens for the creation and modification of logical points. This would include the defining of doors where a door is the logical association of multiple and different low level points. Programming functions shall be from Microsoft Windows style dialog boxes, Microsoft design principles shall be applied for the creation of all data entry screens. For each door the system shall allow the definition of:
 - .1 Input point for the door monitor switch.
 - .2 Input point for the lock status switch.
 - .3 Output point that activates the lock.
 - .4 Intercom stations on either side of the door.
 - .5 CCTV cameras on either side of the door.
 - .6 Amount of time the door lock is activated for
 - .7 Amount of time the alarm switches are bypassed or shunted when the door is commanded to open.

- .8 Membership in a door interlock group.
- .9 The above items are intended to present a general intent and is not a complete listing of required functions. Submit with graphic screen presentation samples of all data entry screens for all system functions specified herein. These items are to be considered a shop drawing submittal.
- .10 The system shall have a master disable icon on primary workstations. Activation of this icon shall cause the system to suspend all functions at all operator consoles in the room. The workstations will be reset in the BSCS equipment room via the maintenance screen.
- .11 Install an Unman Switch in the vestibule outside the LCP that is connected to the system in such a manner that activating it will disable all monitoring and control functions in the LCP. This can be done by disabling the AC power or through software features. Enabling the system will be done in the BSCS room.
- .12 A device icon (door) selected at a workstation shall only be controllable (lock/unlock) from that same workstation while it is selected. Other workstations that display that same icon shall indicate that the device has been selected but shall not be controllable until the first location has unselected or completed the operation.
- .13 Following a power failure the door control system shall resume normal operation without human intervention and shall display the real time status of all the doors. Operators will be required to login on restoration of the system. Power failure is defined as any action or activity that causes a loss of electricity to the system motherboard.
- .14 The system shall provide for an orderly shutdown. Orderly shutdowns shall close all files and protect data such that no data is lost during the shutdown process.
- .15 Any number of cell doors, up to the maximum installed complement shall be capable of group operation without a system overload.
- .16 The unlocking of doors shall executable at any time regardless of whether there is an intercom connection to the door or not. The audio switcher intercom channels will remain active when changing screens.
- .17 The DCS shall log all events and activities to a database. Include a flexible reporting module that allows retrieval of all information or subsets of information.

3.04 SCOPE OF WORK

- .1 Detail-design, supply, install, configure, program and commission new DCS subsystem in accordance with CSC's ES/SPEC-0900 and as shown on the Drawings.
- .2 Operator shall be provided with the capability to identify the occupant of each cell with a 4-character mnemonic or abbreviation configurable from the touch-screen GUI.
- .3 Detail-design, supply, install, configure, program and commission two new operator interfaces in accordance with CSC's ES/SPEC-0900 and as shown on the Drawings. Operator Interface shall be associated with alternate control of any networked DCS subsystem.
- .4 Detail-design, configure, program and commission a local area network (LAN) as shown on the Drawings.

- .5 Interface the door control system and the electrical systems for the control of lighting throughout the Unit. All lighting zones are to be controlled from the touch screens in the Local Control Post. In the cells individual controls for the room light, night light and cell receptacle are to be provided. Install a separate PLC in the electrical room along with the necessary interface input / output modules and terminal blocks to control these functions.
- .6 Provide functionality and indicate interlock doors on screen.
- .7 System design will include monitoring of Fire Hose Cabinets.
- .8 All exterior door locks to be equipped with heaters.
- .9 Integrate DCS subsystems and LAN into one complete DCS employing control transfer and redundant operation as shown on the Drawings.
- .10 Provide all documentation, reports, plans, schedules, and manuals as defined within ES/SOW-0101.
- .11 Provide all specified spare parts and service manuals for maintenance of the Security Door Supervision system. Provide complete listing of provided parts including quantity, manufacturer, model number, and unit price.

3.05 DESCRIPTION OF EXISTING FACILITIES [if required]

- .1 Main Communications and Control Post (MCCP) [if required]
- .2 Unit Six Common Equipment Room (CER) [if required]

3.06 GOVERNMENT FURNISHED EQUIPMENT [if required]**3.07 SCHEDULE**

- .1 The general contractor will be responsible for establishing and coordinating the project schedule.
- .2 Documentation pre-requisites
 - .1 Installation shall not commence until Preliminary and Final Design Reports (PDR/FDR) defined by document ES/SOW-0101 have been submitted by Contractor and reviewed/accepted by CSC Technical Authority.
 - .2 Acceptance testing shall not commence until project-specific Acceptance Testing Procedures (ATP) defined by document ES/SOW-0101 have been submitted by Contractor and reviewed/accepted by CSC Technical Authority.
 - .3 Operator and Maintenance Technician Training shall not commence until project-specific Training course outlines and trainee handouts defined by document ES/SOW-0101 have been submitted by Contractor and reviewed/accepted by CSC Technical Authority.
 - .4 System substantial performance and commencement of the warranty period shall not commence until acceptable ATPs have been completed and signed off by both Contractor and CSC Technical Authority, and Operator training is complete. Substantial performance may nevertheless be granted in the presence of noted deficiencies at the discretion of the Crown.

- .5 Final completion will not be granted until system is in full operation, all noted deficiencies have been cleared and all documentation deliverables have been received by the Crown in the quantities specified.

3.08 CO-ORDINATION WITH INSTITUTIONAL OPERATIONS

- .1 Security Clearance
 - .1 No employee of the Contractor will be permitted to enter or work in the Institution without a current valid security clearance issued by CSC.
- .2 Precedence of Institutional Operations
 - .1 While working on this project, it is essential that Contractors take every precaution to reduce any disturbance to normal institutional operations to a minimum. On-site work may have to be performed at night or during other periods set by the Institution. The Contractor must recognize that it is essential that his personnel working on-site co-operate fully with the security staff at the institution by conforming to operational security requirements.

3.09 SEQUENCES OF OPERATION

- .1 System operation: when supervised door is opened, zone indicating lamp flashes and operates audible alarm at control panel. When "acknowledge" button is operated, audible signal is silenced and flashing light changes to steady glow.
- .2 System restored to normal when door is closed and "reset" key switch on control panel operated.
- .3 Buzzer located at each door to give pulsating signal when door opened. Upon acknowledgment from control panel signal to change to continuous note. Buzzer at door location to be silenced only after door reclosed and "reset" key switch operated. Closing of door alone not to affect signal once it has started to sound.
- .4 When deactivating switch is operated, supervised door on that zone opened without causing alarm. Zone trouble lamp illuminated when zone is deactivated but audible trouble signal not to sound.
- .5 Fault in wiring of one zone to cause audible signal to sound even if zone in deactivated position.

3.10 GRAPHIC SCREENS

- .1 Modify existing graphic screens that provide the new functionality shown indicated in the drawings.
- .2 Contractors shall submit three drafts and one final version of the screens prior to installing the screens on the system. Users shall provide feedback and this feedback will be incorporated in to the next submission. Complete all screen submissions and install on the system for the FAT.
- .3 These sample screens are to convey the general intent and do not include all details. Contractor is to confirm final operating characteristics with CSC. Costs for this consultation and the subsequent changes are to be included in the total contact price.
- .4 Ensure that interlocked doors are included in the "Screen Layouts", "Control 'System Operation", and "Logging and Reporting" sections.

3.11 SITE TESTS

- .1 Perform tests in accordance with Canadian Electrical Code.
- .2 Test system components in presence of [Engineer] [Consultant] to ensure correct operation of system. On completion of tests, submit to [Engineer] [Consultant] certificate listing components tested.

3.12 FINAL ADJUSTMENTS, TESTING AND COMMISSIONING

- .1 Upon completion of the work and during interim periods as required under the Contract, perform all final adjustments of levels, timing, equalization, limits, and operational sequences.
- .2 Conduct detailed testing of all systems and equipment. Submit certified test results to the Consultant for review.
- .3 Conduct commissioning procedures as required under the Contract. Submit report of results together with all required statements and certificates.

END OF SECTION

Part 1 General**1.01 SECTION INCLUDES**

- .1 Call Originating Devices (COD).
- .2 Call Cancellation Devices (CCD).
- .3 Primary Annunciation and Control GUI.
- .4 Data Logging.

1.02 REFERENCE DOCUMENTS

- .1 National Fire Protection Association (NFPA)
 - .1 NFPA 70, Article 517, National Electric Code.
 - .2 NFPA 101, Life Safety Code.
- .2 Electronic Industries Association (EIA)
 - .1 REC 12749, Power Supplies.
 - .2 RS 16051, Sound Systems.

1.03 REFERENCE STANDARDS

- .1 Canadian Standards Association, (CSA International)
 - .1 CSA C22.1-09, Canadian Electrical Code, Part 1 (21st edition) Safety Standard for Electrical Installations.
 - .2 CAN/CSA-C22.2 No. 182.4-M90 (R2006), Plugs, Receptacles, and Connectors for Communication Systems.
- .2 National Fire Protection Association (NFPA)
 - .1 NFPA 70 National Electric Code.
 - .2 NFPA 101 Life Safety Code.
- .3 Electronic Industries Association (EIA)
 - .1 EIA-310-C Electronic Industries
 - .2 REC 12749, Power Supplies.
 - .3 ANSI/EIA/TIA-568 Commercial Building.
- .4 Underwriters Laboratories of Canada (ULC)
 - .1 ULC-S317 (1996) Installation and Classification of Closed Circuit Video Equipment (CCVC) Systems for Institutional and Commercial Security Systems.

- .2 Underwriters' Laboratories (UL).
- .3 UL 294 (1999) Standard for Safety for Access Control System Units.
- .4 UL 1076 (1995) Standard for Safety for Proprietary Burglar Alarm Units and Systems.
- .5 Association Standard for Racks, Panels and Associated Equipment
- .6 Drawings
 - .1 T1-0
- .7 CSC Telecommunications Standards:
 - .1 ES/SOW-0101 – Procurement & Installation of Electronic Security Systems (Revision 3)
 - .2 ES/SOW-0102 – Quality Control for Procurement and Installations of Electronic Security Systems (Revision 5)
 - .3 ES/SOW-0404 – Electronic System Proposal Evaluation Criteria (Revision 1)
 - .4 ES/SPEC-0006 – Conduit, Space, and Power Requirements for Security Systems Use in Federal Correctional Institutions (Revision 2)
 - .5 ES/SPEC-0303 – Limited Call Intercom System for Use in Federal Correctional Institutions (Revision 2)
 - .6 ES/SPEC-0500 – Inmate Cell Call System for Use in Federal Correctional Institutions (Revision 2)
 - .7 ES/SPEC-0900 – Door/Barrier/Gate Control System for Use in Federal Correctional Institutions (Revision 2)
 - .8 ES/STD-0204 – Fixed/Zoom Lens Closed Circuit Television (Revision 1)
 - .9 ES/STD-0207 – High Security Enclosure Closed Circuit Television (Revision 1)
 - .10 ES/STD-0221 – Fixed Network Colour Closed Circuit Television Camera (Revision 0)
 - .11 ES/STD-0222 – Indoor Network Colour Dome Camera (with Pan/Tilt/Zoom) Closed Circuit Television (Revision 0)
 - .12 ES/STD-0227 – LCD Colour Computer Monitor Closed Circuit Television (Revision 0)
 - .13 ES/STD-0228 – Network Video User Station Closed Circuit Television (Revision 0)
 - .14 ES/STD-0229 – Network Video Recorder Closed Circuit Television (Revision 0)

- .15 ES/STD-0230 – NTSC-IP Video Converter Closed Circuit Television (Revision 0)
- .16 ES/STD-0231 – IP-NTSC Video Converter Closed Circuit Television (Revision 0)
- .17 ES/STD-0803 – Video Display Unit Electronic Systems (Revision 2)

1.04 DEFINITIONS

- .1 ATP Acceptance Testing Procedure/Plan
- .2 CEC Canadian Electrical Code
- .3 CER Common Equipment Room
- .4 CSA Canadian Standards Association
- .5 CSC Correctional Service of Canada
- .6 DCS Door Control System/subsystem
- .7 DIN Deutsches Institute fur Normung (a European Standards Organization)
- .8 ECCS Emergency Cell Call System
- .9 EIA Electronic Industries Association
- .10 ES Electronic Systems
- .11 FAAS Facility Alarm Annunciation System
- .12 FAT Factory Acceptance Test
- .13 FDR Final design Report
- .14 GFE Government Furnished Equipment
- .15 GUI Graphical User Interface
- .16 I/O Input/Output
- .17 ICCS Inmate Call System
- .18 KVM Keyboard/Video/Mouse
- .19 LAN Local Area Network
- .20 LCIS Limited Call Intercom System
- .21 LCP Local Control Post
- .22 MCCP Main Communications Control Post
- .23 MTBF Mean Time before Failure

- .24 PDC Power Distribution Centre
- .25 PDR Preliminary Design Report
- .26 PUI PIDS Integration Unit
- .27 PLC Programmable Logic Controller
- .28 PWC Public Works Canada (PWGSC's predecessor)
- .29 PWGSC Public Works & Government Services Canada
- .30 PTT Push-to-Talk
- .31 RU Rack Units (1.75" vertical space in an EIA-310C standard equipment rack)
- .32 SAC System Administration and Control
- .33 SCP Secure Control Post
- .34 SOW Statement of Work
- .35 SPEC Specification
- .36 STD Standard
- .37 T&E Telecommunications and Electronics
- .38 TES Telecommunications Equipment Space
- .39 UPS Uninterruptible Power Supply
- .40 VAC Volts, Alternating Current
- .41 VDC Volts, Direct Current

1.05 DESIGN PERFORMANCE REQUIREMENTS

- .1 Provide an ECCS complete expansion with Call Originating Devices, Proximity Card Reader operated Call Cancellation Devices and annunciation at the LCP and the MCCP.
 - .1 Provide backup monitoring capability for the ECCS at the MCCP, route the signal from the COD to the MCCP if it is not answered at the LCP.
 - .2 The Inmate Cell Call alarms are to be displayed and recorded on the FAAS in the MCCP.
 - .3 Provide equipment, cabling, installation, programming, and configuration, software interface, testing, and training for upgrade to existing FAAS system for datalogging of cell call in the reconstructed unit.
- .2 Environment: Design components and systems to operate with all specified requirements under following ambient temperatures:

- .1 Indoor installations:
 - .1 Temperature: 0°C to 30°C.
 - .2 Humidity: 10 to 90%.
- .2 Outdoor installations:
 - .1 Temperature: -40°C to 60°C.
 - .2 Humidity: 10 to 100%.

