Correctional Service Canada
Technical Services Branch
Electronics Systems

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Revision 3
15 April 2004

ELECTRONICS ENGINEERING STATEMENT OF WORK

PROCUREMENT & INSTALLATION OF ELECTRONIC SECURITY SYSTEMS

AUTHORITY

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

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address: Director, Engineering Services, Correctional Service of Canada, 340 Laurier Avenue West, Ottawa, Ontario, K1A 0P9

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15 Apr 04

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ABBREVIATIONS

The following abbreviations are used in this specification:

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

DEFINITIONS

The following definitions are used in this specification:

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

1.0 INTRODUCTION

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

The SOW provides guidelines, procedures and responsibilities to the contractor and/or the project officer for the implementation of all telecommunications and electronic security systems in CSC facilities.

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

1.1 Commercial-Off-The-Shelf Equipment

The contractor shall use commercial off-the-shelf (COTS) equipment and proven designs to the maximum extent possible. All new equipment shall meet the specified lifespan requirements. New equipment designs shall be restricted to unique interfaces and common control console.

1.2 Technical Acceptability

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

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

The technical acceptance process shall involve system and subsystem evaluation in accordance with the applicable CSC specifications in one of CSC facilities or may be tested in a CSC facility to verify the effectiveness of the proposed technologies when subjected to the restrictive operational environment.

CSC shall also verify in depth any of the system technical specifications called up. CSC may when it deems necessary, request the supplier to arrange for a full site demonstration. CSC may rely on manufacturer's test results for specific areas of the specification where an independent test facility has conducted the test, and the facility is deemed acceptable to CSC.
It is the supplier's responsibility to make new developments in products available to CSC for evaluation. Equipment qualification is an ongoing process and can be initiated at any time by a vendor. Any vendor can have access to the CSC specifications and standards. Any new development or products should be submitted to the CSC Engineering Services Division, Technical Authority in a suitable time frame prior to any tendering process to allow for an acceptable evaluation period. The evaluation period may take up to sixteen (16) months.

1.3 Equipment Procurement

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

1.4 Quantity of Equipment

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

2.0 APPLICABLE DOCUMENTS

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

3.0 REQUIREMENTS

3.1 The contractor shall:

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

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

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

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

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

f. Provide a program schedule to show all major elements from a contact award to completion of the warranty period and shall include anticipated time of occurrence, interrelationships between events, and time scale; and

g. Be responsible for the integration of the proposed system to any existing telecommunications and electronic security systems.

h. Provide a lightning protection system for the installation of all electronic security systems/equipment in the CSC facilities. As a minimum, surge suppression type lightning arrestors shall be required for all power, communications and antenna cables/wires entering or leaving a building.

5.0 SYSTEM INSTALLATION

The contractor shall be responsible for ensuring that sufficient site utilities are available. No work will be permitted at the site before the approval of the Design Authority. All installation activities shall be conducted in accordance with ES/SOW-0102, Statement of Work.

5.1 Schedule

The contractor shall provide a detailed work schedule for the installation activities. This schedule shall reflect the complete implementation plan by identifying the nature of the work to be performed and the area affected.

5.2 On-Site Inspections

Design Authority or an appointed CSC representative shall perform ongoing inspections of the contractor's activities. These inspections shall verify compliance with the project requirements, the quality of work performed and assess the contractor's progress in relation to the approved schedule. Installation deficiencies requiring corrective action will be brought immediately to the contractor's attention in writing.

5.3 On-Site Coordination

Design Authority shall be responsible for the appointment of an on-site CSC representative. This representative will handle all site related manners and will periodically inspect the installation.

When electronic system installations are part of a construction program or a major redevelopment that involves Public Works & Government Services of Canada, the electronic system installation contractor shall coordinate all activities with the relevant site manager and shall comply with this SOW.

5.4 Facility Criteria

The contractor shall provide the facility criteria data in the proposal. Details as to the power, cooling, space and/or other requirements relating to electronic security system installation at the site must be provided. Final facility criteria information must be provided as part of the FDR.

5.5 Installation Design

The system installation design and planning shall make maximum use of existing ducts, conduits, and other cable routing facilities. Where this is not possible, the contractor shall design and install facilities in a manner acceptable to the Design Authority.

5.6 **Subcontractor Supervision**

The contractor shall provide an on-site supervision of all subcontractors. The subcontractors shall abide by the regulations of this Statement of Work and the conditions in the contract.

5.7 **System Checkout**

Before conducting the formal on-site testing for the CSC acceptance, the contractor shall conduct and document a system checkout to assure the system readiness for formal testing and on-line operations. The test sheets used for the system checkout shall be signed by a company representative and provided to the Design Authority at least seven (7) days prior to the scheduled date of the Acceptance testing. The Design Authority will verify readiness through review of the checkout report. The report may be used as reference during the formal witnessed testing for acceptance.

5.8 **As-Built Drawings**

Thirty (30) days after the system installation acceptance, the contractor shall deliver a complete set of equipment and installation as-built drawings for Design Authority's review and approval. Within thirty (30) days after CSC approval, two (2) complete sets of revised drawings shall be delivered to the Design Authority.

The contractor shall update these drawings throughout the warranty period by the design control procedures. Within thirty (30) days of completion of the warranty period, the contractor shall deliver one (1) set of final revised drawings reflecting all changes to the Design Authority. Upon final CSC approval, the contractor shall deliver two (2) sets of original prints of the final drawings.

6.0 SYSTEM ACCEPTANCE

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

On-site system acceptance testing shall not begin until all of the on-site iInstallation activities have been completed.

6.1 Acceptance Test Plans (ATPs)

The contractor shall provide ATPs for all system, subsystem and equipment tests for Design Authority review and approval. The requirements for the ATP are detailed in the ES/SOW-0102, Statement of Work.

6.2 System Testing

The contractor shall conduct the approved ATP and record the results. The Design Authority or an appointed CSC representative shall witness the tests.

6.3 Deficiency Lists (DL)

The contractor shall prepare and submit a list of deficiencies divided into three categories:

a. Visual/Mechanical,

b. Operational, and

c. Technical/Functional.

6.4 Technical Acceptance

Upon verifying that all of the deficiencies have been corrected, the Design Authority shall issue a letter of Technical Acceptance.

7.0 QUALITY ASSURANCE (QA)

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

7.1 Quality Control Program

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

7.2 System Test Program

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

7.2.1 System Test Plan.

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

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

7.2.2 Test Procedures. These procedures shall ensure that:

a. all equipment supplied meets the performance specification;

b. each subsystem meets the applicable performance requirements; and

c. the overall system meets the performance requirements.

d. test procedure contains the step sequence for each test to be conducted, and the expected results.

7.2.3 **Contractor Testing.**

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

7.2.4 **Test Reports.**

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

a. a summary description of the tests;

b. test results consisting of completed test procedures verified by a CSC representative;

c. incident reports, including analysis and corrective action; and

d. results of any retest.

8.0 TRAINING

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

8.1 Classroom Training

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

8.2 Training Documentation

The contractor shall develop and deliver a complete training plan to the Design Authority for comments and approval. This plan must be submitted to CSC at least thirty (30) days in advance of the training date to allow for CSC review. As a minimum, the training material shall contain:

a. training plans for CSC operations trainers and technical personnel;

b. manuals for each student to add notes;

c. training aids; and

d. student materials.

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

9.0 MAINTENANCE and SPARES

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

9.1 Maintenance Plan

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

9.2 Spares Plan

The spares plan shall list the required spares and recommended quantities. The quantity recommendations shall be supported by system availability and reliability analysis and available experience data. The bidder shall identify spare parts and components by their original manufacturer's code, cross-referenced to the equipment vendor's part number.

9.3 Spares List

The spares list shall identify the following:

a. the spare parts and the subassemblies with the recommended quantities;

b. the cross-reference listings between the vendors and the original manufacturer's codes;

c. the unit and extended prices for stocking; and

d. the expected life or the annual consumption of each part.

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

9.4 Test Equipment

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

10.0 DOCUMENTATION

All final documentation in hard-copy format shall be in a 3-ring binder with all foldout pages having reinforced ring holes.

10.1 Manuals and Drawings

The following items make up the final documentation requirements:

a. Operator Manual,

b. Maintenance Manual,

c. Installation As-built Drawings,

d. Equipment As-built Drawings, and

e. Equipment Operating Software.

The contractor shall prepare and submit all manuals and drawings to the Design Authority for review and approval. The manuals and drawings will be approved when all changes have been satisfactorily incorporated. All drawings must be produced with AUTOCAD (latest available version)

10.2 List of Equipment

The contractor shall provide a list of equipment itemizing the location, quantity, model number, serial number and revision level of all installed equipment.

10.3 Baseline Measurements

The contractor shall provide a copy of the final test results. These results will be used as a reference baseline measurement for monitoring system degradation over time.

10.4 Documentation Format

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

- One (1) hard-copy version of all documentation.

- One (1) electronic version of all documentation in a ‘read-only’ format on a 3½ inch diskette medium; suitable for duplication without any special requirements.

- One (1) electronic version of all documentation in a full 'read-write' format to serve as a master of the documents and drawings.

- all software requirements to access the electronic versions of the documentation.

- One (1) CD containing the equipment operating software.

10.5 **Operator Manuals**

The contractor shall provide CSC approved manuals to support the operation of the system in the format as outlined in section 10.4 of this specification. These manuals shall be prepared to the best commercial standards. Photo copies shall not be accepted. All hard-copy versions shall be on paper stock 8 ½" x 11" and shall be presented in a 3-ring binder. The manuals shall comply with the following format and content requirements:

a. title page;

b. revision notice page, lined, with columns for revision numbers, dates and initials;

c. table of contents;

d. warnings and cautions;

e. introduction - general information including a description of equipment or system and summary of capabilities;

f. theory of operation including an explanation of all major system components;

g. detailed description and use of all user accessible computer screens; and

h. block diagrams.

A hard copy draft version of the manual(s) shall be submitted for CSC approval on or before the date given in the schedule. Upon acceptance and approval by the Design Authority, a total of two copies shall be provided for use during the warranty period. The contractor shall update these manuals through the warranty period and provide revision bulletins to record manufacturers' recommended modifications, etc. during the life of the equipment.

Within thirty (30) days of the warranty expiry date the contractor shall submit one (1) set of final, updated manuals for CSC approval. Following the final CSC approval, the required number of sets of operator manuals shall be delivered to the Design Authority in the format as specified in section 10.4 of this Statement of Work.

10.6 **Maintenance Manuals**

The contractor shall provide CSC approved manuals to support the maintenance of the system in the format as outlined in section 10.4 of this specification. These manuals shall be prepared to the best commercial standards. Photo copies shall not be accepted. All hard-copy versions shall be on paper stock 8 ½" x 11" and shall be presented in a 3-ring binder. The manuals shall comply with the following format and content requirements:

a. title page;

b. warranty page - explaining the warranty period and expiry dates;

c. revision notice page, lined, with columns for revision numbers, dates and initials;

d. table of contents;

e. introduction - general information including a full description of equipment or system, technical summary, specifications and detailed block diagrams;

f. theory of operation including a detailed explanation of all circuits and parts;

g. alignment and test procedures;

h. repair procedures including step by step fault finding or fault localizing;

I. block diagrams;

j. circuit schematics (clear, easy to read, foldout type);

k. complete parts list;

l. mechanical drawings, chassis layout illustrations and wiring data lists; and

m. drawings including as-built and as-installed drawings.

A hard copy draft version of the manual(s) shall be submitted for CSC approval on or before the date given in the schedule. Upon acceptance and approval by the Design Authority, a total of two copies shall be provided for use during the warranty period. The contractor shall update these manuals through the warranty period and provide revision bulletins to record manufacturers' recommended modifications, etc. during the life of the equipment.

Within thirty (30) days of the warranty expiry date the contractor shall submit one (1) set of final, updated manuals for CSC approval. Following the final CSC approval, the required number of sets of maintenance manuals shall be delivered to the Design Authority in the format as specified in section 10.4 of this Statement of Work.

11.0 PROJECT PROVISIONS

11.1 Monthly Progress Reports

The contractor shall submit monthly progress reports. These reports shall report the activities for the previous period. One (1) copy shall be delivered to the Design Authority and one (1) copy to the Contract Authority by the fifth (5th) day of each month. A review meeting may be required.

Monthly reports shall contain the following:

a. summary of the month's activities;

b. scheduled shortfalls and rescheduled dates;

c. problem areas and proposed solutions;

d. review of next month's activities;

e. summary of meetings held during the month; and

f. cash flow forecast.

11.2 Monthly Review Meetings

Review meetings shall be held at the contractor's premises, Design Authority's office, Contract Authority's office, or the site depending on the need. The contractor shall make the design staff members available upon request by the Design Authority.

11.3 Maintenance Support

During the training period, the contractor shall provide maintenance support. This support is expected to be not less than on-site coverage during the normal working day.

11.4 **Shipment and Delivery**

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

12.0 SYSTEM AVAILABILITY

All elements of customed and off-the-shelf equipment shall be designed to operate in a highly reliable fashion, consistent with available technology, with a minimum of system downtime due to scheduled and unscheduled maintenance. System availability will be achieved when each of the included subsystems availabilities have been proved as required.

12.1 Common Facilities

Where units or subsystems are integrated into common facilities no single failure of a component, assembly subassembly, or subsystem shall result in the failure of any other subsystem; nor result in reduced capacity or quality of performance of other subsystems or parts of it.

12.2 Single Point of Failure

The system shall be designed such that no failure of a single component, unit, subassembly or subsystem will result in failure of the next higher hierarchical elements of that subsystem or the system.

12.3 Availability Model

The bidder's technical proposal shall include a complete model and analysis of the availability of each subsystem and of the complete system being offered. This analysis shall include both MTBF and MTTR calculations and shall treat the Mean-Response-Time (MRT) as zero. This availability analysis may be based on either:

a. summation of failure rates of the individual components; or

b. the bidder's documented experience with the same equipment operating in a similar physical environment.

In either case, the source of all failure-rate shall be clearly shown.

The contractor shall maintain the availability model and analysis up-to-date throughout the contract period. A statement of impact of the proposed change would have on the availability model and analysis shall be submitted with all Type I DCRs.

12.4 Availability

Availability is the probability that the system, or subsystem will meet operational performance requirements at all time. Time includes the operating time, the active repair time and the administrative and logistic time. To calculate this availability, the contractor must include all of the pertinent factors such as:

12.4.1 **Mean Time Between Failure (MTBF)**.

The total operating time of the equipment divided by the total number of failures of that equipment.

12.4.2 **Mean Time To Repair (MTTR).**

The repair time divided by the number of failures.

12.4.3 **Mean Response Time (MRT).**

The time to respond to a call for service divided by the number of calls.

12.5 **Expected Life Duration**

This is the time during which the equipment is expected to provide useful service, without an unusual amount of service and without becoming obsolete.

13.0 INTERFERENCE

13.1 Interference to the System

Performance of the system shall not be affected by the use of standard electronic equipment used at the institution. Distance limits of standard electronic equipment are as follows:

13.1.1 CB transceivers at 1 metre or more;

13.1.2 VHF and UHF transceivers at 1 metre or more;

13.1.3 Other radio frequency transmitting, receiving and re-distribution equipment at 5 metres or more; and

13.1.4 Personal computer and/or computer work stations at 5 metres or more.

13.2 Interference by the System

The system shall not interfere with any standard electronic equipment used at the institution, any commercial TV or radio equipment at a minimum distance of 5 metres, or any other electronic security systems at a distance of 1 metre or more.

14.0 LIGHTNING PROTECTION

Surge suppression-type lightning arrestors shall be installed to protect all power, communications and antenna cables or wires entering or leaving a building.

These arrestors must be installed where the cable enters the building i.e. not in the CER or other equipment room.

Correctional Service Canada
Technical Services Branch
Electronics Systems

ES/SOW-0102
Revision 6
1 May, 2008

ELECTRONICS ENGINEERING STATEMENT OF WORK

QUALITY CONTROL FOR PROCUREMENT AND INSTALLATIONS OF ELECTRONIC SECURITY SYSTEMS

AUTHORITY

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

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address: Director, Engineering Services, Correctional Service Canada, 340 Laurier Avenue West, Ottawa, Ontario, K1A 0P9

Prepared by:

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Approved by:

Director,
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18 Aug 06

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ABBREVIATIONS

The following abbreviations are used in this specification:

AC	Alternating Current
ATP	Acceptance Test Procedure
BER	Beyond economical repair (repair cost in excess of 60% of replacement cost)
CER	Common Equipment Room
COTS	Commercial -of-the-Shelf
CSC	Correctional Service Canada
CSA	Canadian Standards Association
DC	Direct Current
DA	Design Authority
DES	Director, Engineering Services
EIA	Electronic Industries Association
EMT	Electrical Metallic Tubing
IDC	Insulation Displacement Connector
ISO	International Standards Organization
PCB	Printed Circuit Board
PVC	Polyvinyl Chloride
QA	Quality Assurance
RFP	Request For Proposal
STR	Statement of Technical Requirements

DEFINITIONS

The following definitions are used in this specification:

Design Authority	Director, Engineering Services (DES), Correctional Service Canada (CSC) is responsible for all technical aspects of the system design and implementation.
Contract Authority	Public Works and Government Service Canada (PW&GSC) and/or the Materiel Management Division of CSC is responsible for all contractual matters associated with the system design and implementation.
Project Manager	A CSC employee and/or a contracted person designated by DES to be responsible for the implementation of the project.
Project Officer	A CSC employee and/or a contracted person designated by DES to provide technical and/or engineering services in support of the project.
Contractor	The company selected as the successful bidder.
Off-the-shelf	Equipment which is commercially, complete with field reliability data, manuals, engineering drawings and parts price list.
Custom Equipment	Equipment designed and/or manufactured specifically for a specific contract.

