

AGRICULTURE AND AGRI-FOOD CANADA

ELECTRONIC SECURITY SYSTEM UPGRADES

Lethbridge Research Centre

Specifications, Schedules & Drawings

ELECTRICAL SPECIFICATIONS

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| .1 | Security Systems Scopes of Work | 26 05 02 |
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1.2 WIRING REFERENCES

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|-----|--|--|
| .1 | Canadian Standards Association (CSA) | |
| .1 | CAN/CSA C22.2 No. 48-M90 - Nonmetallic Sheathed Cable | |
| .2 | CSA C22.2 No. 51 09 - Armoured Cables | |
| .3 | CSA C22.2 No. 52 96 (R2005) - Underground Service Entrance Cables | |
| .4 | CSA C22.2 No. 75 08 - Thermoplastic-Insulated Wire and Cables | |
| .5 | CAN/CSA C22.2 No 131 07 - Type TECK 90 Cable | |
| .6 | CSA C22.2 No. 0.3-09 - Test Methods for Electrical Wires and Cables | |
| .7 | CSA C22.2 No. 38-05 - Thermoset-Insulated Wires and Cables | |
| .8 | CSA C22.2 No. 188-04 - Splicing Wire Connectors | |
| .9 | CSA C22.2 No. 198.2-05 - Sealed Wire Connector Systems | |
| .10 | CSA C22.2 No. 38-05 - Thermoset | |
| .11 | CSA C22.2 No. 188-04 – Splicing | |
| .2 | American National Standards Institute/Insulated Cable Engineers Association (ANSI/ICEA) | |
| .1 | ICEA S-70-547 - Weather-Resistant Polyolefin-Covered Wire and Cable | |
| .2 | ANSI/ICEA S-97-682 - Utility Shielded Power Cables Rated 5 through 46 kV | |
| .3 | ICEA S-19-81 - Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy | |
| .4 | ANSI/ICEA S-97-682 - Utility Shielded Power Cables Rated 5 Through 46 kV | |
| .3 | American National Standards Institute/National Electrical Manufacturers Association (ANSI/NEMA) | |
| .1 | ANSI/NEMA WC 70-2009/ICEA S-95-658-2009 - Power Cables Rated 2000 V or Less for the Distribution of Electrical Energy | |
| .2 | ANSI/NEMA WC 71-1999/ICEA S-96-659-199 - Standard for Non-Shielded Cables Rated 2001-5000 Volts for Use in the Distribution of Electric Energy | |

1.3 TELECOMMUNICATIONS REFERENCES

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| .1 | ANSI/TIA-526-7, OFSTP-7 – Measurement of Optical Power Loss of Installed Singlemode Fibre Cable Plant. |
| .2 | ANSI/TIA-526-14, OFSTP-14 – Optical Power Loss Measurements of Installed Multimode Fibre Cable Plant. |
| .3 | ANSI/TIA-568-C.0 – Generic Telecommunications Cabling for Customer Premises. |
| .4 | ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard. |

- .5 ANSI/TIA-568-C.2 – Balanced Twisted Pair Telecommunications Cabling and Components Standard.
- .6 ANSI/TIA-568-C.3 – Optical Fibre Cabling Components Standard.
- .7 TIA-569B – Commercial Building Standard for Telecommunications Pathways and Spaces.
- .8 ANSI/TIA-598-C – Optical Fibre Cable Colour Coding.
- .9 ANSI/TIA-606-A – Administration Standard for Commercial Telecommunications Infrastructure.
- .10 ANSI/TIA-607-B – Telecommunications Grounding (Earthing) and Bonding for Customer Premises.
- .11 ANSI/TIA-758-A – Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
- .12 ANSI/TIA-862 – Building Automation Systems Cabling Standard for Commercial Buildings.
- .13 ANSI/TIA-942 – Telecommunications Infrastructure Standard for Data Centres.
- .14 ANSI/TIA-1005 – Telecommunications Infrastructure Standard for Industrial Premises.
- .15 BICSI Telecommunications Distribution Methods Manual (TDMM), latest edition.
- .16 BICSI Network Design Reference Manual (NDRM), latest edition.
- .17 BICSI Wireless Design Reference Manual (WDRM), latest edition.
- .18 BICSI Outside Plant Design Reference Manual (OSPRM), latest edition.
- .19 CSA C22.1-06 – Canadian Electrical Code, Part 1: Safety Standard for Electrical Installations.
- .20 CSA C22.1 HB-06 – Canadian Electrical Code Handbook, an Explanation of Rules of the Canadian Electrical Code.
- .21 CSA C22.2 – Canadian Electrical Code, Part 2.
- .22 CSA C22.2 No. 182.4 – Plugs, Receptacles and Connectors for Communications System.
- .23 CSA C22.2 No. No. 214 – Communications Cables.
- .24 CSA C22.2 No. 232-M – Optical Fibre Cables.
- .25 IEEE 802.11 – Wireless Local Area Networks.

- .26 TSB-125 – Guidelines for Maintaining Optical Fibre Polarity Through Reverse-Pair Positioning.
- .27 TSB-140 – Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical fibre Cabling Systems.
- .28 TSB-162 – Telecommunications Cabling Guidelines for Wireless Access Points.
- .29 Cable Manufacturer’s Design Guide.

1.4 CONDUIT REFERENCES

- .1 CSA C22.1 - Canadian Electrical Code, Part I (21st Edition), Safety Standard for Electrical Installations
- .2 CAN/CSA-C22.2 No. 18 - Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
- .3 CSA C22.2 No.45 - Rigid Metal Conduit
- .4 CSA C22.2 No. 45.1 - Rigid Metal Conduit - Steel.
- .5 CSA C22.2 No. 56 - Flexible Metal Conduit and Liquid - Tight Flexible Metal Conduit
- .6 CSA C22.2 No. 83.1 (CSA/UL) - Electrical Metallic Tubing –Steel.
- .7 CSA C22.2 No. 211.1 - Rigid Types EB1 and DB2/ES2 PVC Conduit
- .8 CSA C22.2 No.211.2 - Rigid PVC (Unplasticized) Conduit
- .9 CSA C22.2 No. 211.3 (CSA/UL) - Reinforced Thermosetting Resin Conduit (RTRC) on Fittings.
- .10 CSA C22.2 No. 227.1 (CSA/UL) - Electrical Nonmetallic Tubing
- .11 CSA C22.2 No. 227.2.1 (CSA/UL) Liquid-Tight Flexible Nonmetallic Conduit
- .12 NFPA 70 – National Electrical Code.

1.5 BOX & FITTING REFERENCES

- .1 CAN/CSA-C22.2 No. 18 - Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
- .2 CSA C22.1 - Canadian Electrical Code, Part I (21st Edition), Safety Standard for Electrical Installations
- .3 CSA C22.2 No. 18.1 (CSA/UL/ANCE) - Metallic Outlet Boxes.
- .4 CSA C22.2 No. 40 - Cutout, Junction and Pull Boxes.
- .5 CAN/CSA-C22.2 No. 85 - Rigid PVC Boxes and Fittings

1.6 WIRING DEVICES REFERENCES

- .1 CSA C22.1 - Canadian Electrical Code, Part I (21st Edition), Safety Standard for Electrical Installations
- .2 CSA-C22.2 No.42 - General Use Receptacles, Attachment Plugs and Similar Devices.
- .3 CSA-C22.2 No.42.1 - Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
- .4 CSA-C22.2 No.55 - Special Use Switches.
- .5 CSA-C22.2 No.111 - General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).
- .6 C22.2 No. 184 – Solid State Lighting Controls.
- .7 C22.2 No. 184.1 - Solid-State Dimming Controls (Bi-National standard with UL 1472)

1.7 GROUNDING REFERENCES

- .1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)
 - .1 ANSI/IEEE 837-2002, Qualifying Permanent Connections Used in Substation Grounding.
- .2 Canadian Standards Association, (CSA International)
- .3 CSA C22.1 - Canadian Electrical Code, Part I (21st Edition), Safety Standard for Electrical Installations.
- .4 CSA C22.2 No.0.4 - Bonding of Electrical Equipment.
- .5 CSA C22.2 No. 41 - Grounding and Bonding Equipment.

1.8 LIGHTING REFERENCES

- .1 ANSI/NEMA C78.379 - Classification of the Beam Patterns of Reflector Lamps.
- .2 CSA C22.1 - Canadian Electrical Code, Part I (19th Edition), Safety Standard for Electrical Installations.
- .3 CSA C22.2 No. 9.0 - General Requirements for Fixtures
- .4 CSA C22.2 No. 250.0 - Fixtures (Bi-National Standard, with UL 1598)
- .5 CSA C22.2 No. 141 - Unit Equipment for Emergency Lighting
- .6 CAN/CSA E920 - Ballasts for Tubular Fluorescent Lamps - General and Safety Requirements (Adopted IEC 920:1990, first edition, including Amendment 1:1993 and Amendment 2:1995, with Canadian deviations)
- .7 CAN/CSA-E928 - Auxiliaries for Lamps - A.C. Supplied Electronic Ballasts for Tubular Fluorescent Lamps - General and Safety Requirements (Adopted IEC 928:1995, second edition, with Canadian deviations)
- .8 CAN/CSA-E61347-2-3 - Lamp Controlgear - Part 2-3: Particular Requirements for A.C. Supplied Electronic Ballasts for Fluorescent Lamps (Adopted CEI/IEC 61347-2-3:2000, first edition, 2000-10, with Canadian deviations)
- .9 NEMA WD 6 - Wiring Devices - Dimensional Requirements.

1.9 PANELBOARD REFERENCES

- .1 CSA C22.1 - Canadian Electrical Code, Part I (19th Edition), Safety Standard for Electrical Installations
- .2 CSA C22.2 No.29 - Panelboards and Enclosed Panelboards.
- .3 NEMA AB1 Moulded Case Circuit Breakers, Moulded Case Switches, and Circuit - Breaker Enclosures.
- .4 NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts.

1.10 DRY TYPE TRANSFORMERS UP TO 600V PRIMARY

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA C22.2 No.47 M90(R2001), Air Cooled Transformers (Dry Type).
 - .2 CSA C9 M1981(R2001), Dry Type Transformers.
- .2 National Electrical Manufacturers Association (NEMA)

1.11 REGULATORY REQUIRMENTS

- .1 Comply with Safety Codes Act and rules and regulations made pursuant thereto, including the Canadian Electrical Code.
- .2 Unless otherwise indicated, all references to "Canadian Electrical Code" or "CEC" shall mean the edition of the Canadian Electrical Code, Part I, CSA C22.1, and the variations made thereto by Alberta regulation, which are in force on the date of bid closing for the Contract.
- .3 All electrical products shall be tested, certified and labeled in accordance with a certification program accredited by the Standards Council of Canada. Where a product is not so labeled, provide written approval by the authority having jurisdiction.
- .4 Submit to authority having jurisdiction and utility company, necessary number of drawings and specifications for examination and approval prior to commencement of electrical work. Pay associated fees.
- .5 Submit to Owner, copy of electrical permit obtained from authority having jurisdiction.
- .6 If authority having jurisdiction conducts an electrical inspection, submit copy of certificate of acceptance provided by authority having jurisdiction.
- .7 The General Conditions, Supplementary Conditions and Section 01 are a part of this specification and shall apply to this Division.
- .8 The intent of the drawings and specifications is to include all labor, products and services necessary for complete work, tested and ready for operation, including preparation and submission of record drawings and documentation outlined herein.
- .9 Symbols used to represent various electrical devices often occupy more space on the drawing than the actual device does when installed. In such instances, do not scale locations of devices from electrical symbols. Install these devices with primary regard for usage of wall space, convenience of operation and grouping of devices.
- .10 These specifications and the drawings and specifications of all other divisions shall be considered as an integral part of the accompanying drawings. Any item or subject omitted from either the specifications or the drawings but which is mentioned or reasonably specified in and by the others, shall be considered as properly and sufficiently specified and shall be provided.