1.06 SUBMITTALS

- .1 Product Data: Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings: Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit shop drawings to indicate project layout, camera locations, point-to-point diagrams, cable schematics, risers, mounting details and identification labelling scheme including:
 - .1 Functional description of equipment.
 - .2 Technical data sheets of all devices.
 - .3 Device location plans and cable lists.
- .3 Samples: Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit one sample of each COD, CCD, Primary Annunciation and Control selected complete with housing, brackets and mounting hardware.
 - .2 Samples will be returned for incorporation into work as appropriate.
- .4 Quality Assurance Submittals: Submit the following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Test Reports: Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
 - .2 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .1 Submit UL Product safety Certificates.
 - .3 Instructions: Submit manufacturer's installation instructions.
 - .4 Manufacturer's Field Services: Submit copies of manufacturer's field reports.
- .5 Maintenance Data: Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals. Include following:

- .1 System configuration and equipment physical layout.
- .2 Functional description of equipment.
- .3 Instructions on operation, adjustment and cleaning.
- .4 Illustrations and diagrams to supplement procedures.
- .5 Manufacturer's operation instructions
- .6 Document Requirements:
 - .1 General: Submit three (3) copies of each hard and computer disk copies of all documents in accordance with ES/SOW-0101.
 - .2 Submit three (3) copies of modified operational manuals in accordance with ES/SOW-0101.
 - .3 Preliminary Design Report (PDR): Provide documentation defined by ES/SOW-0101 Section 4.1.
 - .4 Final Design Report (FDR): Provide documentation defined by ES/SOW-0101 Section 4.3.
 - .5 Acceptance Testing Plan (ATP): Provide documentation defined by ES/SOW-0101 Sections 6.1 and 7.2. ATP shall also include test procedure and certificate for fiber optic communications channels.
 - .6 Training Plan and Course Materials: Provide documentation defined by ES/SOW0101 Section 8.2 .3 Operator and Maintenance Technician Training shall not commence until project-specific Training course outlines and trainee handouts defined by document ES/SOW-0101 have been submitted by Contractor and reviewed/accepted by CSC Technical Authority.
 - .7 Operator Manual(s): All CCTV related components and provide generic manual for touch-screen operation, CCTV interface, as well as system specific information summarizing the operator training course content.
 - .8 Maintenance Manual: Provide documentation defined by ES/SOW-0101 Section.

1.07 WASTE MANAGEMENT AND DISPOSAL

- .1 Deposit packaging materials in appropriate container on site for recycling or reuse.
- .2 Avoid using landfill waste disposal procedures when recycling facilities are available.
- .3 Collect and separate plastic, paper packaging and corrugated cardboard.
- .4 Dispose of corrugated cardboard, polystyrene and plastic packaging material in appropriate on-site bin.

1.08 WARRANTY

- .1 Manufacturer's Warranty: Submit, for Consultant's acceptance, manufacturer's standard warranty document executed by authorized company official.
- .2 Provide one (1) year warranty on defective parts and installation labour, commencing on the date of system acceptance by CSC.

1.09 PERFORMANCE REQUIREMENTS

- .1 Security Clearance
 - .1 No employee of the Contractor will be permitted to enter or work in the Institution without a current valid security clearance issued by CSC.
- .2 Precedence of Institutional Operations
 - .1 While working on this project, it is essential that Contractors take every precaution to reduce any disturbance to normal institutional operations to a minimum. Onsite work may have to be performed at night or during other periods set by the Institution. The Contractor must recognize that it is essential that his personnel working onsite cooperate fully with the security staff at the institution by conforming to operational security requirements.
- .3 All work shall be coordinated with the Technical Authority and the institutional staff.
- .4 Contractor Experience
 - .1 The contractor shall provide evidence of five (5) years' experience in the detail design, supply and installation of Emergency Inmate Cell Call Systems in Federal Correctional Facilities.
 - .2 Contractor shall demonstrate full compliance with the mandatory requirements set out in ES/SPEC-0404, including corporate capability; qualifications and experience of personnel assigned to the project; a full understanding, and capability to fulfil warranty obligations; ability to obtain the necessary level of security clearance for its onsite personnel to the installation locations; and the ability to execute the Contract in the language designated at the installation site.
- .5 Service Response Capability
 - .1 Contractor shall provide service response capability within twenty-four (24) hours both during and after the system warranty period.

1.10 SCOPE OF WORK

- .1 The word 'provide' shall mean to detail-design, supply and install, configure and test, program, commission and warrant the system.
- .2 Expand the existing Cell Call Subsystem Expansion in accordance with the CSC ES/ES/SPEC-0500 and as shown on the drawings utilizing state-of-art technology with major brand name from a manufacturer with ISO9001 or better standards.
- .3 Provide a completed system with all necessary components, programming, commissioning, patch cables, and interface devices as required and regardless of mention to provide a complete functioning system.
- .4 All cables must be installed in rigid steel conduit fitted with double the normal number of support hangar. Administration areas not normally accessed by inmates may use standard EMT. Conduits will be provided by Division 26. Review the scope of work as defined in Division 26 and include any additional raceways that may be required to suit the system being installed.

- .5 Use CAT-6 cable with a specific colour different from the rest of the facility's colour coding to clearly identify the cable as for use with the Cell Call system.
- .6 Provide all specified spare parts and service manuals for maintenance of the Cell Call system. Provide complete listing of provided parts including quantity, manufacturer, model number, and unit price.

1.11 SYSTEM DESCRIPTION

- .1 Call Originating Devices (COD).
- .2 Call Cancellation Devices (CCD).
- .3 Primary Annunciation and Control GUI.
- .4 Data Logging shall be via the PIU FAAS.

1.12 CELL CALL GENERAL OPERATION:

- .1 Refer to ES/SPEC-500.

1.13 FUNCTIONAL REQUIREMENTS

- .1 Refer to ES/SPEC-0500.

1.14 PERFORMANCE REQUIREMENTS

- .1 Refer to ES/SPEC-500.

Part 2 Products

2.01 MATERIALS

- .1 Cell call equipment to be designed and manufactured in accordance with ISO-9001 1994 Quality System Standard.
- .2 Manufacturer's quality control program to be registered in accordance with the above noted standard.
- .3 Units of the same type of equipment shall be products of a single manufacturer. All material and equipment shall be new and currently in production. Each major component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place. Material will conform to the applicable requirements of the Underwriters Laboratories and the National Standards Institute.
- .4 All system equipment and field devices to be held securely in place. Fastenings and supports shall be selected to provide a safety factor of three.
- .5 All systems equipment equipped with plug in power connectors to be connected to a dedicated receptacle. Do not use tap connectors for plugging in multiple plugs into a single receptacle.
- .6 Acceptable Manufacturers

- .1 Harding Instruments

2.02 JUNCTION BOX

- .1 Metal, sized to handle all system conduit interconnections with appropriate expansion.

2.03 RADIO FREQUENCY INTERFERENCE

- .1 Ensure that all equipment and systems are capable of operating under RFI conditions at the site. All corrective action is to be at the Contractors cost.

2.04 IN CELL CALL OPERATING DEVICE

- .1 In cell COD shall be a vandal resistant long life switch designed for this purpose.
- .2 Units to be designed for mounting in concrete or block walls with the actuator to provide an extremely high level of ruggedness and security.
- .3 In cell COD to be mounted on heavy duty 11 gauge cover plate mounted to the back box with approved security screws.
- .4 Units to include line supervision circuitry.
- .5 Call Operating Device shall be equivalent to Harding Instruments ICM-400 Series with a two-gang faceplate.

2.05 CALL CANCELLATION DEVICE

- .1 Call cancellation device to be vandal resistant proximity card reader type mounted on 11 gauge steel single gang plate. To be of same manufacturer and model to match devices used in existing institution.
- .2 Devices equivalent in durability to Essex Electronics Extreme Proximity.

2.06 EQUIPMENT ENCLOSURE

- .1 Adapt existing equipment enclosures for expansion of system.
- .2 Ensure sufficient venting for enclosures.

2.07 WIRE AND CABLE

- .1 CSC Specification ES/SPEC-0006 – Conduit, Space, and Power Requirements for Security Systems Use in Federal Correctional Institutions (Revision 2) applies.
- .2 Factory manufactured field interface cables to be provided, as required for all:
 - .1 Master station ports
 - .2 Station control card ports
- .3 Field wiring to conform to manufacturer's recommendations.
- .4 Unless otherwise noted, all wiring is to be installed in conduit or wireways.

- .5 If more or larger conduit is required than exists or is indicated on the drawings, allow for such additional conduit in contract price.
- .6 All cable within equipment racks, cupboards, and cabinets, or on backboards, to be neatly bundled and secured.
- .7 Wires shall not be nicked, have strands removed, or have frayed strands when removing insulation or terminating.
- .8 Factory manufactured interface cables to be provided for each field interface board. Terminal blocks to be provided in cabinet or on backboard for factory cable interface to field wiring.
- .9 Wiring shall be executed in strict adherence to standard broadcast practices.
- .10 Colour identification of wiring:
 - .1 Identify wiring by continuous insulation colour.
 - .2 Where multi-conductor cables are used, use the same colour-coding system for identification throughout.
- .11 Maintain uniform phasing and colour-coding throughout system.
- .12 Name identification of wiring:
 - .1 Identify wiring at all equipment locations, pull boxes, junction boxes and outlet boxes.
 - .2 Develop a uniform identification scheme for use throughout the system.
 - .3 Record wire name identification on all applicable drawings and provide wiring tables within the operating and installation manuals.
- .13 Use one of the following marking materials:
 - .1 Heat shrink sleeves.
 - .2 Clear plastic tape wrap-on strips with designated labelling sections.
 - .3 Slip-on identification bead markers or sleeves.

Part 3 Execution**3.01 DETAILED DESIGN DEVELOPMENT**

- .1 Upon Contract Award, prepare and submit PDR to CSC Design Authority.
- .2 Upon CSC acceptance of PDR, prepare and submit FDR to CSC Design Authority.
- .3 Upon CSC acceptance of FDR, proceed with procurement, manufacture and staging of products compliant with FDR. Prepare subsystem configurations using licensed software. Prepare and submit ATP, training course outlines and materials and operating manual to CSC Design Authority.

- .4 Conduct off-site Factory Acceptance Test (FAT) witnessed by CSC Design Authority, to demonstrate compliant subsystem operation, subsystem non-interference, and system-wide control transfer and redundancy performance.
- .5 Provide all work for inmate cell call alarms to be displayed, controlled, and logged on the FAAS, in the MCCP. New cell call annunciation and controls on the FAAS are to be consistent with existing system naming conventions and procedures. Confirm response procedures with Owner regarding delay times for response from the MCCP.
- .6 {Balance of execution details to be developed}

3.02 GENERAL INSTALLATION PROVISIONS

- .1 Inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- .2 Verify the accuracy of all dimensions, allowance, and clearances on site prior to commencing with any work that may be affected by those dimensions, allowances, and clearances.
- .3 Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in the Contract Documents.
- .4 All wall mounted devices will be housed in steel blocks wherever there is a concrete block wall.
- .5 Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- .6 Supervise construction activities to ensure that no part of the Work, completed or in progress is subject to harmful, dangerous, damaging or otherwise deleterious exposure during the construction period.
- .7 Precautions shall be taken to guard against electrostatic and electromagnetic susceptibility and interference.
- .8 Provide adequate ventilation for all heat radiating equipment.
- .9 Install equipment so as to provide maximum safety to the operating and maintenance personnel.

3.03 METHOD OF WORK

- .1 Work to be performed by fully competent technicians in a thorough manner.
- .2 All workmanship to be of the highest quality and meet recognized standards of craftsmanship.
- .3 Areas of installation deemed not acceptable by the Owner to be redone at the Contractor's expense.

3.04 PROTECTION OF EXISTING PROPERTY

- .1 Be responsible for protecting all existing property including floors, walls, ceilings, furniture, and furnishings from damage, dust and other construction related activities. Provide all necessary dust covers and protective pads required for performance of the Work.
- .2 Remove all debris and protective coverings at the end of each work period. Leave premises in condition found at start of work in each room or area of work.
- .3 Except for scheduled activities, do not inconvenience user due to construction operations.