APPLICABLE DOCUMENTS

The following documents of the issue in effect on the date of the Request For Proposal (RFP) shall form a part of the specification to the extent specified herein.

CSA STANDARD C22.1-1986	Canadian Electrical Code - Part 1 Safety Standard for Electrical Installations
EIA STANDARD EIA-310-D	Racks, Panels and Associated Equipment
CSA STANDARD C22.2	Canadian Electrical Code - Part II
EIA RS-406/IPC-C--405A	Connectors, Electric, Printed Wiring Boards

Any other applicable industrial safety and control standards governing specific aspects for equipment and/or installations.

1.0 INTRODUCTION

1.1 General

This document defines the quality control requirements for the design, installation, testing and acceptance of telecommunications and electronic security systems in all Correctional Service Canada (CSC) facilities.

1.2 Scope

This specification has been developed to ensure high standards for the installation of electronic systems. It defines workmanship standards which may not be fully covered in subsidiary specifications. All contractor's documentation and installation procedures shall meet this specification for equipment reliability, maintainability, longevity, appearance and operational use.

1.3 Off-The-Shelf Equipment

The contractor shall provide commercial off-the-shelf (COTS) equipment wherever possible. COTS equipment shall meet or exceed the manufacturing standards as listed in this specification.

1.4 Manufactured Equipment

Where COTS equipment is unavailable or unsuitable for a specific application, the contractor may manufacture or arrange for the manufacturing of a particular item to suit the requirements. Manufactured equipment shall meet or exceed the best commercial equipment manufacturing standards. Approval of the final design, appearance and ergonomics of all custom manufactured equipment shall rest with the DES, Project Manager or CSC delegate.

1.5 Commonality of Equipment

The contractor shall provide commonality of hardware components within the design parameters ie. switch locks, racks, panels, security screws, etc. All equipment, if appropriate shall be interchangeable.

2.0 MATERIAL AND EQUIPMENT REQUIREMENTS

2.1 Environmental Conditions

All materials and equipment which is used in CSC installations shall be equal to, or better than the standards established in the original equipment and shall be chosen with due consideration being given to the intended use, safety, retention of appearance, maintainability and durability under rugged operating conditions. These materials shall be suitable to perform over the following environmental ranges:

a. **Indoor Equipment**

Temperature: 0° C to 40° C; and
Humidity: 20% to 95% non-condensing.

b. **Outdoor Equipment**

Temperature: -40° C to +50° C; and
Humidity: 0 to 100%, condensing.

Outdoor equipment shall operate reliably and not be damaged by combinations of direct exposure to the sun, wind, rain, lightning, hail, snow and ice as may be expected to occur at each institution location.

Complete assemblies of indoor equipment shall be resistant to liquid spills, airborne contaminants (dust, pollen and water droplets), shock and vibration.

2.2 Materials

2.2.1 Metals

Metals used shall be either corrosion resistant or be suitably treated to resist corrosion in all potential atmospheric conditions, including tear gas, to which the installation may be subjected.

For the connection of copper to a cadmium or galvanized surface, effective "wiping" of the copper surface shall be considered satisfactory protection.

No cut galvanized fitting shall be used without protection equal to or greater than the original galvanized surface. All parts shall be free from burrs and sharp edges.

Metal which has been cut, scraped, or drilled shall be properly treated (primed and painted) to retain a uniform appearance.

2.2.2 **Plastic**

Plastic materials must be stable and shall retain their original shape and finish over the range of operating environmental conditions specified in 2.1

No material shall be used that softens or hardens within the storage environment in a way which is detrimental to its suitability as replacement parts for existing equipment.

Metal screws shall not be threaded into plastic materials.

2.2.3 **Natural Rubber**

The use of natural rubber is prohibited.

2.2.4 **Wood**

The use of wood or wood products is not acceptable.

2.3 **Toxic Materials**

Materials capable of producing harmful toxic effects under any operating condition, equipment malfunction, or accidental cause shall not be used.

2.4 **Flammable Materials**

Materials, used either for electrical insulation or mechanical purposes which are combustible or capable of causing an explosion, shall not be used.

2.5 **Fungus and Insect Supporting Materials**

Materials capable of providing a nutrient medium for fungus or insects shall not be used.

2.6 **Finish Application**

Finish shall be applied to all surfaces where consideration of appearance and protection against corrosion, toxicity, and other deterioration exists.

Application of finish shall not impair equipment performance, and will maintain uniformity in outward appearance.

Finish materials must be scratch resistant, not react to normal cleaning products and applied so as to last at least ten years.

3.0 INSTALLATION REQUIREMENTS

3.1 Wiring and Cabling

Prior to the installation, all wires and cables shall be tested in accordance with the manufacturer's instructions and shall meet all performance parameters.

Wire and cable harnesses shall be neatly formed and clamped in position. If brackets, forms or clamps are required, these shall be the responsibility of the contractor.

All wires and cables shall be stranded. Single conductor type wires are not acceptable except when such cables are specified to terminate on an IDC type connector. This does not apply to coaxial cables with single centre conductors.

Electrical tape, masking tape, or its equivalent shall not be used on wires, cables or any installed equipment.

3.1.1 Wiring/Cabling Methods

Three (3) or more individual wires or cables which are located in one(1) cable run shall be formed into a cable harness, properly dressed, supported and securely tied with flat lacing twine or equivalent.

Wires and cables which are installed by the contractor external to consoles, equipment racks, pull boxes and junction boxes shall be contained in securely mounted conduit or cable tray systems.

Plastic PVC conduits may be used in underground installations unless otherwise specified at time of bidder's conference.

A rigid steel conduit shall be used in indoor, security sensitive areas and outdoor above-ground applications.

Signal and 120 VAC power wiring shall not be run in the same conduit, cable tray, or raceway; and shall be separated in accordance with the local Electrical Authority.

Wire splicing in cable runs shall not be permitted. All cable runs shall be continuous. If continuous cable runs are not possible, terminal block configurations are acceptable provided they are approved by the Design Authority.

Cross-connects installed on BIX. or similar blocks, must not pass across the face of the block, but must be carried around the block, so as not to impede access to the connections.

BIX, or similar, blocks are to be used for solid wire only. Stranded wires are not to be directly terminated on BIX, or other IDC terminations.

Wires in multi-conductor cables which terminate on connectors, and which are not being used, must be twisted around the cable in a neat fashion. They are not to be cut off.

Wires in multi-conductor cables which terminate on BIX or similar IDC connector blocks, and which are not being used, must be punched down on the block. They are not to be cut off.

All conductors on IDC and any other type of terminal block will be identified with a cable marker and cross referenced in the as-built drawings.

Rectangular slots shall be cut in the computer floor, underneath any cabinets, racks, and consoles, for the running of cables. These slots must constitute at least 1/2 of the available floor area. Sharp edges on the computer floor shall be supplied with suitable protection to eliminate possible nicks, tears or wear in cable insulation sheaths. Individually drilled holes for the purpose of carrying cables from the under floor to the inside of the cabinet, rack or enclosure are not permitted.

3.1.2 **Cable/Wiring Labelling**

The contractor shall label all cables and cable runs. The labelling method shall be logical and conform to industry standards.

All cables shall be identified with commercially produced or machine printed alpha numeric labels protected by clear heat shrink tubing. Hand printed labels are not acceptable.

All wiring shall be identified at both ends of the wire. The coding shall enable a technician to identify the wire or cable without referring to manual tracing methods, test equipment or as-built drawings.

Cable identification labels shall be attached as follows:

a. within 30 cm of the termination for both ends.

b. in the middle of any access point, i.e. pull box, wall shaft opening, cable tray, etc.

All individual wires shall be labelled according to a cable numbering system or wire function plan, which is acceptable to the Design Authority.

All terminal strips shall be identified with its own unique terminal number and function.

3.1.3 **Exterior Cabling**

Where a cable enters or exits an exterior box, chassis, or conduit, the cable entrance shall be completely sealed to prevent an influx of water. A drip loop shall be formed in the cable to assist in maintaining this weather tight seal.

Conduit bushings shall be used on all conduit entrances/exits.

Sharp edges on metal boxes or chassis enclosures shall be supplied with suitable protection to eliminate possible nicks, tears or wear in cable insulation sheaths.

3.1.4 **Slack**

Wires and cables shall be as short as practical, with sufficient slack to:

a. allow a minimum of three (3) reconnects due to wire breakage;

b. prevent undue stress on cable forms, wires, terminals and connections;

c. enable parts to be removed and replaced during servicing without disconnecting adjoining wires or circuits;

d. facilitate movement of equipment for maintenance purposes; and

e. provide drip loops in exterior cabling.

Slack shall be provided in junction boxes where space permits. Slack shall not exceed one single loop of cable forming the circumference of the junction box.

Slack shall be provided below equipment racks and shall be neatly coiled below the access flooring. The length of slack shall be equal to the height of the associated equipment rack. Units in drawers and slide out racks shall be provided with sufficient slack to permit removing the units without severing connections.

All cross connection wiring shall be neat and tidy, properly bundled, and tied. This procedure shall allow sufficient slack for tracing of individual wires via manual methods.

Parts mounted on a hinged door shall be wired by means of a single cable, and arranged to flex without being damaged by the opening and closing of a door. If physical separation between wires is essential so as to make a single cable impractical, more than one flexible cable may be utilized.

3.1.5 **Terminations**

All terminations relying on friction for electrical and mechanical connection shall be tested in accordance with the manufacturer's instructions and shall meet the performance requirements detailed therein.

Terminal fanning strips shall be used where a number of wires are contained in a harness, shall be used unless a multi-pin connector is provided.

Spade terminal lugs shall be used on all wiring, connections to screw-thread terminals, except where solder or other type of terminal is specified.

Where wires are connected to lugs, which are clamped under screw terminals in the form of a terminal connection strip, no more than one wire shall be attached to each lug, in order that each wire may be removed individually. This requirement will not apply in the case of common connections, daisy chain distribution circuits, or similar terminations where wires will not need to be disconnected for servicing.

No more than two (2) lugs shall be attached to each terminal.

Wire and cable insulation shall be stripped back to allow for proper connection to the lug. No bare wire shall be visible between the terminal lug and the insulator.

Terminal strips must be fastened to a hard surface using a screw, or nut and bolt. Adhesive supports to secure the terminal strip, or floating terminal strips are not acceptable.

3.1.6 **Splicing and Joining**

Splicing of wires on new installations is not permitted.

Where connectors are used on cable assemblies, they shall be a locking type which will not disengage under tension.

All joints or splices in underground cable runs shall be located inside accessible, secure, waterproof, and lockable steel enclosures. The enclosures shall be located at least one (1) metre above grade and be firmly secured to existing structures or to stub pole supports.

Splices in underground cable runs, if required to repair Crown caused damage, shall be subject to approval from the Design Authority.

Stranded conductor splices shall be held by wire binding terminals in order to prevent stray strands from causing either short circuits or grounds.

Joints and splices shall be soldered and encased in waterproof shrink tubing for protection against leaching, oxidization, moisture damage, etc.

Joints and splices shall be clearly and accurately identified on applicable as-built drawings.

3.1.7 **Shielding**

Shielding shall be secured on wires and cables to prevent accidental contacting or shorting exposed current-carrying parts, grounded metal objects, or structures.

Shielding shall terminate at sufficient distance from the exposed conductors of the cable to prevent shorting or arcing between the cable conductor and the shielding.

Ends of the shielding material shall be secured against fraying.

3.1.8 **Protection**

Wires and cables shall be strategically located and protected to avoid contact with rough, irregular surfaces or sharp edges.

Wires and cables shall be protected by suitable grommets or bushings when passing through openings in metal.

Guards or other suitable protection shall be provided on insulated high voltage cables.

3.1.9 **Support**

Wires and cables shall be properly supported with adequate strain relief to prevent excessive strain on the connections, devices, or joints of any electrical apparatus connected therein.

Adhesive supports with ty-wrap products shall not be used unless they are secured by a nut and bolt device.

3.1.10 **Clearance**

Physical clearance between wires/cables and associated heat emitting parts, i.e. amplifiers, shall be sufficient to prevent deterioration of the wires or cables. Refer to Table 19 of CSA Standard C22.1 Part 1.

3.1.11 **Inductive and Capacitive Effects**

Wires and cables, including harness wire and cables, shall be located such that inductive and capacitive effects do not adversely affect system operation. The amount of twists in paired wires shall be increased over the length of wire not covered by the cable sheath.

3.2 **Power Wiring**

The contractor shall not employ "Marette" (TM) type connectors regardless of CSA Standard C22.1 regulations. All wiring shall terminate on an insulated or protected barrier strip or terminal board, and be provided with spade terminal lugs where required.

Where control and signal wires which are run in conduit, cable-harness, or cable-trough systems, shall be run in separate wire ways. The separation shall be a physical barrier of suitable material and shall conform to applicable building codes and wiring methods.

All high voltage and/or high current terminations shall be provided with protective guard devices by the contractor. The device shall be mounted to allow for maintenance access to the terminals.

Terminal lugs shall be used on all power wiring, both VAC and VDC.

Warning labels must be installed in accordance with the CSA guidelines to warn maintenance personnel of any hazardous voltages and currents.

3.2.1 **AC Wiring**

AC wiring methods shall conform to all local and national wiring regulations.

Outlet boxes shall be installed such that all outlets are clear of any obstructions including wiring and cabling, and shall be easily accessible.

Power distribution within a cabinet or rack shall be via a power outlet strip, as provided by the original cabinet or rack manufacturer. A third party outlet strip is not acceptable. All power strips must be mounted into the equipment cabinet with rack mounting hardware.

All power cable installations shall be completed in a neat and sturdy fashion and shall meet all requirements of the specifications detailed herein.

Power cords within equipment cabinets and racks shall be maintained as short as practicable with due consideration for maintenance needs.

Systems which use redundant equipment, such as dual microprocessors, shall power each unit from two separate breakers connected to opposite phases of the AC feed.

3.2.2 **AC Power Connections**

All AC power connections from the cabinet or rack power outlet strip to the AC junction box shall be via flexible armoured cable. AC power connectors are not permitted.

3.3 **Conduits, Enclosures, Cable Troughs and Raceways**

3.3.1 **Conduits**

Conduits installed above ground, and accessible to the inmate population, shall be rigid steel.

Metal conduits installed in secure and inmate accessible areas shall be fitted with double the normal quantity of support hangars.

In locations subject to extreme temperature changes, and/or where conduit lengths are of non-standard size, the contractor shall make provisions for the inclusion of conduit expansion joints.

Rigid PVC conduits shall be used only in buried applications.

Rigid PVC conduits shall not be threaded, but may be used with approved adapters and couplings applied in a manner consistent with industry standards.

EMT conduit may be used in administrative areas, and locations which are not normally assessable to the inmate population.

Liquid-tight flexible metal conduits may be used where a flexible connection is required, i.e. cameras, microwave dishes, etc. In such applications, the length of "flex" conduit shall not exceed one (1) metre.

PVC conduits which cross roadways shall be encased in poured concrete.

The contractor shall provide a suitable means of protecting the buried conduit against damage caused by digging or excavating. The preferred method is installing a tape marker directly above the conduit path.

In addition to these requirements, the applicable industrial standards apply, including:

a. CSA Standard C22.2 No. 45-M1981 - Rigid Metal Conduit

b. CSA Standard C22.2 No. 56-1977 - Flexible Metal Conduit

3.3.2 **Enclosures**

All electrical connections, terminations, and cross connections shall be made within lockable, covered steel enclosures, using good quality locks. At least two keys must be supplied to CSC.

Outdoor enclosures shall be environmentally sealed and gasketed to provide a moisture/dust free and secure environment.

Enclosures which contain electrical equipment such as circuit breakers, relays, switches, and transformers, or cable networks, connections and terminations, shall be weatherproof and dust-tight and meet the provisions of IP64.

All enclosures such as junction boxes, racks and consoles shall be positioned for ease of maintenance, service, and connection/disconnection of cables and cable harnesses.

The contractor shall provide a proper drain hole in all enclosures which are grouted in concrete.