- .11 Provide all minor items and work not shown or specified but which are reasonably necessary to complete the Work.
- .12 If discrepancies or omissions in the drawings or specifications are found, or if the intent or meaning is not clear, advise the Consultant for clarification before submitting tender. Clarification shall be giving in writing prior to the closing of the tender.
- .13 Responsibility to determine which Division provides various products and work rests with the Contractor. Additional compensation will not be considered because of differences in interpretation of specifications.
- .14 Electrical contractor is to coordinate the exact locations and mounting heights of all equipment with other divisions prior to rough-in. Coordinate with mechanical, security, architectural, and mill work drawings.

1.12 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates and labels for control items in English.

1.13 QUALITY ASSURANCES

- .1 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license and apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial Act respecting manpower vocational training and qualification.
 - .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
 - .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with the general requirements and the authority having jurisdiction.
- .3 Codes, Rules, Permits & Fees
 - .1 Comply with all laws, ordinances, rules, regulations, codes and orders of all authorities having jurisdiction relating to this work.
 - .2 Quality of work specified and/or shown on the drawings shall not be reduced by the foregoing requirements.
 - .3 Immediately after award of contract and prior to installation, verify location, arrangement and point of attachment for service and service entrance equipment with supply authority and inspection departments. Failure to do so will render

this Division responsible for any corrections necessary without additional compensation.

- .4 Give all required notices, submit drawings, obtain all permits, licenses and certificates and pay all fees required for this work.
- .5 Furnish a Certificate of Final Inspection and approvals from inspection authority to the Consultant.
- .4 Standards of Workmanship
 - .1 Execute all work in a competent manner and to present an acceptable appearance when completed.
 - .2 Employ a competent supervisor and a sufficient number of licensed tradesmen to complete the Work in the required time.
 - .3 Arrange and install products to fit properly into designated building spaces.
 - .4 Unless otherwise specified or shown, install products in accordance with recommendations and ratings of manufacturers.

1.14 SUBMITTALS

- .1 Shop drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.
 - .2 Submit shop drawings of all electrical components as required by the Consultant. Approval of shop drawings is for general design only and does not relieve the electrical contractor and/or their supplier or manufacturer from complying with all requirements of drawings, plans and specifications. The electrical contractor is responsible for conforming to and coordinating all dimensions. The electrical contractor to take note that any shop drawing revisions required after the second review shall be at their own expense.
 - .3 Prior to submission, all shop drawings are to be stamped, dated and signed by the electrical contractor and the general contractor.
 - .4 The electrical contractor is to coordinate each shop drawing submission with requirements of the contract documents. Individual drawings will not be reviewed until all related shop drawings and product data is available.
 - .5 The electrical contractor is to review shop drawings and assume responsibility for:
 - .1 Completeness – including all details specified
 - .2 Dimensions, field measurements
 - .3 Catalogue numbers and similar data
 - .4 Conformance with contract documents
 - .5 Colors.
 - .6 Site conditions.
 - .7 Interference with mechanical equipment including motor sizes and loads, equipment locations and connection points.
 - .6 Shop drawing to include:
 - .1 Name of contractor, subcontractor, supplier and manufacturer.

- .2 Date and revision dates.
- .3 Project name.
- .4 All pertinent data.
- .5 Specification section number.
- .6 Electrical contractor's stamp and general contractor's stamp.
- .7 A clear space of 100mm x 75mm on each sheet for placement of the Consultant's review stamp.
- .8 Each sheet to be number sequentially.
- .9 Model and type numbers.
- .7 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.
- .8 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
- .9 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
- .10 Submit copies of drawings and product data to Consultant.
- .11 If changes are required, notify Consultant of these changes before they are made.
- .12 Comply with requirements of Division 01.
- .13 Submit shop drawings, product data and samples as specified, indicating details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment and materials. Include data on manufacturer's recommended environmental conditions for equipment affected by temperature and humidity.
- .14 Provide wiring, single line and schematic diagrams for electrical control systems and where otherwise applicable. Include wiring drawings or diagrams showing interconnection among work of different Sections.
- .15 Cross or block out from manufacturer's standard product data sheets all data inapplicable or irrelevant to project.
- .16 All component identification numbers for communications equipment shall be generic.
- .17 Shop drawings will not be reviewed if they:
 - .1 Are not clearly legible.
 - .2 Do not contain all information required above.
 - .3 Describe other products or models not applicable to this project.
 - .4 Alternates will not be reviewed unless submitted in accordance with the products and substitutions section and are submitted pre-tender for approval.
- .18 Keep one complete set of shop drawings at job site during construction.
- .19 Provide product data for the following:
 - .1 Panel boards & distribution equipment
 - .2 Light fixtures and lighting control devices.
 - .3 Motor control/starters.

- .4 Fire alarm panels and components.
 - .5 Control panels.
 - .6 Data, Telephone, and Television devices and equipment
 - .7 Security Door Access System and devices
 - .8 Security System and equipment
 - .9 Data/Telephone Communication
 - .10 Cable Tray and Support System
 - .11 Other electrical items that pertain to this contract.
- .2 Quality Control: in accordance with Section 01.
- .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction and the electrical inspection authorities for approval before delivery to site. All associated costs carried by the contractor.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Consultant.

1.15 OPERATION AND MAINTENANCE MANUALS

- .1 Within 30 days prior to substantial performance, the Contractor shall submit a draft copy of the proposed contents of each maintenance manual to the Consultant for review. Once the draft copy is approved, the Contractor will supply 4 copies in suitably labeled, hard back, D-Ring type commercial binders, each complete with an index and tabbed title sheets for each section. Final copies of manuals to be received by Consultant not less than 7 days prior to substantial performance.
- .2 All maintenance manual data shall be printed on 8 1/2" x 11" heavy bond, indexed, tabbed, punched and bound in the binders. each manual shall have a title sheet which is labeled "Operation & Maintenance Manual", and lists the Project name, Contractor's & Consultant's names, date submitted, and a Table of Contents for each volume. If a manual exceeds 75 mm in thickness, provide additional manuals as required.
- .3 Each section of the manual shall contain the following information:
 - .1 Systems Descriptions. A brief synopsis of each system typed and inserted at the beginning of each section. Include sketches and diagrams where appropriate.
 - .2 Descriptive and technical data.
 - .3 Maintenance and operating instructions for all electrical equipment and controls. (These operating instructions need not be manufacturer's data but may be typewritten instructions in simple language to guide the Owner in the proper operation and maintenance of his installation.)
 - .4 Lubricating and servicing intervals recommended.
 - .5 A copy of all wiring diagrams complete with wire coding.

- .6 List of spare parts of all electrical equipment complete with names and addresses of sales, service representatives and suppliers.
- .7 Copy of test data
- .8 A motor list showing each motor number, name, horsepower, full load amps, overload settings, nameplate, current rating, heater size and type, and current being drawn.
- .9 Include type and accuracy of instruments used to obtain test data.
- .10 Copy of final inspection certificate.
- .11 Copy of the purchase order, showing equipment make and model numbers issued to the manufacturer complete with all addendums .
- .12 Copy of all warranty certificates.
- .13 Set of final reviewed Shop Drawings.
- .14 Names, addresses, phone numbers and facsimile numbers of Contractor, sub-contractors and suppliers used on the work together with a specification reference of the portion of the work they undertook.
- .15 Manufacturer's product data, including performance curves and schematic and wiring diagrams for all electrical control systems. Manufacturer's installation instructions. Manufacturer's operation instructions. Manufacturer's maintenance instructions, including complete parts list for all serviceable components.
- .16 Digital photos of all underground installations prior to backfill.

1.16 RECORD DRAWINGS

- .1 The Contractor shall keep one complete set of white prints at the site, including all addendums, change orders, site instructions, clarifications and revisions for the purpose of record drawings. As the work on site proceeds, the Contractor shall clearly record in Red Pencil all as-built conditions which deviate from the original contract documents. Record drawings to include circuiting of all devices, conduit and feeder runs (complete with conductor size and number) and locations of all electrical equipment.
- .2 Contractor shall provide the Owner one hard copy and one electronic copy of the record drawings showing all information as shown by the electrical contractor.
- .3 Contractor shall carry a cash allowance, per the amount listed under 01 21 00 Cash Allowances, for the preparation of electronic record drawings by MP&P Engineering, to be based on red line record drawing markups to be provided to MP&P Engineering by the Contractor not more than 15 days following completion of the work.

1.17 COORDINATION

- .1 Coordinate work specified in the Electrical Specification with work specified in other Sections. Ensure that proper arrangements and provisions are made for work specified in other divisions

- .2 Examine the drawings and specifications of all divisions and become fully familiar with their work. Before commencing work, obtain a ruling from the Consultant if any conflict exists, otherwise no additional compensation will be made for any necessary adjustments.
- .3 Lay out the work and equipment with due regard to architectural, structural and mechanical features. Architectural and structural drawings take precedence over electrical drawings regarding locations of walls, doors and equipment.
- .4 Electrical Contractor shall coordinate all work with Mechanical/other contractors and owner supplied equipment supplier prior to rough-in.
- .5 Do not cut or core structural members without written approval of the Structural Engineer.
- .6 Install anchors, bolts, pipe sleeves, hanger inserts, etc. in ample time to prevent delays.
- .7 Examine previously constructed work and notify the Consultant of any conditions which prejudice the proper completion of this work. Commencement of this work without such notification shall constitute acceptance of other work.
- .8 Electrical Contractor shall coordinate with the owners Information Technology department for the work to be performed in the server room and all other areas that have owner supplied equipment to be installed and connected by the electrical contractor.

1.18 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS DIVISION

- .1 Supply access doors and panels where required for access to electrical work in otherwise inaccessible ceilings, walls and floors. Supply such access doors and panels for installation under Division 3, 4, and 9. Coordinate with architectural drawings. Provide all gum cups for all roof penetrations for electrical work.

1.19 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS DIVISION

- .1 Install equipment as noted on the mechanical motor list and drawings as being the responsibility of the Electrical Contractor which are supplied under the Mechanical Contract.
- .2 The Electrical Contractor shall install all conduit, pull strings and back boxes for the security system and devices, door access and CCTV systems. Security, door access and CCTV devices and wiring shall be provided and installed by the owner's own contractors. Coordinate the installation of the security, door access and CCTV devices with the owner contractors prior to rough-in.

1.20 PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 All product substitutions must be pre-tender approved by the Consultant. Failure to obtain pre-tender approval from the Consultant will result in the alternative product being rejected, in the event that the current model number is no longer available the Contractor shall provide an approved equal product at no additional cost to the owner.