3.05 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and datasheet.
- .2 Manufacturers' directions shall be followed in all cases where the manufacturers of equipment or materials used in the Work furnish directions covering points not shown on the Drawings or Specifications.

3.06 INSTALLATION

- .1 Installation shall not commence until Preliminary and Final Design Reports (PDR/FDR) defined by document ES/SOW-0101 have been submitted by Contractor and reviewed/accepted by CSC Technical Authority.
- .2 All work shall be coordinated with the Technical Authority and the Institutional staff.
- .3 Provide complete Inmate cell call system as indicated on the drawings and specified herein.
- .4 Install cable, boxes, mounting hardware, brackets, and system components in accordance with manufacturer's written installation instructions.
- .5 Install components secure, properly aligned and in locations shown on reviewed shop drawings.
- .6 Install equipment so that manufacturers', ULC and CSA labels are visible and legible. Install ULC labels where required.
- .7 Units to be mounted outside or subject to inclement conditions shall be weatherproof or be mounted in weatherproof enclosures.
- .8 Engrave all cell call cover plates with "CALL", including installed cover plates and spares. Coverplates to be engraved prior to installation.
 - .1 Nylon tubing for Section 11 19 20 shall be run with the low voltage device wires in conduit, raceways or cable trays. Low voltage wire and pneumatic tubing shall be pulled in the same conduit raceway by Sections 27 51 23, 28 13 27, 28 13 29 and 28 23 00. Nylon tubing must be run continuously from pneumatic lock to manifold in BSCS Room, or other designated location where pneumatic manifolds will be installed. Splices or tees shall **NOT** be

permitted. Sections 27 51 23, 28 13 27, 28 13 29 and 28 23 00 Contractor is responsible for pulling the nylon tubing.

3.07 FIELD QUALITY CONTROL

.1 Manufacturer's Services:

- .1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, and protection and cleaning, of its products and submit written reports, in acceptable format, to verify compliance of Work with Contract.
- .2 Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .3 Schedule site visits, to review Work, at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of the Work, after cleaning is carried out.

3.08 SYSTEM DOCUMENTATION

- .1 General: Submit two (2) sets hardcopy (paper) plus one (1) set softcopy (computer files) documentation at each submittal.
- .2 Preliminary Design Report (PDR): Provide documentation defined by ES/SOW-0101 Section 4.1
- .3 Final Design Report (FDR): Provide documentation defined by ES/SOW-0101 Section 4.3
- .4 Acceptance Testing Plan (ATP): Provide documentation defined by ES/SOW-0101 Sections 6.1 and 7.2. ATP shall also include test procedure and certificate for fibre-optic communications channels.
- .5 Training Plan and Course Materials: Provide documentation defined by ES/SOW-0101 Section 8.2
- .6 Operator Manual(s): All CCTV related components and provide generic manual for touch-screen operation, CCTV interface, as well as system-specific information summarizing the operator-training course content.

3.09 VERIFICATION

- .1 Operator and Maintenance Technician Training shall not commence until project-specific Training course outlines and trainee handouts defined by document ES/SOW-0101 have been submitted by Contractor and reviewed/accepted by CSC Technical Authority.

- .2 System substantial performance and commencement of the warranty period shall not commence until acceptable ATPs have been completed and signed off by both Contractor and CSC Technical Authority, and Operator training is complete. Substantial performance may nevertheless be granted in the presence of noted deficiencies at the discretion of the Crown.
- .3 Final completion will not be granted until system is in full operation, third party written tests submitted and verified by the consultant, all noted deficiencies have been cleared and all documentation deliverables have been received by the Crown in the quantities specified.
- .4 Acceptance testing shall not commence until project Acceptance Testing Procedures (ATP) defined by document ES/SOW-0101 have been submitted by Contractor and reviewed/accepted by CSC Technical Authority.
- .5 Conduct offsite Factory Acceptance Test (FAT) witnessed by CSC Design Authority, to demonstrate compliant subsystem operation, subsystem non-interference, system-wide control transfer and redundancy performance.
- .6 Obtain reports, within three (3) days of review, and submit, immediately, to Consultant. Upon completion of the work and during interim periods as required under the Contract, perform all final adjustments of levels, timing, equalisation, limits, and operational sequences.
- .7 Conduct detailed testing of all systems and equipment. Submit test results to the Consultant for review.
- .8 Conduct commissioning procedures as required under the Contract. Submit report of results together with all required statements and certificates.
- .9 Final completion will not be granted until system is in full operation, all noted deficiencies have been cleared and all documentation deliverables have been received by the Crown in the quantities specified.
- .10 Perform verification inspections and test in the presence of Consultant.
 - .1 Provide all necessary tools, ladders and equipment.
 - .2 Ensure appropriate subcontractors, and manufacturer's representatives are present for verification.
- .11 Visual verification: Objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents. Visual inspection to include:
 - .1 Sturdiness of equipment fastening.
 - .2 Non-existence of installation related damages.
 - .3 Compliance of device locations with reviewed shop drawings.
 - .4 Compatibility of equipment installation with physical environment.

- .5 Inclusion of all accessories.
- .6 Device and cabling identification.
- .7 Application and location of ULC approval decals.
- .12 Technical verification: Purpose to ensure that all systems and devices are properly installed and free of defects and damage. Technical verification includes:
 - .1 Measurements of tension and power.
 - .2 Connecting joints and equipment fastening.
 - .3 Measurements of signals (dB, baud rate, etc).
 - .4 Compliance with manufacturer's specification, product literature and installation instructions.
- .13 Operational verification: Purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes:
 - .1 Operation of each device individually and within its environment.
 - .2 Operation of each device in relation with programmable schedule and or/specific functions.
 - .3 Demonstrate:
 - .1 Refer to ES/SPEC-0500.

3.10 CLEANING AND ADJUSTING

- .1 Remove protective coverings from components.
- .2 Adjust for correct function.
- .3 Clean housing, system components, free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

END OF SECTION

Part 1 General**1.01 SECTION INCLUDES**

- .1 System
 - .1 Software
 - .2 Receiver
 - .3 High Gain Antenna
- .2 Transmitters
- .3 Transmitter Programmer
- .4 Power supply
- .5 UPS
- .6 Cable

1.02 REFERENCE DOCUMENTS

- .1 CSC Specifications:
 - .1 ES/SOW-0101 – Procurement & Installation of Electronic Security Systems (Revision 3)
 - .2 ES/SOW-0102 – Quality Control for Procurement and Installations of Electronic Security Systems (Revision 5)
 - .3 ES/SOW-0404 – Electronic System Proposal Evaluation Criteria (Revision 1)
 - .4 ES/SPEC-0006 – Conduit, Space, and Power Requirements for Security Systems Use in Federal Correctional Institutions (Revision 2)
 - .5 ES/SPEC-0600 – Personal Portable Alarm Systems (Revision 2)
 - .6 ES/SPEC-0601 - Fixed Point Security Alarm System (Revision 2)
 - .7 ES/SPEC-0602 - PPA system (Revision 3)
- .2 Canadian Standards Association (CSA) International
 - .1 CSA C22.1-09, Canadian Electrical Code, Part 1 (21st edition) Safety Standard for Electrical Installations.
 - .2 CAN/CSA-C22.2 No. 182.4-M90 (R2006), Plugs, Receptacles, and Connectors for Communication Systems.
- .3 Electronic Industries Alliance (EIA)
 - .1 REC 12749, Power Supplies.
 - .2 ANSI/EIA/TIA-568 Commercial Building.

.4 Underwriters' Laboratories (UL)

.1 UL 1635 (1996) The Standard for Digital Alarm Communicator System Units.

1.03 DEFINITIONS

.1 ATP - Acceptance Testing Procedure/Plan

.2 BSCS – Building Security & Communication System

.3 CEC - Canadian Electrical Code

.4 CER - Common Equipment Room

.5 CSA - Canadian Standards Association

.6 CSC - Correctional Service of Canada

.7 DCS - Door Control System/subsystem

.8 EIA - Electronic Industries Association

.9 ES - Electronic Systems

.10 FAAS - Facility Alarm Annunciation System

.11 FAT - Factory Acceptance Test

.12 FDR - Final design Report

.13 GFE - Government Furnished Equipment

.14 GUI - Graphical User Interface

.15 LCP - Local Control Post

.16 LED - Light Emitting Diode.

.17 MCCP - Main Communications Control Post

.18 MTBF - Mean Time before Failure

.19 OFC - Optical Fibre Cable

.20 PC - Personal Computer

.21 PDC - Power Distribution Centre

.22 PDR - Preliminary Design Report

.23 PE - Principal Entrance

.24 PIN - Personal Identification Number.

.25 PIU - Perimeter Intrusion Unit

- .26 PPA - Portable Personal Alarm
- .27 PPD - Personal Protection Device
- .28 PWC - Public Works Canada (PWGSC's predecessor)
- .29 PWGSC - Public Works & Government Services Canada
- .30 RFI: Radio Frequency Interference.
- .31 RU - Rack Units (1.75" vertical space in an EIA-310C standard equipment rack)
- .32 SAC - System Administration and Control
- .33 SCP - Secure Control Post
- .34 SOW - Statement of Work
- .35 SPEC - Specification
- .36 STD - Standard
- .37 STP - Shielded Twisted Pair.
- .38 T&E - Telecommunications and Electronics
- .39 TES - Telecommunications Equipment Space
- .40 UPS - Uninterruptible Power Supply
- .41 UTP - Unshielded Twisted Pair.
- .42 VAC - Volts, Alternating Current
- .43 VDC - Volts, Direct Current
- .44 LCD - Liquid Crystal Display.

1.04 PERFORMANCE REQUIREMENTS

- .1 Security Clearance
 - .1 No employee of the Contractor will be permitted to enter or work in the Institution without a current valid security clearance issued by CSC.
- .2 Precedence of Institutional Operations
 - .1 While working on this project, it is essential that Contractors take every precaution to reduce any disturbance to normal institutional operations to a minimum. Onsite work may have to be performed at night or during other periods set by the Institution. The Contractor must recognize that it is essential that his personnel working onsite cooperate fully with the security staff at the institution by conforming to operational security requirements.
- .3 All work shall be coordinated with the Technical Authority and the institutional staff.

- .4 Contractor Experience
 - .1 The contractor shall provide evidence of five (5) years' experience in the detail design, supply and installation of Portable Alarm Location Systems in Federal Correctional Facilities.
 - .2 Contractor shall demonstrate full compliance with the mandatory requirements set out in ES/SPEC-0404, including corporate capability; qualifications and experience of personnel assigned to the project; a full understanding, and capability to fulfil warranty obligations; ability to obtain the necessary level of security clearance for its onsite personnel to the installation locations; and the ability to execute the Contract in the language designated at the installation site.
- .5 Service Response Capability
 - .1 Contractor shall provide service response capability within twenty-four (24) hours both during and after the system warranty period.

1.05 SUBMITTALS

- .1 General: Submit two (2) sets hardcopy (paper) plus one (1) set softcopy (computer files) documentation at each submittal.
- .2 Preliminary Design Report (PDR): Provide documentation defined by ES/SOW-0101 Section 4.1.
- .3 Final Design Report (FDR): Provide documentation defined by ES/SOW-0101 Section 4.3.
- .4 Acceptance Testing Plan (ATP): Provide documentation defined by ES/SOW-0101 Sections 6.1 and 7.2. ATP shall also include test procedure and certificate for fibre optic communications channels.
- .5 Training Plan and Course Materials: Provide documentation defined by ES/SOW-0101 Section 8.2.
- .6 Operator Manual: Provide generic manual for touch-screen operation, as well as system-specific information summarizing the operator-training course content.
- .7 Provide data for incorporation into maintenance manual specified in CSC Specification ES/SOW-0101 – Procurement & Installation of Electronic Security Systems (Revision 3).
- .8 Include description of system operation.
 - .1 Include parts list using component identification numbers standard to electronics industry.

1.06 CLOSEOUT SUBMITTALS

- .1 Provide data for incorporation into Operation & Maintenance manuals as specified in Section 01 78 00 - Closeout Submittals and
- .2 O&M manuals to include:
 - .1 Table of contents.

- .2 Warranty information.
- .3 Completed test reports and certificates.
- .4 Include parts list using component identification to electronics industry standard and serial numbers.
- .5 Description of system operation.
- .6 Functional description for equipment.
- .7 Product data.
- .8 Manufacturer's installation instructions.
- .9 Maintenance schedule.
- .10 Cleaning instructions.
- .11 Training manual.
- .3 As-built Drawings to include:
 - .1 Equipment layout, indicate device type at each location on the floorplans.
 - .2 Device mounting and location details.
 - .3 Wiring diagrams.
 - .4 Typical devices connection detail drawings.
 - .5 Wiring diagrams.
 - .6 Zone layout drawing indicating number and location of zones and areas covered.

1.07 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

1.08 WARRANTY

- .1 Manufacturer's Warranty: Submit, for Consultant's acceptance, manufacturer's standard warranty document executed by authorized company official.
- .2 Provide one (1) year warranty on defective parts and installation labour, commencing on the date of system acceptance by CSC.

1.09 PERFORMANCE REQUIREMENTS

- .1 Installation Contractor shall be a fully authorized dealer of Senstar Stellar Products. Proof of authorization shall accompany all documents. The Contractor must show proof of trained technical personnel as per manufacturer's requirements.