All floor mounted cabinets, racks, and consoles shall be secured to prevent overturning when associated drawers, shelves and movable parts are extended, or when heavy objects are placed on pull out shelves or writing tables.

In addition to the provisions stated herein, the applicable industrial standards shall apply, including:

a. CSA Standard C22.2 No. 29-M1983 for Industrial Products.

b. CSA Standard C22.2 No. 94-1976 for Special Purpose Enclosures.

3.3.3 Cable Troughs and Raceways

Cable troughs and raceways shall be continuous and shall be constructed of metal.

The contractor shall provide adequate mounting devices which will permit the use of fastening devices that will not damage conductor insulation.

Cable troughs, raceways, and fittings shall be free from burrs or other sharp edges which may cause damage to the cable or insulated conductors.

Cable troughs and raceways shall be installed as a complete system before the conductors or cables are installed.

Cable troughs may be either ventilated or solid and unless otherwise specified, shall be equipped with covers and steel guards to protect against damage.

In addition to these provisions, the appropriate standards shall apply, including:

a. CSA Standard C22.2 No. 126-M1980 - Cable Troughs and Fittings.

b. CSA Standard C22.2 No. 79-1978 - Raceways and Fittings.

c. CSA Standard C22.2 No. 62-1972 - Surface Raceways and Fittings.

3.3.4 Labelling

The contractor shall label equipment racks, junction boxes etc. The labelling method shall be logical and conform to industry standards. All equipment racks and junction boxes shall be identified with commercially produced or machine printed alpha numeric labels. Hand printed labels are not acceptable.

Identification of chassis equipment shall be located in a suitable location within the rack and affixed to the rack, not the chassis.

Approved materials used for labels include lamicoyd strip, etched metal, stamped labels, or indelible ink.

3.4 Soldering

On solder connections, the insulation on individual wires shall not be stripped back more than 1.5 mm from the solder area.

Soldering shall be executed so that positive electrical and strong mechanical connections are assured.

Leads shall not be wrapped more than once around the terminal.

Soldered connections on the back of connector plugs, i.e. cannon plugs, switches, relay sockets or any other device employing solder lugs, shall be insulated by means of a short length of insulating tubing placed over each wire in the connector.

"Cold" solder joints, and excessive solder on connections shall not be acceptable.

Each soldered connection shall be tested for mechanical and electrical strength to ensure that a strong connection is achieved.

Use of acid based solder flux is not permitted.

Where insulation material is subject to heating during soldering, the material shall be undamaged and the fastened parts shall not be loosened.

3.5 Welding

All welds shall be free of harmful defects such as cracks, porosity, undercuts, voids and gaps.

There shall be no burn through.

Weld fillets shall be uniform, smooth, and shall cover a sufficient area of the welded surface to ensure that a solid bond is achieved.

Surfaces to be welded shall be free of extraneous particles which may affect the mechanical elements of the welded area.

3.6 Crimping

Crimp connections shall be made in accordance with the manufacturer's instructions. Industry standards shall be observed at all times.

Solid conductors may be used with crimp connections where the use of solid conductor wiring cannot be avoided. In all other cases only stranded wiring shall be used on crimp connections.

Solid conductors which are connected to terminals by crimping shall be soldered as well. This provision only applies to terminal lugs. It does not apply where wires may be spliced by crimping except in the case of some LED's and indicator lights which employ pigtail leads which should be soldered or connected by screw terminals.

3.7 Cleaning

Upon completion of the installation, the equipment shall be cleaned of smudges, loose or excess solder, weld beads, metal chips, burrs, mold release agents, or any other foreign material which might detract from the intended operation, function, or appearance of the equipment.

All corrosive materials shall be removed.

The cleaning processes employed shall leave no harmful residues and shall not have a negative effect on the equipment or its parts.

4.0 GROUNDING REQUIREMENTS

4.1 General

Grounding source and distribution points shall be provided by the Crown unless otherwise specified at the bidder's conference, in the Statement of Technical Requirement (STR), or any applicable documents.

The grounding shall be such that the signal ground, equipment ground, and electrical power ground shall be connected at one point and shall follow the shortest possible path. Where necessary, ground isolation techniques shall be employed.

The path from the tie point to any ground shall be permanent, continuous, have sufficiently low impedance to limit the potential above ground, and facilitate the operation of the 'over current' devices in the circuits.

Ground conductors shall be made of copper, sized for a minimum of 200 circular mils for each 300 mm length of conductor.

Inactive wires installed in long cable or conduit runs shall be grounded to prevent stray or static electrical discharges, with proper consideration given to prevent ground loops or other grounding problems.

Installation must be such that ground loops are prevented.

4.2 Signal Ground

Signal grounds shall be used to provide a ground potential reference which is independent of the frame ground and the power equipment ground.

An insulated grounding conductor shall be connected from the equipment signal ground terminal to the main ground connection point for single units such as equipment racks.
An insulated ground plate shall be used with insulated grounding conductors for multiple units, such as common equipment room (CER) equipment, from each equipment signal ground terminal connected to the plate. The plate shall be connected to the main ground connection point by means of a single insulated grounding conductor.

4.3 **Frame Ground**

The ground connection of the receptacle may be used for the frame ground as long as that ground connection is isolated and insulated from the power equipment ground system. Such receptacles shall be clearly identified so that they will not be used to supply equipment that does not require frame grounds.

The receptacle ground connection conductor shall be insulated and isolated from the power equipment grounding system, and shall be connected from the receptacle ground connection to an isolated ground plate.

The isolated ground plate may be an insulated buss bar for low power applications,.

Size of grounding conductors shall be in accordance with the requirements of CSA Standard C22.1 Section 10 and Table 17.

4.4 **Combined Signal and Frame Ground**

Connection between the signal ground terminal and the frame ground terminal shall be part of the equipment wiring. The connection to the main ground connection point shall be similar to that for a frame ground.

4.5 **Main Ground Connection Point**

Main ground connection point shall be installed in accordance with CSA Standard C22.1 Section 10, and C22.2 No. 41.

4.6 **Ground to Chassis**

Ground connections to an electrically conductive chassis or frame shall be made by:

a. soldering to a spot-welded terminal lug.

b. soldering to a portion of the chassis or frame that has been formed into a soldering lug.

c. using a terminal on the ground wire and securing the terminal by a screw, nut and lockwasher.

When using a terminal on a ground wire which is secured by a screw, nut and lockwasher, the screw shall fit in a tapped hole in the chassis or frame, or it shall be held in a through hole by a nut.

When the chassis or frame is painted, the metal around the screw hole shall be scraped clean and plated (or tinned) to provide a corrosion resistant connection.

4.7 Shielding

Shielding on wire and cable shall be grounded to the chassis or frame, in the manner specified in Section 2.5.5

4.8 Lightning Protection

All equipment with external cabling including radiating cables or other forms of antennas which may be susceptible during lightning strikes or other static discharges shall be protected fully in accordance with the relevant safety rules and regulations.

The ground rod used for lightning protection shall be copper or copper-plated steel, and shall be a minimum of 2.5 metres in length. Where the ground conditions preclude installation of a single ground rod, multiple rods of a shorter length may be used in parallel to provide the lightning protection.

The copper ground conductor shall be fastened to the ground rod using a thermic welding technique. Clamps are not acceptable.

5.0 ELECTRICAL/MECHANICAL DESIGN REQUIREMENTS

5.1 Design Considerations

All equipment shall be manufactured and finished with a degree of uniformity and grade of workmanship which shall comply with applicable industry standards, and the generally accepted principles of safe practice.

Exposed and moving parts that might constitute a safety hazard shall be provided with protective guards and warning labels.

All elements of the equipment shall be designed to operate in a highly reliable fashion, consistent with available technology, with a minimum of system downtime due to scheduled and unscheduled maintenance.

Where units or subsystems are integrated into common facilities, no single failure of a component, sub- assembly, assembly, or sub-system shall result in the failure of any other sub-system or reduced capacity or performance of other sub-systems or parts thereof.

The system shall be designed such that no failure of a single component, unit, subassembly, or subsystem will result in failure of the system or the next higher hierarchical elements.

All equipment shall be designed and installed to provide useful service, with minimal maintenance for a period of no less than 10 years, unless otherwise specified.

Tabletop or wall-mount power supplies or transformers shall not be used to power equipment installed within equipment racks and cabinets. Power supplies or transformers used within racks and cabinets shall be securely fastened to the rack equipment rails or side of the cabinet. DIN rail mounted power supplies are preferred.

5.2 Assemblies

The contractor (or manufacturing agent) shall apply special considerations in the execution of assembling system component parts.

Rack mounted equipment chassis; whose depth from the front face panel to the rear of the chassis exceeds 25 cm shall be equipped with rack slides.

Each assembly shall have a permanently fixed label showing the model number, serial number, and power requirements.

Materials used in assemblies shall be chosen with due consideration being given to the intended use, safety, durability, retention of appearance, and ability to resist corrosion from a variety of causes including tear gas.

In addition to applicable CSC/DES specifications, the appropriate industrial standards shall apply, including:

a. EIA-310-D Racks, Panels, and Associated Equipment.

b. CSA C22.2 No. 94-1976 Special Purpose Enclosures.

c. CSA C22.2 No. 29-M1983 Panel boards and Enclosures.

5.3 **Printed Circuit Board (PCB)**

PCBs shall be constructed of non-flammable material, preferably a glass epoxy base.

The contractor shall provide extractor devices at the front of each card assembly.
All cards shall have keyed edges to prevent accidental replacement by another type of card.

Each device shall be identified and properly labelled, showing card type, and revision number.

All PCBs shall be etched. Wire wrap connections are not acceptable.

In addition to the requirements set forth herein the appropriate industrial standards shall apply, including:

a. CSA C22.2 No.154-M1983 Data Processing Equipment.

b. CSA C22.2 No.0.7-M1985 Equipment Electrically Connected to a Telecommunications Network.

c. EIA RS-406/IPC-C-405A General Document for Connectors, Electric, Printed Wiring Boards.

5.4 **Components**

All electrical equipment, i.e. power supplies, amplifiers, etc. attached to the equipment structure shall be fastened securely and rigidly not using nuts and lockwashers.

Electrical components used in manufacturing in-house products shall be of commercial quality and shall comply with the standards of the Canadian Electrical Code, Part II.

Electronic circuit components, such as resistors, capacitors, inductors, or semiconductor devices which have no applicable standards in the Canadian Electrical Code, Part II shall comply with the test parameters as set forth in CSA C22.2 No. 154-M1983 Part 6.

6.0 QUALITY ASSURANCE REQUIREMENTS

The contractor shall provide objective evidence that the system and any major component therein have been designed, manufactured, inspected and tested under the umbrella of a quality assurance program capable of meeting the requirements of the applicable ISO Standard 9002 Series. More stringent requirements will be identified on a case by case basis, as needed.

In addition, the contractor shall develop a site-acceptance test/inspection procedure to demonstrate that all parameters of the system are fully operational and conform to the Statement of Technical Requirements.

6.1 In-plant Inspection

The equipment shall meet all functional, electrical, and visual/mechanical test parameters and shall have been fully tested and inspected by the contractor. Results shall be documented and reported to the Design Authority. Periodic inspections may be done by the Design Authority or his designated representative to verify that the equipment meets all requirements.

Particular attention shall be given to the following:

a. Inventory of received equipment.

b. Physical condition of equipment i.e.: scratches, dents, paint chips, etc . . .

c. Construction techniques, board and components accessibility.

d. Neatness, clamping and tying of wiring, cabling and harnesses.

e. Strain relief of cables and wire connections.

f. Legibility of nameplates, identification plates, and markings.

g. Safety and protective covers, warning labels and grounding.

h. Tightness of connectors, screw type fasteners, etc.

i. Soldered and weld joints.

j. Completeness.

k. Operation of drawers, adjustable and sliding parts, controls etc.

l. Shielding.

m. Cable and wire connections, ground clamps and terminal strips.

n. Type and quality of paint finish.

o. Quality of printed circuitry, etching, the electronic components and other associated parts.

p. Quality of locks, cabinets and other materials.

It must be noted that the in-plant tests are performed as a requirement of the financial arrangements and serve to guarantee that the design parameters of the FDR are followed and will meet the requirements of the applicable system specification. Sign-off of in-plant tests will not denote any form of final acceptance of the equipment and design.

6.2 Test Equipment

All test equipment shall be supplied by the contractor.
All instruments and test equipment shall be checked periodically by the QA Inspector in order to ensure accuracy of measurement. Records showing when the test equipment was last calibrated are to be provided as proof of accuracy.

6.3 Calibration

All test equipment used by the contractor shall bear a calibration seal showing the date calibrated and the due date for the next calibration.

The contractor shall ensure that the test equipment's calibration due date does not occur during the test period.

All equipment performance measurements shall be made with instruments whose accuracy and calibration guarantee that the results comply with the terms of the contract.

CSC reserves the right to furnish and/or require the use of any applicable instruments and standards in order to ascertain the accuracy of any measurements.

Test equipment suspected of being damaged or out of calibration shall be rejected by the Design Authority.

6.4 Safety Design Aspects

Particular attention is to be given to the safety design aspects of CSC installations, so as to minimize any hazards while in gaining access to, operating and servicing equipment. Such design aspects shall include the proper grounding of equipment, the installation of protective covers and warning labels over high voltage areas, the installation of warning labels on x-ray equipment, etc.

Radio and TV camera towers must receive careful attention in regards to make them accessible for servicing, especially during inclement weather.

7.0 ON-SITE INSTALLATION

7.1 Inspections

Inspections will be performed by the Design Authority or their designated representative. A thorough visual and mechanical inspection of the installation shall be performed to ensure that all applicable requirements and safety precautions have been met.

7.2 Damage to Government Property

Damage to Government property, including buildings, equipment, etc. during the course of the installation shall be made good by the contractor.

The contractor shall replace all equipment which has suffered major damage, i.e. damage which renders the equipment BER, unserviceable, or subject to deterioration.

If stocks of the applicable equipment are at such a level that replacement of the damaged items cannot be made, and the contractor cannot readily obtain new equipment in order to allow the installation to proceed without delay, the contractor shall:

a. repair the damage immediately with available materials.

b. return to the site and replace the equipment as soon as new equipment is procured.

Minor damage shall be repaired in a manner which leaves the government property in a condition equivalent to its original state and performing the original function, with no deterioration in appearance, performance, and/or reliability.

Any equipment where the paint finish becomes scratched or marred during the installation shall be completely refinished and repainted consistent with the appearance of new equipment.

Equipment shall neither be exposed to rain, nor be left out-of-doors during inclement weather. This stipulation does not apply to construction materials.

7.3 Protection of Surfaces

The contractor shall obtain approval from the appropriate Institution authority before moving heavy loads or equipment on floors, roofs and other surfaces.

The contractor shall adequately protect floors, finished surfaces and roofs from damage during the installation and shall implement special measures when moving heavy loads or equipment on them.

The contractor shall keep the floors free of oils, grease, or other materials likely to damage or discolour them.

The contractor shall provide dust protection for the equipment during the installation period, as related construction activities may occur simultaneously.

7.4 Cutting, Patching and Digging

The contractor shall perform all cutting, patching or digging necessary for the installation of the system.

The contractor shall be responsible for changes or damage to any existing work, cables or equipment by cutting, welding, drilling, or digging without prior consent from the Design Authority.

The contractor shall promptly repair any damage for which he is responsible in order to restore the facilities to their original condition.

7.5 Visual-Mechanical Inspection

Inspection shall be performed by the Design Authority or his designated representative.

Prior to the commencement of performance and operational testing, the installation shall be inspected to ensure that all applicable requirements and standards have been met.

Particular attention shall be given to the following:

a. Physical condition and positioning of equipment.

b. Neatness, clamping and tying of wire and cable harnesses.

c. Cable and wire connections, ground clamps, and terminal strips.

d. Soldered and welded joints.

e. Strain relief of cables, wire connections, and cable harnesses.

f. Cleanliness of equipment boxes under computer flooring.

g. Nameplates, identification methodology and markings.

h. Operation of drawers, adjustable and sliding parts and controls.

i. Equipment fit, fastening devices and accessibility of parts.

j. Construction and finishes.

k. Legibility of labels and tags.

l. Safety aspects, including secure provisions for climbing and working on towers.

m. Shielding.

n. Grounding.

o. Equipment Cooling Provisions.

p. Washers and lock-washers.

q. Tightness of screw type fasteners & connectors.

r. Screws, nuts and bolts shall show no evidence of cross-threading or mutilation.

s. Bottom of equipment racks etc. shall be free of debris and loose parts.

7.6 **Final System Acceptance**

The system shall be accepted when all of the following items have been completed to the satisfaction of the Design Authority and with the written certification of the project manager:

a. performance and operational tests.

b. all documentation.

c. all training.

d. all other terms and conditions.

The system warranty shall be deemed to begin at the completion of the Final System Acceptance or when the system is taken into service with accepted deficiencies, whichever comes first.

7.7 On-Site Maintenance

Building and site maintenance shall be interpreted to include all the areas in which the contractor is carrying out installation activities.