- .2 The Contractor shall assume full responsibility for ensuring that when providing alternative products or materials, all space, weight, connections, power and wiring requirements etc. are considered. Any costs incurred for additional components, changes to services, structural or space requirements, layouts and plans, etc. that may be necessary will be borne by the contractor.
- .3 Contractor to submit all requests for alternative product approval to the Consultant. Submissions must be received by the Consultant not less than **seven (7) working days** prior to the close of tenders. Submissions received after the “Cut-Off” date will not be reviewed or accepted.
- .4 All submissions which are approved by the Consultant shall be identified as “Approved Alternatives” in an Addendum. Alternative products not listed in the Addendum will be rejected.
- .5 Approval of an alternate is not intended to change the original specifications unless specifically stated in the addenda. The submitter is responsible for all costs incurred by other trades as well as his own, to install the product/system in accordance with the contract documents.
- .6 The Consultant is not obliged to accept any or all Alternative Products and/or Proposed Substitutions offered by the Contractor. The Consultant reserves the right to dismiss any or all items with no further explanation.
- .7 All submissions to be provided with technical data and whatever pertinent information that may be required by the Consultant to evaluate equivalency to the specified product. The responsibility to provide sufficient technical data with respect to submissions will remain solely with those making the submission.
- .8 Contractor shall prepare a list of Proposed Substitutions and submit for review by the Consultant within seven (7) working days after notification of award of contract. The completed list must include statements of respective costs of items originally specified and proposed substitutions
- .9 Substitute Products: Where substitute products are permitted, unnamed products will be accepted by the Consultant, subject to the following:
 - .1 Substitute products shall be the same type as, be capable of performing the same functions as, and meet or exceed the standards of quality and performance of the named product(s). Substitutions shall not require revisions to Contract Documents nor to work of Other Contractors.
- .10 Substitute Manufacturers: Where substitute manufacturers are permitted, unnamed manufacturers will be accepted by the Consultant, subject to the following:
 - .1 Substitute manufacturers shall have capabilities comparable to those of the named manufacturer(s). Substitutions shall not require revisions to Contract Documents nor to work of Other Contractors.
- .11 In making a substitution Contractor represents that:

- .1 He has investigated substitute product or manufacturer, or both, and has determined that it meets the criteria specified in 1.6, and
 - .2 He will make any changes to the Work necessitated by the substitution as required for the Work to be complete in all respects, and
 - .3 He waives claims for additional costs and time caused by substitution which may subsequently become apparent.
- .12 Substitutions shall not be ordered nor installed without the Consultant's written acceptance. Where substitutions are found in the Work that have not been formally accepted by the Consultant, the Contractor will be required to remove such products and replace with specified materials or provide a credit to the value of the contract at the Consultant's discretion.
- .13 If in the consultant's opinion, a substitution does not meet requirements of Contract Documents, Contractor shall, at no extra cost to the owner, provide a product which, in the consultant's opinion, does meet requirements of Contract Documents.

1.21 GUARANTEE

- .1 Furnish a written guarantee to the Owner prior to final contract payment, which will be in effect for one year from the date of final acceptance of the complete work. Replace or repair at no cost to the Owner any defective material or workmanship except where, in the opinion of the Consultant, such defects are due to the misuse or neglect by the Owner.
- .2 This general guarantee shall not act as a waiver of any specified or special equipment guarantees which cover a greater length of time, but will warranty equipment which is not covered up to minimum 1 year by the manufacturer's warranty to include equipment parts, labor and all associated travel expenses to and from the site. All off hours work to accommodate owner's schedule.

1.22 SITE EXAMINATION

- .1 Examine the site of work and become familiar with all features and characteristics affecting this work **before** submitting Bid.
- .2 No additional compensation will be given for extra work due to existing conditions which such examination should have disclosed.
- .3 Report to the Owner and consultant any unsatisfactory conditions which may adversely affect the proper completion of this work.

Part 2 Products

2.1 PRODUCTS, MATERIALS AND EQUIPMENT

- .1 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in Submittals.
- .2 Factory assemble control panels and component assemblies.
- .3 Products and materials provided shall be new and free from all defects. Defective products or materials will be rejected, regardless of previous inspections. The Contractor shall be responsible to remove and replace defective products at their expense, and shall be responsible for any resulting delays and associated expenses which result from defective products being rejected. Related materials shall be of the same manufacturer throughout the project.
- .4 Products and materials referred to in the specifications by trade names, manufacturer's name and catalogue reference are those which shall be used as the basis for the Bid.
- .5 The design has been based on the use of the specified products.
- .6 Unless otherwise specifically called for in the Specifications, uniformity of manufacture shall be maintained for similar products throughout the work.
- .7 Apply primer on all items which are to be finished on the job.
- .8 Touch up all damaged painted finishes with matching lacquer, or, if required by the Consultant, completely repaint damaged surface.
- .9 All boxes suited as per NEMA ratings where required to suit location installed in. For example, exterior weatherproof, hazardous locations, explosions proof, etc.

2.2 USE OF PRODUCTS DURING CONSTRUCTION

- .1 Any equipment used for temporary or construction purposes shall be approved by the Owner and the Consultant and in accordance with the use of premises general conditions. Clean and restore to "as new" condition all equipment prior to the time of substantial completion.
- .2 The warranty period shall not begin until post 45 days from the date of substantial performance of the work.

2.3 BUILDING WIRES

- .1 Copper conductors: size as indicated, with 600V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE for 208V systems.
- .2 Copper conductors: size as indicated, with 1000V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE for 600V system.
- .3 Verify field measurements for all main feeder and branch feeder runs.
- .4 Conductor sizes are based on copper conductors, unless otherwise indicated.
- .5 Aluminum conductors will not be allowed to be substituted for copper.

- .6 Wire and cable routing is the responsibility of the electrical contractor. Consolidate runs where possible.
- .7 Power Circuits: No. 12 AWG minimum, except as follows:
 - .1 No. 10 AWG for 15A, 120 V circuits longer than 23 m.
 - .2 No. 8 AWG for 15A, 120 V circuits longer than 45 m.
 - .3 Electrical contractor shall allow larger wire sizes to compensate for voltage drop. Tolerances to be as per the Canadian Electrical Code.
- .8 Teck 90 Cable
 - .1 Conductors:
 - .1 Grounding conductor: copper.
 - .2 Circuit conductors: copper, size as indicated.
 - .2 Insulation:
 - .1 Cross-linked polyethylene XLPE.
 - .2 Rating: 1000V.
 - .3 Inner jacket: PVC -40°C.
 - .4 Outer Jacket: PVC -40°C.
 - .5 Armour: interlocking galvanized steel.
 - .6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.
 - .7 Fastenings:
 - .1 One hole steel or aluminum straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
 - .2 Channel type supports for two or more cables. Space channel as required by CEC.
 - .3 Threaded rods: 6 mm diameter to support suspended channels.
 - .8 Connectors:
 - .1 Watertight approved for TECK cable.
- .9 Armoured Cables - ACWU90 flame retardant jacket over thermoplastic armour and compliant to applicable Building Code classification for this project. Utilize only for light fixture feeds from junction boxes, limited to 3m length.
- .10 Provide factory fabricated, metal connectors of sizes, ampacity ratings, materials, types and classes for applications.

2.4 CONDUIT REQUIREMENTS

- .1 Minimum Size: 21mm unless otherwise specified. Refer to electrical details.
- .2 Wet and Damp Locations: Use rigid steel or aluminum conduit.
- .3 Dry Locations:

- .1 Concealed: Use electrical metallic tubing.
- .2 Exposed: Use rigid steel if exposed to mechanical damage or electrical metallic tubing in all other areas.
- .4 Except where otherwise required by Canadian Electrical Code (CEC), provide conduit of types specified in Conduit Installation Schedule and sizes indicated on drawings or specified.
- .5 Where sizes are not indicated, select proper sizes to suit intended use, fulfill wiring requirements, and comply with Canadian Electrical Code (CEC).
- .6 Metal Conduit:
 - .1 Galvanized Rigid Steel Conduit: zinc coated steel.
 - .2 Fittings: same material as conduit.
 - .3 Rigid Steel Conduit: C22.2 No. 45.1.
- .7 PVC Coated Metal Conduit
 - .1 Rigid Type EB1 PVC Conduit: to CSA C22.2 No. 211.1-M1984.
 - .2 Rigid Type DB2/ES2 PVC Conduit: to CSA C22.2 No. 211.1-M1984.
 - .3 Rigid PVC (Unplasticized) Conduit: to CSA C22.2 No. 211.2-M1984.
 - .4 Reinforced Thermosetting Resin Conduit (RTRC) and Fittings: to CSA C22.2 No. 211.3-96
- .8 Underground:
 - .1 Conduit: Rigid polyvinyl chloride.
 - .2 Conduit Spacers: fabricated plastic.
 - .3 Duct banks sand bedded c/w pressure treated planks over and marker tapes as detailed.
- .9 Flexible Metal Conduit:
 - .1 Flexible Metal Conduit: spirally wound, interlocked zinc coated strip steel, minimum 10 mm diameter.
 - .2 Flexible Metal Conduit Fittings: threadless hinged clamp type.
 - .3 Liquid-Tight Flexible Metal Conduit: continuous interlocked and double-wrapped steel, zinc coated inside and outside, coated with liquid-tight jacket of flexible PVC, minimum 12 mm diameter.
 - .4 Liquid-Tight Flexible Metal Conduit Fittings: cadmium plated, malleable iron fittings with compression type steel ferrule and neoprene gasket sealing rings.
 - .5 Fittings: CSA C22.2 No. 56.
- .10 Liquid Tight Flexible Metal Conduit:
 - .1 Description: Interlocked steel construction with PVC jacket.
 - .2 Fittings: CSA C22.2 No. 56.
- .11 Electrical Metallic Tubing (EMT)

-
- .1 Fitting Material for 27 mm size Conduit and Smaller: zinc alloy or zinc coated steel.
 - .2 Fitting Material for Conduit Larger than 27 mm Size: zinc coated steel.
 - .3 Type: compression or set screw, liquid tight for wet or damp areas.
 - .4 Edit the following descriptive specifications to meet Project requirements and to eliminate any conflict with manufacturers' Products specified above.
 - .5 Description: CSA C22.2 N0. 83.1; galvanized tubing.
 - .6 Fittings and Conduit Bodies: CSA C22.2 N0. 83.1; steel, set screw type.
 - .12 Except where otherwise required by Canadian Electrical Code (CEC), provide conduit of types specified in Conduit Installation Schedule and sizes indicated on drawings or specified.
 - .13 All under floor conduits to be embedded in the gravel under the concrete slab.
 - .14 Where sizes are not indicated, select proper sizes to suit intended use, fulfill wiring requirements, and comply with Canadian Electrical Code (CEC).
 - .15 Install nylon pull string in all empty conduits.
 - .16 Conduit Fastenings
 - .1 One hole steel straps to secure surface conduits 53 mm and smaller.
 - .1 Two hole steel straps for conduits larger than 53 mm.
 - .2 Beam clamps to secure conduits to exposed steel work.
 - .3 Support two or more conduits with channel type supports as per the C.E.C.
 - .4 Threaded rods, 6mm diameter, to support suspended channels.
 - .17 Conduit Fittings:
 - .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.
 - .2 Ensure factory "ells" where 90 degrees bends for 53 mm and larger conduits.
 - .3 Watertight connectors and couplings for EMT.
 - .1 Set-screws are not acceptable.
 - .18 Expansion Fittings for Rigid Conduit
 - .1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.
 - .2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 21 mm deflection.
 - .3 Weatherproof expansion fittings for linear expansion at entry to panel.
 - .19 Install Polypropylene fish cord in all empty conduits.

2.5 BOXES & FITTINGS

- .1 Sheet Metal Outlet Boxes: CSA C22.2 No. 18, galvanized steel.

