Part 1 General

1.01 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 26 05 01.

.2 Data shall include system components, operating instructions and wiring schematics.

1.02 RELATED WORK SPECIFIED ELSEWHERE

.1 Conduits, Conduit Fastenings and Conduit Fittings - Section 26 05 34.

.2 Outlet Boxes and Fittings - Section 26 05 32.

.3 Junction and Pull Boxes, Cabinets - Section 26 05 31.

1.03 SYSTEM DESCRIPTION

.1 Complete communications horizontal cabling system consisting of outlet boxes, outlet jacks, cable, coverplates, conduits, pullboxes, and patch panels.

1.04 CERTIFICATION

.1 General Requirements

.1 Every cabling link in the installation shall be tested in accordance with the latest edition of Telecommunications Industry Association (TIA) standard ANSI/TIA/EIA-568. (CAT 6)

.2 The installed twisted-pair horizontal links shall be tested from the data jack at the patch panel to the data jack at the workstation against the “Permanent Link” performance limits specification as defined in the latest edition of ANSI/TIA/EIA-568. (CAT 6)

.3 100% of the installed cabling links must be tested and must pass the requirements of the standards noted above and as further detailed below. Any failing link must be diagnosed and corrected. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements. The final and passing result of the tests for all links shall be provided in the test results documentation.

.4 Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. Appropriate training programs include but are not limited to installation certification programs provided by BiCSi or the ACP (Association of Cabling Professionals).

.5 The test equipment (tester) shall comply with or exceed the accuracy requirements for Level III field testers as defined in TIA-568. (CAT 6) The tester including the appropriate interface adapter must meet the specified accuracy requirements. The accuracy requirements for the permanent link test configuration (baseline accuracy plus adapter contribution) are specified in TIA/EIA-568. (CAT 6)

.6 The tester shall be within the calibration period recommended by the vendor in order to achieve the vendor-specified measurement accuracy.

.7 The tester interface adapters must be of high quality and the cable shall not show any twisting or kinking resulting from coiling and storing of the tester interface adapters. In order to deliver optimum accuracy, preference is given to a permanent link interface adapter for the tester that can be calibrated to extend the reference plane of the Return Loss measurement to the permanent link interface. The contractor shall provide proof that the interface has been calibrated within the period recommended by the vendor. To ensure that normal handling on the job does not cause measurable Return Loss change, the adapter and cord cable shall not be of twisted-pair construction. the Fluke DSP-LIA101S permanent link adapter available for the Fluke DSP-4000 Series CableAnalyzer™ is an example of a tester interface that fully complies with this requirement.

.8 The Pass or Fail condition for the link-under-test is determined by the results of the required individual tests (detailed in Section I.B). Any Fail or Fail* result yields a Fail for the link-under-test. In order to achieve an overall Pass condition, the results for each individual test parameter must Pass or Pass*.

.9 A Pass or Fail result for each parameter is determined by comparing the measured values with the specified test limits for that parameter. The test result of a parameter shall be marked with an asterisk (*) when the result is closer to the test limit than the accuracy of the field tester. The field tester manufacturer must provide documentation as an aid to interpret results marked with asterisks.

.10 A representative of the end-user shall be invited to witness field testing. the representative shall be notified of the start date of the testing hase 5 business days before testing commences.

.11 A representative of the end-user will select a random sample of 5% of the installed links. The representative (or his authorized delegate) shall test these randomly selected links and the results are to be stored in accordance with the prescriptions in Section I.C. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the end-user representative shall repeat 100% testing and the cost shall be borne by the installation contractor.

.2 Performance Test Parameters

The test of each Category 6 link shall contain all of the following parameters as detailed below. In order to pass the link test all measurements (at each frequency in the range from 1 MHz through 250 MHz) must meet or exceed the limit value determined in the above-mentioned Category 6 standard.

.1 **Wire Map:**

Wire Map shall report Pass if the wiring of each wire-pair from end to end is determined to be correct. The Wire Map results shall include the continuity of the shield connection if present.

.2 **Length:**

The field tester shall be capable of measuring length of all pairs of a permanent link or channel based on the propagation delay measurement and the average value for nominal velocity propagation (NVP). The physical length of the link shall be calculated using the pair with the shortest electrical delay. This length figure shall be reported and shall be used for making the Pass/Fail decision. The Pass/Fail criteria are based on the maximum length allowed for the permanent link configuration (90 meters – 295 ft) or the channel (100 meters – 328 ft) plus 10% to allow for the variation and uncertainty of NVP.