All sites and buildings shall be maintained by the contractor in a clean and tidy condition.

Upon completion of each day's work, all areas such as hallways, stairways, elevators and storage rooms used by the contractor in delivering or storing equipment shall be left in a clean and tidy condition.

The contractor shall store all electronic components not yet installed in a lockable storage room/trailer at the end of each workday. This procedure will reduce the probability of damaged and/or stolen equipment prior to system acceptance. Prior to the commencement of performance and operational testing, the installation shall be inspected to ensure that all applicable requirements and standards have been met.

8.0 DELIVERY

8.1 Packaging

All equipment shall be packaged to ensure that the equipment will not be damaged during shipment and/or delivery to the institution, as well as any associated handling on site.

Fragile components must be clearly identified and labelled.

All circuit cards, equipment modules, etc. shall be protected by the original packaging material until the equipment is placed into service.

8.2 Addressing

Address labelling shall be clearly marked in a minimum of two (2) locations on each package. The following format shall be observed:

a. Complete name of the institutional site.

b. Complete shipping address.

c. Clear description of contents.

d. Complete name of the Institutional representative.

All of the above addressing items will be provided at the Bidder's Conference.

- END OF TEXT -

Correctional Service Canada
Technical Services Branch
Electronics Systems

ES/SPEC-0501
Revision 2
21 January, 2002

ELECTRONICS ENGINEERING

SPECIFICATION

NURSE CALL SYSTEM FOR USE IN FEDERAL CORRECTIONAL INSTITUTIONS

AUTHORITY

This Specification is approved by the Correctional Service of Canada for the procurement and Installation of a Nurse Call system, subsystem, and equipment in Canadian federal correctional institutions.

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address: Director, Engineering Services, Correctional Service of Canada, 340 Laurier Avenue West, Ottawa, Ontario, K1A 0P9

Prepared by:

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Approved by:

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TABLE OF CONTENTS

ABBREVIATIONS

The following abbreviations are used in this specification:

CCD	Call Cancellation Device
CER	Common Equipment Room
COD	Call Originating Device
COTS	Commercial-Off-The- Shelf
CSA	Canadian Standards Association
CSC	Correctional Service Canada
DES	Director Engineering Services
EIA	Electronic Industries Association
GFE	Government Furnished Equipment
MCCP	Main Communications and Control Post
PACP	Primary Annunciation and Control Panel
RFP	Request for Proposal
SAP	Secondary Annunciation Panel
SOW	Statement of Work
STR	Statement of Technical Requirements
TES	Terminal Equipment Space

DEFINITIONS

The following definitions are used in this specification:

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

1.0 INTRODUCTION

1.1 General

This specification defines the essential technical and functional requirements of the Correctional Service Canada (CSC) for the procurement and installation of a Nurse Cell System (NCS) for federal correctional institutions.

1.2 Purpose

The purpose of the NCS is to provide a means for inmates in a Health Care Unit (HCU) to indicate to the Nursing Staff that they need some form of attention, to display the location of the call originator on an annunciator panel and to record the date and time of the call sequence of events which can be used as documentary evidence.

In a Health Care Unit, a Call Ordinating Device (COD) shall be installed in each ward, a corresponding white annunciating Over door Light shall be installed over each ward door and an annunciator, complete with control equipment, will monitor the system at a local Nurse's Station. When required, strategically located Repeater Annunciators shall also monitor the system remotely. If a call is not acknowledged after a specified time delay (variable 1-15 minutes) then the call shall be automatically transferred and annunciated at the Main Communications and Control Post (MCCP) where appropriate action will be initiated.

The NCS described herein would be applicable to new institutions to be constructed. It could also be retrofitted into existing institutions whenever it becomes necessary to add a cell call capability or replace existing obsolete equipment.

1.3 Commercial-Off-The-Self Equipment

The NCS shall use commercial off-the-shelf (COTS) equipment and proven designs to the maximum extent possible. All new equipment shall meet the specified lifespan requirements. New equipment designs shall be restricted to unique interfaces and common control console.

1.4 Technical Acceptability

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

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

The technical acceptance process shall involve system and subsystem evaluation in accordance with the applicable CSC specifications in one of CSC facilities or may be tested in a CSC facility to verify the effectiveness of the proposed technologies when subjected to the restrictive operational environment.

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

It is the supplier's responsibility to make new developments in products available to CSC for evaluation. Equipment qualification is an ongoing process and can be initiated at any time by a vendor. Any vendor can have access to the CSC specifications and standards. Any new development or products should be submitted to the CSC Engineering Services Division, Technical Authority in a suitable time frame prior to any tendering process to allow for an acceptable evaluation period. The evaluation period may take up to sixteen (16) months.

1.5 Equipment Procurement

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

1.6 Quantity of Equipment

The quantity and location of the equipment required for CSC institutions will be contained in the specification identified in the Statement of Technical Requirements (STR)

2.0 APPLICABLE DOCUMENTS

The following documents of the issue in effect on the date of the Request for Proposal (RFP) shall form a part of this specification to the extent specified herein.

ES/SOW-0101	Statement of Work for Electronic Systems for Correctional Service of Canada Institutions
ES/SOW-0102	Statement of Work for Quality Control for installation of Electronic Systems in Federal Correctional Institutions.
ES/SPEC-0005	Specification for Main Communications and Control Post Integration Consoles
ES/STD-0802	Standard for Display and Control Panel
ES/STD-0803	Standard for Video Display Unit
EIA-310-C	Electronic Industry Association Standard for Racks, Panels and Associated Equipment

3.0 REQUIREMENTS

3.1 General

The Nurse Call System consists of a number of Call Originating Devices (COD), one or more Primary Annunciation and Control Panels (PACP), one or more Repeater Annunciators (if Required), a Secondary Annunciation Panels (SAP) a number of Overdoor Indicating Devices, Call Cancellation Devices (CCD), wires, cables, conduits, ducts, etc. and an interface with a Data Logger.

3.1.1 System Capacity

The number of control units and the number of wards served by each shall be as specified in the STR. The system shall be of a modular design and it shall be possible at a future date to add more annunciation panels and associated cell equipment to the basic installed complement without replacing the existing hardware.

3.1.2 Period of Operation

The NCS and all associated equipment shall be rated for and capable of 24 hours per day, seven days per week operation.

3.2 System Requirements

3.2.1 Call Originating Device

The COD shall be mounted on the wall near the patients bed. It shall contain a tamper proof switch, which when activated, originates a call to the PACP in the Nurse Station.

This device is located in an area continually exposed to the inmate. The COD shall be highly resistant to physical attack, tampering, liquids, jamming, abrasives, heated objects, etc.

3.2.1.1 Bed Call COD

The bed call COD shall be used by an inmate patient confined to bed in a hospital ward or Health Care Unit. It shall not furnish the inmate with material with which he or she might do injury to himself/herself or others. The unit shall consist of the following elements:

a. A latching-type receptacle mounted on a brushed stainless steel wall plate secured to a single-gang electrical outlet box.

b. A detachable cord assembly consisting of a specified length of lightweight stranded, jacketed electrical cord and a pendant cord switch having positive touch feedback and audible click. Cable grip and strain relief shall be incorporated.

Differences in institutional construction preclude a single COD design which is usable in every situation. Mounting information for each specific site application will be given in the STR.

In order to prevent damage due to excessive force the switch mechanism shall be effectively isolated from any applied load greater than that necessary to activate it. The switch mechanism shall provide a positive touch feedback and audible click to the inmate so that the inmate is fully aware of its actuation. The switch wiring shall be designed so that destruction of the unit will sever the conductors, yielding only the minimum possible length of light-gauge wire, and will not disturb the built-in wiring beyond a local junction box. The force required to operate the push-button shall be between 5.6 and 11.0 N (20 and 40 oz.). The push button shall have a minimum diameter of 2.5 cm.

3.2.1.2 **COD Procurement**

The STR shall define whether the COD will be deliverable items under the contract or will be Government Furnished Equipment (GFE).

3.2.1.3 **Prototype Approval**

When the contractor is to supply the COD as part of the system, a working COD prototype shall be provided to the Design Authority for approval prior to manufacturing or purchasing of system quantities.

3.2.2 **Primary Annunciation and Control Panel**

The PACP may be rack, desk, or wall-mounted and will usually be installed in the Nursing Station which is responsible for the supervision of an area containing a group of wards. It shall contain the following annunciations and controls:

a. one Visual Indicating Device for each bedroom in the ward;

b. one Acknowledge Call Indicating Device for the ward;

c. one Audible Indicating Device for the ward;

d. one Call Disable Device (CDD) for each bedroom in the ward;

e. one Call Disable Indicator for each bedroom in the ward; and

f. one Audio/Visual Test Indicating Device.

In addition, a means of individually cancelling each patient's nurse call shall be provided in the system. This shall be accomplished by a Call Cancellation Device which will be either:

a. a manually-operated switch located on the PACP; or

b. a key-operated switch located near the bed in the ward.

The STR will specify the type of Call Cancellation Device to be used.

3.2.3 Secondary Annunciation Panel

The SAP is located in a central location such as a control console of the Main Communication and Control Post (MCCP) and provides annunciation and status (but not control) of the complete NCS by wards. The wards are identified in the STR.

For each of these areas the Secondary Annunciation Panel shall indicate:

a. if any nurse calls have not been acknowledged or cancelled within a preset, adjustable time (1 to 15 minutes); and

b. if any COD has been disabled.

The identification of the actual cell which is unacknowledged, uncancelled, or disabled shall not be annunciated.

The SAP shall contain an Audio/Visual Test Indicating Device for checking the operability of all visual and audible annunciators on the panel. In addition, it shall contain a common Acknowledge Device and an Audible Indicating Device which shall sound for every call transfer and every call disable. The Acknowledge Device when operated shall silence the Audible Indicating Device for all existing calls.

3.2.4 Call Cancellation Device

The CCD may be located in the PACP(s) or may be located in the ward. In the latter case, the device will be exposed to inmate abuse or attack and must therefore be rugged and tamper resistant and shall be key-operated. Operating the key shall require the user to overcome a spring resistance of 113 m.n.m. to 678 m.n.m. (1 in-lb to 6 in-lb) and the key shall be removable only in the rest position. A single key shall operate all CCD's.

3.2.5 Over door Indicating Device

Each COD shall have an associated Over door Indicating Device which shall be surface mounted in the outlet box provided in the corridor above each ward door. The Over door Indicating Device shall visually annunciate upon activation of its associated COD.

3.2.6 Wires, Cables, Conduits, Ducts

The contractor shall supply all necessary terminations, cross connection cabinets, conduits, wire and cabling and any other items that may be required for the satisfactory completion of the specified system. All installation workmanship shall be performed in accordance with ES/SOW-0102, Statement of Work and all applicable national, provincial, and local electrical codes.

A wiring diagram shall be supplied in the Installation section of the Maintenance Manual to detail where module connections terminate and how wires are routed and terminated.

Conduits, cables, ducts, trays, etc. may be either GFE or supplied and installed by the contractor depending on the particular institution. The determination will be made by the Design Authority and will be identified in the STR.

Connectors provided on the ends of any cable must mate with the corresponding connector on the equipment. Adapters from one type of connector to another are not acceptable.

3.2.7 Control Equipment

The maximum feasible amount of common control equipment (power supplies, logic boards, amplifiers, etc.) shall be located in Terminal Equipment Spaces (TES) and Common Equipment Room (CER) provided for the purpose. These areas will be identified in the STR. It is preferred that only equipment such as lights, switches, actuators, etc. which the operator must access directly should be located in the Nursing Stations.

3.2.8 Repeater Annunciators

When required, Repeater Annunciators shall serve as a secondary monitor of the Nurse Call Systems. Repeater Annunciators shall be strategically located, wall, desk or rack mounted as required and shall be fitted and function in the same manner as those located at the Nurse's Stations. The Repeater Annunciators shall operate in parallel with the associated Nurse Call Annunciators located at the Nurse's Stations. Control equipment required to achieve the specified functions shall be located at the associated Nurse's Station.

3.2.9 Interface to Data Logger

The contractor shall supply and install all necessary wiring and control equipment required to interface the NCS the MCCP Data Logger described in ES/SPEC-0005, Specification.

3.3 Design Requirements

3.3.1 General

To the maximum practical extent, off-the-shelf equipment should be selected for use in the ICCS. New designs should be restricted to common interface areas, control panels and consoles, or unique devices for which an off-the-shelf item does not exist.

A design objective is to minimize the number of wires required between all elements of the system.

A space-diversity approach to system planning shall be employed to ensure that loss of one interconnection routing does not impair the operational capability of the complete ICCS system.

3.3.2 Wiring Supervision

Wiring shall be supervised in all system modes. An alarm shall occur if any system wiring is cut or shorted to other wires or if the system devices are tampered with by unauthorized people or environmental conditions.

3.3.3 Sabotage, Tampering and Survivability

Elements of the NCS must operate in areas exposed to inmate access and shall have high resistance to damage, destruction, or conversion to other uses (including weapons). All interconnecting service must be secure against tampering or improper eavesdropping interference.

3.3.4 Power Failure

Loss or restoration of primary power to the system shall not produce spurious call annunciations or outputs to the data logger. When power is returned after a power failure, the system shall resume normal operation without operator action and shall automatically start from a "no-calls-present," cleared condition with no bedrooms disabled.

3.3.5 System Failure

A system failure shall be deemed to have occurred when any required annunciation (visual or audible) is not produced or when any required control function cannot be performed. This applies to both the PACP and the SAP.

3.3.6 Human Factors

Elements of the NCS which are used directly by staff or patients (i.e., control panels, annunciators, call originating devices, etc.) shall conform with accepted principles of good human factors design.

3.3.7 **Existing Equipment**

In most installations, control and annunciation elements of the NCS will share console space with other electrical/electronic equipment such as door controls, lighting controls, etc. and will be operated by the same staff member. In such cases it is important that effort be made to coordinate the functional and operational design of the NCS according to accepted human engineering principles to ensure a uniform appearance and commonality of a layout to assist the operator in the performance of his duties.

3.3.8 **Annunciation and Control Units**

Mounting space within control posts is usually limited and the problem of determining a suitable equipment mounting location is minimized if the control panels are small. Therefore, the designer should make maximum possible use of annunciation and control devices which combine two or more functions into a single unit (e.g., a lighted push-button instead of a separate light and an unlit push-button).

The control units may use Electronic Industries Association (EIA) standard display and control panels or video display units. The design of either display and control method shall be in accordance with ES/STD-0802 or ES/STD-0803 Standards.

3.4 **Operational Requirements**

3.4.1 **Single Call**

The functioning of equipment in response to a single call when an inmate in his cell operates the COD is as follows:

a. the associated Visual Indicating Device on the PACP in the appropriate control post flashes;

b. the Audible Indication Device turns steady ON;

c. the Over door indicator device flashes; and

d. the Data Logger records the call.

NOTE: The Audible Indicating Device shall have a pleasing tone and an internal control shall be provided to adjust its audible level.

The staff member will either operate the Master Acknowledge Device causing:

a. the associated Visual Indicating Device on the PACP in the control post changes to steady ON;

b. the Audible Indicating Device silences;

c. the Over door Indicating Device changes to steady ON; and

d. the Data Logger records the acknowledgement, or

The staff member will activate the Call Cancellation Device associated with that call causing:

a. the associated Visual Indicating Device on the PACP to return to the OFF state;

b. the Audible Indicating Device silences;

c. the Over door Indicating Device shuts OFF; and

d. the Data Logger records the Call Cancellation.

Subsequent operation of the COD before the original call from it has been cancelled shall not cause a change of status of any visual or audible annunciator. Only the initial call shall be recorded on the Data Logger.

3.4.2 **Multiple Calls**

The NCS shall have the ability to satisfactorily handle multiple simultaneous calls in the same manner as single calls. If prior calls have been acknowledged and not yet cancelled, a subsequent call from another COD shall cause the Audible Indicating Device to sound again. A single operation of the Master Acknowledge Device shall silence the Audible Indicating Device regardless of the number of calls present. There shall be no change in the status of calls already acknowledged. The calls may be selectively cancelled with the associated CCD in any desired sequence, independent of the sequence in which they were initiated. Any number of calls, up to the maximum installed complement shall be capable of being separately annunciated and logged without a system overload. The Data Logger shall record:

a. each call origination;

b. each call cancellation; and

c. the acknowledgement of one or more calls (the number of calls present when the acknowledgement was made need not be recorded).

3.4.3 **Enable/Disable**

When the Call Disable Device is operated on the PACP or SAP, the associated Call Disable Indicator shall be illuminated. Any further activation of the COD shall be totally disregarded by the system including the data logger. If an unacknowledged call is present on the circuit being disabled, operation of that call disable devices shall effectively cause an acknowledgement to occur, i.e., the Audible Indicating Device shall silence, and the Visual Indicating Device and Overdoor Indicating Device shall change from flashing to steady. However, it shall not be possible to cancel a call by use

of the Disable Device. Calls may be cancelled when the circuit is in the disabled state by operating the CCD.

