1. GENERAL

1.01 REFERENCE STANDARDS

.1 CSA Group:

.1 CSA C22.1:21, Canadian Electrical Code, Part 1 (25th Edition), Safety Standard for Electrical Installations.

.2 Ontario Electrical Safety Code (28th edition/2021), and all bulletins.

.2 UL:

.1 UL 294-2018, Standard for Safety for Access Control System Units.

.2 UL 1076-2018, Standard for Safety for Proprietary Burglar Alarm Units and Systems.

.3 ULC:

.1 CAN/ULC-S316-14 (R2019), Standard for Performance of Video Surveillance Systems.

.2 CAN/ULC-S301:2018, Standard for Signal Receiving Centres Configurations and Operations.

.4 ANSI/TIA/EIA-568-B.1 and its addendum

.5 ANSI/TIA/EIA-568-B.3 and its addendum

.6 BICSI Telecommunications Distribution Methods Manual – Most current Edition

.7 BICSI Network Design Reference Manual – Most current Edition

.8 BICSI Information Transport Systems Installation Manual – Most current Edition

.9 Department of State (DOS)

.1 Publication SD-STD-02.01, Revision A, dated March 2003 for Vehicle Crash Testing of Perimeter Barriers and Gates.

.10 American Concrete Institute (ACI)

.1 301 Standard Specifications for Structural Concrete.

.11 American Society of Testing Materials (ASTM)

.1 C 33 - Standard Specification for Concrete Aggregates.

.2 C 94 - Standard Specification for Ready-Mixed Concrete.

.3 C150 - Standard Specification for Portland cement.

.4 F2656 – Crash Testing Vehicle Barriers

.12 Underwriters Laboratories (UL) Cable Certification and Follow Up Program.

.13 American Society for Testing Materials (ASTM).

.14 Institute of Electrical and Electronic Engineers (IEEE).

.15 UL Testing Bulletin.

.16 Applicable local Building Codes

.17 Manufacturer's specifications, latest issue.

1.02 DEFINITIONS

.1 The following are definitions of important terms specific to this specification and on related drawings.

.1 DVR – Digital Video Recorder.

.2 CCTV – Closed Circuit Television.

.3 DGP – Data Gathering Panel.

.4 ACS – Access Control System.

.5 REX – Request to Exit Motion Detector.

.6 RXP – Request to Exit Push Button.

.7 LAN – Local Area Network.

.8 COTS – Commercial Off The Shelf.

.9 4CIF – Image resolution of 740 x 480 pixels.

.10 GUI – Graphical User Interface.

.11 IPS – Images Per Second.

.12 BTU - British Thermal Unit.

.13 RU – Rack Unit.

.14 UTP – Unshielded Twisted Pair.

.15 IP – Internet Protocol.

.16 RAM – Random Access Memory.

.17 UPS – Uninterruptible Power Supply.

.18 KVM – Keyboard, Video, Mouse console.

.19 VDU – Visual Display Unit.

.20 MTBO – Mean Time Between Outages.

.21 MTTR – Mean Time to Recovery.

.22 MTBF – Mean Time Between Failures.

.23 DPU – Distributed Processing Unit.

.24 NVR – Network Video recorder.

.25 PoE – Power Over Ethernet.

.26 PoE+ - Power Over Ethernet +.

.27 OBC – Ontario Building Code.

.28 LED – Light Emitting Diode.

1.03 GENERAL REQUIREMENTS

.1 Section Includes

.1 This specification will outline the requirements for the configuration, system operating requirements, products, components, and materials for the Access Control System (ACS), Video Surveillance System (VSS), all Bollards, Intercom and VIP/ Help Assistance systems.

.2 This document details the required submittals, testing procedures and installation procedures for all parts of the security system.

.3 The Security Systems Contractor shall have the following qualifications:

.1 Be an authorized approved vendor of the proposed solution having a minimum three (3) years' experience with the installation and maintenance of Access Control and CCTV systems. Vendors must be in good standing with the manufacturer and must have all up to date certifications.

.2 Have a minimum of three (3) years' experience with the installation and maintenance of information technology networks and network components.

.3 Upon request, provide a list of previous successfully completed projects of similar installation, size and scope and provide name of contact person at each site for verification. Additionally, upon request, the Owner may request an onsite visit or photographs of similar jobs to verify vendor workmanship.

.4 Confirm explicitly that the personnel to be employed on the contract are suitably trained in the installation and maintenance of equipment of the type and model being provided so as to be able to carry out all work in a competent manner.

.2 General

.1 Provide documentation and training for all systems as detailed in this specification.

.2 System components to comply with all relevant requirements of Underwriter's Laboratories Inc.

.3 Security System Contractor to verify all raceways, related to this scope, on site.

.4 Provide additional conduits and raceways where required, provide stainless steel cover plates for back boxes that are not being used.

.5 The Security Contractor shall examine all project documents in order to determine whether there are any impediments to the installation of a fully functioning system. At the time of tendering the supplier shall provide written notification to the Owner or Owner’s Representative of any omission, irregularities, errors, or ambiguities. Failure to supply notification shall not relieve the Security Contractor of the responsibilities for providing a fully functional system at the Tender Price.

.6 Identify all critical interdependencies with the Owner or any third parties that would require addressing during the project.

.7 Identify (tabulate) consecutive rack unit (RU) space requirements (including free space or blanks) for all rack mounted equipment.

.8 Identify (tabulate) total BTU generation for each equipment room being utilized.

.9 Provide all technical information required to evaluate the solution, including proposed equipment, diagrams, layout, and functional / operational benefits.

.10 Submit a summary bill of materials and catalogue cut sheets for all major active and passive components for the project. Include model numbers, revision numbers for hardware and software as applicable. Although not expected as part of the Proposal, a complete bill of materials shall be required to be in place and agreed upon with the Owner prior to Contract signing.

.11 Provide a statement of guarantee that all required equipment and materials will be available for timely delivery of the project.