.3 **Insertion Loss (Attenuation):**

Insertion Loss is a measure of signal loss in the permanent link or channel. The term 'Attenuation' has been used to designate 'insertion loss'. Insertion Loss shall be tested from 1 MHz through 250 MHz in maximum step size of 0.5 MHz (500 kHz). It is preferred to measure attenuation at the same frequency intervals as NEXT Loss in order to provide a more accurate calculation of the Attenuation-to-Crosstalk Ratio (ACR) parameter.

Minimum test results documentation: Identify the worst wire pair (1 of 4 possible). The test results for the worst wire pair must show the highest attenuation value measured (worst case), the frequency at which this worst case value occurs, and the test limit value at this frequency.

.4 **NEXT Loss, pair-to-pair:**

Pair-to-pair near-end crosstalk loss (NEXT Loss) shall be tested for each wire pair combination from each end of the link (a total of 12 pair combinations). This parameter is to be measured from 1 through 250 MHz. Minimum test result documentation: Identify the wire pair combination that exhibits the worst case NEXT margin **and** the wire pair combination that exhibits the worst value of NEXT (worst case). NEXT is to be measured from each end of the link-under-test. These wire pair combinations must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

.5 **PSNEXT Loss:**

Power Sum NEXT Loss shall be evaluated and reported for each wire pair from both ends of the link-under-test (a total of 8 results). Like NEXT this test parameter must be evaluated from 1 through 250 MHz.
Minimum test result documentation: Identify the wire pair that exhibits the worst case margin and the wire pair that exhibits the worst value for PSNEXT. These wire pairs must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

.6 **ELFEXT Loss, pair-to-pair:**

Pair-to-pair FEXT Loss shall be measured for each wire-pair combination from both ends of the link-under-test. FEXT Loss measures the crosstalk disturbance on a wire pair at the opposite end (far-end) from which the transmitter emits the disturbing signal on the distribution pair. FEXT is measured to compute ELFEXT Loss that must be evaluated and reported in the test results. ELFEXT measures the relative strength of the far-end crosstalk disturbance relative to the attenuated signal that arrives at the end of the link. This test yields 24 wire-pair combinations. ELFEXT is to be measured from 1 through 250 MHz. Minimum test result documentation: Identify the wire pair combination that exhibits the worst case margin and the wire pair combination that exhibits the worst value for ELFEXT. These wire pairs must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

.7 **PSELFEXT Loss:**

Power Sum ELFEXT is a calculated parameter that combines the effect of the FEXT disturbance from three wire pairs on the fourth one. This test yields 8 wire-pair combinations. Each wire-pair is evaluated from 1 through 250 MHz. Minimum test result documentation: Identify the wire pair that exhibits the worst case margin and the wire pair that exhibits the worst value for PSELFEXT. These wire pairs must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

.8 **Return Loss**:

Return Loss (RL) measures the total energy reflected on each wire pair. Return Loss is to be measured from both ends of the link-under-test for each wire pair. This parameter is also to be measured form 1 through 250 MHz.
Minimum test result documentation: Identify the wire pair that exhibits the worst case margin and the wire pair that exhibits the worst value for Return Loss. These wire pairs must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

.9 **ACR:**

Attenuation to crosstalk ratio (ACR) provides an indication of bandwidth for the two wire-pair network applications. ACR is a computed parameter that is analogous to ELFEXT and expresses the signal to noise ratio for a two wire-pair system. This calculation yields 12 combinations – six from each end of the link.
Minimum test result documentation: Identify the wire pair combination that exhibits the worst case margin and the wire pair combination that exhibits the worst value for ACR. These wire pair combinations must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test

limit value at this frequency.

.10 **PSACR:**

The Power Sum version of ACR is based on PSNEXT and takes into account the combined NEXT disturbance of all adjacent wire pairs on each individual pair. This calculation yields 8 combinations – one for each wire pair from both ends of the link. Minimum test result documentation: Identify the wire pair that exhibits the worst case margin and the wire pair that exhibits the worst value for PSACR. These wire pairs must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

.11 **Propagation Delay**

Propagation delay is the time required for the signal to travel from one of the link to the other. This measurement is to be performed for each of the four wire pairs.