- .1 Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 13 mm male fixture studs where required.
- .2 Sheet Steel Boxes: pressed sheet steel, galvanized, blanked for conduit, integral locating lugs.
- .3 Concrete Ceiling Boxes: Concrete type.
- .2 Non-metallic Outlet Boxes: CSA C22.2 No. 18.
- .3 Cast Boxes: CSA C22.2 No. 18, Type FD, aluminum or cast ferric alloy. Provide gasketed cover by box manufacturer.
- .4 Provide and install wall plates for finished areas.
- .5 Size boxes in accordance with CSA C22.1.
- .6 102 mm square or larger outlet boxes as required.
- .7 Blank cover plates for boxes without wiring devices.
- .8 Combination boxes with barriers where outlets for more than one system are grouped.
- .9 Provide and install one-piece electro-galvanized steel outlet box in areas requiring this product. Size and mount accordingly.
- .10 Provide and install electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls as required.
- .11 Conduit Boxes cast FS or FD boxes with factory threaded hubs and mounting feet for surface wiring of devices.
- .12 Fittings:
 - .1 Bushing and connectors with nylon insulated throats.
 - .2 Knock-out fillers to prevent entry of debris.
 - .3 Conduit outlet bodies for conduit up to 35mm and pull boxes for larger conduits.
 - .4 Double locknuts and insulated bushings on sheet metal boxes.
- .13 Air/vapour Hats: polyethylene, minimum 0.40 mm thick, with minimum 25 mm wide flanges, designed to be installed over electrical boxes and provide an effective air/vapour seal.

2.6 WIRING DEVICES

- .1 WALL SWITCHES:
 - .1 Single Pole Switch; Three-way Switch; Four-way Switches to: CSA-C22.2 No.55 and CSA-C22.2 No.111
 - .2 Switches to CSA C22.2 No. 111 Toggle Style Specification Grade and as follows:

- .1 Rating: except where otherwise indicated or specified, 15 A, 125V and 600V, full load rated for fluorescent, incandescent.
- .2 Type: single pole, three-way or four-way as indicated.
- .3 Operation: toggle, quiet action.
- .4 Features:
 - .1 Totally enclosed, 2-piece phenolic case.
 - .2 Large silver cadmium oxide contacts.
 - .3 Rust resistant continuous steel mounting strip.
 - .4 Captive mounting screws.
 - .5 Large head terminal screws.
- .3 Body and Handle: White plastic with Decora style handle.
- .4 Ratings:
 - .1 Voltage: 120-347 volts, AC.
 - .2 Current: 15 amperes.

.2 RECEPTACLES

- .1 Duplex receptacles, CSA type 5-15R, 5-20R, 125 V, 15/20A, U ground, to: CSA-C22.2 No.42.
- .2 General Purpose Receptacles:
 - .1 Rating: 15 A, 125 V except where otherwise indicated.
 - .2 Configuration: 5-15R, 5-20R, 2 pole, 3 wire grounding.
 - .3 Features:
 - .1 Ground terminal and poles connected to continuous mounting yoke.
 - .2 Wiring terminals: 8 back-wired entrances, 4 side screws.
 - .3 Split feed operation.
 - .4 Nylon face.
 - .5 Suitable for No. 10 AWG for back and side wiring
 - .6 Double wipe heavy phosphor bronze contacts.
 - .7 Decora Style Receptacles, all normal power receptacles to be White in color.
 - .8 All House Keeping receptacles are to be GREY in color. Clearly tag receptacles "House Keeping" with circuit number, as shown on electrical drawings.
 - .9 All receptacles are to be labelled with their circuit number on the face plate.
- .3 Ground Fault Circuit Interrupter Receptacles: same as general purpose receptacles, except for following features:
 - .1 Solid state ground fault sensing and signalling.
 - .2 5mA ground fault trip level.
 - .3 Feed-through type.

.4 Color: White

.3 WALL PLATES:

- .1 Cover plates for wiring devices to: CSA-C22.2 No.42.1.
- .2 Cover plates from one manufacturer throughout project.
- .3 Sheet steel utility box cover for wiring devices installed on surface mounted utility boxes in unfinished areas.
- .4 Cast cover plates for wiring devices mounted in surface mounted FS or FD type conduit boxes.
- .5 Weatherproof double lift spring loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.
- .6 Weatherproof spring loaded cast aluminum cover plates complete with gaskets for single receptacles or switches.

2.7 SUPPORT DEVICES

- .1 Materials and Finishes: Provide adequate corrosion resistance.
- .2 Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.
- .3 Anchors and Fasteners:
 - .1 Concrete Structural Elements: Use precast insert system , expansion anchors and preset inserts with the written permission from the base building structural engineer.
 - .2 Steel Structural Elements: Use beam clamps , spring steel clips , steel ramset fasteners , and welded fasteners.
 - .3 Concrete Surfaces: Use expansion anchors.
 - .4 Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.
 - .5 Solid Masonry Walls: Use expansion anchors and preset inserts.
 - .6 Sheet Metal: Use sheet metal screws.
 - .7 Wood Elements: Use wood screws.
- .4 STEEL CHANNEL:
 - .1 Provide metal brackets, frames, hinges, clamps and related types of supporting devices and support systems adequate for weight of equipment and raceways, including wiring which they carry.
 - .2 Straps: steel.
 - .3 Channels: 42 x 42mm galvanized steel.
 - .4 Rod Hangers: 6mm galvanized steel.
 - .5 Inserts: after-set expansion types.
 - .6 Description: Galvanized steel.

2.8 GROUNDING

- .1 Clamps for grounding of conductor: size as required to electrically conductive underground water pipe.
- .2 Insulated grounding conductors in each conduit: green grounding conductor, sized according to the CEC.
- .3 Rod electrodes: copper clad steel 19mm diameter by 3000mm long. Connect to the ground bus with a #3/0 bare copper ground conductor.
- .4 Ground bus: copper, complete with insulated supports, fastenings, connectors, and lugs. Locate in the electrical room.
- .5 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
 - .1 Grounding and bonding bushings.
 - .2 Protective type clamps.
 - .3 Bolted type conductor connectors.
 - .4 Thermit welded type conductor connectors.
 - .5 Bonding jumpers, straps.
 - .6 Pressure wire connectors.
- .6 Ensure that all grounding buss and associated lugs are securely and properly mounted and installed.
- .7 Grounding conductors: As shown on drawings or as per the Canadian Electrical Code.

2.9 PANELBOARDS

- .1 Manufacturers:
 - .1 Eaton Cutler Hammer or approved equal.
 - .2 Substitutions: To be approved.
- .2 Panel boards: to CSA C22.2No.29 and product of one manufacturer.
 - .1 Install circuit breakers in panel boards before shipment.
 - .2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.
- .3 Minimum integrated short circuit rating: 14kA amperes rms symmetrical for 240 volt panel boards; 25kA amperes rms symmetrical for 600 volt panel boards, or as per the vendors short circuit analysis.
- .4 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.
- .5 Panel boards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

- .6 Two keys for each panel board.
- .7 Copper bus with neutral of same ampere rating as mains.
- .8 Mains: suitable for bolt-on breakers.
- .9 Trim with concealed front bolts and hinges.
- .10 Trim and door finish: baked grey enamel.
- .11 Hinged door on door construction cover dished back to device face with hinged locking door.
- .12 Install circuit breakers in panel boards before shipment.
- .13 Panel boards: 42cct, as shown on the drawings. Mains, number of circuits, and number and size of branch circuit breakers as indicated.
- .14 Mains: Cooper, ampere ratings as shown, solderless lug connectors sized for cables in panels without breakers, bolt-on connectors for all main breakers and branch circuit breakers.
- .15 Front shields to cover breaker assembly and neutral bars, leaving wiring gutters accessible when fronts removed.
- .16 Front Covers, Doors: CSA code gauge galvanized steel, with doors, concealed hinges, combination locks and latches, interior plastic covered circuit directory cardholders, concealed mounting screws, finish painted, same size as tubs where surface mounted, overlapping trim with wall gaskets where flush mounted.
- .17 Branch Circuit Breakers: Thermal magnetic with "ON", "OFF" and "TRIPPED" positions, single, two and three pole as shown; ampere ratings as shown; bolt-on line connections, solderless lug load connections; common trip for two and three pole.
- .18 Spaces: Stamp out spaces, install removable fillers where breaker spaces are shown.

2.10 BREAKERS GENERAL

- .1 Breakers with thermal and magnetic tripping in panel boards.
- .2 Main breaker: separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.
- .3 Lock-on devices for emergency lighting circuits.
- .4 Provide a new main breaker in the existing CDP to feed the relocated panel MH. Breaker to match existing manufacturer.
- .5 Moulded-case circuit breakers and Ground-fault circuit-interrupters: to CSA C22.2 No. 5

- .6 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation.
- .7 Common-trip breakers: with single handle for multi-pole applications.
- .8 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
 - .1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.

2.11 TRANSFORMERS

- .1 High Efficiency Transformers (97% MIN): 3 phase, 60 Hz, delta/wye, 4 wire, grounded star, air cooled type, natural circulation in ventilated metal case to CSA and CEMA standards, Class F for 115°C rise above 40°C., 220°C Insulation Class. Primary Voltage: 600 volts, 3 phase.
- .2 Secondary Voltage: 208Y/120 volts, 3 phase.
- .3 Insulation system and average winding temperature rise for rated kVA as follows:
 - .1 Up to 500 kVA: Class 220 with 115 degrees C rise.
- .4 Case temperature: Do not exceed 35 degrees C rise above ambient at warmest point at full load.
- .5 Winding Taps:
 - .1 Transformers Less than 15 kVA: Two 5 percent below rated voltage, full capacity taps on primary winding.
 - .2 Transformers 15 kVA and Larger: NEMA ST 20.
- .6 Sound Levels: NEMA ST 20.
- .7 Basic Impulse Level: 10 kV for transformers less than 300 kVA.
- .8 Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- .9 Mounting:
 - .1 Up to 15 kVA: Suitable for wall mounting.
 - .2 Up to 75 kVA: Suitable for wall, floor (mounted on 100mm stand offs or house keeping pad), or trapeze mounting. Wall mounting will require sign off by the structural engineer.
 - .3 Larger than 75 kVA: Suitable for floor mounting.
- .10 Coil Conductors: Copper Continuous windings with terminations brazed or welded.
- .11 Enclosure: NEMA ST 20, ventilated. Provide lifting eyes or brackets.

- .12 Isolate core and coil from enclosure using vibration absorbing mounts.
- .13 Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

2.12 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated on the mechanical drawings and specification. Cover all costs associated
- .2 Control wiring and conduit: in accordance with the Canadian Electrical Code - Control Devices except for conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections and as shown on mechanical drawings.
- .3 Assist in placing in operation all mechanical equipment having electrical connections.
- .4 Provide a complete system of wiring to motors and controls as specified in the vendors specifications in the mechanical package. Coordination is to be done by the electrical contractor with the mechanical contractor, drawings and mechanical motor list.
- .5 Unless specifically noted otherwise, wire and leave in operation all electrically operated equipment supplied under all contracts related to this project. Examine the shop drawings of all Divisions for the extent of electrically operated equipment supplied under other contracts.
- .6 All control wiring diagrams shown on the shop drawings or in the vendor's literature illustrate control circuits applicable to the equipment. Verify all control circuits with the suppliers of the equipment and make any corrections that may be required. Refer to the mechanical drawings and the mechanical motor list for control wiring details.
- .7 Unless specifically noted otherwise, supply all pushbuttons, relays, pilot lights starters, etc., necessary for the operation of equipment. Check all starters, relay coils and thermal elements to ensure that they provide the necessary protection for motors.
- .8 Do not operate motors and controls until approval is obtained from the trade providing equipment.
- .9 Examine drawings and shop drawings of other Divisions to obtain exact location of motors and equipment shown on drawings. Where necessary, obtain conduit locations from other trades' drawings and shop drawings.
- .10 Provide three phase starters with fused 120 volt control transformers and overload relays.
- .11 Provide all power wiring for all motors and control wiring.
- .12 Fans: Provide all line voltage power wiring and disconnects as per the vendors specifications. All control for fans is to be supplied, installed and wired from the starter control circuits to the equipment.

2.13 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper conductors. Push-in type connectors will not be accepted.