.12 Submit a security and backup plan for all documentation and system data related to this project. The plan should outline how the project related information (hardcopy and electronic) will be safeguarded against loss or damage.

.13 System Programming

.1 The Security System Contractor shall attend meetings with the Owner's Representatives and key staff to identify the specifics of the system programming. The Security System Contractor shall be responsible to record all decisions and parameters discussed during these meetings. The Security System Contractor shall submit in a document all configurations, parameters and receive approval for all programming parameters prior to implementation.

.2 The Security System Contractor shall ensure that the operation of the system matches and meets the programming requirements determined in the pre-installation meetings.

.14 Work shall be of professional quality and shall not detract from the aesthetic qualities of the facility.

.15 Follow established guidelines for installation and termination of all cabling and equipment as established by EIA/TIA-568-A, EIA/TIA-569, EIA-TIA-606, TSB-36 and TSB-40, BICSI Telecommunications Distribution Methods Manual, and applicable local electrical and building codes, IBC and NEC.

.3 Substitutions

.1 The Technical specifications are meant to outline the minimum requirements and are not meant to limit or inhibit the Proponents from submitting enhanced or alternative solutions.

.2 Enhanced or alternative solutions may be proposed, stipulating all variations from the Specification, and clearly identifying any cost savings and operational benefits of the proposed alternative approach.

.4 Omissions

.1 Omissions in the Proposal of any provision herein described shall not be interpreted as to relieve the Proponent of their responsibility or obligation to the complete and satisfactory delivery of the Owner's intent for the project.

.5 Bid Responses shall include:

.1 Detailed itemized Bill of Material with Quantity, Make, and Model, Manufacturer part numbers, quantity, and unit prices.

.2 Manufactures Authorization Certificates

.3 Resumes indicating project experience of Project Manager/s and Lead technicians with copies of certificates.

.4 Compliance Statement to Security and IT Specifications.

.5 Project plan with timeline to complete Security System.

1.04 SUBMITTALS

.1 All submitted drawings and documentation shall become property of the Owner. Contractor shall have no rights over the entire documentation package or any parts of the documentation package.

.2 The drawings and documentation shall be considered confidential documents and shall not be disclosed or distributed to any other party except the Owner's personnel directly involved in the work.

.3 Documentation is to be provided in both hard and electronic format for each project deliverable. (4 Hard, 4 Soft) The electronic format shall include for each document editable files (in its raw format, .xlsx, .docx, .DWG, .vsd, etc.)

.4 Along the course of design and implementation the Security System Contractor shall submit to the Owner standards, as-built documentation, and other supporting documents. The Security System Contractor shall provide a schedule for the following document submissions within one (1) week of contract award for review and approvals by the Owner or Owner's Representative. All submittals shall be in accordance with this Section unless stated otherwise.

.1 Work Breakdown Structure (WBS) indicating all relevant milestones.

.2 Shop Drawings

.1 Each drawing shall include all changes and be upgraded to reflect the latest configuration.

.2 The first drawings submitted by the Security System Contractor will be reviewed for conformance to the requirements herein. Once approval is given, the Security System Contractor shall use this approved drawing as the standard, and prepare subsequent drawings to a quality equal to or better than the approved standard.

.3 Each drawing prepared and submitted for review shall have in the lower right hand corner, just above the title block, a five-inch square blank space in which the Consultant may indicate the action taken.

.4 All final approved drawings and catalogue cuts shall be submitted to the Consultant.

.5 Shop drawings shall be prepared and submitted in the native (editable) electronic format (.vsd, .dwg, .xlsx, .docx). All documents produced shall be property of the client and the Security System Contractor shall have no rights over the entire documentation package or any parts of the documentation package.

.6 All Shop Drawings must be submitted as follows:

.1 Cover Sheet - Job Name, Date.

.2 Table of Contents with following columns

.1 Device Name.

.2 Model #.

.3 Symbol Name on Drawings.

.7 All Shop drawings shall include as a minimum:

.1 Details necessary for the procurement, installation, maintenance, and repair of all components or facilities equipment provided.

.2 List of equipment to be installed organized by location and including the part number and the manufacturer.

.3 Manufacturer specification sheet for each new piece of equipment.

.1 Each sheet should clearly identify the particular model number of the hardware being provided. Where such information is

not provided, at the discretion of the Owner or Owner's Representative, the most expensive option will be assumed.

.4 Wiring diagrams for each location.

.5 Point allocation tables for each control panel.

.6 Digital pictures for all cameras displaying the camera's waveform signal, and field of views. Show all presets for PTZ cameras.

.7 Digital pictures of all camera installations, communications room DGP's and equipment cabinets.

.8 Software configuration parameters.

.3 Integration Document for each interface to be implemented or configured.

.4 Testing and commissioning plan.

.5 Testing procedures for each functional module.

.6 Quantifiable test parameters and the expected/acceptable results for each procedure.

.7 Detailed System Architecture Diagrams.

.8 Installation Procedures.

.9 Quality Assurance Plan.

.10 Safety Plan.

.11 Software Documentation and VDD (Version Description Document)

.1 Shall include, but not be limited to listing all application specific programs, modules, interfaces, and drivers to include programming languages, operating systems, applications code, compilers, editors, build process files and executables, directories, parameters and variables, block diagrams and flow charts.

.12 Software Materials Licenses.

.13 Operator Manuals and Procedures.

.14 System Administrator's Manuals and Procedures.

.15 Training Course Outline and Materials.

.16 Operator/Maintenance Manuals.

1.05 SECURITY SYSTEMS TESTING PROCEDURE

.1 General: Overall testing algorithm shall consist of three phases per system and final Integrated Test(s) of all subsystems.

.1 Field devices (Field Layer).

.2 Telecomm room equipment, including system servers (Distribution Layer).

.3 Monitoring locations, integrated system functionality – within the system (Core Layer).

.2 Exact testing schedule on day by day basis (including exact list of devices that should be tested during allocated time period) should be submitted two weeks prior to commencement of testing.

.3 The test shall be conducted according to the following algorithm:

.1 Verify prerequisites.