Minimum test result documentation: Identify the wire pair with the worst case propagation delay. The report shall include the propagation delay value measured as well as the test limit value.

.12 **Delay Skew**

This parameter shows the difference in propagation delay between the four wire pairs. The pair with the shortest propagation delay is the reference pair with a delay skew value of zero.

Minimum test result documentation: Identify the wire pair with the worst case propagation delay (the longest propagation delay). The report shall include the delay skew value measured as well as the test limit value.

.13 Test Result DocumentationThe test results information for each link shall be recorded in the memory of the field tester upon completion of the test.

.14 The test results records saved by the tester shall be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of these test records. A guarantee must be made that the measurement results are transferred to the PC unaltered, i.e., “as saved in the tester” at the end of each test and that these results cannot be modified at a later time.

.15 The database for the completed job shall be stored and delivered on CD-ROM including the software tools required to view, inspect, and print any selection of test reports.

.16 A paper copy and an electronic copy (CD disk) of the test results shall be provided that lists all the links that have been tested with the following summary information:

.a The identification of the link in accordance with the naming convention defined in the overall system documentation

.b The overall Pass/Fail evaluation of the link-under-test including the NEXT Headroom (overall worst case) number

.c The date and time the test results were saved in the memory of the tester

The CD disk shall be complete with a typewritten label indicating Data Test Results, Project Name, Date of Test.

.17 General Information to be provided in the electronic data base with the test results information for each link:

.a The identification of the project

.b The identification of the link in accordance with the naming convention defined in the overall system documentation

.c The overall Pass/Fail evaluation of the link-under-test

.d The name of the standard selected to execute the stored test results

.e The cable type and the value of NVP used for length calculations

.f The date and time the test results were saved in the memory of the tester

.g The brand name, model and serial number of the tester

.h The identification of the tester interface

.i The revision of the tester software and the revision of the test standards database in the tester

.18 The detailed test results data to be provided in the electronic database for each tested link must contain the following information:

.a For each of the frequency-dependent test parameters, the minimum test results documentation shall be stored for each wire-pair or wire-pair combination as observed from each end of the link.

Length: Identify the wire-pair with the shortest electrical length, the value of the length rounded to the nearest 0.5 m and the test limit value

Propagation delay: Identify the pair with the shortest propagation delay, the value measured in nanoseconds (ns) and the test limit value

Delay Skew: Identify the pair with the largest value for delay skew, the value calculated in nanoseconds (ns) and the test limit value

Insertion Loss (Attenuation): Minimum test results documentation for the wire pair with the worst insertion loss

Return Loss: Minimum test results documentation. Identify as detected from each end of the link, the wire pair that exhibits the worst case margin and the wire pair with the worst RL. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

NEXT, ELFEXT, ACR: Minimum test results documentation. Identify as measured from each end of the link, the wire pair combination that exhibits the worst case margin and the wire pair combination that delivers the worst case value. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

PSNEXT, PSELFEXT, and PSACR: Minimum test results documentation. Identify as detected from each end of the link, the wire pair that exhibits the worst case margin and the wire pair with the worst value. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

Link length, propagation delay, and delay skew shall be reported for each wire pair as well as the test limit for each of these parameters.

1.05 SAMPLES

.1 A sample of the computer outlet jack and faceplate shall be submitted with the shop drawings.

Part 2 Products

2.01 MATERIAL

.1 Conduits: EMT type 19 mm minimum.

.2 Fish Wires: Polypropylene type.

.3 Computer outlet box as detailed on drawings (multiple outlet detail).

2.02 DATA COMMUNICATIONS HORIZONTAL CABLING

.1 Data Outlet Jacks

.1 Eight conductor modular keystone jack (blue in colour) complete with dust cover.

.2 Standard ISDN T568A pin/pair configuration.

.3 Jacks must exceed the requirements of TIA/EIA 568 for Category 6.

.4 Contacts beryllium copper with a 50 micro-inch gold plating.

.5 Housing: blue thermoplastic.

.6 Jacks shall be mounted on a white nylon three-port rectangular faceplate, that matches the rectangular wiring devices (Hubbell #ISF3W, or Leviton

#41643-W). The three-port rectangular faceplate color shall match wiring devices.

.7 CAT 6 jacks shall be Hubbell #HXJ6B, Leviton #61110-RL6 or approved equal.

.8 Coverplates shall be as specified in Section 26 27 26.