2.14 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: plastic laminate for devices and lamacoid labels for equipment, matt white finish face, black lettering accurately aligned. Lamacoid labels mechanically attached with rivets or self tapping screws. Red with white inlay for emergency and fire alarm devices.
 - .2 Sizes as follows:

NAMEPLATE SIZES

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .2 Wording on nameplates and labels to be approved by Owner and Consultant prior to manufacture.
- .3 Allow for minimum of twenty-five (25) letters per nameplate and label.
- .4 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .5 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .6 Terminal cabinets and pull boxes: indicate system and voltage.
- .7 Transformers: indicate capacity, primary and secondary voltages.
- .8 3 mm thick plastic lamacoid name plates, black face, white core, mechanically attached with self tapping screws, 6 mm high lettering, to be attached to the front face of the following equipment:
 - .1 Panelboard, splitters, fused disconnects (Designation, voltage, Bus Capacity)
 - .2 Terminal cabinets and pull boxes (system, voltage)
 - .3 Data/Security Misc Racks
 - .4 Motor Starters/VFD's
 - .5 Low voltage Lighting Cabinets

2.15 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, numbered plastic tapes on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.

- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

2.16 CONDUIT AND CABLE IDENTIFICATION

- .1 Color code exposed conduits and conduits above T-bar ceilings, junction and pull boxes, and metallic sheathed cables with paint or plastic tape (25 mm wide band) at 15 metre intervals. Color coding to be as per the Owners standard or as follows (if discrepancy exists the Owners standard will be taken as correct):
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15m intervals.
- .3 Colours: 25mm wide prime colour and 20mm wide auxiliary colour.

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.17 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint outdoor electrical equipment "equipment green" finish unless noted otherwise.
 - .2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.
 - .3 Field painting is not acceptable.

2.18 MOUNTING HEIGHTS

- .1 Unless a conflict exists, use the following as mounting heights from finished floors to centre of device.

Receptacles in Mechanical Rooms	1400 mm
Receptacles & Telephone Outlets	300 mm
Light Switches (All switches to be at Barrier Free Height)	1050 mm
Fire Alarm Manual Stations	1400 mm
Fire Alarm Bells	2100 mm
Television & Computer Outlets	300 mm
Intercom	1400 mm
Door Entry PushButtons (Barrier Free Height)	1050 mm

Wall mounted speakers	2100 mm
Panelboards, starters and disconnects(to top of cover)	2000 mm
End of Line Resistors	1800 mm
Outlets above Counters	150 mm above counter top or backsplash
Pay Telephone outlets free	1050 mm for barrier

2.19 SLEEVES

- .1 Provide sleeves of galvanized steel pipe with machine cut ends of ample size to accommodate conduits passing through walls, partitions, ceilings, floors, etc.
- .2 For wall, partitions and ceilings the ends shall be flush with the finish on both sides but for floors they shall extend 100mm above finished floor level.
- .3 The space between the sleeve and the conduit shall be filled with Dow Corning silicone RTV foam for fire stop and caulked around the top and bottom with approved permanently resilient, non-flammable and weatherproof silicone base compound and ensure that the seal is compatible with the floor and ceiling finishes.
- .4 Locate and position sleeves exactly prior to construction of walls, floors.
- .5 Failure to comply with the above requirements shall be remedied at the electrical contractor's expense.

2.20 ACCESS PANELS

- .1 Where electrical equipment, junction boxes, remote ballasts or the like are concealed, access panels shall be supplied. Panels shall be of adequate size for servicing of the electrical work and complete with necessary frames and hinged doors held closed with captive fasteners. Coordinate type and size of panels with the Consultant.
- .2 In removable ceiling areas, provide markers on ceiling tile to locate equipment requiring access. Markers shall be of a type approved by the Consultant.

2.21 LIGHTING FIXTURES

- .1 Install surface or recessed fixtures to permit removal from below, to gain access to outlet or pre-wired fixture box. Connect recessed fixtures to boxes with flexible conduit and approved fixture wire.
- .2 Supply recessed fixtures complete with trim type required for ceiling system installed. Before ordering, confirm the ceiling construction details and architectural finish for each area.
- .3 Recessed incandescent fixtures: pre-wired type with junction box forming an integral part of the assembly with satisfactory access complete with necessary plaster rings, supports, etc. required.

- .4 Depth of recessed fluorescent fixtures to be 150 mm maximum including mounting yokes or bridges with distance from backface of fixture or lens to centre of lamp 65 mm minimum. Design reflector and lamp positions to provide high efficiency, even brightness and lack of lamp lines.
- .5 All plastic diffusers and lenses shall be manufactured from 100% acrylic (3 mm thick). Flame spread rating of 250, smoke development 600, in conformance with
- .6 CAN/ULC-S102.2-M.
- .7 Refer to fixture schedule on the drawings.

LED LUMINAIRES

- .8 LED luminaire requirements include
 - .1 Each luminaire shall consist of an assembly that utilizes LEDs as the light source. In addition, a complete luminaire shall consist of a housing, LED array, and electronic driver (power supply).
 - .2 The luminaire shall operate from a 60 HZ \pm 3 HZ AC power source. The fluctuations of line voltage shall have no visible effect on the luminous output.
 - .3 The operating voltage may range from 120 VAC to 347 VAC. The luminaire may operate over the entire voltage range or the voltage range may be selected. Refer to luminaire schedule for voltages for each luminaire type.
 - .4 The correlated color temperature shall be 3000K, unless noted otherwise in the luminaire schedule.
 - .5 The color rendition index shall be 70 CRI or greater.
 - .6 Include IES photometric files based on the LM-79 testing with product submittal.
 - .7 Provide IES LM-79 and LM-80 compliant test reports with each luminaire type.
 - .8 L70 results provided in accordance with IES TM-21.
 - .9 The luminaire shall carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement of luminaire at no additional cost to the owner.

FLUORESCENT BALLASTS

- .9 T8 and T5 ballasts shall be:
 - .1 General Requirements
 - .1 Ballast must have permanently connected leads integral to the ballast, color coded to ANSI C82.11 (latest version).
 - .2 Ballast shall carry a 5 year warranty.
 - .3 Manufacturer must have a 10 year history of designing and manufacturing electronic ballasts for the North American market.
 - .4 Ballast must be manufactured in a facility Certified to ISO 9002 Quality System Standards.

- .5 Ballast must be ordered and shipped from a distribution center Certified to ISO 9002 Quality System Standards.
 - .6 Ballast shall meet ANSI C82.11 limits for Total Harmonic Distortion (THD).
 - .7 Ballast shall meet FCC Part 18 non-consumer standards for electrical equipment (Class A).
 - .8 Ballast shall meet ANSI 62.41 Category A standards for Transient Voltage protection.
 - .9 Ballast shall meet UL 935 standards and be UL Listed and CSA Approved.
 - .10 Ballast shall contain no Polychlorinated Byphenols (PCBs) in accordance with US law.
 - .11 Ballast shall meet all Canadian provincial and federal efficacy laws.
- .2 General Lighting Performance Requirements
- .1 Ballast must have a ballast factor of:
 - .1 0.85-0.92 for a normal light output design.
 - .2 0.75-0.78 for a low wattage design (LW).
 - .3 1.1-1.18 for a high light output design (HL).
 - .2 Ballast must have a maximum input wattage (ANSI) as indicated on the datasheet.
 - .3 Ballast must have a Ballast Efficacy Factor greater than or equal to as indicated on the datasheet.
 - .4 Ballast must be able to start and operate the specified lamps at a minimum temperature of -20°C for standard ballasts and -38°C for HO ballasts and shall be in accordance with lamp manufacturers' recommendations.
 - .5 Ballast must be designed and UL Listed to operate the number and type of lamps as indicated on the datasheet.
- .3 General Electrical Performance Requirements
- .1 Ballast THD shall be less than 10%
 - .2 Lamp Current Crest Factor shall not exceed 1.6.
 - .3 Ballast Power Factor must be greater than 98%.
 - .4 Ballast output frequency shall be greater than 20kHz and less than 30kHz or greater than 42kHz. Ballast output shall not be between 30kHz and 42kHz for any lamp combination.
 - .5 Ballast must be sound rated A. (T8/HO and T8/Slimline rated B.)
- .4 Instant Start Ballast Requirements

- .1 Ballast must operate between 108-132V (120V) and 249-305V (277V), and 312-382V (347V), 60Hz.
 - .2 Ballast must maintain light output at +/- 10% during a voltage fluctuation of +/- 10%. Ballast shall be Instant Start Parallel.
- .5 Programmed Rapid Start Ballast Requirements
- .1 Ballast must operate between 90-145V (120V) and 200-305V (277V), 60Hz.
 - .2 Ballast must maintain light output at +/- 1% during a voltage fluctuation of +/- 10%.
 - .3 Ballast shall be Programmed Rapid Start Series.
- .6 Compact Fluorescent Ballast Requirements
- .1 Ballast shall be Programmed Rapid Start.
 - .2 Ballast shall operate between 90-145V (120V), 249-305V (277V) and 312-382V (347V), 60Hz.
 - .3 Ballast shall be high frequency electronic type and operate lamps at a frequency above 42 kHz to minimize interference with infrared control systems.
 - .4 Ballast shall operate with no visible flicker (<3% flicker index).
 - .5 Ballast shall tolerate sustained open and short circuit output conditions without damage.
 - .6 Ballast shall have a minimum ballast factor of 0.93.
 - .7 Ballast shall incorporate lamp shutdown circuitry for end of life protection.
 - .8 Ballast shall allow for re-lamping without the need to cycle power.
 - .9 Ballast shall have a minimum starting temperature of -20°C.
 - .10 Ballast shall be available in a hybrid can or all metal can construction to meet all plenum requirements and to eliminate the need for additional ground wires.
 - .11 Ballast shall be furnished with poke-in wire trap connectors, color coded to ANSI C82.11.
- .7 Low Voltage Dimming Ballast Requirements
- .1 Ballast shall be Programmed Rapid Start
 - .2 Ballast shall operate from a nominal line voltage of 120 or 277 volts, 60Hz. 120V ballast shall operate from 90V - 145V. 277V ballast shall operate from 200V - 305V.
 - .3 Ballast shall maintain constant light output, for line voltage variations of ±10% of rated supply voltage.

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- .4 Ballast shall ignite the lamps at any light output setting selected without first starting at maximum light output.
 - .5 Ballast input current shall have Total Harmonic Distortion (THD) of less than 10% at maximum light output for primary lamps. Total Harmonic Current (THC) at minimum light output shall not exceed THC at maximum light output.
 - .6 Ballast shall have a Power Factor greater than 98% at full light output and greater than 90% throughout the dimming range when used with primary lamp.
 - .7 Lamp Current Crest Factor shall be 1.6 or less throughout the dimming range in accordance with lamp manufacturer recommendation.
 - .8 Ballast shall withstand a sustained short to ground or open circuit of any output leads.
 - .9 Ballast shall be controlled by a Class 1 or Class 2 low-voltage 0-10V circuit.
 - .10 Ballast shall be furnished with integral protection circuitry to withstand connection of control leads to mains power supply. In this event, ballast shall default to the maximum light output level.
- .8 Dimming Compact Fluorescent Ballast Requirements
- .1 Low Voltage Compact Fluorescent Dimming Ballasts shall meet all requirements of Low Voltage Dimming Ballasts.
 - .2 Line Voltage Compact Fluorescent Dimming Ballasts shall meet all requirements of Line Voltage Dimming Ballasts.
- .9 H.I.D. Lamp Ballast Requirements
- .1 H.I.D. ballasts shall be either integral or remote mounted.
 - .2 These ballast shall be of the constant wattage regulated output type, and provide satisfactory lamp operation to -30oC. Ballasts shall maintain full lamp operation over a 13% deviation of input voltage. Input voltage shall drop to 45% rated voltage before lamp drop-out occurs.
 - .3 Ballasts connected line-to-neutral may be of the auto-transformer type, and if connected line-to-line shall be of the two winding type. The secondary conductor connected to the screw shell of the lampholder shall be grounded at the fixture by connection to the grounded metal parts of the fixture.
 - .4 Ballasts shall operate at a power factor of 90% or better.
 - .5 Ballast enclosures shall be suitable for the location and method of mounting indicated on the drawings; ballasts shall be CBM Class A sound rated.
 - .6 Encapsulated when mounted indoors or remote mounted as noted.
- .10 Ballasts to be Philips, G.E., or Osram-Sylvania.