- .2 System shall be installed to provide ease of operation, servicing, maintenance, testing and expansion of additional services.
- .3 The Portable Personal Alarm (PPA) system shall meet safety requirements specified in accordance with UL standards.
- .4 The system shall be provided with a high level of flexibility and comprehensive system management and database reporting facilities.
- .5 Allow monitoring of overall system for functionality and alarms from multiple points.
- .6 Demonstrated MTBF for the PPA system (excluding consumable items such as batteries) shall be less than one failure per two years per 4,645 square m (50,000 square ft.) of indoor coverage, and less than one failure per two years per 18,580 square m (200,000 square ft.) of outdoor coverage.

1.10 SCOPE OF WORK

- .1 Relocate existing PPA system receiver as shown on the drawings and specified herein.
- .2 Recalibrate relocated receiver at the completion of construction.
- .3 Provide training and Operation & Maintenance manuals, as-built documentation, personnel training, demonstration, commissioning and extended warranty.
- .4 Supply and install PPA system as follows:
 - .1 Relocation and recalibration of existing PPA receiver unit, and cabling.
 - .2 Systems programming, configuration, testing and commissioning.
- .5 All cables will be installed in raceways unless noted otherwise.
- .6 Provide written test results on a device-by-device basis as part of the base bid.
- .7 Provide modified service manuals for maintenance of the PPA system.

Part 2 Products

2.01 SYSTEM OVERVIEW

- .1 The PPA system shall provide a means of identifying and locating a person wearing a Personal Protection Device (PPD) within a prescribed area, when the person initiates a duress alarm.
- .2 An alarm is on the PPD unit by pressing the button on the unit, removing a pin attached to a lanyard from the PPD, or by tilting the PPD beyond a specified angle for a specified period (man-down feature).
- .3 The PPA system shall consist of individual PPDs that are carried by staff, a receiving system that determines the identification and location of each PPD transmitting a call and a reporting system, which is capable of displaying both the identification and location of the PPD that has generated the duress call on computer-based facility maps.

- .4 The PPA system shall have the ability to simultaneously display the identity and the location of multiple PPDs that are reporting duress alarms, within a facility.
- .5 The PPA system shall maintain a historical record and archive of all duress alarms, from all PPDs. The record shall include the alarm ID, date and time at which the duress alarm was received. The record shall be saved in a common format so that the data can be exported and accessed for analysis and archiving.
- .6 The PPA system shall, as an option, be capable of communicating duress alarm information to computer-based third party equipment, through the development of appropriate software data protocols.
- .7 The PPA system shall operate within a licensed frequency band that will not be shared by other RF equipment at the same location.
- .8 The PPA system equipment shall carry the appropriate RF registrations for use in the country where it will be installed.

2.02 STANDARD OF ACCEPTANCE

- .1 Senstar Stellar Flare – Portable Personal Alarm (PPA) system.
- .2 Senstar Stellar Flash – Personal Protection Device (PPD), use existing.
- .3 System to be compatible with existing facility equipment.

2.03 MATERIALS

- .1 Use and relocate existing system sensors.
- .2 Mount power supplies and power distribution terminal strips in locked wall-mounted cabinets.
- .3 All wall mounted devices will be housed in steel blocks wherever there is a concrete block wall.
- .4 Equipment shall operate from a primary power source of 110 V AC, 60 Hz AC power. Provide transformers and power supplies to achieve required system voltage levels.
- .5 Contractor shall provide the system set-up and data entry for a complete and fully operational system. Provide the Owner with data forms and instructions on how to fill out the forms for all user defined data.
- .6 Contractor shall install and configure the graphic maps for the system. The entire facility shall be shown on the maps and all installed devices shall be shown on the maps. The maps shall be laid out in a logical manner consistent with the operating areas of the facility. Submit draft maps to the Consultant for review and approval. Correct and modify the maps as directed by the Consultant.

2.04 OPERATION

- .1 The PPA system shall audibly report the occurrence of a duress alarm within two seconds of the PPD transmission. The identity and location of the duress alarm shall be displayed on a graphic site map of the facility within six seconds of the PPD transmission.

- .2 The PPA system shall be capable of identifying and locating transmitting PPDs outside of a building to a minimum distance of 91 m (300 ft.) from the building, without requiring the installation of any system equipment outside the building.
- .3 The PPA system shall be capable of reporting the identification and location of PPD transmissions in outdoor areas, regardless of size, by installing the appropriate system equipment.
- .4 A valid alarm from a PPD shall never fail to be reported by the PPA system because a person's body covered the PPD.
- .5 The PPA system shall provide both indoor and outdoor identification and location in multi-building (campus) configurations. In fully enclosed structures, where floors and rooms are completely delimited by concrete and steel materials, the system shall be able to locate PPDs with an indoor accuracy to within a 6 m (20 ft.) radius. The system shall be able to locate PPDs with an outdoor accuracy to within a 15 m (50 ft.) radius.
- .6 In fully enclosed structures, where floors and rooms are completely delimited by concrete and steel materials, the PPA system shall provide accurate PPD transmission locations to the correct floor of a building, on the correct side of an exterior wall, and within the defined locating accuracy, with a minimum success rate of 95%, averaged over the entire site. PPD transmission location accuracy shall be qualified through a predefined, and agreed upon, site acceptance test procedure, performed by the installer.
- .7 A valid alarm from a PPD shall be reported by the PPA system anywhere within the defined area of indoor and outdoor coverage with a minimum reliability of 99.9%. An alarm shall never fail to be reported because of the presence of nearby concrete walls, metal structures, or other environmental considerations inside or outside of buildings, if such considerations were in place at the time of the installation of the system.
- .8 A valid alarm from a PPD shall never fail to be reported by the PPA system anywhere within the defined area of indoor and outdoor coverage as a result of doors to cells, corridors, or other rooms or areas being closed or opened.
- .9 Locating accuracy and alarm reporting reliability shall not be degraded by smoke, sunlight, infrared or visible light sources, or by sonic or ultrasonic noise.
- .10 Locating accuracy and alarm reporting reliability shall not be degraded by the presence of metal in concrete or block walls, in floors, or in other structures providing the metal was in place at the time of the system's installation.
- .11 Locating accuracy and alarm reporting reliability shall not be degraded by the presence of nearby electrical equipment including computers, radios, and other devices, provided the equipment meets current National Regulatory requirements for RF emissions.
- .12 Each person using the PPA system shall wear a PPD. A user shall be capable of transmitting a duress alarm, which will be reported at the control computer, by pressing a button on the PPD. Optionally, a PPD shall be capable of transmitting a duress alarm by the removal of a pin attached to a lanyard from the PPD, or by the activation of the man-down function. The man-down function shall include the following user-programmable features:
 - .1 Tilt angle,
 - .2 Audible warning of pending alarm,

- .3 Silent mode (no audible warning),
- .4 Time delay before warning of pending alarm,
- .5 Warning duration, and
- .6 Optional retransmission of the man-down alarm at user-defined intervals.
- .13 An alarm shall always be reported as originating from one location. A duress alarm shall not be reported as originating from more than a single location, or from several possible locations.
- .14 An alarm shall report floor level in multi-level facilities.
- .15 The location of a duress alarm transmission shall be visually presented on a computer generated graphic floor plan of all, or part, of the facility. The boundary of the zone in alarm shall be highlighted. Optionally, the alarm point within the zone shall be displayed.
- .16 The acknowledgement and clearing of duress alarms, and all other alarm handling functions, shall be performed using a computer mouse and a point-and-click interface. A computer keyboard shall not be required for the alarm processing operation of the PPA system.
- .17 The PPA system shall continuously monitor the state of all system hardware. The system shall be capable of immediately reporting a maintenance or diagnostic alarm, upon the detection of a system problem or the failure of a hardware component.
- .18 The failure of AC power, resulting in the operation of any installed equipment on its integral backup battery, shall result in a warning alarm within ten (10) minutes of the condition having been continuously present.
- .19 The PPA system shall create and maintain a record of all system equipment failure alarms.
- .20 The PPA system shall report duress alarms with a distinct audible and visual indication that is easily distinguished from equipment, maintenance, and diagnostic alarms.
- .21 The system shall archive all alarm data. The archive shall include the ID, location, and time of each duress alarm, for all alarm occurrences. The log shall include the time at which each duress alarm was acknowledged and the time it was cleared.
- .22 Each PPD shall be configurable by the system administrator to report any desired identification code, without return to the factory. This will enable any PPD to be used as a replacement for another PPD that is damaged or otherwise needs to be replaced.
- .23 Optionally, each PPD shall be capable of being configured by the system administrator to transmit repeatedly after a duress call is initiated. In this way, a PPD can be tracked and located if the person carrying it does not remain in one location.
- .24 The PPD shall automatically report a low battery condition.
- .25 The PPD shall be capable of operating normally for a minimum of one week, following the reporting of a low battery condition.

- .26 The PPD shall use non-rechargeable, commercially available batteries, which can be replaced by the user, or by the system administrator.
- .27 Under normal operating conditions (i.e., 3 test transmissions per day, standard PPD) the PPD battery shall provide a minimum life time of one (1) year, before a low battery condition is reported.

2.05 RECORDING AND STORAGE OF ALARM DATA

- .1 The PPA system shall log all duress alarms, equipment failure alarms, and warning alarms to computer hard disk.
- .2 Duress alarms shall be displayed as a distinct log, separate from equipment failure and other alarms.
- .3 The data logged for each alarm shall include the identification and location of the alarm, the time of the alarm, the time that the alarm condition was acknowledged and the time that the alarm was cleared from the system.
- .4 All logged data shall be saved in a current Windows-compatible, commonly accessible data format, from which data can be exported or retrieved by the system administrator, or others, for analysis or to archive.
- .5 The PPA system administrator shall be provided with the capability of selecting and printing any, or all, alarms from the alarm logs on demand.
- .6 It shall be possible to convert and edit AutoCad files of the facility for use as floor plans in the control computer.

2.06 SYSTEM HARDWARE & SOFTWARE FUNCTIONALITY

- .1 The PPA system shall support communications between the distributed sensors and the control computer using any of, or a combination of, the following media:
 - .1 Unused existing fiber-optic links,
 - .2 Unused existing wire-pairs such as telephone or data lines,
 - .3 Shielded twisted-pair cabling, and
 - .4 Wireless paths (RF).
- .2 The PPA system shall be capable of locating PPDs accurately in all prescribed parts of a facility without requiring the installation of locating hardware in every room, closet, and other discrete location throughout the facility.
- .3 Each receiver and each system electrical device shall be capable of including, individual integral battery backup. When fully charged, the backup batteries shall provide a minimum of four (4) continuous hours of operation following the loss of AC power.
- .4 It shall be possible to configure the PPA system to operate at any of a number of frequencies within the approved band. The selection of the operating frequency for each site enables the system to avoid RF interference from pre-existing RF sources on, or near, the site.

- .5 The RF receivers, transmitters and other hardware items shall be microprocessor based, and shall be designed such that software reconfigurations and software upgrades can be accomplished without removing the units from the site. Installed equipment shall be capable of receiving software patches or software upgrades from the control computer at the site, without the need to physically access each piece of equipment.
- .6 The PPA system shall run regular diagnostic checks on all installed equipment, and it shall report any exceptions or failures as alarms on the control computer.
- .7 The PPA system shall perform a locating accuracy check, and RF receiver functionality verification a minimum of once per day, to ensure that all receiver equipment is functioning correctly.
- .8 The PPA system shall provide notification of the failure of any integral backup battery by means of a failure alarm or warning alarm.

2.07 ENVIRONMENTAL REQUIREMENTS

- .1 The PPDs shall be water resistant such that they will not malfunction after being exposed to 30 seconds of heavy rain.
- .2 Other than for cosmetic damage, the PPDs shall not be damaged or malfunction after six drops onto a tiled floor from a height of 1.5 m (5 ft.) with one drop on each of the six sides on three orthogonal axes.
- .3 The PPDs shall have an operating temperature range of -20°C to +60°C (-4°F to +140°F).
- .4 The receivers and other installed devices shall have an operating temperature range of -0°C to +60°C (0°F to +140°F).

2.08 SYSTEM CAPACITY

- .1 The PPA system shall support a minimum of 4,000 unique PPD identification codes.
- .2 The PPA system shall utilize local emergency power (from the closest mechanical room) to install IR locators for zone designation and wireless repeaters to extend coverage areas.
- .3 All transmissions of alarms shall be activated and transmitted through RF (radio frequency) signals. No additional wiring, trenching or conduit runs shall be acceptable to achieve alarm status between multiple structures.
- .4 The PPA system shall have several ways of presenting incoming alarms. Central computer and alarm software shall control all alarms and configuration of system operation.
- .5 System modules and transmitters shall be field programmable through the use of a laptop computer or programming module. No components of the system shall require dis-assembly in order to change features or software programming parameters.

2.09 PERSONAL PROTECTION DEVICE (PPD)

- .1 Existing devices to be employed.

2.10 EQUIPMENT ENCLOSURES

- .1 Supply and install all enclosures as per the drawings and as specified in Section 27 11 19 Communications Distribution Equipment.

2.11 UPS

- .1 Employ existing UPS power.

Part 3 Execution**3.01 MANUFACTURER'S INSTRUCTIONS**

- .1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions and datasheet.