.2 Data Cable

.1 Data Outlet Cable

.a Four pair, unshielded twisted pair cable.

.b Conductors #23AWG solid copper, thermoplastic insulated, formed into four individually twisted pairs and enclosed in a blue thermoplastic jacket.

.c Cable shall meet FT6 flammability requirements for use in plenums.

.d Cable shall exceed requirements of TIA/EIA 568 for Category 6.

.e General Cable #7131800.

.3 Data Patch Cords

.1 Provide and install one 10’-0” CAT 6 booted blue patch cord for each workstation data jack. Patch cords shall be tested and comply with Category 6 ANSI/T1A/E1A-568-B-2.1 requirements. Hubbell #PCX6B10, Leviton #62460-10B.

.2 Provide and install one 2’-0” CAT 6 booted blue patch cord for each patch panel data jack. Patch cords shall be tested, and comply with Category 6 ANSI/T1A/E1A-568-B-2.1 requirements. Hubbell #PCX6B02, Leviton #62460-02B.

.3 Patch cords must be factory made; hand made patch cords will not be accepted.

.4 Patch cords must be incorporated in the manufacturer’s end-to-end system certification.

.5 Patch cords must be labelled at both ends. The labelling format will be 1-2m, 2-2m, 3-2m, 4-2m etc. where the first digit is the patch cord identifier while the second digit represents the length of the patch cord in meters.

.6 Patch cords must be fabricated and tested by the same manufacturer used for the horizontal cabling plant and will be compliant with TIA/EIA 568-B.2.

Part 3 Execution

3.01 INSTALLATION

.1 When a data or voice outlet is located in a multi-gang outlet box with other devices, a

25 mm conduit (for both data and voice cabling) shall be installed to the cable tray. Identify conduit neatly with black felt marker "Voice/Data".

.2 When a separate data or voice outlet is specified (not in a multi-gang outlet box) one 102 x 102 mm square outlet box complete with a square cut single device raised cover shall be installed, with a 25 mm conduit to the cable tray. Identify conduit neatly with black felt marker “Voice/Data”.

.3 Install cable to manufacturer's recommendations regarding bending radius, pulling strain, etc. Maintain a maximum bend radius of eight (8) times the cable diameter.

.4 Communications horizontal cabling system shall be installed by trained personnel only.

.5 Install plastic bushing to protect conductors whenever conduit terminates.

.6 Identify both ends of each data and voice cable with permanent identification indicating the jack number. Data jack cables shall be terminated at patch panels dedicated to data, and voice jack cables shall be terminated at patch panels dedicated to voice.

.7 Identify each data jack with a clear self-adhesive label (black lettering) indicating the data cabinet number, the patch panel number, and the data jack number (i.e. C1-P2-D43 indicates cabinet #1, patch panel #2, data jack #43). Each data jack shall be identified with a consecutive number.

.8 Identify each voice jack with a clear self- adhesive label (black lettering) indicating the data cabinet number. the patch panel number and the voice jack number (i.e. C1-P3-V43 indicates cabinet #1, patch panel #2 and voice jack #43). Each telephone jack shall be identified with a consecutive number.

.9 Strip back a maximum of 12 mm of computer cable jacket. Maintain pair twists as close as possible to the point of mechanical termination.

.10 Apply cable restraints loosely and at random intervals. Velcro straps shall be used for all cable restraints.

.11 A pullbox is required after two 90° bends or equivalent deflections, and after every 30 metres of straight run.

.12 Conduit bending radius shall not exceed:

.1 6 times internal diameter for conduit up to 50 mm diameter.
.2 10 times internal diameter for conduit larger than 50 mm diameter.

.13 Terminate all four pair of voice conductors from each outlet to rear of connector (6 telephone outlets per connector). Identify designation strip on connector with telephone jack number corresponding with identification on telephone jack.

.14 Provide and install one fibre optic cable between the floor mounted data cable termination cabinet and the main telephone plywood. Locate a loose fibre optic termination panel at the main telephone plywood. Terminate fibre optic cable at both ends.

.15

.16 Record the location and identification of all communication jacks on the electrical as-built drawings.

.17 Provide and install a mounted (glazed and framed) plan of the building showing the location and identification of all communications jacks. Locate adjacent to each patch panel.

.18 Data/voice cabling shall not exceed 90 meters in total length from workstation jack to the patch panel.