- .11 Ballast to be instant start type unless specified otherwise.
- .12 Ballasts to be suitable for circuit voltage on site. Confirm voltage on site.

LAMPS

- .13 T8 Lamps
 - .1 Lamps shall be Philips, G.E., or Osram-Sylvania
 - .2 Lamp life of 20,000 hrs.
 - .3 Lamps shall have medium bi-pin based and minimum 95% lumen maintenance.
 - .4 Minimum CRI of 86.
 - .5 Lamps to operate on any ballast that complies with ANSI (C82.11 and C62.41) and
 - .6 CSA ballast standards.
 - .7 Lamp to properly start and operate at -20°C for T8 and -38°C for T8HO.
 - .8 4100°K color temperature (3000, 3500, 4100°K) will be identified at shop drawings stage.
 - .9 As specified in fixture schedule measures. Suitable for fixture type.
- .14 T5 Lamps
 - .1 Lamps shall be Philips, G.E., or Osram-Sylvania.
 - .2 Lamps shall have miniature bi-pin bases and minimum 95% lumen maintenance.
 - .3 Minimum CRI of 85
 - .4 Lamps to operate on any ballast that complies with ANSI (C82.11 and C62.41) and
 - .5 CSA ballast standards.
 - .6 Lamp to properly start and operate at -20°C for T5 and -38°C for T5HO
 - .7 4100°K color temperature (3000, 3500, 4100°K) will be identified at shop drawings stage.
 - .8 Lamp life of 20,000 hrs.
 - .9 As specified in fixture schedule measures. Suitable for fixture type.
- .15 Compact Fluorescent Lamps
 - .1 Lamps shall be Osram-Sylvania dulux T/E/IN (CF18, CF26, F32, CF42) or G.E. or Philips equivalent.
 - .2 2700°K to 3000°K color temperature will be identified at shop drawings stage.
 - .3 Minimum CRI of 82
 - .4 Provide 90% light output over ambient temperature range 4°C - 60°C
 - .5 Lamps to have a 4-pin base with no internal starter.
 - .6 Lamps to be stable to 10% of full light output.

- .16 H.I.D. Lamps
 - .1 HID Lamps shall all be open lamp rated.
 - .2 Lamps shall be of the wattage, colour and type indicated on the drawings; the description used is the ANSI Code.
 - .3 Lamps shall be suitable for their burning position in the mounted fixture.
 - .4 Super Metalarc metal halide.
- .17 T8 and T5 Fluorescent lamps to be guaranteed for 36 months, from date of final acceptance of fixture by Owner.
- .18 Burn-in lamps continuously for a period of 100 hours prior to turnover. Replace faulty lamps if necessary.
- .19 Lamps to be as specified in fixture schedules.
- .20 Incandescent Lamps shall be inside frosted or clear, as indicated or as required to suit the fixture design, and shall have wattages as noted on the drawings.
- .21 Incandescent Lamps shall be rated 130 volts (5,000 hr. life).
- .22 Incandescent Lamps shall be supplied with the fixture as specified herein.

2.22 EMERGENCY LIGHTING EQUIPMENT

- .1 Emergency lighting equipment: to CSA C22.2 No.141.
- .2 Supply voltage: as per the fixture schedule, ac.
- .3 Output voltage: as per the fixture schedule, dc.
- .4 Operating time: 30 min.
- .5 Battery: sealed, maintenance free.
- .6 Charger: solid state, multi rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01V for plus or minus 10% input variations.
- .7 Solid state transfer circuit.
- .8 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.
- .9 Signal lights: solid state, for 'AC Power ON' and 'High Charge'.
- .10 Lamp heads:[integral on unit and remote, 345 degrees horizontal and 180 degrees vertical adjustment. Lamp type: as per the fixture schedule.

- .11 Cabinet: suitable for direct or shelf mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.
- .12 Auxiliary equipment:
 - .1 Test switch.
 - .2 Battery disconnect device.
 - .3 AC input and DC output terminal blocks inside cabinet.
 - .4 Bracket.

2.23 EXIT SIGNS

- .1 Fixture voltage to be suitable for site circuit voltage. Refer to the fixture schedule on the drawings.
- .2 Exit lights: thin profile type, edge lit acrylic, 152 mm(6") high cut-out letters with red letters, complete with flush aluminium LED panel Style, single circuit operation, with arrows and conform to CAN/CSA-C860-01. Provide single and double face as required.
- .3 Standard Units
 - .1 Exit lights: to CSA C22.2 No.141 and CSA C860.
 - .2 Housing: cold rolled steel minimum 1.0mm thick, satin aluminum enamel finish or cast anodized extruded aluminum housing, brush aluminum finish.
 - .3 Face and back plates: cast aluminum alloy.
 - .4 Lamps: LED.
 - .5 Operation: designed for over 100,000 hours of continuous operation without relamping.
 - .6 Letters: 152mm high x 19mm, with 13 mm thick stroke, reading EXIT.
 - .7 Face plate to remain captive for relamping.
- .4 Self-Powered Units
 - .1 Exit lights: to CSA C22.2 No.141 and CSA C860.
 - .2 Housing: cold rolled steel minimum 1.0mm thick, satin aluminum enamel finish or cast anodized extruded aluminum housing, brush aluminum finish.
 - .3 Face and back plates: cast aluminum alloy.
 - .4 Lamps: LED.
 - .5 Operation: designed for over 100,000 hours of continuous operation without relamping.
 - .6 Letters: 152mm high x 19mm, with 13 mm thick stroke, reading EXIT.
 - .7 Face plate to remain captive for relamping.
 - .8 Third lamp socket for emergency lamp lighting circuit.
 - .9 Face plate to remain captive for relamping.
 - .10 Supply voltage: as per the fixture schedule, ac.

- .11 Output voltage: as per the fixture schedule, dc.
- .12 Operating time: 30minutes minimum.
- .13 Recharge time: 12 hours
- .14 Battery: sealed, maintenance free.
- .15 Charger: solid state, voltage/current regulated, inverse temperature compensated, short circuit protected, with regulated output of plus or minus 0.01 V for plus or minus 10% V input variation.
- .16 Solid state transfer circuit.
- .17 Signal lights: solid state, for 'AC Power ON' and 'High Charge' condition.
- .18 Lamp heads: integral on unit, 345 degrees horizontal and 180 degrees vertical adjustment.
 - .1 Lamp type: LED.
- .19 Mounting: suitable for universal mounting directly on junction box and c/w knockouts for conduit.
 - .1 Removable or hinged front panel for easy access to batteries.
- .5 Mounting: Coordinate mounting with the electrical drawings and site conditions. Ensure all exit signs are visible.

2.24 COMMUNICATION SUMMARY OF WORK

- .1 Communications scope of work includes provision of conduit, copper and fiber optic cabling as shown on the drawings, including required connectors, termination, testing, labeling, and documentation.

Part 3 Execution

3.1 ELECTRICAL COORDINATION

- .1 Coordinate work specified in the Electrical Specification with work specified in other Sections. Ensure that proper arrangements and provisions are made for work specified in other divisions
- .2 Examine the drawings and specifications of all divisions and become fully familiar with their work. Before commencing work, obtain a ruling from the Consultant if any conflict exists, otherwise no additional compensation will be made for any necessary adjustments.
- .3 Lay out the work and equipment with due regard to architectural, structural and mechanical features. Architectural and structural drawings take precedence over electrical drawings regarding locations of walls, doors and equipment.
- .4 Electrical Contractor shall coordinate with Mechanical contractor, refrigeration contractor and owner supplied equipment supplier all work prior to rough-in.
- .5 Electrical Contractor shall coordinate with the security drawings and security contractor prior to rough-in. Electrical contractor shall supply and install all security back boxes, conduit and pull string. Refer to Security drawings for device layouts.

- .6 Electrical Contractor shall coordinate with the owners Information Technology department for the work to be performed in the main service rooms and all other areas that have owner supplied equipment to be installed and connected by the electrical contractor.
- .7 Do not cut or core structural members without written approval of the Structural Engineer.
- .8 Install anchors, bolts, pipe sleeves, hanger inserts, etc. in ample time to prevent delays.
- .9 Examine previously constructed work and notify the Consultant of any conditions which prejudice the proper completion of this work. Commencement of this work without such notification shall constitute acceptance of other work.
- .10 Electrical drawings are, unless otherwise indicated, drawn to scale and approximate distances and dimensions may be obtained by scaling. Figured dimensions shall govern over scaled dimensions. Where exact dimensions and details are required, refer to Architectural and Structural drawings.
- .11 Security equipment locations shown on the drawings are approximate. Locations may be revised up to 3 meters to suit construction and equipment arrangements without additional cost to the Owner.
- .12 Unless otherwise specified or shown, install products in accordance with recommendations and ratings of manufacturers.
- .13 Outlet and equipment locations shown on the drawings are approximate. Locations may be revised up to 3 meters to suit construction and equipment arrangements without additional cost to the Owner.
- .14 Maintain luminaire locations wherever possible. Notify the Consultant of conflicts with other services.

3.2 GENERAL WIRING INSTALLATION

- .1 All wiring to be in conduit for all systems, unless indicated otherwise.
- .2 Cable Colour Coding: to CSA C22.1.
- .3 Conductor length for parallel feeders to be identical.
- .4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- .5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Wiring from below and horizontal wiring in walls is to be avoided. If wiring from below and/or horizontal wiring in walls it is to be reviewed on site with the consultant for approval prior to installation.
- .6 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.
- .7 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

- .8 Use conductor not smaller than 12 AWG for power and lighting circuits. Utilize larger conductor sizes for longer runs to ensure voltage drop does not exceed 3% from the source.
- .9 Pull all conductors into raceway at same time.
- .10 Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- .11 Protect exposed cable from damage.
- .12 Installation of Teck 90 Cable (0-1000V)
 - .1 Group cables wherever possible on channels.
 - .2 Install cable exposed, securely supported by straps or hangers.
 - .3 Provide protection for exposed cables where subject to damage.
 - .4 Support horizontal runs on cable tray or channels complete with spacers and clamps.
 - .5 Support vertical runs on channels complete with spacers and clamps.
 - .6 Support cables minimum one diameter apart. Maintain equal spacing across supports.
 - .7 Install single conductor cables in 3 phase circuits as follows.
 - .1 Arrange cables in delta formation supported on hardwood spacer blocks providing one cable diameter space between cables. Install spacers at 900 mm centers around horizontal and vertical runs of cable.
 - .2 Install non magnetic and insulating plates at cable termination points. Fit connectors at supply points with grounding style bushing and No. 6 AWG copper conductor to connect supply end of cable sheath to ground. Ground the cable sheath at supply end only.
 - .3 Install non metallic plate at load end of cable to terminate cable.
 - .4 Provide non magnetic plates, minimum 12 mm fiberboard, securely bolted over openings cut in enclosure.

3.3 CONDUIT INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits except in mechanical and electrical service rooms.
- .3 Installed conduit shall be free from dents, bruises and other damage.
- .4 Use electrical metallic tubing (EMT) except where installed under the slab or otherwise indicated.
- .5 All conduit exposed to pool environment shall be waterproof and sealed to prevent any intrusion of moisture/liquid.