If an uncancelled call is still present when the circuit is enabled again, its status will become the same as if it had been acknowledged but not cancelled, i.e., Audible Indicating Device is not activated and the Visual Indicating Device and Over door Indicating Device are steady ON. The data logger shall record the disabling and enabling of each cell call circuit.

3.4.4 **Call Transfer**

If a call is not "acknowledged" or "cancelled" after a specific period of time (adjustable 1 to 15 minutes) the call will automatically be transferred to the SAP at the MCCP. All annunciations will continue normally at the PACP. There shall be no indication at the PACP that a call transfer has occurred.

At the Secondary Annunciation Panel, the call transfer shall:

a. cause a flashing of the visual annunciation for the zone which has caused the transfer;

b. sound the audible annunciator; and

c. be recorded by the data logger.

Operation of the common acknowledge device at the SAP in response to a call transfer shall:

a. cause the visual annunciation to alter from flashing to steady;

b. silence the Audible Indicating Device; and

c. be recorded by the Data Logger.

The visual annunciation of call transfer shall extinguish only when all calls transferred from that zone are acknowledged and/or cancelled. Visual annunciation of a disabled condition shall extinguish only when all cell call circuits have been enabled in that zone.

3.4.5 **Interface To Data Logger**

The NCS shall provide an output to the Data Logger described in ES/SPEC-0005, Specification to provide separate indication of all call-related activities in the NCS including:

a. call origination (zone and cell number for initial call);

b. call acknowledgement at PACP (zone number only);

c. call cancellation (zone and cell number);

d. circuit disable (zone and cell number);

e. circuit enable (zone and cell number);

f. call transfer to SAP (zone number only); and

g. call acknowledge at SAP.

All of these activities shall be logged with the time-of-day and the zone and cell number where applicable in plain-language (or abbreviation thereof) without the need for a cross-reference table.

3.4.6 **Audio/Visual Test Indicating Device**

Both the PACP and SAP shall contain an Audio/Visual Test Indicating Device which when activated shall cause all visual annunciators and the Audible Indicating Device on that panel to turn ON and remain ON until the Audio/Visual Test Indicating Device is released. Operation and release of the Audio/Visual Test Indicating Device shall not cause any change of system status with respect to calls in progress and shall not be recorded by the data logger.

3.5 **Environmental Requirements**

The NCS shall operate over the following indoor environmental conditions:

3.5.1 Temperature: 0° C to +50° C; and

3.5.2 Humidity: 0 to 90% relative, non-condensing.

3.6 **Power Requirements**

The NCS shall use VAC power within the following limits:

3.6.1 Voltage: 120 VAC ±10%;

3.6.2 Frequency: 60 Hz ±1.5%;

3.6.3 Transients: up to 5 times nominal voltage for up to 100 msec durations. Changes in the input power or any fluctuations within the above limits shall not cause damage to the unit; and

3.6.4 Power: power consumption shall not exceed 100 watts.

3.7 **Installation Requirements**

The NCS shall be installed at the site in accordance with the ES/SOW-0101, Statement of Work and the ES/SOW-0102, Statement of Work.

3.8 **Documentation Requirements**

All final NCS documentation shall be provided in accordance with the ES/SOW-0101, Statement of Work.

3.9 **Support Requirements**

The NCS maintenance and spares support shall be provided in accordance with the ES/SOW-0101, Statement of Work.

3.10 **Training Requirements**

Operator training and maintenance training on the NCS shall be in accordance with the ES/SOW-0101, Statement of Work.

4.0 QUALITY ASSURANCE

4.1 General

The NCS Quality Assurance programme shall be provided as detailed in the ES/SOW-0101, Statement of Work.

All on-site installation work, test plans and system acceptance testing shall be conducted in accordance with the ES/SOW-0101, Statement of Work.

5.0 DELIVERY

Delivery requirements for the NCS documents, drawings, plans, manuals, etc. (where applicable) shall be in accordance with the ES/SOW-0101, Statement of Work.

Delivery requirements of the NCS equipment shall be in accordance with the ES/SOW-0102, Statement of Work.

6.0 INTERFERENCE

Performance of the NCS shall not be affected by the use of standard electronic equipment used at the institution. Distance limits of standard electronic equipment are listed in the Statement of Work, ES/SOW-0101.

7.0 SAFETY

All NCS electrically powered elements shall meet the applicable CSA standards.

Correctional Service Canada
Technical Services Branch
Electronics Systems

ES/SPEC-0006
Revision 2
14 January, 2002

ELECTRONICS ENGINEERING

SPECIFICATION
CONDUIT, SPACE AND POWER REQUIREMENTS FOR SECURITY SYSTEMS FOR USE IN FEDERAL CORRECTIONAL INSTITUTIONS

AUTHORITY

This Specification is approved by the Correctional Service of Canada for the procurement and Installation of Conduits for Electronic Security Systems in Canadian federal correctional institutions.

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address: Director, Engineering Services, Correctional Service of Canada, 340 Laurier Avenue West, Ottawa, Ontario, K1A 0P9

Prepared by:

Manager,
Electronics Systems Research

Approved by:

Director,
Engineering Services

TABLE OF CONTENTS

ABBREVIATIONS

The following abbreviations are used in this specification:

CER	Common Equipment Room
COTS	Commercial-Off-The- Shelf
CSA	Canadian Standards Association
CSC	Correctional Service Canada
DES	Director Engineering Services
EIA	Electronic Industries Association
EMT	Electrical Metallic Tubing
GFE	Government Furnished Equipment
MCCP	Main Communications and Control Post
PVC	Polyvinyl Chloride
RFP	Request for Proposal
SOW	Statement of Work
STR	Statement of Technical Requirements
TES	Terminal Equipment Space

DEFINITIONS

The following definitions are used in this specification:

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

1.0 INTRODUCTION

1.1 General

This specification defines the requirements for the design and installation of conduits, cable troughs and raceways as well as space and power requirements for telecommunications and electronic security systems in the Correctional Service of Canada (CSC) facilities.

1.2 Scope

This specification has been developed to ensure high standards for the installation of conduits, cable troughs and details equipment space and power requirements for electronic systems. It defines workmanship standards which may not be fully covered in subsidiary specifications. All contractor's documentation and installation procedures shall meet this specification for reliability, maintainability, longevity, appearance and operational use.

1.3 Off-The-Shelf Equipment

The contractor shall provide commercial off-the-shelf (COTS) materials wherever possible. COTS materials shall meet or exceed the manufacturing standards as listed in this specification.

Where COTS material is unavailable or unsuitable for a specific application, the contractor may manufacture or arrange for the manufacturing of a particular item to suit the requirements. Manufactured materials shall meet or exceed the best commercial equipment manufacturing standards.

1.4 Equipment Procurement

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

2.0 APPLICABLE DOCUMENTS

The following documents of the issue in effect on the date of the Request for Proposal (RFP) shall form a part of this specification to the extent specified herein.

ES/SOW-0101	Statement of Work for Procurement and Installation of Electronic Systems
ES/SOW-0102	Statement of Work for Quality Control of Electronic Systems
EIA-310-C	Electronic Industries Association Standard for Racks, Panels and Associated Equipment.
CSA C22.1	Canadian Electrical Code - Part 1 Safety Standard for Electrical Installations
CSA C22.2	Canadian Electrical Code - Part II

3.0 REQUIREMENTS

3.1 General

The contractor shall supply all necessary conduits, cable troughs and raceways and any other items that may be required for the satisfactory completion of the specified project. All installation workmanship shall be performed in accordance with the Statement of Work, Standards specified in Section 2.0 of this specification and all applicable national, provincial, and local electrical codes.

A conduit diagram shall be supplied in the installation documentation to detail where connections terminate and how conduits are routed and terminated.

Conduits, ducts, trays, etc. may be either Government Furnished Equipment (GFE) or supplied and installed by the contractor depending on the particular institution. The determination will be made by the Design Authority and will be identified in the STR.

The contractor shall provide Electronic Industries Association (EIA) standard racks, panels and associated hardware according to the space requirements of this specification.

The contractor shall provide all necessary wiring, circuit panels, circuit breakers and associated hardware according to the power requirements of this specification.

3.2 Environmental Conditions

All materials and equipment which are used in CSC installations shall be chosen with consideration being given to the intended use, safety, retention of appearance, maintainability and durability under rugged operating conditions. These materials shall perform over the following environmental ranges:

a. **Indoor Equipment**

Temperature: 0° C to 50° C; and

Humidity: 20% to 95% non-condensing.

b. **Outdoor Equipment**

Temperature: -40° C to +55° C; and

Humidity: up to 100% condensing.

3.3 Conduits, Cable Troughs and Raceways

3.3.1 Conduits

Conduits installed above ground, and accessible to the inmate population, shall be rigid steel. Metal conduits installed in secure and inmate accessible areas shall be fitted with double the normal quantity of support hangars.

In locations subject to extreme temperature changes, and/or where conduit lengths are of non-standard size, the contractor shall make provisions for the inclusion of conduit expansion joints.

Outdoor conduit shall not be damaged by combinations of direct exposure to the sun, wind, rain, lightning, hail, snow and ice as may be expected to occur at each institution location.

Rigid Polyvinyl Chloride (PVC) conduits shall be used only in buried applications. Rigid PVC conduits shall not be threaded, but may be used with approved adapters and couplings applied in a manner consistent with industry standards. PVC conduits which cross roadways shall be encased in poured concrete. The contractor shall provide a suitable means of protecting the buried conduit against damage caused by digging or excavating. The preferred method is installing a tape marker directly above the conduit path.

Electrical Metallic Tubing (EMT) conduit may be used in administrative areas, and locations which are not normally assessable to the inmate population.

Liquid-tight flexible metal conduits may be used where a flexible connection is required, ie. cameras, microwave dishes, etc. In such applications, the length of "flex" conduit shall not exceed one (1) metre.

In addition to these requirements, the latest issue of applicable industrial standards apply, including:

a. CSA Standard C22.2 - Rigid Metal Conduit

b. CSA Standard C22.2 - Flexible Metal Conduit

3.3.2 Cable Troughs and Raceways

Cable troughs and raceways shall be continuous and shall be constructed of metal. The contractor shall provide adequate mounting devices which will permit the use of fastening devices that will not damage conductor insulation.

Cable troughs, raceways, and fittings shall be free from burrs or other sharp edges which may cause damage to the cable or insulated conductors. All troughs and raceways shall be installed as a complete system before the conductors or cables are installed.

Cable troughs may be either ventilated or solid and unless otherwise specified, shall be equipped with covers and steel guards to protect against damage.

In addition to these provisions, the latest issue of appropriate standards shall apply, including:

a. CSA Standard C22.2 - Cable Troughs and Fittings.

b. CSA Standard C22.2 - Raceways and Fittings.

c. CSA Standard C22.2 - Surface Raceways and Fittings.

4.2 Facility Alarm Systems

4.2.1 Inmate Cell Call System

The ICCS is provided so that an occupant of a cell may request assistance from the control post. This is achieved by operating a call originating device (COD) mounted in the cell. The call is annunciated in the control post, the guard responds to the call and cancels the call by operating a call cancelling device (CCD) external to the cell and adjacent to the cell door.

4.2.1.1 Conduit Requirements

One (1) 15 mm conduit is required from each cell, the conduits from four cells are combined in a junction box in the pipe chase. Two or three of these junction boxes are linked together by 25 mm conduit. One (1) 38 mm conduit connects the group to the terminal equipment space (TES) where they are terminated.

One (1) 25 mm conduits are provided from the TES to the control post. These are shared by the electronics contractors with each contractor using at least one each.

The cables interconnecting the equipment in the TES to the CER are normally installed in a cable tray which runs throughout the institution.

4.2.1.2 Space Requirements

The equipment should normally occupy half the area of an one (1) 2.483 m rack in each TES.

4.2.1.3 Power Requirements

The power requirement for this system is a 110.0 VAC, 15.0 ampere circuit.

4.2.2 Fixed Point Security Alarm System

The FPSA system is provided so that an occupant of designated rooms may request assistance from the control post. This is achieved by operating a call originating device (COD) mounted on the wall or under a desk. The call is annunciated in the control post, the guard responds to the room.

5.0 QUALITY ASSURANCE

5.1 General

All on-site installation work, and installation acceptance shall be conducted in accordance with the ES/SOW-0101, Statement of Work.

6.0 DELIVERY

Delivery requirements for drawings, plans, etc. (where applicable) shall be in accordance with the ES/SOW-0101, Statement of Work.

CORRECTIONAL SERVICES CANADA
TECHNICAL SERVICES BRANCH
ELECTRONIC SECURITY SYSTEMS

ES/SOW-0110
Revision 0
2013 October 07

ELECTRONICS ENGINEERING
STATEMENT OF WORK

STRUCTURED CABLE SYSTEMS
FOR
ELECTRONIC SECURITY INSTALLATIONS

AUTHORITY

This Specification is approved by the Correctional Service Canada for the procurement and installation of a Security Patrol System in Canadian federal correctional institutions.

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address:

Director, Electronic Security Systems
Correctional Service of Canada
340 Laurier Avenue West,
Ottawa, Ontario
K1A 0P9

Prepared by:	Approved by:
Manager Electronics Security Systems	Director, Engineering Services

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TABLE OF ABBREVIATIONS

Abbreviation	Expansion
CSC	Correctional Service Canada
ATP	Acceptance Test Plan
CM	Corrective maintenance
COTS	Commercial-off-the-shelf
CSC	Correctional Service Canada
DA	Design Authority
DCR	Design Change Request
DES	Director Engineering Services
DL	Deficiency List
FDR	Final Design Report
MRT	Mean Response Time
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
PDR	Preliminary Design
PM	Preventative Maintenance
PW&GSC	Public Works & Government Service Canada
QA	Quality Assurance
RFP	Request for Proposal
SOW	Statement of Work
STR	Statement of Technical Requirement

TABLE OF DEFINITIONS

Abbreviation	Expansion
CSC	Correctional Service Canada
Design Authority	Director, Engineering Services (DES) - Correctional Service Canada (CSC) is responsible for all technical aspects of the system design and implementation.
Contract Authority	Public Works and Government Services Canada (PW&GSC) is responsible for all contractual matters associated with the system design and implementation.
Contractor	The company selected as the successful bidder.
Project Manager	A CSC employee or a contracted person designated by DES to be responsible for the test and evaluation or feasibility study project.
Project Officer	A CSC employee or a contracted person designated by DES to be responsible for the implementation of the project.
Off-the-shelf	Equipment currently on the market with available field reliability data, manuals, engineering drawings and parts price list.
Custom Equipment	Equipment designed and/or manufactured specifically for a specific contract.

APPLICABLE DOCUMENTS REFERENCES

.1 The following documents of the issue in effect on the date of the Request For Proposal (RFP) shall form a part of the specification to the extent specified herein.

.1 EIA/TIA Standard EIA/TIA-568 Commercial Building Telecommunications Wiring Standard

.2 EIA/TIA Technical Systems Bulletin TSB-36 Additional Cable Specifications for Unshielded Twisted Pair Cables

.3 EIA/TIA Technical Systems Bulletin TSB-40 Additional Transmission Specifications for Unshielded Twisted Pair Connecting Hardware.

.4 International standard ISO/IEC 11801-2nd Edition: Information technology — Generic cabling for customer premises.

.2 Any other applicable industrial safety and control standards governing specific aspects for equipment and/or installations.

1 INTRODUCTION

1.1 General

.1 This document defines the quality control requirements for the design, installation, testing and acceptance of structured cable systems for use in security systems installed in all Correctional Service Canada (CSC) facilities.

1.2 Scope

.1 This specification has been developed to ensure high standards for the installation of electronic systems. It defines workmanship standards which may not be fully covered in subsidiary specifications. All contractor's documentation and installation procedures shall meet this specification for equipment reliability, maintainability, longevity, appearance and operational use.

1.3 Off-the-Shelf Equipment

.1 The contractor shall provide commercial off-the-shelf (COTS) equipment wherever possible. COTS equipment shall meet or exceed the manufacturing standards as listed in this specification.

1.4 Manufactured Equipment

.1 Where COTS equipment is unavailable or unsuitable for a specific application, the contractor may manufacture or arrange for the manufacturing of a particular item to suit the requirements. Manufactured equipment shall meet or exceed the best commercial equipment manufacturing standards.

1.5 Commonality of Equipment

.1 The contractor shall provide commonality of hardware components within the design parameters ie. switch locks, racks, panels etc. All equipment, if appropriate shall be interchangeable.

2 MATERIAL AND EQUIPMENT REQUIREMENTS

2.1 Environmental conditions

.1 All materials and equipment which is used in CSC installations shall be equal to, or better than the standards established in the original equipment and shall be chosen with due consideration being given to the intended use, safety, retention of appearance, maintainability and durability under rugged operating conditions. These materials shall be suitable to perform over the following environmental ranges:

.1 Indoor Equipment

Temperature: 0° C to 40° C; and
Humidity: 20% to 95% non-condensing.