.1 Verify presence of all required witnesses of the test in accordance with the Contract Specification.

.2 Verify presence of a test plan, test description.

.3 Verify presence of all test forms and checklists for proper test recording and documenting.

.4 Verify presence of all test objects: field devices, panels, racks, equipment, components, cables, hardware, software, programming devices, AC power, etc.

.5 Verify presence of programming and/or configuration settings, manufacturer's recommended test procedures for every device, predetermined parameter ranges and expected test results. This information may vary and depends on the actual location of testing and commissioning activity.

.6 Shop and Record Drawings(s).

.7 Programming/configuration settings.

.8 Verify presence of prototype documentation package.

.9 Prototype inspection forms and checklists.

.10 Shop and Record Drawings(s).

.11 Programming/configuration settings.

.12 Digital images of all CCTV cameras shall be taken by the Security System Contractor. The digital image shall include the field of view of the camera along with a "picture in picture" inset of the camera's waveform signal.

.2 Conduct the Test

.1 Verify record drawings with the site location and the prototype package.

.2 Verify programming sheets with the prototype and active settings(s).

.3 Verify installation, workmanship, wiring, cabling, grounding, shielding, etc.

.4 Verify functionality.

.3 Document the Test

.1 Complete all test forms and checklists.

.2 Record all required and applicable information.

.3 Compare obtained test results with expected results.

.4 Provide test report.

.4 Dealing with Deficiencies

.1 In general, every deficiency is considered to be within the Contract specification, or outside of the Contract. In both cases an actual action to correct any specific deficiency should be treated on an individual basis, confirmed, and approved by the Owner or Owner's Representative.

.2 A proper line of command(s) based on specific contract shall be followed.

.3 Identify deficiencies and record them in system's log.

.4 Each and every deficiency should be corrected in a prompt manner. All deficiencies shall be identified with proper correction schedule, dates, responsible parties, and names.

.5 It is the sole responsibility of the Security System Contractor to schedule any re-test in the event that the previous test has not

been successful. A new test shall follow the same steps described within this document.

.5 The following test forms shall be created by the Security System Contractor and approved by the consultant and shall be used during Testing/Commissioning and Acceptance.

.1 Video Surveillance System Tests:

.1 Camera Test.

.2 Camera Power Supply Test (if applicable).

.3 Video Control Display Test.

.4 Video Storage Test.

.5 Application Client Test.

.6 System Server Diagnostic Test.

.7 System fail Over Test.

.8 Overall CCTV Functionality Test.

.9 Video Surveillance-Intercom cross reference table.

.10 Video Surveillance – Access Control System reference table.

.11 System Management Server(s)/Application(s) Test.

.12 Camera Field of View Checklist.

.2 Access Control System Tests:

.1 Door Electronic Hardware Test.

.2 Door Functionality Test.

.3 Door Control Unit Test.

.4 Distributed Processing Unit Test.

.5 Auxiliary Devices Power Supply Test.

.6 System Server Diagnostic Test.

.7 System Server Fail Over Test.

.8 Workstation Client Test.

.9 Overall Card Access System Functionality Test.

.3 Intercom System Tests

.1 Intercom Station Checklist.

.2 Intercom Exchange Checklist.

.3 Intercom Commissioning List.

.4 Integrated Functionality Tests

.1 Card Access System – Video Surveillance System.

.2 Intercom System – Card Access System.

.3 Intercom System – Video Surveillance System.

1.06 WARRANTY

.1 Security System Contractor shall warranty the completed Security System including all equipment, computer software, documentation and latent defects delivered shall perform in accordance with and conform to all applicable standards, requirements, specifications, descriptions, and other requirements included in their proposal and shall be without defects in materials, workmanship, and design. The warranty shall commence upon Substantial Completion as defined by the Consultant.

.2 Include 2 Year all-inclusive parts and labour with two (2) year warranty as part of the tender price. This should, include all required software and firmware maintenance for the warranty period of two (2) years.

.3 As a minimum during the warranty period and at no extra cost to the owner, the Security System Contractor shall include a guaranteed response time of two (2) hours for a major system failure and eight (8) hours for a minor system failure on a twenty-four (24) hours per day, seven (7) days per week basis. A major system failure shall be defined as the failure of any operator controls as well as any system controller, processor or communication link which renders more than 10% of a specific security subsystem of systems inoperative. A minor system failure shall be defined as the failure of a single security device such as a card reader, egress device, camera, intercom unit, etc.

.4 Provide one preventative maintenance service inspection prior to the end of the two (2) year warranty period.

.5 As part of the submission, provide a complete list of recommended spare parts with the prices to the owner.

.6 Preventive and corrective maintenance performed by a maintenance contractor other than this Security System Contractor after or during the warranty period shall not void warranty on labor, hardware and software provided by this Security System Contractor.

1.07 MAINTENANCE AND SERVICE LEVEL AGREEMENT

.1 The Security System Contractor shall provide a Service Level Agreement (SLA) for scope and cost for stand alone maintenance services (schedules, remedial and preventative maintenance) for one (1) year following commissioning. The maintenance services proposal may or may not be included in the contract. Non- procurement of such services shall not void the warranty terms.

.2 The Security System Contractor shall implement the preventative maintenance procedures as specified by the systems manufacturer and as noted elsewhere in this specification package. This includes all such items produced by Security System Contractor s or procured as off-the-shelf. This SLA shall include the provision and implementation of all software upgrades.

.3 The proposed SLA shall include breakdown in cost and services for the following response times:

.1 Two (2) hours;

.2 Eight (8) hours; and

.3 Twenty-four (24) hours.

.4 Such costs shall remain in effect for one (1) year.

.5 The term of the maintenance contract will commence from the time of system acceptance.

.6 The Security System Contractor shall provide hot-line engineering help desk telephone support to answer any questions and provide any assistance as required for the owner.

.7 Security System Contractor shall provide application specific (non-COTS) software and firmware updates, upgrades, enhancements and modifications.

.8 Security System Contractor shall provide application specific (non-COTS) “bug fixes” support.