- .6 Use rigid PVC conduit for underground installation. Embed PVC conduit in gravel below slab.
- .7 Use flexible metal conduit for connection to motors in dry areas, connection to recessed incandescent fixtures without prewired outlet box, connection to surface or recessed fluorescent fixtures, work in movable metal partitions.
- .8 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
- .9 Mechanically bend steel conduit over 21 mm diameter.
- .10 Install fish cord in empty conduits.
- .11 Run 2 - 27 mm spare conduits up to ceiling space and 2 - 27 mm spare conduits down to ceiling space from each flush panel.
 - .1 Terminate these conduits in 152 x 152 x 102 mm junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in flush concrete type box.
- .12 Dry conduits out before installing wire.
- .13 Run parallel or perpendicular to building lines.
- .14 Group conduits wherever possible on suspended or surface channels.
- .15 Do not pass conduits through structural members.
- .16 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.
- .17 Surface conduits allowed only in main service rooms.
- .18 Conceal all conduits in walls, ceilings or floors.
- .19 Do not install horizontal runs in masonry walls.
- .20 Do not install conduits in terrazzo or concrete toppings.

3.4 BOX INSTALLATION

- .1 Install boxes to CSA C22.1.
- .2 Install in locations as shown on drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- .3 Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- .4 Measure mounting height from finished floor to centre line of device.

- .5 Owner reserves the right to change location of outlets prior to installation with no change in Contract Price, provided that distance does not exceed 3 m from originally indicated location.
- .6 All switch boxes to be mounted at barrier free height. Coordinate boxes mounted in walls with FRP paneling so that the box is mounted a minimum of 50mm below the edge of the FPR panel.
- .7 Electrical boxes are shown on drawings in approximate locations unless dimensioned. Adjust box location up to 3m if required to accommodate intended purpose.
- .8 Orient boxes to accommodate wiring devices oriented as specified in Section 26 05 00.
- .9 Maintain headroom and present neat mechanical appearance.
- .10 Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- .11 Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 150 mm from ceiling access panel or from removable recessed luminaire.
- .12 Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 26 05 00.
- .13 Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- .14 Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
- .15 Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- .16 Use flush mounting outlet box in finished areas.
- .17 Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- .18 Do not install flush mounting box back-to-back in walls; provide minimum 150 mm separation. Provide minimum 600 mm separation in acoustic rated walls.
- .19 Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- .20 Use stamped steel bridges to fasten flush mounting outlet box between studs.
- .21 Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- .22 Use adjustable steel channel fasteners for hung ceiling outlet box.
- .23 Do not fasten boxes to ceiling support wires.

- .24 Support boxes independently of conduit.
- .25 Use gang box where more than one device is mounted together. Do not use sectional box. Use separate boxes for power and data.
- .26 Use gang box with plaster ring for single device outlets.
- .27 Set floor boxes level.
- .28 Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.
- .29 Install air/vapour hats around electrical boxes located in walls and ceilings where polyethylene vapour retarder is required by code..

3.5 WIRING DEVICES INSTALLATION

- .1 Install to CSA C22.1.
- .2 Install devices plumb and level.
- .3 Install switches with OFF position down.
- .4 Install wall dimmers to achieve full rating specified and indicated after de-rating for ganging as instructed by manufacturer.
- .5 Do not share neutral conductor on load side of dimmers.
- .6 Install receptacles with grounding pole on bottom.
- .7 Connect wiring device grounding terminal to outlet box with bonding jumper.
- .8 Connect wiring devices by wrapping conductor around screw terminal.
- .9 Use jumbo size plates for outlets installed in masonry walls.
- .10 Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets in unfinished service rooms.
- .11 Switches:
 - .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Install switches in gang type outlet box when more than one switch is required in one location.
 - .3 Mount toggle switches at height in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .12 Receptacles:
 - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

- .2 Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .3 Where split receptacle has one portion switched, mount vertically and switch upper portion.
- .13 Cover plates:
 - .1 Install suitable common cover plates where wiring devices are grouped.
 - .2 Do not use cover plates meant for flush outlet boxes on surface mounted boxes.

3.6 SUPPORTING DEVICE INSTALLATION

- .1 Install supporting devices to maintain headroom, neat mechanical appearance and to support equipment loads required.
- .2 Except where otherwise indicated, support equipment, conduit and cables using clips, spring loaded bolts, or cable clamps designed as accessories to base channel members.
- .3 Support exposed conduit and conduit installed in space above suspended ceilings and in crawl spaces using hangers, clamps or clips. Support conduit on each side of bends and on spacing in accordance with Canadian Electrical Code.
- .4 Where three or more conduits run parallel, install conduit on conduit racks. Size conduit racks to provide 25% spare capacity.
- .5 Support riser conduit at each floor level with clamp hangers.
- .6 Do not fasten supports to piping, ductwork, mechanical equipment or conduit.
- .7 Do not use shot driven pins.
- .8 Install surface mounted cabinets and panelboards with minimum of four anchors.
- .9 Do not drill or cut structural members.
- .10 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole steel straps to secure surface conduits and cables 53 mm and smaller.
 - .2 Two-hole steel straps for conduits and cables larger than 53 mm.
 - .3 Beam clamps to secure conduit to exposed steel work.
- .11 Suspended support systems.
 - .1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.
 - .2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.
- .12 In wet and damp locations use galvanized steel channel supports to stand cabinets and panel-boards 25mm off wall.

- .13 Secure equipment to poured concrete with expandable inserts.
- .14 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .15 Provide metal brackets, frames, hangers, clamps and related types of support structures or as required to support conduit and cable runs.
- .16 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

3.7 GROUNDING INSTALLATION

- .1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Where EMT and PVC is used, run ground wire in all conduits.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .5 Soldered joints not permitted.
- .6 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- .7 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.
- .8 Install separate ground conductor to outdoor lighting fixtures.
- .9 Make grounding connections in radial configuration only, with connections terminating at a single grounding point. Avoid loop connections.
- .10 Bond single conductor, metallic armoured cables to cabinet at supply end and at load end.
- .11 Install system and circuit grounding connections to neutral of primary system and secondary system.
- .12 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting, mechanical equipment, data equipment, security equipment, fire alarm system, etc.
- .13 Install copper grounding buss mounted on insulated supports on wall of electrical room and in the data room. Tie back to main system ground.

- .14 Ground items of electrical equipment in electrical room to ground buss with individual bare stranded copper connections size 3/0AWG.
- .15 Install grounding connections for telephone, sound, fire alarm, data, and intercommunication systems as follows:
 - .1 Telephones: make telephone grounding system in accordance with Telephone Utility requirements.
 - .2 Sound, fire alarm, data, and intercommunication systems to be grounded utilizing a #6AWG ground minimum.

3.8 PANEL BOARD INSTALLATION

- .1 Locate panel boards as indicated and mount securely, plumb, true and square, to adjoining surfaces.
- .2 Install surface mounted panel boards on plywood backboards painted with fire rated paint. Where practical, group panelboards on common backboard.
- .3 Mount panel boards to height specified.
- .4 Connect loads to circuits.
- .5 Connect neutral conductors to common neutral bus with respective neutral identified.
- .6 Install panel boards flush or surface as indicated.
- .7 Number of breakers, and sizes specified on drawings.
- .8 Provide supports independent of conduits. Match trim and door heights on adjacent panel boards.
- .9 Install branch circuit wiring in neat bundles at sides of wiring gutters, with wires to branch breakers horizontal.
- .10 Provide lamacoid plate securely and permanently attached to the exterior of each panel board door showing panel board designation, voltage and source of feed.
- .11 For all ground fault breakers, provide a sign indicating that circuits are so protected and that equipment should be tested regularly.
- .12 Provide typed directory identifying all branch circuits. Directory to indicate device and location.
- .13 Locking Straps: To permit automatic tripping of breakers but prevent manual switching, for exit lights, receptacles feeding emergency battery packs, fire alarm panels and where designated.

3.9 MOLDED CASE BREAKER INSTALLATION

- .1 Install over current protective devices as indicated, in accordance with manufacturer's written instructions.
- .2 Fasten over current protective devices without causing mechanical stresses, twisting or misalignment of equipment in final position.
- .3 Set field-adjustable trip settings as indicated subsequent to installation.
- .4 Over current protective device sizes and identification as specified in respective equipment schedules.

3.10 LOCATION OF OUTLETS

- .1 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .2 Outlet and equipment locations shown on the drawings are approximate. Locations may be revised up to 3 meters to suit construction and equipment arrangements without additional cost to the Owner, provided that the Contractor is notified prior to the installation of the outlets, or equipment.
- .3 Locate light switches on latch side of doors.
 - .1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.
- .4 Electrical drawings are, unless otherwise indicated, drawn to scale and approximate distances and dimensions may be obtained by scaling. Figured dimensions shall govern over scaled dimensions. Where exact dimensions and details are required, refer to Architectural and Structural drawings.
- .5 Maintain fixture locations wherever possible. Notify the Consultant of conflicts with other services. All recessed fixture installed in insulated ceiling spaces to receive IC rated cans regardless of fixture schedule rough-in model number.
- .6 Unless otherwise specified or shown, install products in accordance with recommendations and ratings of manufacturers.
- .7 All panels or boxes installed in fire rated walls which breach fire separations will receive drywall fire rated enclosures.

3.11 SEPARATION OF SERVICES

- .1 Maintain separation between electrical wiring system and building piping, ductwork, etc. so that wiring system is isolated (except at approved connections to such systems) to prevent galvanic corrosion. Cable trays passing through fire separations shall be fire sealed or conduit adaptors utilized throughout separate areas.
- .2 In particular, contact between dissimilar metals, such as copper and aluminum, in damp or wet locations is not permitted.

- .3 Do not support wiring from pipes, ductwork, etc. Hangers for suspended ceilings may be used for the support of wiring only when approval is obtained from the Consultant and the ceiling installer, and approved clips or hangers are used.

3.12 WIRING TO EQUIPMENT SUPPLIED BY OTHERS

- .1 Equipment supplied by the Owner or under other Division will be moved to the site by others. However, the electrical connection to the equipment shall be done by the electrical contractor. This will include all specialty male and female cord ends and flex cable or SI style cords. Direct wired equipment to receive local disconnect at unit.

3.13 CLEANING

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.
- .3 Do the following prior to Interim Acceptance of the Work, as required to remove all construction dust and debris:
 - .1 Clean out all cabinets and enclosures with vacuum or compressed air.
 - .2 Wipe all insulators with clean, dry rags.
 - .3 Clean all light fixtures and lenses.

3.14 SEALING OF WALL AND FLOOR OPENINGS

- .1 All conduit and cable entries through outside walls of buildings, through partition walls separating electrical rooms from other areas, through fire separations, and through floors above grade shall be sealed to prevent passage of moisture, dust, gasses, flame, or to maintain pressurization.
- .2 Openings shall be sealed when all wiring entries have been completed.
- .3 Sealing material shall be fire resistant and shall not contain any compounds which will chemically affect the wiring jacket or insulating material. Cable penetrations through fire separations to be sealed.

3.15 FIRE STOPPING

- .1 It is the responsibility of the electrical contractor to fire stop all conduit penetrations thru walls, ceilings, and floors. Use CSA approved products.
- .2 Ensure that all penetrations thru exterior walls and roof are sealed and water tight.
- .3 Provide fire rated drywall enclosure for all devices recessed in fire rated walls or ceilings. All costs for enclosures factory or field built by this contractor for his work.

3.16 SYSTEM STARTUP

- .1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.

- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.
- .4 Inform owner prior to preliminary start-up if representative wants to be present.