.19 Installation practices will conform to EIA/TIA standards.

.20 No splices are permitted in any data or fibre cable.

.21 In locations where the cabling is not in conduit, it will be installed in the same manner as conduit systems i.e., straight lines, parallel to walls etc. The cables shall be bundled together with Velcro straps every 610 mm.

END OF SECTION 27 15 00

Part 1 GENERAL

1.01 SECTION INCLUDES

.1 Digital Communications Controllers (DCC's)

.2 Digital Communication Expanders (DCE's)

.3 Administrator Software for configuring and maintaining system

.4 Intercom master stations

.5 Intercom stations

1.02 REFERENCE DOCUMENTS

.1 CSC Specifications:

.1 ES/SOW-0101 – Procurement & Installation of Electronic Security Systems (Revision 3)

.2 ES/SOW-0102 – Quality Control for Procurement and Installations of Electronic Security Systems (Revision 5)

.3 ES/SOW-0404 – Electronic System Proposal Evaluation Criteria (Revision 1)

.4 ES/SPEC-0006 – Conduit, Space, and Power Requirements for Security Systems Use in Federal Correctional Institutions (Revision 2)

.5 ES/SPEC-0303 – Limited Call Intercom System for Use in Federal Correctional Institutions (Revision 2)

.6 ES/SPEC-0500 – Inmate Cell Call System for Use in Federal Correctional Institutions (Revision 2)

.7 ES/SPEC-0900 – Door/Barrier/Gate Control System for Use in Federal Correctional Institutions (Revision 2)

.8 ES/STD-0204 – Fixed/Zoom Lens Closed Circuit Television (Revision 1)

.9 ES/STD-0207 – High Security Enclosure Closed Circuit Television (Revision 1)

.10 ES/STD-0221 – Fixed Network Colour Closed Circuit Television Camera (Revision 0)

.11 ES/STD-0222 – Indoor Network Colour Dome Camera (with Pan/Tilt/Zoom) Closed Circuit Television (Revision 0)

.12 ES/STD-0227 – LCD Colour Computer Monitor Closed Circuit Television (Revision 0)

.13 ES/STD-0228 – Network Video User Station Closed Circuit Television (Revision 0)

.14 ES/STD-0229 – Network Video Recorder Closed Circuit Television (Revision 0)

.15 ES/STD-0230 – NTSC-IP Video Converter Closed Circuit Television (Revision 0)

.16 ES/STD-0231 – IP-NTSC Video Converter Closed Circuit Television (Revision 0)

.17 ES/STD-0803 – Video Display Unit Electronic Systems (Revision 2)

.2 EIA-310-C Electronic Industries Association Standard for Racks, Panels and Associated Equipment.

.3 CSA-C22.1-98 Canadian Electrical Code (CEC) Part 1.

.4 UL 2572.

.5 Drawings.

1.03 DEFINITIONS

.1 ATP - Acceptance Testing Procedure/Plan

.2 BSCS – Building Security & Communication System

.3 CEC - Canadian Electrical Code

.4 CER - Common Equipment Room

.5 CSA - Canadian Standards Association

.6 CSC - Correctional Service of Canada

.7 DCS - Door Control System/subsystem

.8 EIA - Electronic Industries Association

.9 ES - Electronic Systems

.10 FAAS – Facility Alarm Annunciation System

.11 FAT - Factory Acceptance Test

.12 FDR - Final design Report

.13 GFE - Government Furnished Equipment

.14 GUI - Graphical User Interface

.15 I/O - Input/Output

.16 KVM - Keyboard/Video/Mouse

.17 LAN - Local Area Network

.18 LCIS - Limited Call Intercom System

.19 LCP - Local Control Post

.20 MCCP – Main Communications Control Post

.21 MTBF - Mean Time before Failure

.22 OFC - Optical Fibre Cable

.23 PC - Personal Computer

.24 PDC - Power Distribution Centre

.25 PDR - Preliminary Design Report

.26 PE - Principal Entrance

.27 PLC - Programmable Logic Controller

.28 PIU – Perimeter Intrusion Unit

.29 PWC - Public Works Canada (PWGSC's predecessor)

.30 PWGSC - Public Works & Government Services Canada

.31 PTT - Push-to-Talk

.32 RU - Rack Units (1.75" vertical space in an EIA-310C standard equipment rack)