.9 Security System Contractor shall provide updated documentation and operational procedures and manuals software changes and enhancements services.

.10 Security System Contractor shall maintain in-house all software tools and development environment to the latest configuration.

.11 Security System Contractor shall guarantee the continuous availability of spare parts as are required by the availability and performance, deployed quantities, MTBF, MTTR, MTBO, redundancy and mission-critical requirements.

.12 Special tools and test equipment support shall be provided.

.13 Security System Contractor shall demonstrate during the design reviews the provisions incorporated into the design in order to support adequate life cycle cost (LCC) (e.g. selection of parts, sole source avoidance if possible, obsoleteness and discontinued items handling including migration path, MTBF, MTTR, MTBO etc.).

.14 Throughout the maintenance period the Security System Contractor shall conduct as may be required failure analysis for failure modes including cause, failure count, downtime, MTBF, MTTR, and MTBO.

.15 A master schedule for preventative maintenance work for a one (1) year all with all forms as required shall be submitted electronically by the Security Contractor five (5) days after system acceptance.

.16 The master schedule shall be a computerized bar-chart type. The chart will clearly show the date, time, location, and name of the technician(s) attending.

.17 The Security System Contractor (technicians and Subcontractors) shall comply with the owner's preventative maintenance standards.

.18 The preventative maintenance inspections shall be scheduled to occur during business hours. At the commencement of this contract, the Security System Contractor is to carry out an initial thorough inspection/cleaning of all systems and respective components/equipment to identify and correct any deficiencies.

.19 The Security System Contractor shall provide a preventative maintenance schedule for regular maintenance checks/service, including initial inspection/cleaning as per the owner's Maintenance Standards that will be performed during the entire contract term as well as a full description of the work to be carried out. Any variations from the schedule must be pre-approved by the Owner.

1.08 LICENSE FEES

.1 Provide licenses for every application installed on a workstation and server for all machines that would require the software such that there are enough licenses for each software application to run on all machines, with an installation of the software application, concurrently at the time of commissioning.

.2 All firmware and software shall be guaranteed for up to five (5) years, during which period any patches, bug fixes or related upgrades shall be implemented without additional cost to the Owner.

.3 All software, firmware and installer or programming codes installed and delivered as part of this Contract shall become the property of the Owner. The Owner's right to use all software and firmware delivered for this project shall not expire, regardless of other upgrade and warranty arrangements agreed with the Owner.

2. PRODUCTS – NOT USED

3. EXECUTION

3.01 GENERAL

.1 Working Conditions

.1 The Work shall be scheduled to avoid and/or minimize the impact on business operations. Portions of the Work including portions of the inspection of the Work will be required to be performed outside regular working hours.

.2 The Owners Security Regulations shall be followed at all times during the performance of the Work.

.2 Examination

.1 Verify that critical dimensions are correct and conditions are acceptable. Proceed with installation only after unsatisfactory conditions have been coordinated.

.2 Examine surfaces, substrates, and conditions for compliance with requirements of other Sections in which that related work is specified, and determine if surfaces, substrates, and conditions affecting performance of the work of this Section are satisfactory. Do not proceed with work of this Section until unsatisfactory conditions have been corrected in a manner acceptable to the Installer. Starting installation constitutes acceptance of surfaces, substrates, and conditions.

.3 Prior to commencement of Work, examine current site conditions and inform the owner of any unusual existing conditions that may affect Work.

.3 Preparation

.1 Cooperate and coordinate with the owner for the location of all mechanical, plumbing, electrical rights-of-way and access/egress to any area required to remain accessible for maintenance and removal of equipment or related components.

.2 Coordinate with the Owner or the Owner Representative, the overall project schedule, the equipment, and system equipment layout in relation to the facility, work aisle or equipment removal paths and drive aisles to avoid any conflicts.

.4 Workmanship

.1 All work shall be performed to standards and best practices as governed by the reference standards mentioned earlier.

.2 Equipment shall be mounted in accordance with manufacturer's recommended/supplied hardware and fasteners.

.3 Cabling shall be mounted in accordance with manufacturer's recommended/supplied hardware and fasteners.

.5 Installation

.1 Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each device securely in place, accurately located and aligned with other Work. Conflicts between the manufacturer's instructions and the Specification shall be, promptly brought to the attention of the Consultant or Construction Manager by the Contractor prior to the initiation of any related Work.

.2 For the products overhead, installation such as outside cameras that are subject to strong winds provide adequate backup safety mechanisms to prevent higher equipment damage.

.3 The Security System Contractor shall be responsible for the installation of all the equipment, units, sub-systems etc. at the required site in order to meet all requirements specified in this document and as per all applicable standards.

.4 All installation materials, accessories and special equipment, services, personnel team, test equipment and tools required for installation of the equipment shall be provided by the Security System Contractor.

.5 The Security System Contractor shall ensure that installation workmanship complies with the best industry quality standard levels.

.6 The Security System Contractor shall be responsible for the shipment, in country storage, transportation, installation, testing, commissioning of all material and equipment.

.7 Any spare parts supplied within the scope of this project, but used to replace the faulty items during the installation, testing and commissioning phases until final acceptance of the system, shall be replaced by the Security System Contractor free of charge, within thirty (30) days.

.8 The Security System Contractor shall specify the estimated periods, personnel requirement and costs for the installation and commissioning of the equipment. The cost of travel, accommodation, and subsistence, as well as any related insurance costs during the installation and commissioning phase shall be borne by the Security System Contractor.

.9 The Security System Contractor shall individually identify all installation personnel in terms of qualifications, experience and designation.

.10 The Security System Contractor shall be responsible of obtaining work permits or visas for all its personnel.

.11 At least forty-five (45) days prior to installation, the Security System Contractor shall submit for approval to the Owner or Owner's Representative a detailed site installation plan. The plan shall contain all necessary information required to install the equipment and set it for operation.

.12 The installation plan shall be updated to reflect changes made to the equipment layout, cabling drawings, installation instructions and test procedures during the installation. A marked-up installation plan shall be provided.