3.02 INSTALLATION

- .1 Install PPA system and ancillary equipment modifications as indicated, in accordance with equipment manufacturer's written instructions and with recognized industry practices, to ensure that the Personal Portable Alarm System fulfils all requirements.
- .2 Comply with manufacturer's recommendations, procedures and standards for the assembly and operation of the PPA system. Provide system feature program requirements as per Consultant's directives. Provide detailed documentation on all programming and numbering of the system's modules, locators and transmitters for future reference.
- .3 Consideration shall be given to heat sensitive equipment so that it is not placed near or immediately over a heat source, such as a large power supply or a high power transceiver. All system modules that include microprocessor chips and related component equipment will be installed in an environmentally controlled room with an operating range of 0 - +40°C.
- .4 Equipment shall be located away from interference sources. It shall be the contractor's responsibility to insure that no interference on the radio frequency will disrupt or impede the performance or function of the PPA system. System should not be installed next to or near high voltage transformers or electrical devices. Receivers shall not be installed into metal cabinets or restrictive areas where RF signal would be impeded.
- .5 All terminators and connectors throughout the system shall have crimp on coaxial connectors, multi-pin connectors, solder terminals, telephone-type punch down terminal strips or machine wire-wrapped terminals in cabinets, and screw type or plug and socket connections at all equipment. Properly utilize terminations in the applications for which they are intended by the manufacturer.
- .6 Do not install control cables and power distribution wiring adjacent to signal cables. Power distribution cabling shall be on the opposite side from signal wiring in equipment enclosures and shall be uniformly located throughout an installation.
- .7 Construct racks and cabinets to easily accommodate interconnecting cables entering from above or below. Provide interconnecting cables with plugs for disconnecting each incoming and outgoing cable on at least one end.

- .8 All power wiring interconnects in each group of equipment racks or consoles shall be done with flexible conduit, properly installed and of the proper size.
- .9 Supply and install a custom cabinet to store PPDs.
- .10 All wall mounted devices will be housed in steel blocks wherever there is a concrete block wall.

3.03 METHOD OF WORK

- .1 Work to be performed by fully competent technicians in a thorough manner.
- .2 All workmanship to be of the highest quality and meet recognized standards of craftsmanship.
- .3 Areas of installation deemed not acceptable by the Owner to be redone at the Contractor's expense.

3.04 TESTING, ADJUSTING AND BALANCING

- .1 Except where otherwise specified, arrange and pay for testing, adjusting and balancing of system.
- .2 If test results do not conform to applicable requirements, repair, replace, adjust or balance equipment and systems. Repeat testing as necessary until acceptable results are achieved.
- .3 Log and tabulate test results in appropriate test plan.
- .4 Test, adjust and balance to verify the full and proper operation of each system component and integrated function.

3.05 FIELD QUALITY CONTROL

- .1 Manufacturer's Services:
 - .1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports in acceptable format to verify compliance of Work with Contract.
 - .2 Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of the Work, after cleaning is carried out.

- .4 Obtain reports, within three (3) days of review and submit immediately to the Consultant.

3.06 VERIFICATION

- .1 Perform verification inspections and test in the presence of Consultant.
- .2 Provide all necessary tools, ladders and equipment.
- .3 Ensure appropriate subcontractors and manufacturer's representatives are present for verification.
- .4 Visual verification:
 - .1 Objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents.
 - .2 Visual inspection to include:
 - .1 Sturdiness of equipment fastening.
 - .2 Non-existence of installation related damages.
 - .3 Compliance of device locations with reviewed shop drawings.
 - .4 Compatibility of equipment installation with physical environment.
 - .5 Inclusion of all accessories.
 - .6 Device and cabling identification.
 - .7 Application and location of ULC approval decals.
- .5 Technical verification:
 - .1 Purpose to ensure that all systems and devices are properly installed and free of defects and damage.
 - .2 Technical verification includes:
 - .1 Measurements of coverage patterns.
 - .2 Connecting joints and equipment fastening.
 - .3 Compliance with manufacturer's specification, product literature and installation instructions.
- .6 Operational verification:
 - .1 Purpose to ensure that devices and systems' performance meet or exceed established functional requirements.
 - .2 Operational verification includes:
 - .1 Operation of each device individually and within its environment.

- .2 Operation of each device in relation with programmable schedule and or/specific functions.
 - .3 Verify that System is fully operational and meets all system performance requirements of this specification.
 - .4 Total system test
 - .1 Proceed with testing when system and subsystems are functionally tested and accepted. Total System tests to verify that requirements have been met for DC (and/or audio), sub carrier and control signals in accordance with this specification.
 - .5 Safety
 - .1 Demonstrate with documentation that access control system meets safety requirements specified in UL 294.
- .7 Performance testing and commissioning
 - .1 Test procedure: perform test on a "go-no-go" basis.
 - .1 Make only operator adjustments required to show proof of performance.
 - .2 Test to demonstrate and verify that installed System complies with installation and technical requirements of this specification under operating conditions.
 - .3 Test results to be evaluated by Consultant as either acceptable or unacceptable using following procedures.
 - .2 Documentation review
 - .1 This review will determine if information provided is sufficient to meet requirements of this specification.
 - .2 Provide for review all system manuals, as installed drawings, pretest forms, antenna radiation patterns, equipment cabinet pictorials, antenna pictorials, antenna mount pictorials, video and audio equipment details.
 - .3 Mechanical inspection
 - .1 Arrange site tour for Consultant, Owners representatives and Contractor to review all areas to insure that all systems and subsystems are installed in place for proof of performance testing.
 - .2 Provide system inventory at this time. Verify following items before beginning proof of performance tests:
 - .1 All electrical power circuits designated for system equipment are properly labeled, wired, phased, protected and grounded.
 - .2 Conductor ends are protected by heat shrink wrap; audio spade lugs, barrier strips and punch blocks are used.

- .3 Dust, debris, solder splatter, etc. are cleaned and removed from site.
- .4 All equipment and cabling is properly labeled.
- .5 All equipment identified in system's equipment lists are in-place and properly installed.
- .6 Each system ground is installed in accordance with manufacturer's instructions and this specification.

3.07 CLEANING

- .1 Remove protective coverings from accessories and components.
- .2 Adjust all components for correct function.
- .3 Clean housings and system components, free from dirt, marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

END OF SECTION

Part 1 General**1.01 SECTION INCLUDES**

- .1 Cameras
 - .1 Fixed and cell cameras
- .2 Digital video management system
- .3 UPS
- .4 Cable

1.02 REFERENCE STANDARDS

- .1 Canadian Standards Association, (CSA International)
 - .1 CSA C22.1-09, Canadian Electrical Code, Part 1 (21st edition) Safety Standard for Electrical Installations.
 - .2 CAN/CSA-C22.2 No. 182.4-M90 (R2006), Plugs, Receptacles, and Connectors for Communication Systems.
- .2 Electronic Industries Association (EIA)
 - .1 REC 12749, Power Supplies.
 - .2 ANSI/EIA/TIA-568 Commercial Building.
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 ULC-S317 (1996) Installation and Classification of Closed Circuit Video Equipment (CCVC) Systems for Institutional and Commercial Security Systems.
 - .2 Underwriters' Laboratories (UL)
 - .3 UL 294 (1999) Standard for Safety for Access Control System Units.
 - .4 UL 1076 (1995) Standard for Safety for Proprietary Burglar Alarm Units and Systems.
- .4 CSC Standards:
 - .1 ES/SOW-0101 – Procurement & Installation of Electronic Security Systems (Revision 3)
 - .2 ES/SOW-0102 – Quality Control for Procurement and Installations of Electronic Security Systems (Revision 5)
 - .3 ES/SOW-0404 – Electronic System Proposal Evaluation Criteria (Revision 1)
 - .4 ES/SPEC-0006 – Conduit, Space, and Power Requirements for Security Systems Use in Federal Correctional Institutions (Revision 2)

- .5 ES/STD-0204 – Fixed/Zoom Lens Closed Circuit Television (Revision 1)
- .6 ES/STD-0207 – High Security Enclosure Closed Circuit Television (Revision 1)
- .7 ES/STD-0221 – Fixed Network Colour Closed Circuit Television Camera (Revision 0)
- .8 ES/STD-0222 – Indoor Network Colour Dome Camera (with Pan/Tilt/Zoom) Closed Circuit Television (Revision 0)
- .9 ES/STD-0227 – LCD Colour Computer Monitor Closed Circuit Television (Revision 0)
- .10 ES/STD-0228 – Network Video User Station Closed Circuit Television (Revision 0)
- .11 ES/STD-0229 – Network Video Recorder Closed Circuit Television (Revision 0)
- .12 ES/STD-0230 – NTSC-IP Video Converter Closed Circuit Television (Revision 0)
- .13 ES/STD-0231 – IP-NTSC Video Converter Closed Circuit Television (Revision 0)
- .14 ES/STD-0803 – Video Display Unit Electronic Systems (Revision 2)

1.03 DEFINITIONS

- .1 AGC: Automatic Gain.
- .2 ATP: Acceptance Testing Procedure/Plan.
- .3 CCTV: Closed Circuit Television.
- .4 CCVC: Closed Circuit Video.
- .5 CCD: Charge Coupled Device.
- .6 CEC: Canadian Electrical Code.
- .7 CER: Common Equipment Room.
- .8 CSA: Canadian Standards Association.
- .9 CSC: Correctional Service of Canada.
- .10 EIA: Electronic Industries Association.
- .11 ES: Electronic Systems.
- .12 FAT: Factory Acceptance Test.
- .13 FDR: Final Design Report.
- .14 FOV: Field of View.
- .15 GFE: Government Furnished Equipment.

- .16 GUI: Graphical User Interface.
- .17 I/O: Input/Output.
- .18 KVM: Keyboard/Video/Mouse.
- .19 LAN: Local Area Network.
- .20 LCP: Local Control Post.
- .21 MTBF: Mean Time Before Failure.
- .22 NVRS: Network Video Recorder System.
- .23 OFC: Optical Fiber Cable.
- .24 PC: Personal Computer.
- .25 PDC: Power Distribution Centre.
- .26 PE: Principal Entrance.
- .27 PIU: PIDS Integration Unit.
- .28 PWC: Public Works Canada (PWGSC's predecessor).
- .29 PWGSC: Public Works and Government Services Canada.
- .30 RU: Rack Units.
- .31 SCP: Secure Control Post.
- .32 SOW: Statement of Work.
- .33 SPEC: Specifications.
- .34 STD: Standard.
- .35 T&E: Telecommunications and Electronics.
- .36 TES: Telecommunications Equipment Space.
- .37 UPS: Uninterruptible Power Supply.
- .38 V&C: Visits and Correspondence.
- .39 VAC Volts: Alternating Current.
- .40 VDC Volts: Direct Current.
- .41 VVMS: Virtual Video Matrix Switcher.

1.04 DESIGN PERFORMANCE REQUIREMENTS

- .1 Support: Provide a CCTV System expansion for real time viewing and digital network recording with the highest possible clarity for post event investigations. Camera functions such as pan/tilt and zoom fully supported by CCTV system.
 - .1 Provide operator with ability to control all camera functions.
- .2 Alarm point monitoring: System capable, upon alarm recognition, of switching CCTV cameras associated with alarm point.
- .3 Switching:
 - .1 Provision to switch any camera in system to any monitor in system manually or automatically.
 - .2 Provision to switch system video recorders to selective monitor outputs in system.
- .4 Control: Provision for any camera equipped with pan, tilt, and/or motorized zoom lens:
 - .1 Manually control pan, tilt and lens functions.
 - .2 Set pan and tilt home position.
 - .3 Set and clear movement limits of pan and tilt mechanism.
 - .4 Adjust motorized zoom lens.
- .5 Enter and edit CCTV programs and save them for future use.
- .6 Set dwell time for viewing of any camera picture.
- .7 Define sequence for viewing cameras on each monitor.
- .8 Bypass cameras in system during sequencing to monitor.
- .9 Provide ability to display stored 'video image' of cardholder, and switch real-time camera to card reader location for specific card usage.
- .10 Overall control of CCTV provided through software control, which provides complete integration of security components.
- .11 Environment: Design video components and systems to operate with all specified requirements under following ambient temperatures:
 - .1 Indoor installations:
 - .1 Temperature: 0°C to 30°C.
 - .2 Humidity: 10 to 90%.
 - .2 Outdoor installations:
 - .1 Temperature: -40°C to 60°C.

.2 Humidity: 10 to 100%.

1.05 SUBMITTALS

- .1 Product Data: Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings: Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit shop drawings to indicate project layout, camera locations, point-to-point diagrams, cable schematics, risers, mounting details and identification labelling scheme including:
 - .1 Functional description of equipment.
 - .2 Technical data sheets of all devices.
 - .3 Device location plans and cable lists.
 - .4 Video camera surveillance chart.
 - .5 Video interconnection detail drawings.
 - .6 Calculation of the recording period for video storage and RAID array.
- .3 Samples: Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit one (1) sample of each camera selected complete with housing, brackets and mounting hardware.
 - .2 Camera will be returned for incorporation into work as appropriate.
- .4 Quality Assurance Submittals: Submit the following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Test Reports: Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
 - .2 Instructions: Submit manufacturer's installation instructions.
 - .3 Manufacturer's Field Services: Submit copies of manufacturer's field reports.
- .5 Maintenance Data: Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals. Include following:
 - .1 System configuration and equipment physical layout.
 - .2 Functional description of equipment.
 - .3 Instructions on operation, adjustment and cleaning.
 - .4 Illustrations and diagrams to supplement procedures.
 - .5 Manufacturer's operation instructions

- .6 Document Requirements:
 - .1 General: Submit three (3) copies of each hard and computer disk copies of all documents in accordance with ES/SOW-0101.
 - .2 Submit three (3) copies of operational manuals in accordance with ES/SOW-0101.
 - .3 Preliminary Design Report (PDR): Provide documentation defined by ES/SOW-0101 Section 4.1.
 - .4 Final Design Report (FDR): Provide documentation defined by ES/SOW-0101 Section 4.3.
 - .5 Acceptance Testing Plan (ATP): Provide documentation defined by ES/SOW-0101 Sections 6.1 and 7.2. ATP shall also include test procedure and certificate for fiber optic communications channels.
 - .6 Training Plan and Course Materials: Provide documentation defined by ES/SOW0101 Section 8.2 .3 Operator and Maintenance Technician Training shall not commence until project-specific Training course outlines and trainee handouts defined by document ES/SOW-0101 have been submitted by Contractor and reviewed/accepted by CSC Technical Authority.
 - .7 Operator Manual(s): All CCTV related components and provide generic manual for touch-screen operation, CCTV interface, as well as system specific information summarizing the operator training course content.
 - .8 Maintenance Manual: Provide documentation defined by ES/SOW-0101 Section.