.33 SAC - System Administration and Control

.34 SCP - Secure Control Post

.35 SOW - Statement of Work

.36 SPEC - Specification

.37 STD - Standard

.38 T&E - Telecommunications and Electronics

.39 TES - Telecommunications Equipment Space

.40 UPS - Uninterruptible Power Supply

.41 VAC - Volts, Alternating Current

.42 VDC - Volts, Direct Current

1.04 PERFORMANCE REQUIREMENTS

.1 Security Clearance

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

.2 Precedence of Institutional Operations

.1 While working on this project, it is essential that Contractors take every precaution to reduce any disturbance to normal institutional operations to a minimum. Onsite work may have to be performed at night or during other periods set by the Institution. The Contractor must recognize that it is essential that his personnel working onsite cooperate fully with the security staff at the institution by conforming to operational security requirements.

.3 All work shall be coordinated with the Technical Authority and the institutional staff.

.4 Service Response Capability.

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

1.05 DESIGN PERFORMANCE REQUIREMENTS

.1 Expand the existing Intercommunication System in accordance with the CSC ES/ ES/SPEC-0303 and as shown on the drawings.

.2 Provide high quality Intercommunication System components utilizing state-of-art technology with major brand name from a manufacturer with ISO9001 or better standards.

.3 Provide a completed system with high quality voice intelligibility, all necessary components, programming, commissioning, patch cables, and interface devices as required and regardless of mention to provide a complete functioning system.

.1 Integrate the intercom system with the door control system.

.4 Provide all required software updates and telephone technical support for no less than five (5) years from the date of substantial completion.

.5 All cables will be installed in raceways supplied by Division 26. Review the scope of work as defined in Division 26 and include any additional raceways that may be required to suit the system being installed.

.6 Use Shielded CAT-6 cable with specific colour from the rest of the facility’s colour coding to clearly identify the cable as for use with intercom.

.7 Provide third party written test results on a station-by-station basis as part of the base bid.

.8 Provide an equipment enclosure (rack) to house the central exchange complete with all necessary ventilation fans, power supplies, storage drawers, keyboard/mouse/LCD monitors as required to run the system with rear locking door and front smoked glass locking door. Rack must meet CSC standard for Racks EIA-310-C.

.9 Provide all specified spare parts and service manuals for maintenance of the Intercommunications and Program system. Provide complete listing of provided parts including quantity, manufacturer, model number, and unit price.

1.06 WARRANTY

.1 Manufacturer's Warranty: Submit, for Consultant's acceptance, manufacturer's standard warranty document executed by authorized company official.

.2 Provide one year warranty on defective parts and installation labour, commencing on the date of system acceptance by CSC.

1.07 PRODUCT DATA

.1 Submit product data in accordance with CSC Specification ES/SOW-0101 – Procurement & Installation of Electronic Security Systems (Revision 3)

.2 Include riser diagram, talk paths of complete intercom system.

1.08 SUBMITTALS

.1 General: Submit two (2) sets hardcopy (paper) plus one (1) set softcopy (computer files) documentation at each submittal.

.2 Preliminary Design Report (PDR): Provide documentation defined by ES/SOW-0101 Section 4.1

.3 Final Design Report (FDR): Provide documentation defined by ES/SOW-0101 Section 4.3.

.4 Acceptance Testing Plan (ATP): Provide documentation defined by ES/SOW-0101 Sections 6.1 and 7.2. ATP shall also include test procedure and certificate for fibre optic communications channels.

.5 Training Plan and Course Materials: Provide documentation defined by ES/SOW-0101 Section 8.2.

.6 Operator Manual: Provide generic manual for touch-screen operation, as well as system-specific information summarizing the operator-training course content.

.7 Provide data for incorporation into maintenance manual specified in CSC Specification ES/SOW-0101 – Procurement & Installation of Electronic Security Systems (Revision 3).

.8 Include description of system operation.

.9 Include parts list using component identification numbers standard to electronics industry.

1.09 WASTE MANAGEMENT AND DISPOSAL

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

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Consultant.

.5 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.01 MATERIALS

.1 Intercommunications system and software to be designed and manufactured in accordance with ISO-9001 1994 Quality System Standard.

.2 Manufacturer's quality control program to be registered in accordance with the above noted standard.

.3 Units of the same type of equipment shall be products of a single manufacturer. All material and equipment shall be new and currently in production. Each major component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place. Material will conform to the applicable requirements of the Underwriters Laboratories and the National Standards Institute. Each major component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place.