.13 Final As-Built documents shall be provided within forty- five (45) days after completion of Site Acceptance Tests.

.14 The Security System Contractor shall be responsible for cleaning the sites after completion of the Site Acceptance Tests.

3.02 MECHANICAL AND ELECTRICAL REQUIREMENTS

.1 Power:

.1 Supply and install all additional conduit as well as power supplies, wire, and cable for distribution of 120 V power to security devices as required. Refer to electrical specifications for more details regarding electrical conduit requirements.

.2 All AC and DC power wiring shall conform to ANSI/NFPA 70, OHESC, IBC2003, and other applicable Local and National Codes. Guards shall be provided over high voltage or high current terminators.

.2 Wire and Cable:

.1 All wires and cables shall be formed, neatly laced or tie wrapped, and clamped in position. No adhesive or stick-on clamps are permitted. The use of masking tape or electrical tape is not acceptable.

.2 All wire and cable is to be installed by the Security Systems Contractor, as well as additional conduit extensions or relocations, necessary to achieve the specified security system.

.3 Slack:

.1 Sufficient slack shall be provided to:

.1 Prevent undue stress and strain on connectors and cables.

.2 Allow easy disconnection of equipment.

.3 Allow a minimum of three re-terminations of each cable or wire in the event of breakage.

.4 In the case of CCTV cameras three (3) m of slack cable in flexible conduit shall be provided to enable future relocation at each and every camera location.

.4 Grommets:

.1 Where wires run through holes or conduit, they shall be protected by suitable grommets.

.5 Conduit and Boxes:

.1 Wires and cables external to equipment and enclosures shall be run in conduit. PVC conduit may be used underground. Where free movement of equipment is required, flexible conduit shall be employed. Once installed in the conduit, all cable shall be tested for continuity, insulation breakdown (skinning) and ground faults.

.2 Refer to electrical specifications for more details regarding electrical conduit requirements.

.3 All Conduits is to be supplied and installed by the Electrical Contractor.

.6 Connectors and Splices:

.1 Wires and cables shall be continuous between termination and connection points. Connectors and splices shall be located within secure enclosures and are not permitted inside conduit.

.7 Cable Positioning:

.1 Wires and cables shall be located so that inductive and capacitive effects do not degrade system operation.

.8 Outdoor Cabling:

.1 Outdoor cabling shall have drip loops at the point of entry into enclosures, junction boxes, etc. and all entries shall have a weather tight seal. Where a cable connection is exposed to outdoor elements, it shall be protected with heat shrink material.

.9 Solid or Stranded:

.1 Only stranded wire shall be used. All shielded wiring shall be jacketed with PVC and shall have the shield braid terminated so that the insulation is not damaged by soldering, heat, or mechanical pressure.

.10 Wire Termination:

.1 All wires shall be terminated by the use of solder-less terminals. Crimp lug terminals shall only be used on stranded wire. For devices utilizing solid wire, the solid wire shall be soldered to the terminal and the soldered portion insulated. No more than one wire per lug is permitted.

.11 Terminal Lugs:

.1 Terminal lugs shall be suitably electroplated or treated by commercially acceptable methods to ensure good electrical contact and prevent corrosion.

.12 Terminal Blocks:

.1 Terminal and connecting blocks shall be of the screw type. As a minimum, all terminal blocks shall have 10% spare capacity. A barrier shall separate each termination. No more than two terminal

lugs shall be clamped under each terminal screw. Solder, wire wrap and pressure termination type terminal blocks shall only be used with prior approval and where the need for this type of device has been demonstrated. No more than one wire may be connected to each terminal, except in permanent daisy chaining requirements.

.13 Cable Connectors:

.1 No more than one wire shall be connected to each pin of a cable connector unless that pin has been designed to accept more than one wire. All strands of the wires shall fit into the pin receptacle. All cable connectors shall be field replaceable. Provision shall be made to fix the cable connector covers to a chassis or to each other by means of screws.

.14 Cable and Equipment Labelling:

.1 Functional or alpha-numerical mechanically printed labelling shall be installed on all equipment including racks and cabinets. All visible wires and cables typically accessed for service shall be labelled at both ends. As well, all connecting strips, terminal blocks, plugs and sockets shall be labelled. The marking on the labels shall be consistent with the As-Built Drawings.

.2 Approved materials for labels include alphanumeric labels protected by clear heat shrink material, tie-wrap labels, lamacoid strips, etched metal, or indelible ink. The use of Dymo tape (or equivalent) labelling is not permitted.

.3 The Security System Contractor is required to submit their cable and equipment labelling standard to the Owner or Owner's Representative for prior approval.

.15 Fasteners:

.1 Panels, doors, and access shields shall be fastened with a suitable style of fastening compatible with the degree of security required for each enclosure and the frequency of access. There shall be no sign of cross-threading or mutilation on any screws or fasteners. All nuts shall be of standard size and preferably of hexagonal design. All threaded parts shall be secured by the use of lock washers except under counter sunk screw heads, coaxial plugs and similar connectors, terminal binding screws, etc.

.16 Replaceable Parts:

.1 Parts and components that may require replacing or removal for servicing shall not be affixed by rivets, welds, metal tags on other similar means that would prevent ready removal.

.17 Materials:

.1 Materials used in installations shall be selected with due regard to the intended use, durability, safety, retention of appearance and avoidance of corrosion or other chemical effects. The use of wood, natural rubber, toxic materials, and other materials capable of supporting fungus or insects is not allowed. The use of electrical tape or masking tape is prohibited.

.18 Soldering:

.1 No soldered joints are permitted.

.19 Enclosures:

.1 All enclosures shall be firmly fixed to floor or wall, be positioned for ease of maintenance, be lockable and properly grounded. As well, outdoor enclosures shall be dust tight and weatherproof. They shall be sized to allow easy access to work on any equipment or wiring contained within them.