.2 Outdoor Equipment

Temperature: -40° C to +50° C; and
Humidity: 0 to 100%, condensing.

.2 Outdoor equipment shall operate reliably and not be damaged by combinations of direct exposure to the sun, wind, rain, lightning, hail, snow and ice as may be expected to occur at each institution location.

.3 Complete assemblies of indoor equipment shall be resistant to liquid spills, airborne contaminants, shock and vibration.

3 TELECOMMUNICATIONS OVERVIEW

3.1 Structured Cabling System

.1 The design objective is a flexible network that is easy to re-configure, easy to manage and capable of incremental growth. The network is based on a structured cabling system conforming to Electric Industry Association/Telecommunications Industry Association Specification 568 (EIA/TIA-568) and Canadian Standards Association 529 (CSA 529) and using a star wired topology for the horizontal distribution with Category 6 Unshielded Twisted Pair (UTP) and 50/125 Micron Laser Optimized Fibre. The design will support Ethernet, Fast Ethernet, and network management.

4 DESCRIPTION OF WORK

4.1 General System Requirements

.1 Outline

.1 This section defines the minimum requirements for a structured cabling system to be provided on an engineered, furnished, installed, tested, and commissioned basis. Products and installation practices shall conform with the EIA/TIA documents identified in the **APPLICABLE DOCUMENTS** section of this Statement of Work.

.2 The structured cabling system includes the following basic elements arranged into backbone feeders and horizontal distribution subsystems that are cross connected or patched together in Telecom Closets or Common Equipment Rooms on Intermediate Distribution Frames (IDFs).

.1 Unshielded Twisted Pair (Horizontal)
.2 8-pin modular Telecom outlets
.3 Insulation displacement connector type terminal blocks
.4 LOF optic cable (Backbone)
.5 Fibre optic (duplex) Interconnect patch panels
.6 Patch cords for patch panels
.7 Line cords for workstation data equipment (Office Cables)

.3 Notes:

.1 3 metre leghth in standard for Office Cables
.2 All cables provided for a project shall have a GREEN jacket

4.2 Horizontal Data Cable

.1 Cable

.1 Each cable shall consist of 8 each of 24 AWG thermoplastic insulated solid copper conductors formed into four individually twisted pairs and enclosed by a jacket with the appropriate protection rating determined by Provincial codes.
.2 The cable shall fully conform with EIA/TIA-568 design requirements for 100 ohm UTP cable and fully conform with EIA/TIA-568 TSB-36 transmission requirements for Category 6 cable.
.3 Cables shall bear evidence of verified Level 6 or Category 6 and also bear evidence of certification by a recognized standard or testing body. (eg: Bearing NORDX Brand name and have length clearly marked on cable sheath)
.4 The cable bundles will be fed to locations in either a supplied cable tray or conduit system. Outlet cables will then be fed to the user locations via either pac poles or fished down hard wall offices. A pull string will remain in the conduit/cable tray for future installations.
.5 The cable run length from the IDC to the workstation location shall NOT exceed 90 metres. The combined length for patch cords for data network horizontal distribution connections shall not exceed 10 metres for an overall length from data network hub equipment to workstation equipment not exceeding 100 metres

.2 User Termination

.1 Termination at the user end will be made onto a certified Category 6 RJ45 module for data. These modules will then be housed in a certified faceplate. The faceplate to house the modules will have the capability to equip up to six each 8 pin modular jacks. Other configurations to be used will vary with locations: A duplex flush mount

faceplate for drywall applications, a duplex surface mount kit for PAC pole applications and duplex single gang outlets mounted into custom furniture with adapter plates. Surface mount kits will not exceed a 6.5 cm. protrusion from the wall. For custom furniture it is assumed that the cable runs will be fed to the outlet via raceways in the legs of furniture. For security reasons, jacks are NOT be installed in exterior walls or walls not totally part of CSC space. All cables must either terminate on a patch panel or on a faceplate, loose or unterminated cables are not acceptable.

.2 The 8 pin modular jack connectors shall comply for termination of 4 wire pairs with 24 AAWG solid copper conductors: minimum contact force of 100g and conductors separated by jack comb.

.3 Each modular outlet will be wired per EIA/TIA-568 polarization sequence, designation T568A (reference CAN/CSA T529 Clause 11.2 Figure 11-1 and Table 10-1).

.4 This illustration is a front view of the connector

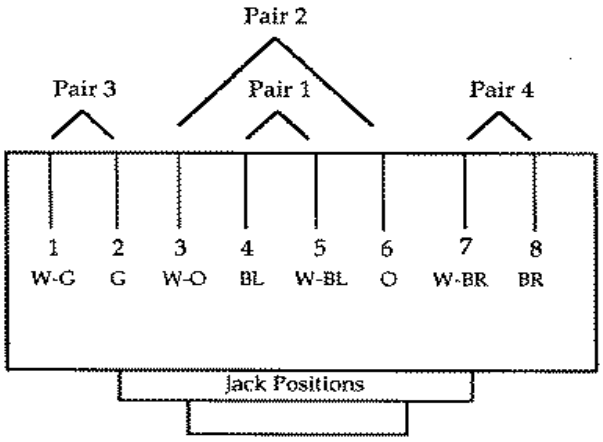

Figure 11-1
Eight-Postion Jack Pin/Pair Assignments
(T568A Type)

.1 Figure 11-1 and Table 10-1 outlines the sequencing required to construct line, office, and patch cables.

.2

.3 Each modular outlet will conform with EIA/TIA TSB 40 transmission requirements for Category 6 and will also be compatible with existing standard electrical outlet boxes.

.4 Table 10-2 outlines the correct punch down positioning when using Northern Telecom T568A BIX DVOs' , T568A ISDN QCBIX36DI and T568A ISDN QCBIX46DI Modular Jack Connectors, and T568A QPBIX Modular Patch Panels.

.5 Table 10-1

.1 Colour Codes for patch, line, and office cables

Colour Identification	Colour Code	Abbreviation
Pair 1	White-Blue	(W-BL)
	Blue	(BL)
Pair 2	White-Orange	(W-O)
	Orange	(O)
Pair 3	White-Green	(W-G)
	Green	(G)
Pair 4	White-Brown	(W-BR)
	Brown	(BR)

.6 Table 10-2

.1 Colour Codes for punch down and modular outlets

Position	Colour Code	Abbreviation
1	White-Blue	(W-BL)
2	Blue	(BL)
3	White-Orange	(W-O)
4	Orange	(O)
5	White-Green	(W-G)
6	Green	(G)
7	White-Brown	(W-BR)
8	Brown	(BR)

.7 Closet Termination

.1 Supply and installation of RJ45 Category 6 hardware for system connection in communications closet using 24 NT certified patch panels rack mounted with cable organizer panels installed for each patch panel.

.2 Active components will be connected to equipment by 8 conductor patch cords manufactured to CAT 6 compliance. Patch cords shall be stranded conductor and have a “no-snag” boot over the RJ45 connector.

.3 Multi-Level building installations will require individual patch panels be installed for each level of the building. Patch panel(s) for each level of a multi-level building must have at least 15% unused ports. The same holds true for single story, multi ICC buildings.

.8 Cable Protection

.1 All ceiling distribution cabling shall be enclosed and protected by 3/4” and 1” rigid conduit from communications closet(s) room(s) and cabinets to all user outlets located in inmate accessible areas. In areas that CSC designated as non inmate accessible, EMT zone conduit will be allowed. Conduits must have end bushings installed to protect the cable from sharp edges.

.2 Conduit containing Copper backbone cable must be designated “CAUTION SECURITY SYSTEM CABLE”

.3 Conduit containing Fibre Optic backbone cable must be designated “CAUTION FIBRE OPTIC SECURITY SYSTEM CABLE”

.9 Line cord

.1 The cabling company will supply RJ45, 8 pin modular line cords to connect owner provided data equipment to the horizontal distribution outlets at the workstation. They must be consistent with CAT 6 specification and provide end-to-end CAT 6 connectivity. Line cords shall be stranded conductor and have a “no-snag” boot over the RJ45 connector.

.10 Testing

.1 All cables/pairs will be scanned with a MicroTest Penta cable scanner or equivalent at 100 Mbs to determine DC loop resistance, near end cross talk and attenuation to meet or exceed the performance stated in EIA/TIA TSB-36 and TSB-40, noise, pair mapping and ranking. These tests must be conducted as originating from both the punch down location and modular outlet location of each cable segment.

.11 Labeling

.1 All jacks must be identified by means of labels with unique numbers These markings will be made with printed labels. The Correctional Service of Canada expects that all drops at the user end will be sequential and not out of order.

.2 The closet terminations must be identified with these same numbers marked on BIX labels adhered to BIX 20A designation strips and patch panels. The CAN/CSA 568 colour code will apply.

.3 Labels will also be placed on the horizontal wire, 6-9” from termination points. This would include closets, main cabinet, and jacks.

.12 Documentation

.1 Customer to supply CAD or Visio Version 5 floor plans when available. If CAD documents are not available, contractor will be responsible to scan hard copy of plans.

.2 Contractor to supply site plans, individual runs, risers, wire #’s, jack #’s, patch panel #’s in both hard and soft copy.

.3 All test results shall be machine printed, hand written test result sheets are NOT acceptable.

4.3 Fibre Optic Backbone Cable

.1 Cable

.1 The cable to be supplied and installed for backbone purposes shall consist of 12 strands (6 pairs) of Laser Optimized Fibre with nominal 50/125 um core/cladding diameter formed into a single cable.

.2 Optical cable shall physically conform with ANSI/ICEA S-83-596 mechanical and environmental specifications for outdoor fibre optic cable.

.3 Fibre optic cable shall conform with the requirements of OM3 as per the ISO 11801-2nd Edition standards.

.2 Terminations

.1 Fibre optic cables shall be terminated to SC Physical contact Connectors shall be able to sustain a minimum of 200 mating cycles per EIA/TIA-455-21 without violating specifications. These connectors will terminate within interconnect sleeves to facilitate patching in patch panels. The maximum optical attenuation per pair of mated connectors shall not exceed 0.75 db.

.2 All fibre strands, whether used in the project or not, shall be terminated with SC type connectors and installed into a fibre patch panel: generally one duplex patch per cable (i.e. 12 connectors per panel for 12 strand fibre cable). Please note that these cables shall be SC to ST unless otherwise noted.

.3 The patch panel proposed shall provide strain relief for each fibre as an integral part of the panel design. This standard type and size of panel should be uniformly used throughout the project.

.4 Installed fibre panels shall be completed with all guides, brackets and other accessories to facilitate cable cross connect to active components for administration and management, including provisions for labeling that are consistent with EIA/TIA-568.

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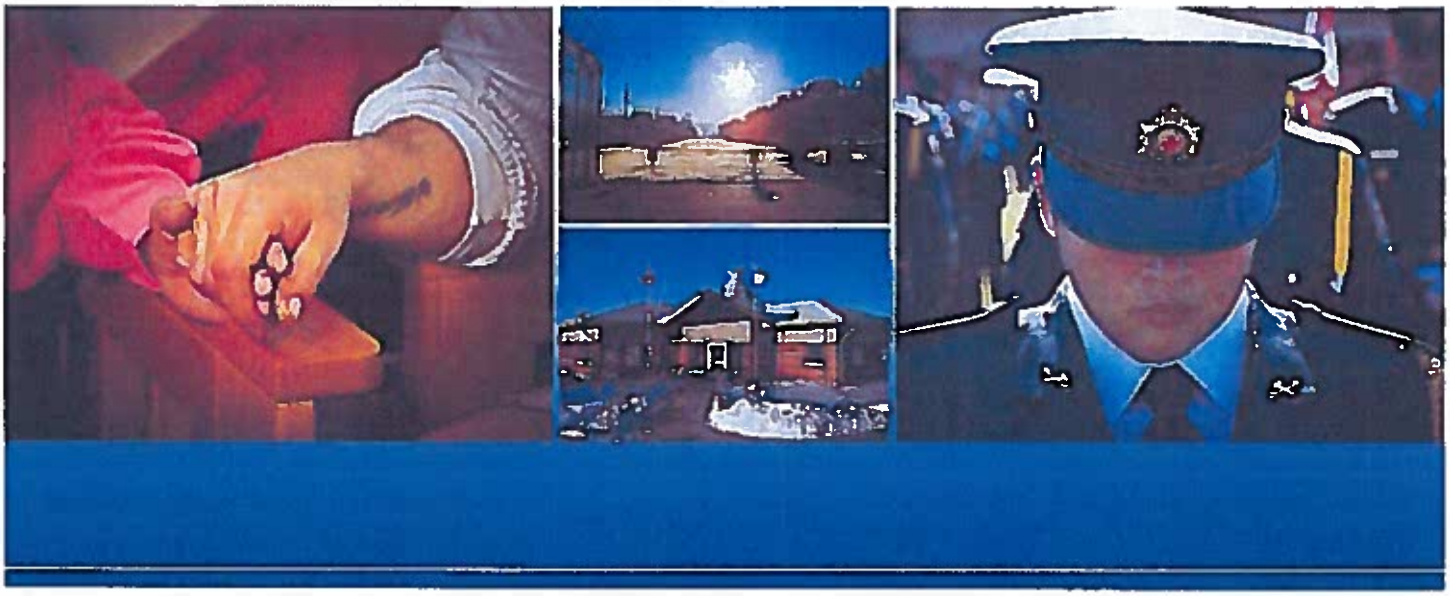

STATEMENT OF WORK
INSTALLATION OF NURSE CALL SYSTEM
REGIONAL PSYCHIATRIC CENTER

This Statement of Work is approved by the Correctional Service of Canada for the installation of Nurse Call System at the Regional Psychiatric Centre, Saskatoon, Saskatchewan.

Prepared by:
CESM

Reviewed by:
Electronic Security Systems Engineer

Approved by:
Director, Electronics Security Systems

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ABBREVIATIONS

The following abbreviations are used in this specification:

AOD	Alarm Originating Device
CCD	Call Cancel Device
CER	Common Equipment Room
COD	Call Originating Device
CSC	Correctional Service Canada
DA	Design Authority
FAAS	Facility Alarm Annunciation System
PIU	PIDS Integration Unit
GTS	Guard Tour System
ICCS	Inmate Cell Call System
MCCP	Main Communications and Control Post
OID	Overhead Indication Device
PACP	Primary Annunciation and Control Panel
STR	Statement of Technical Requirements

DEFINITIONS

The following definitions are used throughout this specification:

Design Authority:	Director, Engineering Services, Correctional Service of Canada (CSC)
Contract Authority:	Public Works & Government Services Canada
Contractor:	The company selected as the successful bidder on the contract.

1.0 INTRODUCTION

1.1 General

The Correctional Service of Canada (CSC) has a requirement to install an Inmate Cell Call System (ICCS) Nurse Call System (NCS) in a shower at the Regional Psychiatric Centre (RPC), Saskatoon, Saskatchewan

RPC is a forensic mental health/psychiatric hospital within a multi-level security setting. It is located in the City of Saskatoon Saskatchewan.

1.2 Scope

The contractor shall design, supply, install, test and provide operational and technical training on an ICCS NCS as described in this Statement of Work, and shall integrate the ICCS/GTS into the existing Perimeter Intrusion Unit (PIU).

The contractor shall provide all programming and integration into the existing ICCS. The contractor shall provide acceptable documentation for the operation and the maintenance of this equipment.

2.0 APPLICABLE DOCUMENTS

2.1 Applicability

The provisions contained in the documents listed in the following paragraphs shall apply to all aspects of this requirement, unless these provisions have been exempted or modified by this SOW.

2.2 Specifications

The following electronics engineering documents form part of this STR:

ES/SOW-0101 Statement of Work for Installation of Electronic Systems

ES/SOW-0102 Statement of Work for Quality Control of Electronic Systems Installations

ES/SOW-0110 Electronics Engineering Statement of Work - Structured Cable Systems for Electronic Security Systems

ES/SPEC-0006 Electronics Engineering Specification, Conduit, Space, and Power Requirements for Security Systems for use in Federal Correctional Institutions

ES/SPEC-0501 Electronics Engineering Specification, Nurse Call System for use in Federal Correctional Institutions

Nurse Call Device Suppliers:

wilshireworks.com
cleanpullcord.co.uk
cresthealthcare.com
cornell.com
becintegrated.com

2.4 Language

The language at RPC, as identified in this SOW, is English; therefore, all related documentation for this project shall be in English. The operator manuals, maintenance manuals and as-built documents shall be provided in English.

2.5 **Drawings**

As attached

3.0 **OPERATIONAL CRITERIA**

3.1 **General**

The Marcomm Dynatrol Software Suite is used as the Graphical User Interface (GUI) for the operators. The Dynatrol Software Suite is user friendly and provides colored icons to define system states throughout the alarm processing. The cell icons are displayed to the operator in a tabular format.