1.06 WASTE MANAGEMENT AND DISPOSAL

- .1 Deposit packaging materials in appropriate container on site for recycling or reuse.
- .2 Avoid using landfill waste disposal procedures when recycling facilities are available.
- .3 Collect and separate plastic, paper packaging and corrugated cardboard.
- .4 Dispose of corrugated cardboard, polystyrene and plastic packaging material in appropriate on-site bin.

1.07 WARRANTY

- .1 Manufacturer's Warranty: Submit, for Consultant's acceptance, manufacturer's standard warranty document executed by authorized company official.
- .2 Provide one (1) year warranty on defective parts and installation labour, commencing on the date of system acceptance by CSC.

1.08 PERFORMANCE REQUIREMENTS

- .1 Security Clearance
 - .1 No employee of the Contractor will be permitted to enter or work in the Institution without a current valid security clearance issued by CSC.

- .2 Precedence of Institutional Operations
 - .1 While working on this project, it is essential that Contractors take every precaution to reduce any disturbance to normal institutional operations to a minimum. Onsite work may have to be performed at night or during other periods set by the Institution. The Contractor must recognize that it is essential that his personnel working onsite cooperate fully with the security staff at the institution by conforming to operational security requirements.
- .3 Contractor Experience
 - .1 The contractor shall provide evidence of five (5) years' experience in the detail design, supply and installation of Closed Circuit Television Systems in Federal Correctional Facilities. Due to the complex IP virtual matrix design, contractor to provide evidence of team member IT technology and PC Network competency (MCSE or equal).
 - .2 Contractor shall demonstrate full compliance with the mandatory requirements set out in ES/SPEC-0404, including corporate capability; qualifications and experience of personnel assigned to the project; a full understanding, and capability to fulfil warranty obligations; ability to obtain the necessary level of security clearance for its onsite personnel to the installation locations; and the ability to execute the Contract in the language designated at the installation site.
- .4 Service Response Capability
 - .1 Contractor shall provide service response capability within twenty-four (24) hours both during and after the system warranty period.

1.09 DESCRIPTION OF EXISTING FACILITIES

- .1 Main Communications and Control Post (MCCP) and Local Control Post
 - .1 An existing IP based video surveillance system exists within the facility with monitoring capabilities at the MCCP and Local Control Post. Viewing of new unit cameras to be via existing equipment.

1.010 SCOPE OF WORK

- .1 Provide a high resolution CCTV system expansion utilizing state of art IP technology for real time viewing and digital network recording with the highest possible clarity for post event investigations.
- .2 System shall utilize existing camera storage.
- .3 The current CCTV VMS is Genetec Omnicast 4.8. The contractor is required to upgrade existing to Security Centre Version 5.7 to accommodate new cameras.
- .4 Cameras with high quality colour (auto switching to black and white at low light) pictures, with all necessary components, programming, commissioning, patch cables, and interface devices as required and regardless of mention to provide a complete functioning system.

- .5 Provide all required phase lock, common ground reference filters, ground loop transformers, synchronization and any other equipment required to ensure proper video transmission with zero picture roll or tearing.
- .6 Utilize existing CCTV Monitors and keyboards and all necessary devices to call any camera to any monitor or quad monitor view position
- .7 Provide all devices in accordance to the following CSC's ES/STD-0207, ES/STD-0221, ES/STD-0204, ES/STD-0231, ES/STD-0203, ES/STD-0222, ES/STD-0214 specifications.
- .8 Connect, terminate and focus all cameras to IP streaming devices as located on the drawings with virtual matrix IP control system with 'group salvo' macro commands for area by area camera call-up, integrate camera programming and PTZ commands, video display IP decoders and monitors, and network video recorders and storage devices.
- .9 Integrate the CCTV Subsystem with the Door Control system.
- .10 Provide all documentation, reports, plans, schedules, and manuals as defined within ES/SOW-0101.
- .11 All cables shall be installed in conduit provided by Division 26, coordinate with Division 26 and ensure all conduits as laid out are adequate. If any conduit is inadequate then identify the discrepancy prior to the close of tenders.
- .12 Use CAT 6 cable from all cameras to the network switches located in the [BSCS] [T & E] room. Where the use of IP based cameras is not possible i.e. for zoom pan tilt cameras then locate the digital streamer box as close as possible to the camera location. Use CAT6 cable for Low Voltage power to all cameras for Camera Power. Use 16 Gauge wire for Heater and Blower power and 16 Gauge wire for Dome Zoom Pan and Tilt power.
- .13 Provide terminal servers, communication and closed CCTV network 10/100Mb/1Gig switches etc as required.
- .14 Provide all specified spare parts and service manuals for maintenance of the Video Surveillance system. Provide complete listing of provided parts including quantity, manufacturer, model number, and unit price.

Part 2 Products**2.01 MATERIALS**

- .1 All system hardware and software components to be designed and manufactured in accordance with ISO-9001 Quality System Standard.
- .2 Manufacturer's quality control program to be registered in accordance with the above noted standard.
- .3 Units of the same type of equipment shall be products of a single manufacturer. All material and equipment shall be new and currently in production. Each major component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place. Material will conform to the applicable requirements of the Underwriters Laboratories and the National Standards Institute. Each major

component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place.

- .4 All system equipment and field devices to be held securely in place. Fastenings and supports shall be selected to provide a safety factor of three.
- .5 All systems equipment equipped with plug in power connectors to be connected to a dedicated receptacle. Do not use tap connectors for plugging in multiple plugs into a single receptacle.
- .6 Acceptable Manufacturers
 - .1 Fixed CCTV Camera: AXIS or approved equal.
 - .2 Corner Mount Cell Camera: Bosch.
 - .3 NVR Servers: existing.
 - .4 Network Data Switches to be Cisco.
- .7 Video Software System
 - .1 Existing.
 - .2 Provide additional licenses as required.
- .8 Camera Housings
 - .1 Housing shall be an integral part of the specified cameras.
 - .2 Enclosures shall be high security, constructed and designed for installation in detention facilities.
 - .3 All domes are to include smoked bubbles to hide where the camera is pointing.
 - .4 Tamper screws with no exposed cables or mounting hardware
- .9 Transmission Methods: Fiber Optics, and control cabling as required by location and manufacturer.

2.02 INDOOR CAMERAS

- .1 Housing:
 - .1 Dome type housing with transparent bubble and white impact-resistant casing with aluminum base.
 - .2 Three (3) axis camera gimbal for adjustment of pan (360 degrees), tilt (80 degrees) and azimuth (340 degrees).
 - .3 Wall and ceiling mount units to be low profile design and include 9:16 corridor mode.
- .2 Camera Specifications:

- .1 Resolution 1920 x 1080p
- .2 Digital Imager Progressive scan CMOS 1/2.9"
- .3 Sensitivity (auto night) Colour 0.1 lux, B/W 0.01 lux
- .4 IR Range 30m
- .5 Video streaming Simultaneous MJPEG, & H.264
- .6 Protocol TCP, HTTP, IPv4/v6
- .7 Power PoE IEEE 802.3af compatible
- .8 Frame rate 1-30 fps (HDTV 1080p)
- .9 Connectors RJ-45 (100BASE-TX) PoE
- .10 Operating temperature -30°C to +60°C
- .11 Lens 2.8 - 12 mm, remote focus & zoom
- .12 Signal-to-Noise Ratio >52 dB
- .13 Housing Vandal Resistant IP66, IK10

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2.03 CELL CAMERAS

- .1 Housing:
 - .1 Corner-mount anti-ligature steel housing.
 - .2 Adjustable lens tilt w/polycarbonate window.
- .2 Camera Specifications:
 - .1 Resolution 1440 x 1080p
 - .2 Imager CCD 1/2.7"
 - .3 Sensitivity (auto night) Colour 0.3 lux, B/W 0.01 lux w/IR
 - .4 Power 24 VAC or PoE
 - .5 Connector RJ45
 - .6 Operating temperature -10°C to +50°C
 - .7 Lens 2.0 mm
 - .8 Field of View 121 degree H x 91 degree vertical
 - .9 IR Illuminator 940 nm LED

.10 Housing Vandal Resistant IP65

.3

2.04 CAMERA POWER SUPPLY

.1 Camera power shall be supplied from the Cisco switch. Provide power supplies for other devices as required.

2.05 JUNCTION BOX

.1 Metal, sized to handle all system conduit interconnections with appropriate expansion.

2.06 RADIO FREQUENCY INTERFERENCE

.1 Ensure that all equipment and systems are capable of operating under RFI conditions at the site. All corrective action is to be at the Contractors cost.

2.07 EQUIPMENT ENCLOSURE

.1 Employ existing equipment rack.

Part 3 Execution

3.01 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and datasheet.

.2 Manufacturers' directions shall be followed in all cases where the manufacturers of equipment or materials used in the Work furnish directions covering points not shown on the Drawings or Specifications.

3.02 INSTALLATION

.1 Installation shall not commence until Preliminary and Final Design Reports (PDR/FDR) defined by document ES/SOW-0101 have been submitted by Contractor and reviewed/accepted by CSC Technical Authority.

.2 All work shall be coordinated with the Technical Authority and the Institutional staff.

.3 Install video surveillance equipment and components in accordance with ULC-S317.

.4 All wall mounted devices will be housed in steel blocks wherever there is a concrete block wall.

.5 Install cable, boxes, mounting hardware, brackets, video cameras and system components in accordance with manufacturer's written installation instructions.

.6 Install components secure, properly aligned and in locations shown on reviewed shop drawings.

.7 Connect cameras to cabling in accordance with installation instructions.

3.03 VERIFICATION

- .1 Acceptance testing shall not commence until project Acceptance Testing Procedures (ATP) defined by document ES/SOW-0101 have been submitted by Contractor and reviewed/accepted by CSC Technical Authority.
- .2 System substantial performance and commencement of the warranty period shall not commence until acceptable ATPs have been completed and signed off by both Contractor and CSC Technical Authority, and Operator training is complete. Substantial performance may nevertheless be granted in the presence of noted deficiencies at the discretion of the Crown.
- .3 Conduct offsite Factory Acceptance Test (FAT) witnessed by CSC Design Authority, to demonstrate compliant subsystem operation, subsystem non-interference, system-wide control transfer and redundancy performance.
- .4 Obtain reports, within three (3) days of review, and submit, immediately, to Consultant. Upon completion of the work and during interim periods as required under the Contract, perform all final adjustments of levels, timing, equalisation, limits, and operational sequences.
- .5 Conduct detailed testing of all systems and equipment. Submit test results to the Consultant for review.
- .6 Conduct commissioning procedures as required under the Contract. Submit report of results together with all required statements and certificates.
- .7 Final completion will not be granted until system is in full operation, all noted deficiencies have been cleared and all documentation deliverables have been received by the Crown in the quantities specified.
- .8 Perform verification inspections and test in the presence of Consultant.
 - .1 Provide all necessary tools, ladders and equipment.
 - .2 Ensure appropriate subcontractors, and manufacturer's representatives are present for verification.
- .9 Visual verification: Objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents. Visual inspection to include:
 - .1 Sturdiness of equipment fastening.
 - .2 Non-existence of installation related damages.
 - .3 Compliance of device locations with reviewed shop drawings.
 - .4 Compatibility of equipment installation with physical environment.
 - .5 Inclusion of all accessories.
 - .6 Device and cabling identification.
 - .7 Application and location of ULC approval decals.

- .10 Technical verification: Purpose to ensure that all systems and devices are properly installed and free of defects and damage. Technical verification includes:
 - .1 Measurements of tension and power.
 - .2 Connecting joints and equipment fastening.
 - .3 Measurements of signals (dB, lux, baud rate, etc).
 - .4 Compliance with manufacturer's specification, product literature and installation instructions.
- .11 Operational verification: Purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes:
 - .1 Operation of each device individually and within its environment.
 - .2 Operation of each device in relation with programmable schedule and or/specific functions.
 - .3 Operation control of camera lens, pan, tilt and zoom.
 - .4 Switching of camera to any monitor.
 - .5 Switching of system video recorder to selective monitor.
 - .6 Set dwell times.
 - .7 Demonstrate:
 - .1 Sequence viewing of cameras on each monitor.
 - .2 Bypass capability.
 - .3 Display of stored image to cardholder.