.20 Communication Rooms:

.1 Space has been allocated in the building for the installation of distributed processing equipment associated with the Access Control, Video Surveillance, and Intercom equipment. Where equipment is to be wall mounted provide lockable wall mounted cabinets to house equipment. Where equipment is to be rack mounted, equipment cabinets shall be supplied by others.

.2 Ensure that all equipment cabinets or racks are of the same manufacturer with the same features.

3.03 COMMISSIONING

.1 Project Schedule

.1 The Tenderer shall submit a complete project schedule and milestones as a pre-condition to contract award.

.2 The schedule shall include the scheduled commencement date for each major activity, the duration of each activity, the proposed sequence of activities, dependencies between internal activities and milestone, dependencies between external activities and milestones, identification of the critical path and related milestones.

.3 The schedule shall be progressively updated as the Contract progresses and enable the Owner or Owner's Representative to readily identify activities by location, resources, or WBS.

.4 The schedule shall clearly identify completion dates and shall clearly identify schedule contingencies, free floats, and critical path.

.5 The schedule information shall be sufficiently detailed to enable integration of all interface activities by the Owner or Owner's Representative.

.6 The proponent shall develop and submit to the Owner or Owner's Representative for approval, project design review and audit Schedule.

.7 The schedule shall be presented in weekly segments and include the following as a minimum:

.1 Site surveys or pre-bid meeting (as required).

.2 Submission and approval of installation, design, and drawings; Design Reviews.

.3 Equipment manufactures.

.4 Factory Acceptance Tests (FAT).

.5 Shipping of equipment.

.6 Equipment installation.

.7 Equipment integration and dry-run.

.8 On-the-job training (OJT).

.9 Factory training.

.10 Site Acceptance Tests (SAT).

.11 Commissioning and hand-over.

.8 The Security System Contractor shall submit, on a monthly basis, a progress report to the Owner or Owner's Representative including percentage complete and deliverables of scheduled work. Reports shall provide comparison of actual progress versus baseline and in accordance with the WBS and report any variation from the master schedule. Progress reporting shall include as a minimum:

.1 Summary of changes since the prior schedule.

.2 Actual dates for activities started during the period.

.3 Actual dates for activities completed during the period.

.4 Actual human resource allocation during the period.

.5 Estimate of percent complete for activities in progress.

.6 Duration for remaining activities.

.7 Activities behind schedule.

.8 Critical path.

.9 Deliverables.

.2 Factory Acceptance Tests (FAT)

.1 The Commissioning Phase of the project, which includes (FAT), shall begin upon approval of the Shop Drawings.

.2 The Security System Contractor shall be required to assemble, integrate, and test the entire system at their own premises prior to shipment. This FAT shall be performed in accordance with a prepared Factory Acceptance Test Plan incorporating specific test procedures which will clearly demonstrate compliance of the equipment with the technical specification in all general, operational, and technical aspects.

.3 The Security System Contractor shall undertake to submit for the Owner or Owner's Representatives approval at least thirty (30) days prior to the scheduled commencement of the FAT, the FAT Procedures together with the proposed acceptance certificate format. The Owner or Owner's Representative shall notify the Security System Contractor of its decision within thirty (30) days thereafter, and after an agreement has been reached, the procedures shall form part of the eventual contract. Any changes in the procedures initiated by the Security System Contractor will be without cost to the Owner or Owner's Representative and subject to their approval.

.4 All test procedures shall contain step-by-step instructions with a concise but comprehensive explanation of each test, including test scenario and objective. Equipment interconnection shall be explicitly described in graphical and textual form as necessary.

.5 All test equipment used for the factory tests shall be standard commercial equipment and shall not be modified and all ancillary equipment required for testing shall be furnished by the Security System Contractor for the duration of the tests.

.6 Factory Acceptance shall be required for all equipment, both hardware and software, before shipping. The Factory Acceptance shall verify all equipment functional and operational capabilities.

.7 All results of the Factory Acceptance Test shall be duly recorded and shall be signed by the Security System Contractor and Owner or Owner's Representative.

.8 All observations agreed on and discrepancies noted during the inspection are to be corrected by the Security System Contractor prior to shipment of the equipment.

.9 The Security System Contractor shall arrange for one (1) FAT Session, to run consecutively for all equipment instead of fragmented sessions.

.10 The Owner or Owner's Representative shall be entitled to witness all FAT phases.

.11 Notwithstanding any inspection or test conducted at factory prior to shipment, all equipment shall be subject to acceptance on site subject to the Owner or Owner's Representative right of rejection.

.12 The Factory Acceptance Tests shall be performed at the Security System Contractor's factory in accordance with the approved procedures, the intent of which shall be that those systems accepted at factory shall be functionally installed and integrated on-site.

.13 Following the satisfactory completion of the tests, the Owner or Owner's Representative shall sign and issue a Factory Acceptance Certificate.

.14 With the exception of minor failures and discrepancies at the sole discretion of the Owner or Owner's Representative, which do not adversely affect the performance or operation of the equipment for the purpose intended and subsequently subject to modification by the Security System Contractor at no extra cost, shall not be deemed as items preventing the Owner or Owner's Representative Factory Acceptance.

.15 In case of non-acceptance, the Security System Contractor shall provide a recovery plan to the Owner or Owner's Representative on how it intends to rectify the equipment in order that testing may be repeated to which the equipment did not initially comply, and also the tests in respect of those parts of the equipment affected by the rectification. The Security System Contractor shall bear all costs associated with the re-testing (e.g. travel, accommodation and subsistence costs for Owner or Owner's Representative re-participation.)

.16 If the equipment, or any part thereof, is not accepted by the anticipated final Factory Acceptance date for the systems, the

Owner or Owner's Representative shall have the right to request that the accepted component equipment be shipped, provided that the use of the equipment, or any part thereof, for any purpose by the Owner or Owner's Representative under such conditions shall not imply Final Acceptance in any way and the Security System Contractor shall be afforded the earliest possible opportunity of taking such steps as may be necessary to obtain Final Acceptance.