The Inmate Cell Call System (ICCS) reports calls from the inmate/offenders cells/dwellings and identifies them on the Primary Annunciation and Control Panel (PACP) in the appropriate Living Unit (LU). Each LU is equipped with a PACP.

The ICCS features standalone computers/PACP units in the Control Posts for standalone operation in the event of link failures. The PACP units are Windows Based Panel PC computers that are connected via TCP/IP connection to network switches that are located throughout the institution.

In each LU, the PACP is granted permission to communicate to designated cells using a two-way voice channel. The voice channel is dictated by the operator at the Control Post which allows the operator to override the inmate in the conversation (half-duplex).

The ICCS is equipped with a Serial data (EIA-232) connection to the existing PIDS and FAAS computers located in the Common Equipment Room (CER) via a Marcomm Systems Group Incorporated (MSGI) Serial to LAN computer.

The institution is divided up into six (6) locations:
• Unit “Bow” – is equipped with one (1) PACP unit at each of the Control Post
• Unit “Clearwater” – is equipped with one (1) PACP unit at each of the two (2) Control Posts
• Unit “MacKenzie” – is equipped with one (1) PACP unit at the Control Post
• Unit “Assiniboine” – is equipped with one (1) PACP unit at the main Control Post
• Unit “Churchill” – is equipped with one (1) PACP unit the Control Post
• The Regional Hospital – is equipped with one (1) PACP unit at the Control Post
In the event that the network link fails between these six (6) locations, each of the six (6) locations will remain fully operational.

In the event of a network link failure, the existing PIDS and FAAS will receive an alarm displaying the fault to the Main Control and Communications Post (MCCP) operator.

Failure of any data communications link from the Living Units to the Serial to LAN (LANSER) box will only affect the data communications of data logging to the PIDS and FAAS. Each PACP keeps its own logs as well and secondary alarms for that unit and will not affect the local ICCS operations for that unit or the operations of any other unit.

3.2 **CALL ORIGINATING DEVICES**

The existing ICCS utilizes COD – Intercom Units (Harding P/N: ICM-620) and CAT6 data cabling. The COD units are water resistant and vandal resistant from any sabotage that the inmate may cause. The COD units have been installed in a custom single piece stainless steel sloped enclosure that is surface mounted within each cell. To ensure that tampering is kept at a minimum, anti-pick caulking has been installed around each surface mounted box.

The COD units are equipped with a direct Ethernet jack connection that originates from a Power over Ethernet (PoE) network switch located in the associated equipment rack in the equipment room. Total CODs Installed: 243 + Healthcare

3.3 **CALL CANCELATION DEVICES**

The existing CCD units utilize RFID card readers (Barantec P/N: ASP26) and are installed throughout the institution. The CCD units are numeric keypads with an RFID reader integrated. The keypad is used to cancel a Cell Call by the institutional staff member by swiping the site issued RFID card and entering the cell number that is in alarm with the numeric keypad.

The CCD unit utilizes the industry recognized Wiegand protocol connecting with six (6) conductor, 22AWG shielded low voltage data cable which connects to the WiIP unit in the equipment rack associated with the Unit. The WiIP board converts the Wiegand protocol to TCP/IP messages which is then connected to the network through LANSER and routed to the PACP units for acknowledgement.

3.4 **OVERHEAD INDICATING DEVICES**

In the Health Care Unit Overhead Indicating Devices (OID) have been installed above each cell door, these units provide the Health Care staff with a visual indication of the cell that is requesting assistance. The OID units are powered using 12VDC that is fed from the equipment rack that is located in the equipment room.
Total OID's Installed: 18

3.5 **Primary Annunciation Control Panel - Voice**

A PACP is used by staff member(s) at a control post to monitor and control call alarms from a group of CODs associated with that PACP by the ICCS configuration data. The PACP units are Windows XP Embedded Panel PC units that provide an interface and integration for Cell Call Systems used with Correctional Services of Canada. The Panel PC is installed into a custom stainless steel enclosure that can be rack mounted, desk mounted or wall mounted.

3.6 **PIU Integration**

All required integration between the ICCS and the existing PIDS and FAAS has been provided under this project. One (1) Dynatrol LANSER, LAN to Serial Data Converter, was installed in the CER to integrate via RS232 interface to the existing PIDS and FAAS. The LANSER Module is connected to the central network switch installed in the MCCP via a CAT6 patch cable. This allows for connection to all ICCS and PACPs for integration of secondary alarms and data logging events to the existing PIDS and FAAS.

This connection also allows the LANSER to supervise network communications to the remote equipment locations and forward fault conditions to the existing PIDS and FAAS for annunciation. Hardware component functionality is also monitored with fault alarms forwarded to the existing PIDS and FAAS for annunciation.

The ICCS secondary alarms are passed from the ICCS Maintenance station that is located in the phone room. The ICCS Maintenance Station is an important part of the PIDS and FAAS integration, the ICCS Maintenance Station passes the secondary alarms to the LANSER. The ICCS Maintenance Station provides network supervision for the secondary alarms that are sent to the PIDS and FAAS.

4.0 **TECHNICAL REQUIREMENTS**

4.1 The contractor shall provide an integrated an networked Nurse Call in a shower in accordance to the existing operational parameters detailed in 3.1, specifications and standards and Nurse Call device suppliers.

The contractor shall provide a Call Originating Device (COD) with a pull string that an inmate may access in the event of a fall in the shower or other emergency. This COD will have intercom capability.

The contractor shall provide an Overhead Indication Device (OID) which will be visible by staff from the Mackenzie control post.

The contractor shall provide a Call Cancellation Device (CCD). Call cancellation devices are located in close proximity of the cell doors.

The contractor shall wire all components into the rack located at the back of the McKenzie control post and integrate into the network as defined in the SOW

4.2 System Installation

In general, all conduits for each Cell should be reused. Cables are all confined in each LCU cabinet associated with a block of cells.

The contractor shall avoid, as much as possible, the use of conduit in inmate accessible areas. The contractor shall utilize existing pipe chases, existing conduit in the walls, etc., where possible. New lengths of conduit shall be of the minimum necessary length. All newly installed conduits carrying video for this project shall be identified, except in inmate accessible areas, by prominent labels with BRIGHT GREEN wording. These labels shall be located at each end of the conduit run, on both sides of any penetration of a wall, and at 3.5 metre points along its length.

All data cables and data jumper cables (minimum 23 gauge), jacks and connector boots installed as part of this project, whether CAT 6 or fibre optic, shall be BRIGHT GREEN in colour. All cables shall be FT4 rated.

All patch cables are to be stranded cable with RJ45 connectors. RJ45 connectors are not to be attached to solid conductor cable.

All *installed runs of CAT6 cable are to be solid conductor cable and terminated into patch panels in equipment racks or faceplates in other locations.

* An installed cable is any cable that is run through a conduit, run from one area in a building to another area, any cable that travels farther than the adjacent equipment cabinet in a series of cabinets. Note: Equipment cabinets must be abutting without side panels to open connection to be considered adjacent.

5.0 ADDITIONAL REQUIREMENTS

5.1 Operator Training

The contractor shall prepare and present operational training course to individuals responsible for the operation of the equipment in accordance with the specification ES/SOW-0101 Statement of Work. The course shall concentrate on the features and proper operation of the installed system. The course shall be presented on the site within two weeks of the successful acceptance of the system. The training shall be provided in English, to two groups with five persons in each group. The training course and training materials shall be approved by the DA before the course is given.

5.2 Maintenance Training

The contractor shall prepare and present maintenance training course to individuals responsible for the maintenance and repair of the systems, in accordance with the specification ES/SOW-0101 Statement of Work. The course shall concentrate heavily on the material contained in the maintenance manual and as-built drawings. The course shall be presented on the site within two weeks of the successful acceptance testing of the system. The course shall be presented in English to one group of five technicians. The training course and training materials shall be approved by the DA before the course is given.

5.3 Manuals

The contractor shall provide the operator and maintenance manuals in accordance with the specification ES/SOW-0101 Statement of Work. The contractor shall provide ten copies of the operator manual in English and two copies of the maintenance manual in English to the site. The contractor shall provide one copy of the operator manual in English and one copy of the maintenance manual in English to the Design Authority, the Regional Telecommunications and Electronics Officer (RTEO) and ADGA Headquarters (Brian Cooper). The maintenance manuals shall include completed copies of the Acceptance Test Plan (ATP).

5.4 As-Built Drawings

The contractor shall provide as-built drawings of the site installation in AutoCAD 2005 format and in accordance with the specification ES/SOW-0101 Statement of Work. The contractor shall provide two copies of the as-built drawings to the site, one to the Design Authority, one to the RTEO and one to ADGA Headquarters (Brian Cooper).

5.5 Software

The contractor shall provide CD copies of all system software in accordance with the specification ES/SOW-0101 Statement of Work. The contractor shall provide two copies of the software to the site, one to the Design Authority, one to the RTEO and one to ADGA Headquarters (Brian Cooper).

5.6 Acceptance Testing

5.6.1 The contractor shall provide a detailed ATP to the DA, or his designated representative, by fax or email, for approval at least two weeks prior to the start of installation of the systems.

5.6.2 The contractor shall complete one hundred percent of the tests outlined in the ATP prior to the ATP testing being carried out by the DA.

5.6.3 The contractor shall provide a fully completed and signed copy of the ATP to the DA, or his designated representative, by fax or email, at least two working days prior to the start of the final ATP testing. This copy of the ATP shall include all of the results of the tests carried out in Section 5.6.2.

5.6.4 In the case where subcontractors have been used, the contractor shall provide written confirmation that the work of their subcontractor has been inspected and verified. This verification shall be sent to the DA or his designated representative, by fax or email, at least two days prior to the start of the ATP.

5.6.5 Testing may be carried out by the DA, a designated representative or a third party contractor.

5.6.6 The DA may repeat all of the ATP tests done by the contractor or a percentage of them. If an unacceptable level of failed tests are encountered during the ATP testing by the DA; the ATP testing will be halted until the contractor has corrected the failures.

5.6.7 If the DA during the ATP testing finds a minor deficiency that does not affect the operational effectiveness of the systems, the ATP testing may continue. If a major deficiency is found during the ATP testing that does affect the operational effectiveness of the radio equipment or system; the testing must cease until the deficiency has been corrected.

5.6.8 ATP testing must be done during normal working hours, 08:00 to 16:00, Monday to Friday. ATP testing at other times will only be done in an emergency situation

5.6.9 The DA or designated representative will sign-off on the ATP, upon the successful

conclusion of the testing. Any minor deficiencies noted during the testing will be indicated on the ATP form. This signature indicates the Conditional Acceptance of the system.

5.6.10 The system will be subjected to operational testing for a period of two (2) weeks following the Conditional Acceptance of the system. CSC will formally accept the system from the Contractor at the end of this two (2) week period, but only if ALL deficiencies have been corrected.

5.6.11 Any deficiencies noted by CSC during this two (2) week operational testing period will be communicated to the Contractor, who will then be required to correct the deficiencies. The two (2) week operational testing period will begin again after all deficiencies have been cleared.

5.6.12 The equipment warranty period will start on the date the system is formally accepted.

5.7 Spares

The contractor shall provide;
1 spare COD
1 spare CCD
1 spare OID
5 spare pull

5.8 Warranty

The required warranty period will be for twelve months effective from the date of the on-site acceptance or the date the system is put in service by CSC, whichever is the earlier. The contractor shall provide all materials and labour required to correct any system/equipment problems occurring during the warranty period.

5.9 Schedule

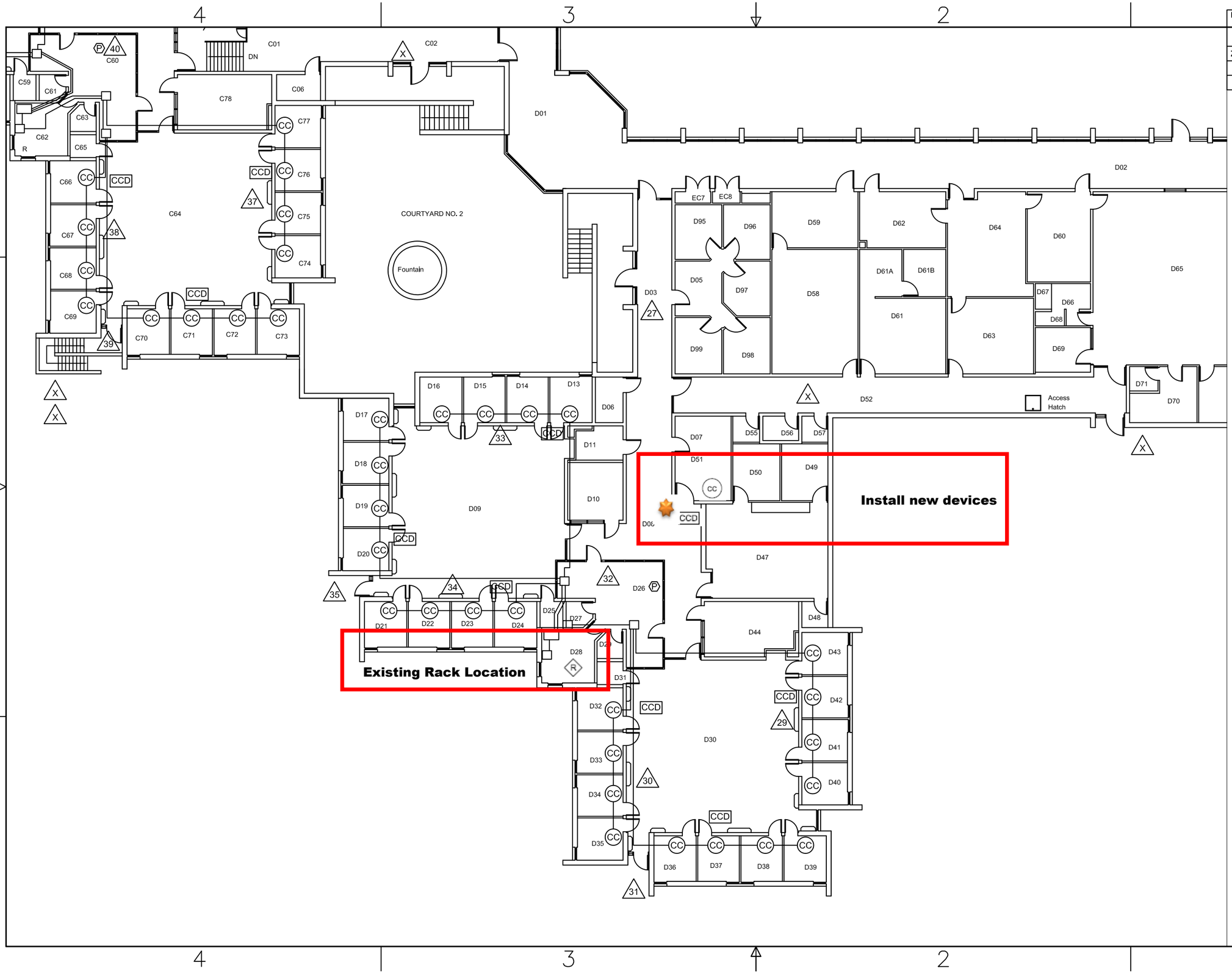
The contractor shall provide a detailed installation schedule as well as a project completion date.

5.10 Operational Down-Time

Equipment and systems operational down time shall be kept to a minimum. All down time will be coordinated with the institution's representative as identified at the bidder's and/or the start-up meeting. The contractor's staff may be required to work during evenings, nights and/or weekends to reduce the amount of down time and to meet operational requirements.

5.11 Institutional Operations

All employees of the contractor will be required to be in possession of a valid, current security clearance before they are permitted to enter and work in the institutions.. The contractor must take every precaution to minimize any disturbance to institutional operations. While on site, the contractor and his staff shall cooperate fully with operational staff and conform to all security requirements.