3.04 CLEANING AND ADJUSTING

- .1 Remove protective coverings from cameras and components.
- .2 Adjust cameras for correct function.
- .3 Clean camera housing, system components and lens, free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

END OF SECTION

Part 1 General**1.01 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 26 05 01.
- .2 Manufacturer shall provide a complete set of shop drawings for this specific project. Drawings shall include, but not be limited to, equipment supplied, wiring diagrams installation instructions, and operating instructions produced specifically for this project. Drawings shall be approved by the Electrical Consultant before fabrication and supply of equipment.

1.02 OPERATING AND MAINTENANCE DATA

- .1 Provide data for incorporation into Electrical Maintenance Manual specified in Section 26 05 01. Include complete information and drawings describing and depicting the entire system as installed, including all information necessary for maintaining, troubleshooting, and / or expanding the system at a future date.
- .2 Submit a detailed operating, maintenance and testing procedure document prepared specifically for this project.

1.03 TRAINING

- .1 The Owner's operating personnel shall be instructed in the operation of the systems for a minimum period of one (1) hour. Written documentation bearing name and signature of Owner's personnel who received the above instructions shall be included in the operating instructions and service manuals.
- .2 The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.
- .3 The instruction shall detail the proper operation of the installed fire alarm systems and shall cover the schedule of maintenance required by ULC and any additional maintenance recommended by the system manufacturer.

1.04 SUPPLIER QUALIFICATIONS

- .1 The supplier shall be fully qualified in the performance of work specified herein. Service personnel shall be located within the Province of Saskatchewan and shall be experienced in the installation and operation of the system. The supplier shall be an established fire alarm supplier with a service department maintained in Saskatchewan both currently, and for the previous five (5) years.

1.05 VERIFICATION

- .1 Upon completion of installation of the system, a factory trained manufacturers representative shall perform a complete verification and inspection of all installed equipment, including each and every component, such as manual stations, automatic ionization detectors, sprinkler flow and tamper switches, audible signalling appliances, monitor modules, control modules, control equipment, etc., to ensure the following:

- .1 That the type of equipment installed is that designated by the electrical consultant's specifications and plans.
 - .2 That the wiring connections to all equipment are correct and in accordance with CSA and ULC requirements.
 - .3 That the equipment is installed in accordance with the Manufacturers recommendations.
 - .4 That the regulations concerning the supervision of components have been adhered to (e.g. stations, detectors, signal devices, etc.) and are properly wired and supervised.
 - .5 That any subsequent changes necessary to conform to the above will be done by the Contractor, with technical advice supplied by the Manufacturer.
 - .6 That activation of the fire alarm system results in a signal received by the fire department.
- .2 During the verification, the Contractor shall supply to the Manufacturer, one (1) electrician and one (1) helper.
 - .3 The Contractor shall also supply any required equipment such as ladders, scaffolding, etc.
 - .4 To assist the Installer in preparing his bid, the Manufacturer shall indicate the number of hours necessary to complete this verification.
 - .5 Upon completion of the verification and when all of the above conditions have been complied with, the Manufacturer shall issue to the Electrical Consultant the following:
 - .1 A copy of the inspecting technician's report, showing the location of each device, address of each device, and certifying the test results of each device.
 - .2 A certificate of verification confirming that the inspection has been completed, and indicating the condition of the system during the inspection and certification.
 - .6 Complete multiple verifications as required to accommodate phasing of construction and/or partial occupancy by the owner.

1.06 SOFTWARE MODIFICATION

- .1 Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes.
- .2 Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site.

Part 2 Products

2.01 CELL SMOKE DETECTION

- .1 Cell smoke detection shall be provided by an air sampling system with a central 4 port aspirator unit to draw air from the exhaust air ducts of up to 4 cells through an integral high sensitivity smoke detector unit.

- .2 Smoke detection in each of the four sampling ports shall be annunciated separately. The air sampling system outputs shall be connected to the main fire alarm system via monitor modules to provide activation of the system alarms.
- .3 The air sampling system shall be designed to be relatively “maintenance-free”. Regular required cleaning of filters is not acceptable. The use of distilled water with re-fillable water storage at the aspirator unit is not acceptable.
- .4 The air sampling system and detector shall be ULC listed for use in the proposed application.
- .5 The air sampling/smoke detection unit panel assembly shall include the following:
 - LED’s indicating alarms on each of the fifteen sampling tubes
 - Power indicator
 - Fault indicator
 - RS-232 serial computer interface port
 - Reset switch to clear all alarms
 - Output alarm contacts
 - Output ‘system trouble’ contacts
- .7 The air sampling system shall be programmed directly through the alpha-numeric display on the detector, or using system software through a TCP/IP connection to a network computer. Each zone (sampling tube) shall be individually programmable along the entire sensitivity range (no generic set points). Time based sensitivity modulation shall be possible with two settings per day per zone, plus weekend and holiday settings.
- .8 The air sampling detector unit shall be networkable via a RS485 loop. Each zone shall be individually monitored and programmed via a remote LCD display.
- .9 The cell smoke detection vendor shall include in their scope of services a complete review of the smoke sampling tube design to confirm that the system will provide acceptable operation. A report shall be submitted with the system shop drawings to confirm this review.

2.02 MULTI SENSOR DETECTORS

- .1 Multi Sensor Detectors shall be addressable, and shall connect with two wires to one of the Fire Alarm Control Panel Signalling Line Circuit loops. The multi sensor detector shall process and analyze information from ionization, photoelectric, and heat sensors within the detector.
- .2 The detectors shall use a unipolar chamber to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.
- .3 The detectors shall be ceiling mounted and shall include a twist-lock base.
- .4 The detectors shall provide dual alarm and power LEDs to indicate "normal" system polling status and "alarm" state.

- .5 The detector sensitivity shall be set through the Fire Alarm Control Panel, and shall be adjustable in the field through the field programming of the system. Sensitivity may be automatically adjusted by the panel on a time-of-day basis.
- .6 Using software in the Fire Alarm Control Panel, the detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72E.
- .7 Intelligent Multi-Sensor Detectors shall be Notifier #FAPT-851 Edwards #SIGA-IPHS or approved equal.

2.03 ADDRESSABLE MONITOR MODULE

- .1 Addressable Monitor Modules shall be provided to connect one supervised IDC zone of Alarm Initiating Devices to one of the Fire Alarm Control Panel Signalling Line Circuit (SLC) Loops (ie sprinkler flow and tamper switches).
- .2 The Monitor Module shall mount in a 102 mm square, 54 mm deep electrical box.
- .3 The Monitor module shall be identified by a device specific address. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor module is operational and in regular communication with the control panel.
- .4 Monitor Modules shall be compatible with the existing system and of the same manufacturer.

2.04 AUDIBLE/VISUAL SIGNAL DEVICE

- .1 Both audible and visual signals shall be contained in one common flush mounted device. The lens for the visual section shall be constructed of polycarbonate with the word "FIRE" in red letters on both sides of the lens. The lens shall project from the face of the enclosure to allow visibility from the side of the device. The visual signal shall consist of xenon flash tube which shall flash at a rate of between one and three flashes per second. The visual signal shall produce a minimum effective luminous intensity of 15 cd, a flash duration of 200 ms or less, with a maximum duty cycle of 40% (as per ULC/CAN-S526).

The audible portion of the device shall have two tone options, two audibility options, and the option to switch between a temporal 3 pattern and a non-temporal continuous pattern. Sound level shall be minimum 97 dBA (measured in anechoic room at 3 metres, and shall meet requirements of ULC Standard S525).

- .2 All strobes shall be synchronized and shall comply with ADA guidelines concerning photo sensitive epilepsy.
- .3 The audible/visual signal device shall be compatible with the existing system and of the same manufacturer.

2.05 WIRE AND CABLE

- .1 Conducts: Copper, to CSA C22.2 and as follows:
 - .1 Refer to riser drawing for particular wiring specifications and as follows:

- .2 Conductor Insulation: Minimum rating 300 volts. Single conductor RW90XLPE (X-link).
- .3 Multi-conductor cables 105C with outer PVC jacket, colour coded, FAS rated.
- .4 Conductor sizes as follows:
 - .a Minimum conductor size for alarm initiating circuits shall be #18 AWG.
 - .b Minimum conductor size for signal circuits shall be #16 AWG.
 - .c Minimum conductor size for AC circuits shall be #12 AWG.
 - .d Minimum conductor size for visual signal appliance circuits shall be #14 AWG.
 - .e Size all Fire Alarm wiring for maximum 3% voltage drop at maximum load at last device in run.
- .5 Main data risers and loops between fire separations to be approved fire rated cables in accordance with the manufacturers rated system requirements.
- .6 Selection of the type of cable to be at discretion of Fire Alarm installer but the system shall meet all code requirements, when complete. All wiring to be terminated in terminal panels, junction boxes, etc. on suitable identified terminal strips or blocks, and to be neatly installed, laced and tagged where required. All terminals in terminal panels and junction boxes to be made with solderless connectors to terminal blocks with separate terminal for each conductor.
- .7 All wiring to be tag identified at the points of connection.
- .8 Provide a ground conductor with all system wiring and bond all metal parts including device boxes.

2.06 MANUFACTURERS

- .1 All equipment and components shall be the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signalling fire alarm and smoke control system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.

Part 3 Execution

3.01 INSTALLATION

- .1 Class "A" wiring shall be used for the fire alarm system. The primary wiring circuit and the return circuit shall not be installed in the same conduit.
- .2 Provide 19 mm empty conduit to telephone plywood.
- .3 Provide and install a fire alarm control module and associated conductors (in conduit) at a 150 x 150 mm junction box mounted adjacent to each elevator controller (for elevator recall).

- .4 Provide and install a fire alarm monitor module and associated conductors (in conduit) at the generator controller (to monitor generator fault condition).
- .5 Pullstations, signal devices, and E.O.L. resistors shall be aligned vertically where grouped at one location. Devices staggered vertically will not be accepted.
- .6 Provide wireguards for all devices located in areas where they may sustain damage.
- .7 Energize fire alarm panel from breaker located in main distribution centre. The breaker shall be coloured red and be lockable in the "on" position. The location of the breaker energizing the fire alarm panel shall be identified on a plastic laminate label located inside the fire alarm panel.
- .8 All fire alarm system wiring shall be contained in conduit.
- .9 Ensure that air sampling tube, and exhaust tube for duct detectors are properly aligned within the ventilation duct, according to manufacturer's installation instructions.
- .10 Manufacturer shall allow for a required amount of on-the-job-site assistance for the Contractor during the construction period.
- .11 The entire installation shall be performed under the supervision of the Manufacturer. Upon completion of the installation, the Manufacturer shall check the entire system to the approval of the Electrical Consultant. The Manufacturer shall verify the entire system and demonstrate its complete operation to those having jurisdiction.
- .12 The exit lighting circuit shall be controlled by the flashing relay.
- .13 All fire alarm conductors shall be free of splices and t-taps and shall be installed continuous between devices.
- .14 If a 120 volt electric bell and associated pressure switch is supplied by the sprinkler trade energize from a dedicated 120 volt branch circuit.
- .15 All monitor and control modules shall be identified with a plastic laminate label (size 3) indicating what device the module is monitoring or controlling (i.e. "TAMPER SWITCH #5", "ELECTRO-MAGNETIC HOLD OPEN", etc.).
- .16 When the fire alarm system installation is complete and before verification, the Contractor shall provide written notification to the Owner requesting that the Owner arrange to contract with a Central Monitoring Agency and/or the telephone utility for monitoring services and telephone line lease (if required). Monitoring of the fire alarm system shall allow both "trouble" and "alarm" status of the fire alarm system to be annunciated separately. During verification, confirm that activation of the fire alarm system results in a signal received by the fire department.
- .17 Existing fire alarm system wiring may be reused providing the conductors are continuous between devices. No terminations will be permitted in junction boxes between devices. Contractor is responsible to ensure the integrity of existing conductors wherever they are reused.

Part 1 General**1.01 SECTION INCLUDES**

- .1 Proximity Reader Tour Stations
- .2 Software
- .3 Power supply
- .4 UPS
- .5 Cable

1.02 REFERENCE DOCUMENTS

- .1 CSC Specifications:
 - .1 ES/SOW-0101 – Procurement & Installation of Electronic Security Systems (Revision 3)
 - .2 ES/SOW-0102 – Quality Control for Procurement and Installations of Electronic Security Systems (Revision 5)
 - .3 ES/SOW-0404 – Electronic System Proposal Evaluation Criteria (Revision 1)
 - .4 ES/SPEC-0006 – Conduit, Space, and Power Requirements for Security Systems Use in Federal Correctional Institutions (Revision 2)
 - .5 ES/SPEC-0601 - Fixed Point Security Alarm System (Revision 2)
- .2 Canadian Standards Association (CSA) International
 - .1 CSA C22.1-09, Canadian Electrical Code, Part 1 (21st edition) Safety Standard for Electrical Installations.
 - .2 CAN/CSA-C22.2 No. 182.4-M90 (R2006), Plugs, Receptacles, and Connectors for Communication Systems.
- .3 Electronic Industries Alliance (EIA)
 - .1 REC 12749, Power Supplies.
 - .2 ANSI/EIA/TIA-568 Commercial Building.