.17 In the event the Owner or Owner's Representative fails to be present at the time and place appointed by the Security System Contractor for Factory Acceptance Tests, the Security System Contractor may proceed with the tests which shall be deemed to have been made in the presence of the Owner or Owner's Representative. The Security System Contractor shall then sign the Factory Acceptance Certificate for corresponding purposes which shall have the same meaning and value as if it had been signed by the Owner or Owner's Representative. A copy of the production test results shall be submitted to the Owner or Owner's Representative for review prior to shipment. Tests shall be conducted in the presence of qualified Quality Assurance personnel.

.18 The equipment shall be considered factory accepted by the Owner or Owner's Representative upon satisfactory completion of each Factory Acceptance Test as certified by the relevant test records signed by the Security System Contractor's appointed representative and counter-signed by the Owner or Owner's Representative and QA personnel. Three copies of the said records shall be sent to the Owner or Owner's Representative.

.19 The Security System Contractor shall insure that all the equipment included under the eventual Contract, as well as spare parts, tools, test equipment, accessories and documentation are present at the Factory Acceptance, for inspection, review and approval by the Owner or Owner's Representative.

.20 The Security System Contractor shall include in the FAT cost, Daily Subsistence Allowance, and air fare for two Owner or Owner's Representative personnel to witness the FAT until the FAT is successfully concluded.

.3 Acceptance Test Procedures

.1 A minimum of thirty (30) days prior to on-site testing, prepare and submit two (2) copies of the Acceptance Test Procedures for review by the Owner or Owner's Representative. As a minimum the tests as described in [Paragraph 1.4.5] of this Section shall be included.

.2 The Owner or Owner's Representative reserves the right to request that tests completed as part of the FAT be repeated or to request any additional tests required to demonstrate compliance with the specifications.

.3 The ATP shall be approved when all issues and comments identified by the Owner or Owner's Representative have been satisfactorily addressed.

.4 Upon approval of the ATP and completion of the FAT, installation, and integration on-site, perform all tests and forward the documented results to the Owner or Owner's Representative.

.4 Site Acceptance Tests (SAT)

.1 After a review of the preliminary tests as outlined in the ATP, a Site Acceptance Test date shall be established. A date will not be established until all equipment is available for testing. The Owner shall be entitled to witness testing on the agreed date.

.2 The Security System Contractor shall provide and include all costs as a part of his proposal for a Manufacture's Engineer to be present at all testing and commissioning of the system. The Security System Contractor is to provide the Manufacture's Engineer access to all points of the installation. The Security System Contractor to provide all test and access equipment required for the inspection.

.3 On the date of Site Acceptance the Security System Contractor shall be present to perform testing. The Owner, Owner's Representative, and manufacturers Engineer shall be present to witness all tests performed including tests performed to confirm door functionality.

.4 In the event that the Owner, Owner's Representative, and manufacturer's engineer proceed to the site for Site Acceptance Testing, on the agreed date, and find the system incomplete or not operational the Security System Contractor shall cover all costs associated with Owner, Owner's Representative, and manufacturer's engineer returning for repeat testing.

.5 The purpose of a SAT is to ensure that the CCTV, Access Control and Intercom Systems are constructed, assembled, integrated and verified for performance to be in full compliance to the requirements and standards and are fully functional and operational for the intended use.

.6 SAT commencement is subject to the full conformance to its As-Built drawings, parameters, and production COTS, application specific hardware, software, and QA / QC approvals.

.7 SAT inspection and functional testing shall be conducted on the basis of preapproved SAT procedures.

.8 SAT infrastructure, performance, and functional requirements and/or specifications compliance which can not be demonstrated or met will require a pre approved waiver by the Owner or Owner's Representative and will require retest. With the exception of pre-approved waivers, the SAT shall comply with a full Pass as per the pre-defined Pass / Fail criteria.

.9 SAT documents shall be under full configuration management and QA supervision as per the Quality Assurance Plan (QAP).

.10 At least thirty (30) days prior to the scheduled commencement of the Site Acceptance Tests, the Security System Contractor shall submit a Site Acceptance Test Plan and Procedures to the Owner or Owner's Representative for approval.

.11 The test procedures shall contain step-by-step instructions with a precise and comprehensive explanation of each test, including test scenario and objective. The procedures shall contain a cross-reference matrix where the requirements, methods of testing and the tolerances shall be listed. Equipment interconnection shall be explicitly described in graphical and textual form as may be required.

.12 The Security System Contractor shall demonstrate that all the CCTV, Access Control and Intercom equipment is compliant to the technical specification and requirements. All deficiencies identified shall be corrected by the Security System Contractor prior to the Final System Acceptance phase.

.13 Perform all operational and performance tests in the presence of the Owner or Owner's Representative. In addition, the Owner or Owner's Representative shall perform a visual and mechanical inspection of the installation, with the Security System Contractor present as a witness.

.14 There shall be a thirty (30) day period between the SAT and FSA phases. During this period of thirty (30) days, the Owner's operation and maintenance personnel shall operate the system normally in order to identify any equipment defects, software defects, hardware defects, modifications required, adjustments required, infrastructure enhancements and upgrades etc. which shall be corrected by the Security System Contractor prior to the FSA.

.5 Final System Acceptance

.1 After successful completion of the SAT, the Owner or Owner's Representative shall prepare a deficiency list. The Security System Contractor shall correct all deficiencies and notify the Owner or Owner's Representative when all on-site work is completed.

.2 The Owner or Owner's Representative will conduct a final acceptance of the work only when all requirements of this specification have been fulfilled, the hand over report has been received and all noted deficiencies have been corrected.

.3 The Owner or Owner's Representative will perform a spot check to verify that all deficiencies have been corrected.

.4 Upon verifying that all the deficiencies have been corrected, the Owner or Owner's Representative will issue a letter of Technical Acceptance signifying that the equipment has been accepted. Final System Acceptance shall be given when all the terms of this section have been met.

3.04 TRAINING

.1 The Training Phase of the project begins upon approval of the Shop Drawings. This phase is made up of three (3) milestones.

.1 Training Course Outline Approval.