DWG No. 10024RP-IC-01	SHT 54	REV. 2

REVISION COLUMN

ZONE	REV.	DESCRIPTION	APP'D	DATE
	1	FIRST ISSUE (DWG # ICCS-RPC-X)		
	2	REDRAWN & REVISED		

NOTES

- CC — CELL CALL
- X — GUARD TOUR SYSTEM
- CCD — CALL CANCELLATION DEVICE
- P — PRIMARY ANNUNCIATOR CONTROL PANEL
- R — RACK
- GTS COMPUTER
- **Overhead Indication Device (OID)**

Marcomm Systems Group Inc.
29 ANTARES DRIVE,
OTTAWA, ONTARIO K2E 7V2
(613) 226-8866
FAX: (613) 226-8171

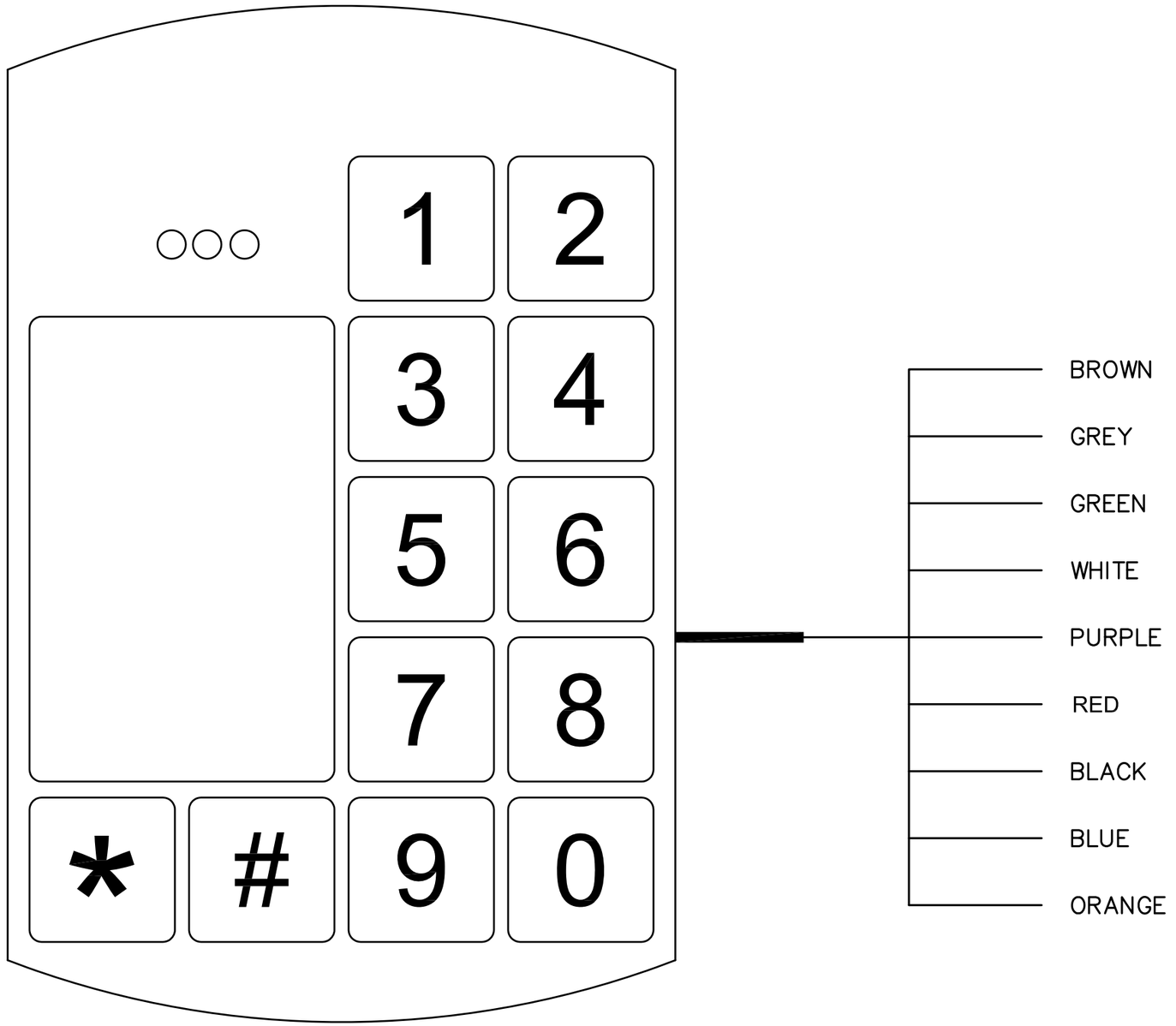
PROJECT	DRAWING TITLE
ICCS PRAIRIES REGIONAL PSYCHIATRIC CENTER SASKATOON, SASKATCHEWAN	MACKENZIE UNIT CALL SYSTEM LAYOUT

DWG SIZE	DRAWING NUMBER												
B	1	0	0	2	4	R	P	–	I	C	–	0	1
	PROJECT NUMBER					CLIENT			PRODUCT			SEQUENCE	
	SCALE NTS					SHEET 55 OF 57							

DWG No. 10024RP-IC-01	SHT 4	REV. 2

REVISION COLUMN

ZONE	REV.	DESCRIPTION	APP'D	DATE
	1	FIRST ISSUE (DWG # ICCS-RPC-X)		
	2	REDRAWN & REVISED		



Norcomm Systems Group Inc.
29 ANTARES DRIVE,
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(613) 226-8866
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PROJECT	DRAWING TITLE
ICCS PRAIRIES REGIONAL PSYCHIATRIC CENTER SASKATOON, SASKATCHEWAN	KEYPAD/CONTROLLER WIRING DIAGRAM

DWG SIZE	DRAWING NUMBER												
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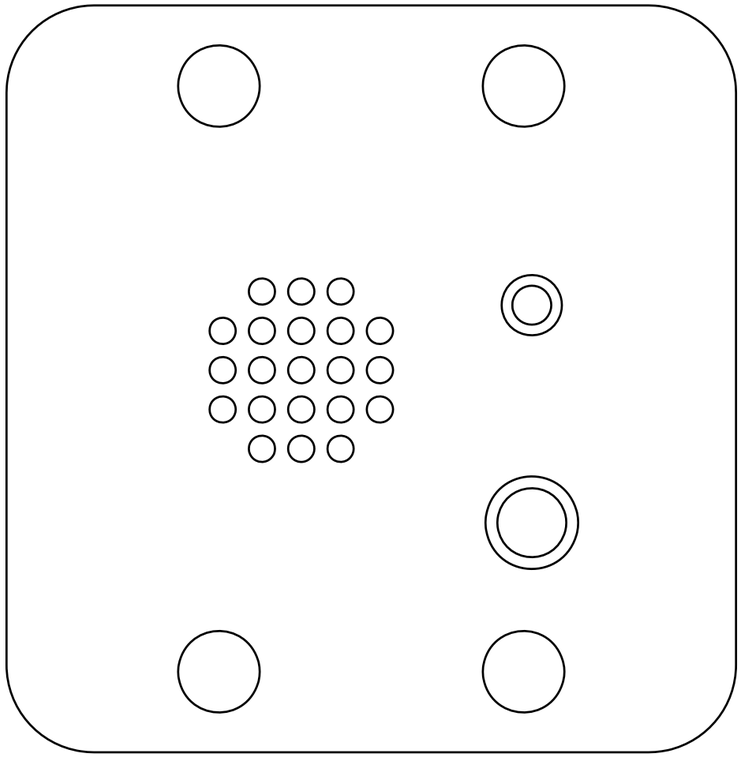
	PROJECT NUMBER					CLIENT			PRODUCT			SEQUENCE	
	SCALE NTS					SHEET 4 OF 57							

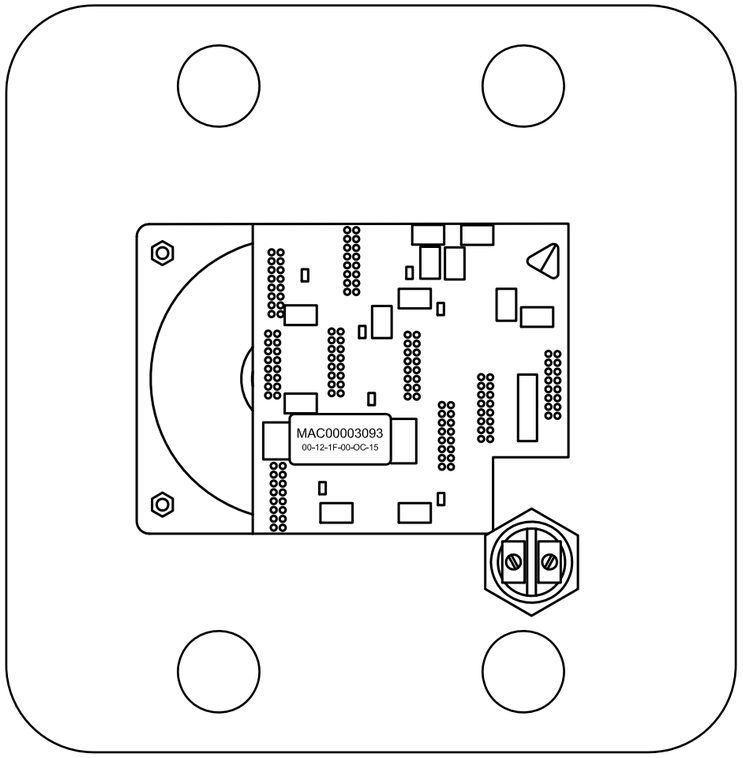
DWG No. 10024RP-IC-01	SHT 2	REV. 2

REVISION COLUMN

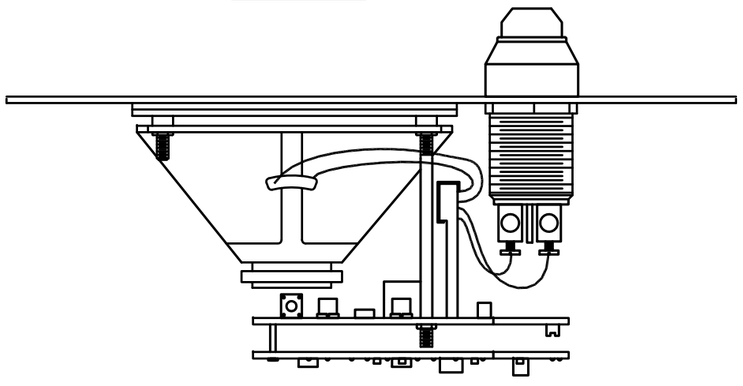
ZONE	REV.	DESCRIPTION	APP'D	DATE
	1	FIRST ISSUE (DWG # ICCS-RPC-X)		
	2	REDRAWN & REVISED		



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Marconi Systems Group Inc.
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PROJECT	DRAWING TITLE
ICCS PRAIRIES REGIONAL PSYCHIATRIC CENTER SASKATOON, SASKATCHEWAN	INTERCOM DIAGRAM

DWG SIZE	DRAWING NUMBER												
B	1 0 0 2 4 R P	–	I C	–	0 1								
	PROJECT NUMBER		CLIENT		PRODUCT		SEQUENCE						
	SCALE NTS		SHEET 2 OF 57										

DWG No. 10024RP-IC-01	SHT 39	REV. 2

REVISION COLUMN

ZONE	REV.	DESCRIPTION	APP'D	DATE
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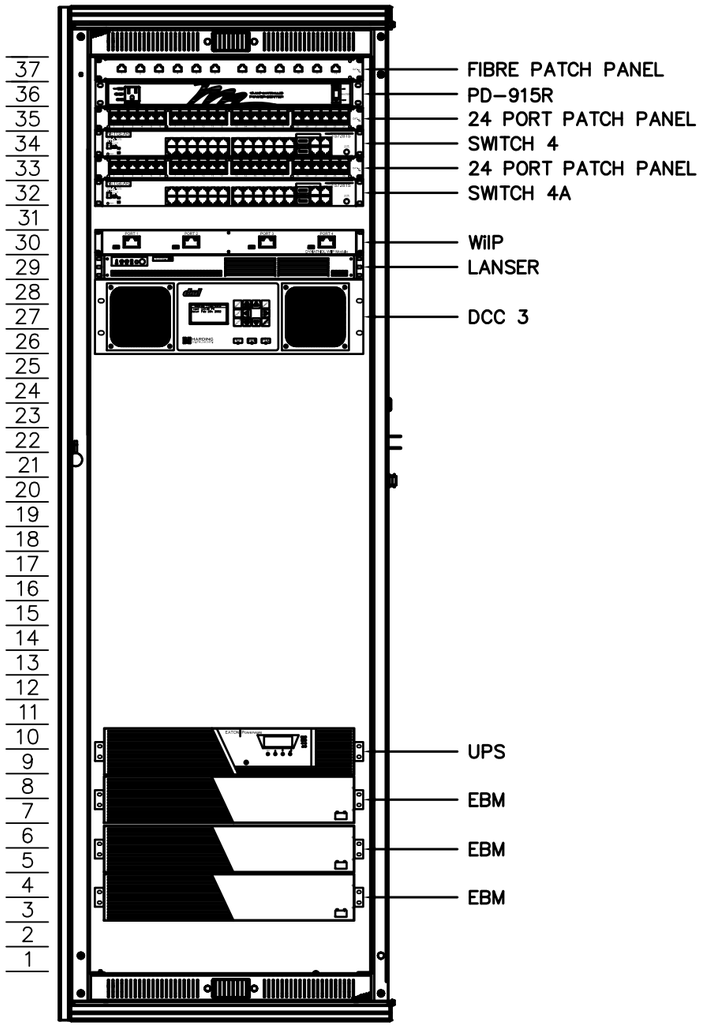
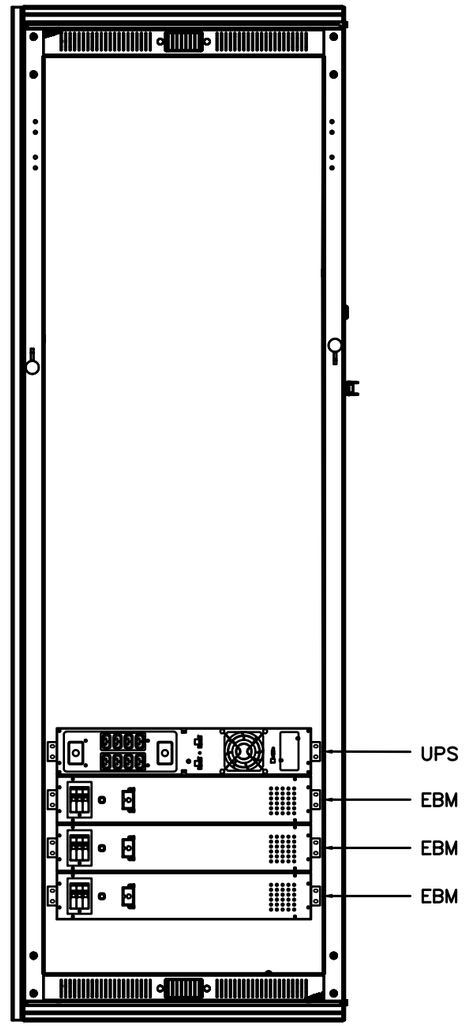
	2	REDRAWN & REVISED		

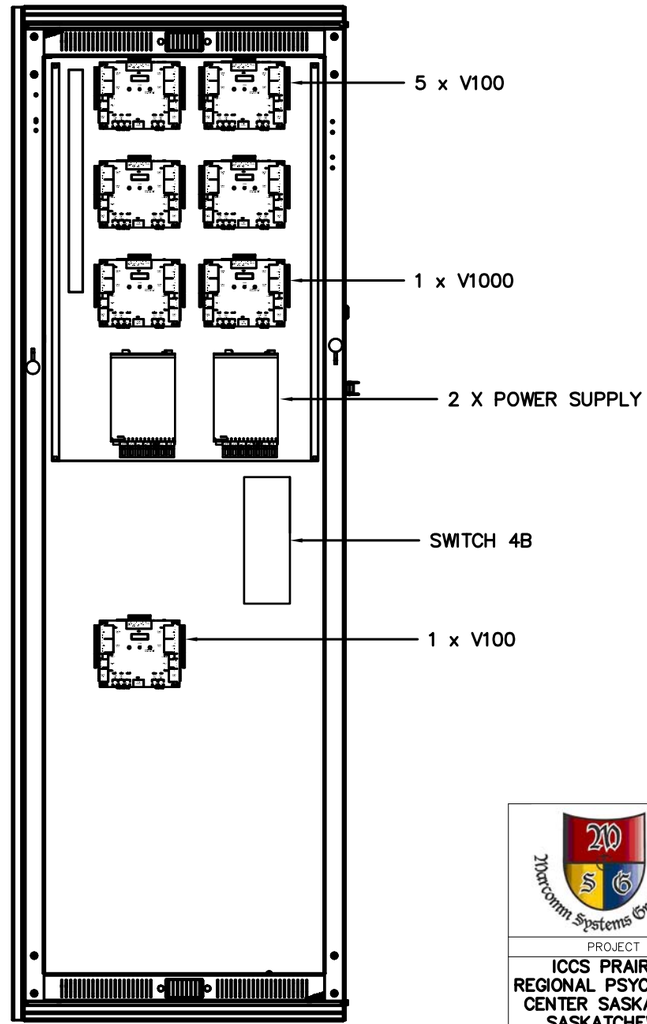
MACKENZIE



FRONT



REAR



BACK

Marcomm Systems Group Inc.
29 ANTARES DRIVE,
OTTAWA, ONTARIO K2E 7V2
(613) 226-8866
FAX: (613) 226-8171

PROJECT	DRAWING TITLE
ICCS PRAIRIES REGIONAL PSYCHIATRIC CENTER SASKATOON, SASKATCHEWAN	RACK LAYOUT MACKENZIE

DWG SIZE	DRAWING NUMBER											
B	1	0	0	2	4	R	P	–	I	C	–	0	1
	PROJECT NUMBER					CLIENT			PRODUCT			SEQUENCE	
	SCALE NTS					SHEET 39 OF 57							