.4 All system equipment and field devices to be held securely in place. Fastenings and supports shall be selected to provide a safety factor of three.

.5 All systems equipment equipped with plug in power connectors to be connected to a dedicated receptacle. Do not use tap connectors for plugging in multiple plugs into a single receptacle.

.6 Approved Manufacturers

.1 The following manufacturers and their named products are approved for use in this Work:

.1 Harding Instrument Co. Ltd; MicroComm DXL

2.02 DIGITAL COMMUNICATION CONTROLLERS (DCC'S)

.1 Digital Communication Controllers to each form an intercom exchange capable of independent local operation. Exchange capacity to be increased by connecting up to four (4) Digital Communication Expanders to each DCC.

.2 Multiple DCC's to be networked together via digital audio trunks and Ethernet data networks to form larger systems.

.3 Each DCC to include:

.1 A Process Control Card (PCC)

.2 A Master Control Card (MCC)

.3 Two Station Control Cards (SCC's)

.4 An optional internal PCI card.

.5 A front panel keypad/display for system setup and maintenance.

.6 A 110 VAC, 60 Hz power supply for internal functions.

.4 Process Control Card:

.1 Process Control Card to contain system configuration and data, control exchange operations and switching, and provide exchange network ports.

.2 Process Control Card to include:

.1 USB network ports for exchange expansion.

.2 Ethernet network ports for system expansion and external control by touch screen computers and graphic control panels.

.3 Fiber optic or copper digital audio trunk ports.

.4 Two (2) serial ports.

.5 An internal modem for transmitting and receiving data over a telephone line.

.5 Master Control Cards:

.1 Include ports for any combination of two (2) intercom or telephone set master stations.

.2 Include two (2) line level audio inputs with status and control.

.3 Include two (2) line level audio outputs with status and control.

.4 Convert incoming audio signals to digital format and outgoing signals to analog format.

.5 Intercom master station audio, press-to-talk and hook switch status transmitted over two single shielded pair cables with wiring supervision to detect open circuit and short circuit faults.

.6 Telephone set master station functions all transmitted over a single wiring pair.

.6 Station Control Cards:

.1 Each provide sixteen half-duplex intercom station ports which can be employed in adjacent pairs for full duplex devices.

.2 Provide an interface for intercom stations. Units to convert incoming audio signals to digital format and outgoing signals to analog format. Each channel to monitor the status of up to two (2) switches associated with each intercom station.

.3 Each card interfaces with sixteen (16) half-duplex channels. Each channel includes a separate audio power amplifier for non-blocking call operation and sixteen (16) independent software controlled volume settings.

.4 All station audio, switch, and power functions on 400 Series and 401 Series cards to be transmitted over a single shielded pair cable with supervision to detect open circuit and short circuit faults.

.5 Audio and switch functions on 300 Series (Generic Intercom) station control cards to be transmitted on separate wiring pairs.

2.03 DIGITAL COMMUNICATION EXPANDERS (DCE'S)

.1 Digital Communication Expanders to provide master station and intercom features similar to the DCC's to facilitate exchange expansion.

.2 Each DCE to include:

.1 A slave Process Control Card (PCC) without exchange control or network functions.

.2 A Master Control Card (MCC).

.3 Two (2) Station Control Cards (SCC's).

.4 A 110 VAC, 60 Hz power supply for internal functions.

2.04 ADMINISTRATOR SOFTWARE

.1 Administrator Software to function on a standard PC to support system configuration, diagnostics, maintenance, and logging but not be required for system operation.

.2 Administrator Software to employ Windows features including views of system tree structure, tables of devices, screens for system settings and adjustments, and tables of operational data.

.3 Configuration features to include:

.1 Creation of overall system architecture.

.2 Creation of multiple device templates.

.3 Copy and paste functions with auto-numbering and auto-assignment to create device schedules.

.4 Configuration error detection and alerts.

.5 Device naming and call routing functions.

.6 Device setting and performance functions.

.4 Diagnostic and Maintenance features to include:

.1 Verification of system configuration and installation.

.2 Verification of system networks.

.3 Verification of device connections.

.4 Verification of system operation.

.5 Diagnostics via modem or Ethernet ports.

.5 Logging features to include:

.1 Display of system activity with filtering options.

.2 Search by time and date.

.3 Search by device.