1.03 DEFINITIONS

- .1 ATP - Acceptance Testing Procedure/Plan
- .2 BSCS – Building Security & Communication System
- .3 CEC - Canadian Electrical Code
- .4 CER - Common Equipment Room

- .5 CSA - Canadian Standards Association
- .6 CSC - Correctional Service of Canada
- .7 DCS - Door Control System/subsystem
- .8 EIA - Electronic Industries Association
- .9 ES - Electronic Systems
- .10 FAAS - Facility Alarm Annunciation System
- .11 FAT - Factory Acceptance Test
- .12 FDR - Final design Report
- .13 GFE - Government Furnished Equipment
- .14 GUI - Graphical User Interface
- .15 LCP - Local Control Post
- .16 LED - Light Emitting Diode.
- .17 MCCP - Main Communications Control Post
- .18 MTBF - Mean Time before Failure
- .19 OFC - Optical Fibre Cable
- .20 PC - Personal Computer
- .21 PDC - Power Distribution Centre
- .22 PDR - Preliminary Design Report
- .23 PE - Principal Entrance
- .24 PIN - Personal Identification Number.
- .25 PIU - Perimeter Intrusion Unit
- .26 PPA - Portable Personal Alarm
- .27 PPD - Personal Protection Device
- .28 PWC - Public Works Canada (PWGSC's predecessor)
- .29 PWGSC - Public Works & Government Services Canada
- .30 RFI: Radio Frequency Interference.
- .31 RU - Rack Units (1.75" vertical space in an EIA-310C standard equipment rack)
- .32 SAC - System Administration and Control

- .33 SCP - Secure Control Post
- .34 SOW - Statement of Work
- .35 SPEC - Specification
- .36 STD - Standard
- .37 STP - Shielded Twisted Pair.
- .38 T&E - Telecommunications and Electronics
- .39 TES - Telecommunications Equipment Space
- .40 UPS - Uninterruptible Power Supply
- .41 UTP - Unshielded Twisted Pair.
- .42 VAC - Volts, Alternating Current
- .43 VDC - Volts, Direct Current
- .44 LCD - Liquid Crystal Display.

1.04 PERFORMANCE REQUIREMENTS

- .1 Security Clearance
 - .1 No employee of the Contractor will be permitted to enter or work in the Institution without a current valid security clearance issued by CSC.
- .2 Precedence of Institutional Operations
 - .1 While working on this project, it is essential that Contractors take every precaution to reduce any disturbance to normal institutional operations to a minimum. Onsite work may have to be performed at night or during other periods set by the Institution. The Contractor must recognize that it is essential that his personnel working onsite cooperate fully with the security staff at the institution by conforming to operational security requirements.
- .3 All work shall be coordinated with the Technical Authority and the institutional staff.
- .4 Contractor Experience
 - .1 The contractor shall provide evidence of five (5) years' experience in the detail design, supply and installation of Guard Tour Systems in Federal Correctional Facilities.
 - .2 Contractor shall demonstrate full compliance with the mandatory requirements set out in ES/SPEC-0404, including corporate capability; qualifications and experience of personnel assigned to the project; a full understanding, and capability to fulfil warranty obligations; ability to obtain the necessary level of security clearance for its onsite personnel to the installation locations; and the ability to execute the Contract in the language designated at the installation site.

.5 Service Response Capability

- .1 Contractor shall provide service response capability within twenty-four (24) hours both during and after the system warranty period.

1.05 SUBMITTALS

- .1 General: Submit two (2) sets hardcopy (paper) plus one (1) set softcopy (computer files) documentation at each submittal.
- .2 Preliminary Design Report (PDR): Provide documentation defined by ES/SOW-0101 Section 4.1.
- .3 Final Design Report (FDR): Provide documentation defined by ES/SOW-0101 Section 4.3.
- .4 Acceptance Testing Plan (ATP): Provide documentation defined by ES/SOW-0101 Sections 6.1 and 7.2. ATP shall also include test procedure and certificate for fibre optic communications channels.
- .5 Training Plan and Course Materials: Provide documentation defined by ES/SOW-0101 Section 8.2.
- .6 Operator Manual: Provide generic manual for touch-screen operation, as well as system-specific information summarizing the operator-training course content.
- .7 Provide data for incorporation into maintenance manual specified in CSC Specification ES/SOW-0101 – Procurement & Installation of Electronic Security Systems (Revision 3).
- .8 Include description of system operation.
- .1 Include parts list using component identification numbers standard to electronics industry.

1.06 CLOSEOUT SUBMITTALS

- .1 Provide data for incorporation into Operation & Maintenance manuals as specified in Section 01 78 00 - Closeout Submittals and
- .2 O&M manuals to include:
- .1 Table of contents.
- .2 Warranty information.
- .3 Completed test reports and certificates.
- .4 Include parts list using component identification to electronics industry standard and serial numbers.
- .5 Description of system operation.
- .6 Functional description for equipment.

- .7 Product data.
- .8 Manufacturer's installation instructions.
- .9 Maintenance schedule.
- .10 Cleaning instructions.
- .11 Training manual.
- .3 As-built Drawings to include:
 - .1 Equipment layout, indicate device type at each location on the floorplans.
 - .2 Device mounting and location details.
 - .3 Wiring diagrams.
 - .4 Typical devices connection detail drawings.
 - .5 Wiring diagrams.
 - .6 Zone layout drawing indicating number and location of zones and areas covered.

1.07 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

1.08 WARRANTY

- .1 Manufacturer's Warranty: Submit, for Consultant's acceptance, manufacturer's standard warranty document executed by authorized company official.
- .2 Provide one (1) year warranty on defective parts and installation labour, commencing on the date of system acceptance by CSC.

1.09 PERFORMANCE REQUIREMENTS

- .1 Existing system shall be expanded and or modified as indicated on the drawings and specified herein.
- .2 System shall be installed to provide ease of operation, servicing, maintenance, testing and expansion of additional services.
- .3 The Guard Tour system shall meet safety requirements specified in accordance with UL standards.
- .4 The system shall be provided with a high level of flexibility and comprehensive system management and database reporting facilities.
- .5 Allow monitoring of overall system for functionality and alarms from multiple points.

- .6 Demonstrated MTBF for the PPA system (excluding consumable items such as batteries) shall be less than one failure per two years per 4,645 square m (50,000 square ft.) of indoor coverage, and less than one failure per two years per 18,580 square m (200,000 square ft.) of outdoor coverage.

1.010 SCOPE OF WORK

- .1 Remove existing Guard Tour input devices as shown on the drawings and specified herein.
- .2 Add new Guard Tour input devices as shown on the drawings and specified herein.
- .3 Modify system programming to delete removed devices and add new devices. .
- .4 Provide training and Operation & Maintenance manuals, as-built documentation, personnel training, demonstration, commissioning and extended warranty.
- .5 All cables will be installed in raceways unless noted otherwise.
- .6 Provide written test results on a device-by-device basis as part of the base bid.
- .7 Provide modified service manuals for maintenance of the Guard Tour system.

Part 2 Products

2.01 MATERIALS

- .1 For new devices, match existing products..
- .2 Mount power supplies and power distribution terminal strips in locked wall-mounted cabinets.
- .3 All wall mounted devices will be housed in steel blocks wherever there is a concrete block wall.
- .4 Equipment shall operate from a primary power source of 110 V AC, 60 Hz AC power. Provide transformers and power supplies to achieve required system voltage levels.
- .5 Contractor shall provide the system set-up and data entry for a complete and fully operational system. Provide the Owner with data forms and instructions on how to fill out the forms for all user defined data.
- .6 Contractor shall install and configure the graphic maps for the system. The entire facility shall be shown on the maps and all installed devices shall be shown on the maps. The maps shall be laid out in a logical manner consistent with the operating areas of the facility. Submit draft maps to the Consultant for review and approval. Correct and modify the maps as directed by the Consultant.

2.02 EQUIPMENT ENCLOSURES

- .1 Supply and install all enclosures as per the drawings and as specified in Section 27 11 19 Communications Distribution Equipment.

2.03 UPS

- .1 Employ existing UPS power.

Part 3 Execution**3.01 MANUFACTURER'S INSTRUCTIONS**

- .1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions and datasheet.

3.02 INSTALLATION

- .1 Install the system and ancillary equipment modifications as indicated, in accordance with equipment manufacturer's written instructions and with recognized industry practices, to ensure that the Guard Tour System fulfils all requirements.
- .2 Comply with manufacturer's recommendations, procedures and standards for the assembly and operation of the Guard Tour system. Provide system feature program requirements as per Consultant's directives. Provide detailed documentation on all programming and numbering of the system's modules, locators and transmitters for future reference.
- .3 Consideration shall be given to heat sensitive equipment so that it is not placed near or immediately over a heat source, such as a large power supply or a high power transceiver. All system modules that include microprocessor chips and related component equipment will be installed in an environmentally controlled room with an operating range of 0 - +40°C.
- .4 Equipment shall be located away from interference sources. It shall be the contractor's responsibility to insure that no interference on the radio frequency will disrupt or impede the performance or function of the system. System should not be installed next to or near high voltage transformers or electrical devices.
- .5 All terminators and connectors throughout the system shall have crimp on coaxial connectors, multi-pin connectors, solder terminals, telephone-type punch down terminal strips or machine wire-wrapped terminals in cabinets, and screw type or plug and socket connections at all equipment. Properly utilize terminations in the applications for which they are intended by the manufacturer.
- .6 Do not install control cables and power distribution wiring adjacent to signal cables. Power distribution cabling shall be on the opposite side from signal wiring in equipment enclosures and shall be uniformly located throughout an installation.
- .7 Construct racks and cabinets to easily accommodate interconnecting cables entering from above or below. Provide interconnecting cables with plugs for disconnecting each incoming and outgoing cable on at least one end.
- .8 All power wiring interconnects in each group of equipment racks or consoles shall be done with flexible conduit, properly installed and of the proper size.
- .9 All wall mounted devices will be housed in steel blocks wherever there is a concrete block wall.

3.03 METHOD OF WORK

- .1 Work to be performed by fully competent technicians in a thorough manner.

- .2 All workmanship to be of the highest quality and meet recognized standards of craftsmanship.
- .3 Areas of installation deemed not acceptable by the Owner to be redone at the Contractor's expense.

3.04 TESTING, ADJUSTING AND BALANCING

- .1 Except where otherwise specified, arrange and pay for testing, adjusting and balancing of system.
- .2 If test results do not conform to applicable requirements, repair, replace, adjust or balance equipment and systems. Repeat testing as necessary until acceptable results are achieved.
- .3 Log and tabulate test results in appropriate test plan.
- .4 Test, adjust and balance to verify the full and proper operation of each system component and integrated function.

3.05 VERIFICATION

- .1 Perform verification inspections and test in the presence of Consultant.
- .2 Provide all necessary tools, ladders and equipment.
- .3 Ensure appropriate subcontractors and manufacturer's representatives are present for verification.
- .4 Visual verification:
 - .1 Objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents.
 - .2 Visual inspection to include:
 - .1 Sturdiness of equipment fastening.
 - .2 Non-existence of installation related damages.
 - .3 Compliance of device locations with reviewed shop drawings.
 - .4 Compatibility of equipment installation with physical environment.
 - .5 Inclusion of all accessories.
 - .6 Device and cabling identification.
 - .7 Application and location of ULC approval decals.
- .5 Technical verification:
 - .1 Purpose to ensure that all systems and devices are properly installed and free of defects and damage.

- .2 Technical verification includes:
 - .1 Compliance with manufacturer's specification, product literature and installation instructions.
- .6 Operational verification:
 - .1 Purpose to ensure that devices and systems' performance meet or exceed established functional requirements.
 - .2 Operational verification includes:
 - .1 Operation of each device individually and within its environment.
 - .2 Operation of each device in relation with programmable schedule and or/specific functions.
 - .3 Verify that System is fully operational and meets all system performance requirements of this specification.
 - .4 Total system test
 - .1 Proceed with testing when system and subsystems are functionally tested and accepted. Total System tests to verify that requirements have been met for DC (and/or audio), sub carrier and control signals in accordance with this specification.
 - .5 Safety
 - .1 Demonstrate with documentation that access control system meets safety requirements specified in UL 294.
- .7 Performance testing and commissioning
 - .1 Test procedure: perform test on a "go-no-go" basis.
 - .1 Make only operator adjustments required to show proof of performance.
 - .2 Test to demonstrate and verify that installed System complies with installation and technical requirements of this specification under operating conditions.
 - .3 Test results to be evaluated by Consultant as either acceptable or unacceptable using following procedures.
 - .2 Documentation review
 - .1 This review will determine if information provided is sufficient to meet requirements of this specification.
 - .3 Mechanical inspection

- .1 Arrange site tour for Consultant, Owners representatives and Contractor to review all areas to insure that all systems and subsystems are installed in place for proof of performance testing.
- .2 Provide system inventory at this time. Verify following items before beginning proof of performance tests:

All electrical power circuits designated for system equipment are properly labeled, wired, phased, protected and grounded.

 - .1 Conductor ends are protected by heat shrink wrap; audio spade lugs, barrier strips and punch blocks are used.
 - .2 Dust, debris, solder splatter, etc. are cleaned and removed from site.
 - .3 All equipment and cabling is properly labeled.
 - .4 All equipment identified in system's equipment lists are in-place and properly installed.
 - .5 Each system ground is installed in accordance with manufacturer's instructions and this specification.

3.06 CLEANING

- .1 Remove protective coverings from accessories and components.
- .2 Adjust all components for correct function.
- .3 Clean housings and system components, free from dirt, marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

END OF SECTION