.2 Operator Training.

.3 Administrative Training.

.2 Prepare and submit three (3) copies of the training course outlines for review. As a minimum, this outline shall list all material to be covered, the time required to cover it, the organization and personnel conducting the training, any training aids or equipment to be used for demonstration and expected training outcome (i.e.: Certification).

.3 Course outlines shall be approved when all comments by the Owner and/or Owner's Representative have been satisfactorily addressed.

.4 Training shall be provided on site and conducted by both the Security System Contractor and system manufacturer. All associated cost shall be carried by the Security System Contractor under his cost. Training shall consist of the following minimum requirements:

.1 Operator Training

.1 Access Control

.1 The Security System Contractor shall provide a custom training course for ten (10) system

Operators/Basic Administrators conducted by the system manufacturer's engineer / training personnel. The custom training course shall focus primarily on daily operations, system integration, and customization.

.2 Successful completion of the training shall result in each trainee receiving a certification certificate.

.2 Video Surveillance Training

.1 The Security System Contractor shall provide ten (10) Operators/Basic Administrators Certification training conducted by the system manufacturer's training personnel.

.2 Successful completion of the training shall result in each trainee receiving a certification certificate.

.3 Intercom System Training

.1 The Security System Contractor shall provide ten (10) Operators/Basic Administrators Certification training conducted by the system manufacturer's training personnel.

.2 Successful completion of the training shall result in each trainee receiving a certification certificate.

.4 The Security System Contractor shall provide technical Certification training conducted by the system manufacturer's engineer / training personnel.

.5 Successful completion of the training shall result in each trainee receiving a technical certification certificate.

.2 Administrative Training

.1 Access Control System

.1 The Security System Contractor shall provide technical System Administrator Certification training conducted by the manufacturer for six (6) Administrators.

.2 Successful completion of the training shall result in each trainee receiving a certification certificate from the manufacturer. The training shall focus on the following areas:

.1 System Components.

.2 Operation and Administration.

.3 Software and PC Control.

.4 System Lifecycle Maintenance.

.2 Video Surveillance Training

.1 The Security System Contractor shall provide technical System Administrator Certification training conducted by the manufacturer for six (6) Administrators.

.2 Successful completion of the training shall result in each trainee receiving a certification certificate from the manufacturer. The training shall focus on the following areas:

.3 System Components

.1 Operation and Administration.

.2 Software & PC Control.

.3 System Lifecycle Maintenance.

.3 Intercom System Training

.1 The Security System Contractor shall provide technical system Certification training conducted by the system manufacturer. The training shall focus on the following areas:

.1 System Components

.2 Operation and Administration

.3 Software and PC Control

.4 System Lifecycle Maintenance

.5 The training shall be performed in three (3) stages:

.1 Stage I: Integrator conducted training certification courses. Time allocated for this training shall conform to recommended durations required by the manufacturer issuing the certification.

.2 Stage II: on-site, hands-on training each for ten (10) operators and six (6) administrative personnel groups using the previously

approved Training Course Outline and conducted by the Security System Contractor.

.3 Stage III: follow-up on-site training conducted by the Security System Contractor, at a time convenient to both parties to reinforce the Stage I training and answer any questions that may arise in the interim. A portion of this training may take the form of telephone support during the first few months of operation.

.6 The Security System Contractor shall supply all training aids and manuals and equipment necessary for training.

.7 The Security Contractor shall include a minimum of sixteen (16) hours of on-site training in their bid for sixteen (16) persons. Additional re-training shall be conducted as necessary until the completion of the two (2) year warranty at no additional charge.

3.05 DOCUMENTATION

.1 The Final Documentation Phase of the project begins upon approval of the Shop Drawings. This phase contains three (3) major milestones:

.1 Operator Manual Approval.

.2 Maintenance Manual Approval.

.3 As-built and Turnover Documentation Approval.

.2 Prepare and submit two (3) hard and soft copies of the Operator and Maintenance Manuals for review by the Owner and/or Owner's Representative within three (3) months of Shop Drawing Approval. Manuals shall be approved when all comments have been satisfactorily addressed.

.3 Deliver three (3) hard and soft copies of each manual within one (1) month of receiving Operator and Maintenance Manual approval from the Owner and/or Owner's Representative.

.4 Prepare and submit (3) hard and soft copies of the As-built Drawings and Turnover Documentation for review by the Owner or Owner's Representative within one (1) month of on-site commissioning. As-built and Turnover Documentation shall be taken to site for accuracy verification against the installation. The As-built Drawings and Turnover Documentation will be approved by the Owner and/or Owner's Representative when all comments have been satisfactorily addressed.

.5 Deliver three (3) hard and soft copies sets of revised As-built Drawings and Turnover Documentation within one (1) month of receiving approval from the Owner and/or Owner's Representative.

.6 Final documentation soft copies shall be prepared and submitted in the native (editable) electronic format (.vsd, .dwg, .xlsx, .docx). All documents produced shall be property of the owner and the Security System Contractor shall have no rights over the entire documentation package or any parts of the documentation package.

3.06 PROTECTION

.1 After installing clean-finished surfaces, touch up shop-applied finishes as required to restore damaged areas.

.2 Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensure equipment is without damage or deterioration at the time of Initial Acceptance.

3.07 CLEAN UP

.1 Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where work has been completed unless designated for storage.

.2 Clean up all areas around system equipment and ensure that internal equipment component area is free from debris.

.3 Remove protective coverings from accessories and components.

.4 Adjust all components for correct function.

.5 Clean housings and system components, free from marks, packing tape, and fingerprints, in accordance with manufacturer's written cleaning recommendations.

.6 Clean all components free from dirt and fingerprints.

3.08 CONTRACT CLOSEOUT

.1 Testing shall be 100% passed before substantial performance is awarded.

.2 Even though the equipment shall be inspected and accepted, the Substantial Performance and Project Closeout shall not occur before all contractual obligations are completed including delivery of all digital "as-built" drawing, software code, maintenance documents, operations, and spare parts manuals.

End of Section