.4 Search by parameter.

2.05 INTERCOM MASTER STATIONS

.1 Use existing.

2.06 INTERCOM STATIONS

.1 Intercom stations are to be designed for mounting on standard 2-gang outlet boxes. Faceplates to be constructed of 11 gauge brushed stainless. Internal steel offset grille to restrict inserting objects through speaker grille. Stations to be ruggedly constructed and resistant to damage from soil and sprays.

.2 Each intercom station is to incorporate an internal loudspeaker, microphone preamplifier and function multiplexing circuitry. One (1) pushbutton is to be provided on each station. Pushbuttons to be software assignable for placement of call requests or control of auxiliary functions.

.3 Pushbuttons to be single piece stainless steel construction and are backstopped to prevent excessive travel. Switch to have positive tactile action with 1 million-operation lifetime.

.4 Loudspeakers to be waterproof mylar cone type.

.5 All intercom station functions to be transmitted over a single shielded pair cable. Stations to be provided with MTA type insulation displacement connector that requires no wire stripping for installation.

.6 Outdoor intercom stations are to be identical in all respects to standard intercom stations except that all metal plates and hardware to be stainless steel, and internal circuitry and components to be conformally coated.

2.07 WIRE AND CABLE

.1 Factory manufactured field interface cables to be provided, as required, for all:

.1 master station ports

.2 station control card ports

.2 Field wiring to conform to manufacturer's recommendations.

.3 Meet or exceed CSC specification ES/SPEC-0006 – Conduit, Space, and Power Requirements for Security Systems Use in Federal Correctional Institutions (Revision 2).

Part 3 Execution

3.01 DETAILED DESIGN DEVELOPMENT

.1 Upon Contract Award, prepare and submit PDR to CSC Design Authority.

.2 Upon CSC acceptance of PDR, prepare and submit FDR to CSC Design Authority.

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

.4 Conduct off-site Factory Acceptance Test (FAT) witnessed by CSC Design Authority, to demonstrate compliant subsystem operation, subsystem non-interference, and system-wide control transfer and redundancy performance.

3.02 GENERAL INSTALLATION PROVISIONS

.1 Inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in and acceptable manner.

.2 Verify the accuracy of all dimensions, allowances, and clearances on site prior to commencing with any work that may be affected by those dimensions, allowances, and clearances.

.3 Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in the Contract Documents.

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

.5 Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

.6 Supervise construction activities to ensure that no part of the Work, completed or in progress is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

.7 Precautions shall be taken to guard against electrostatic and electromagnetic susceptibility and interference.

.8 Provide adequate ventilation for all heat radiating equipment.

.9 Install equipment so as to provide maximum safety to the operating and maintenance personnel.

.10 Nylon tubing for Section 11 19 20 shall be run with the low voltage device wires in conduit, raceways or cable trays. Low voltage wire and pneumatic tubing shall be pulled in the same conduit raceway by Sections 27 51 23, 28 13 27, 28 13 29 and 28 23 00. Nylon tubing must be run continuously from pneumatic lock to manifold in BSCS Room, or other designated location where pneumatic manifolds will be installed. Splices or tees

shall **NOT** be permitted. Sections 27 51 23, 28 13 27, 28 13 29 and 28 23 00 Contractor is responsible for pulling the nylon tubing.

3.03 METHOD OF WORK

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

.2 All workmanship to be of the highest quality and meet recognized standards of craftsmanship.

.3 Areas of installation deemed not acceptable by the Owner to be redone at the Contractor's expense.

3.04 PROTECTION OF EXISTING PROPERTY

.1 Be responsible for protecting all existing property including floors, walls, ceilings, furniture, and furnishings from damage, dust and other construction related activities. Provide all necessary dust covers and protective pads required for performance of the Work.

.2 Remove all debris and protective coverings at the end of each work period. Leave premises in condition found at start of work in each room or area of work.

.3 Except for scheduled activities, do not inconvenience user due to construction operations.

3.05 INSTALLATION

.1 Install equipment as indicated and in accordance with manufacturer's instructions.

.2 Interconnect system components.

3.06 TESTS

.1 Perform tests in accordance with CSC Specification ES/SOW-0101 – Procurement & Installation of Electronic Security Systems (Revision 3) and ES/SOW-0102 – Quality Control for Procurement and Installations of Electronic Security Systems (Revision 5).

END OF SECTION