3.17 TESTING

- .1 Prior to energizing any portion of the electrical system, perform megger tests on all parts of the distribution system. Results shall meet the requirements of the CEC, authority having jurisdiction and the Contract Documents.
- .2 Measure phase current to panel boards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .3 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- .4 Submit, at completion of work, report listing phase and neutral currents on panel boards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- | | | |
|----|--|-----------|
| .1 | Basic Electrical Materials and Methods | 26 05 01 |
| .2 | Access Control System – Appendix A – Access Control Schedule | 28 13 00A |
| .3 | Video Surveillance – Appendix A – Camera List | 28 23 00A |

1.2 GENERAL CONDITIONS

- .1 Each scope of work described herein is to be priced as a complete and discrete scope of work. Pricing shall be inclusive of all equipment, devices, materials, labour, documentation, testing, programming, etc. as may be required to provide a complete and functional scope of work.
- .2 Where applicable to scopes of work outlined below, contractor shall include all costs associated with, and provide trenching, backfill, concrete work, firestopping/caulking penetrations, tracing of existing underground services, and comprehensive coordination with Facility Manager regarding any existing conditions discovered during performance of this work.
- .3 Contractor shall fully review the area(s) to be affected by each scope of work described herein.
- .4 Contractor shall coordinate any/all required power shutdowns to affected building(s) and load(s) for each scope of work with Facility Manager, so as to minimize impact to on-going operations.
- .5 It is the responsibility of the contractor to ensure that all supplied equipment, devices, and materials are fully compatible with existing systems in use on site.
- .6 Where a scope of work description notes one or more prerequisites, the scope of work is to be priced on the basis that the noted prerequisite(s) have been completed.
- .7 Prior to programming/re-programming access control panels and workstation(s) / server(s), verify door descriptions with Facility Manager. Record door designations in access control schedule.
- .8 All new electronic security systems (access control system, CCTV, and/or other) cabling shall be run in conduit, and minimum conduit for same shall be 21mmC (3/4"). Refer to section 26 05 01 for conduit type suitable to each application, and associated installation requirements.
- .9 Where a scope of work outlined below includes the removal of devices/equipment, the contractor shall fully repair/reinstate the surface from which each device or piece of equipment is removed to the satisfaction of the Facility Manager. This includes repair/re-finishing and painting of door frames or surfaces, wall finishes / paint, etc.
- .10 Specific requirements of any/all penetrations at Level 2 labs shall be coordinated directly with Facility Manager onsite.

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- .11 The contractor shall note that asbestos containing materials are or may be present in some locations at existing buildings onsite, including floor tiles, drywall mudding compound, insulation, and plumbing elbows. A full Hazardous Materials Audit will be made available to the successful bidder. The contractor shall coordinate the exact locations of all mounting, penetrations, or other disturbances to existing surfaces, with the Facility Manager, so that asbestos can be avoided where possible, and necessary steps can be taken where it cannot be avoided.
 - .12 Details of the installation of all equipment or devices shall be coordinated with applicable manufacturer's instructions or guidelines, as well as the plans, details, and written descriptions herein. Any alteration or deviation shall be at the direction of, or approved by, the Facility Manager and/or Consultant.
 - .13 Note: This contract does not include the establishment of an on-going maintenance contract for any existing or new electronic security systems at the Lethbridge Research Centre, or commit the LRC in any regard to establish an on-going maintenance contract with the contractor(s) selected for any of the work included in this contract. A maintenance agreement will be separately arranged following successful completion of this contract, directly by the Lethbridge Research Centre.
 - .14 For each scope of work, modifications or additions to existing IT infrastructure (fiber or other) as may be required to facilitate the scope of work, including connection of the building, equipment or device, to existing IT infrastructure, shall be performed by the contractor, and all associated costs carried under the applicable scope of work. Prior to work performed on existing IT infrastructure, the contractor shall consult with AAFC Facility Manager and AAFC IT staff regarding proper protocols, standards, and equipment placement. Such scope of work, as coordinated with AAFC staff, may include but is not limited to: patch cables, termination, labelling and testing of existing (dark) fiber, and associated hardware and programming. All telecommunications-related work shall be completed, tested, labeled, and documented in accordance with applicable site standards, manufacturer's guidelines, and ANSI/TIEA, BICSI, CSA, IEEE, and TSB standards.
 - .15 Where a scope of work requires the addition of IT hardware or equipment (POE network switch, cabinet enclosure, etc.) and a specific manufacturer or model is not specified, the contractor shall propose a suitable product for review and approval by the AAFC Facility Manager, AAFC IT staff, and Consultant. Once an equipment selection is approved, the same shall be used on all applicable scopes of work, unless a deviation from that selection is approved.
 - .16 Where required, all fiber terminations shall use site standard SC connectors, and all splices shall use fusion splicing.

1.3 PRODUCTS

- .1 Unless otherwise indicated herein, Access Control System devices shall be as follows:
 - .1 Card Reader (CR) (Indoor/Outdoor): Kantech HID Proximity Card Readers, to match existing, provided new to be installed outdoors are weatherproof.
 - .2 Door Position Switch (DS): Airtech 1078 Series Steel Door Contacts, to match existing.
 - .3 Request-to-Exit (REX): Kantech T.Rex Request-to-Exit Detectors

- .4 Edge/Rim Mount Electric Strike (ES) (where retrofitting into existing door frame): HES 9600 Series surface mounted electric strike.
 - .1 Note: Where HES 9600 Series electric strikes are required, provide and install add-on power supply at/in associated Kantech access control panel to provide supplemental output power required, along with Kantech 4204 expansion module to monitor each added power supply.

1.4 SCOPE OF WORK: A01

- .1 The following includes system-wide modifications, changes, upgrades, and shall include all existing access control infrastructure, panels, workstation(s), etc.
- .2 Update server software to latest version (v6). Options for server software updates include 'Corporate Edition Upgrade Path' as a onetime cost.
- .3 Upgrade firmware of all existing access control panels in use at the Lethbridge Research Centre site to latest version available for each access control panel.
- .4 Update licenses of existing access control infrastructure at the Lethbridge Research Centre for all existing infrastructure.
- .5 Enable / configure existing access control server to email designated part(ies) on access control alarm.
- .6 Integrate CCTV and Access Control server(s) and enable / configure system to pop up CCTV camera nearest to door / point of entry of access control operation or alarm. Coordinate with facility to designate CCTV cameras, and type of access control operation and/or alarm to initiate camera pop up.
- .7 Repair / reinstate all existing access control panels at Lethbridge Research Centre to make fully operational. This includes repair of access control panel tamper switches, alarms and monitoring of same, and repair/replacement of existing Dairy Barn Electric Gate KT panel at Building 86.
- .8 Restore/re-enable alarms at access control workstation at Commissionaire Desk.

1.5 SCOPE OF WORK: A10

- .1 Delete existing access control from 'Hallway Doors – 1st Flr. Lab Block Southwest', from Corridor 1500 to Corridor 1454.
- .2 Remove associated wiring back to access control panel KT-10.
- .3 Existing back boxes and conduit are to remain, for possible future re-use.
- .4 Provide new blank stainless steel cover plates for all removed devices.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect deletion of devices.
- .7 Update record drawings to reflect removal of devices, and remaining back boxes and conduit.
- .8 Turn over removed access control devices to Facility Manager.
- .9 Pre-requisite: None.

1.6 SCOPE OF WORK: A11

- .1 Delete existing access control from 'Hallway Doors – 1st Flr. Lab Block Southeast', from Corridor 1500 to Corridor 1574.
- .2 Remove associated wiring back to access control panel KT-10.
- .3 Existing back boxes and conduit are to remain, for possible future re-use.
- .4 Provide new blank stainless steel cover plates for all removed devices.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect deletion of devices.
- .7 Update record drawings to reflect removal of devices, and remaining back boxes and conduit.
- .8 Turn over removed access control devices to Facility Manager.
- .9 Pre-requisite: None.

1.7 SCOPE OF WORK: A12

- .1 Delete existing access control from 'Hallway Doors – 1st Flr. Lab Block Northwest', from Corridor 1500 to Corridor 1458.
- .2 Remove associated wiring back to access control panel KT-12.
- .3 Existing back boxes and conduit are to remain, for possible future re-use.
- .4 Provide new blank stainless steel cover plates for all removed devices.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect deletion of devices.
- .7 Update record drawings to reflect removal of devices, and remaining back boxes and conduit.
- .8 Turn over removed access control devices to Facility Manager.
- .9 Pre-requisite: None.

1.8 SCOPE OF WORK: A13

- .1 Delete existing access control from 'Hallway Doors – 1st Flr. Lab Block Northeast', from Corridor 1500 to Corridor 1580.
- .2 Remove associated wiring back to access control panel KT-12.
- .3 Existing back boxes and conduit are to remain, for possible future re-use.
- .4 Provide new blank stainless steel cover plates for all removed devices.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect deletion of devices.

- .7 Update record drawings to reflect removal of devices, and remaining back boxes and conduit.
- .8 Turn over removed access control devices to Facility Manager.
- .9 Pre-requisite: None.

1.9 SCOPE OF WORK: A14

- .1 At Building 22 – Agronomy, provide & install one (1) Kantech KT-300 (2 door) and one (1) Kantech KT-400 (4 door) access control panels, and access control at six (6) single doors, as shown.
- .2 There is no existing emergency power at this building.
- .3 Connect each new access control panel to a dedicated 120V/15A circuit from the nearest 120/208V/3Ph-4W panel board. Provide and install breaker(s) if new/spare breaker(s) are not available. Coordinate selection of power source with Facility Manager. Update panel directory of affected power panel(s) to reflect new load(s).
- .4 Provide new adhesive label (Brother or similar) on new access control panel(s) to reflect panel designation and power source, e.g. ‘KT-## PANEL ABCD CCT-1’.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control panel(s) and device(s).
- .7 Update record drawings to reflect addition of access control panel(s) and device(s), including panel designations, power source, as well as approximate route of conduit and location of junction box(es), for both power and communications wiring.
- .8 Connect new access control panel(s) to existing IT infrastructure at building.
- .9 Pre-requisite: None.

1.10 SCOPE OF WORK: A15

- .1 At Building 87 – Soil Science, provide & install one (1) Kantech KT-400 (4 door) access control panel, and access control at three (3) single doors, as shown.
- .2 There is no existing emergency power at this building.
- .3 Connect each new access control panel to a dedicated 120V/15A circuit from the nearest 120/208V/3Ph-4W panel board. Provide and install breaker(s) if new/spare breaker(s) are not available. Coordinate selection of power source with Facility Manager. Update panel directory of affected power panel(s) to reflect new load(s).
- .4 Provide new adhesive label (Brother or similar) on new access control panel(s) to reflect panel designation and power source, e.g. ‘KT-## PANEL ABCD CCT-1’.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).

- .6 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control panel(s) and device(s).
- .7 Update record drawings to reflect addition of access control panel(s) and device(s), including panel designations, power source, as well as approximate route of conduit and location of junction box(es), for both power and communications wiring.
- .8 Connect new access control panel(s) to existing IT infrastructure at building.
- .9 Pre-requisite: None.

1.11 SCOPE OF WORK: A16

- .1 At Building 118 – Controlled Environment Building, provide & install one (1) Kantech KT-300 (2 door) access control panel, and access control at one (1) double and one (1) single door, as shown.
- .2 There is existing emergency power at this building.
- .3 Connect each new access control panel to a dedicated 120V/15A circuit from the nearest 120/208V/3Ph-4W emergency power panel board. Provide and install breaker(s) if new/spare breaker(s) are not available. Coordinate selection of power source with Facility Manager. Update panel directory of affected power panel(s) to reflect new load(s).
- .4 Provide new adhesive label (Brother or similar) on new access control panel(s) to reflect panel designation and power source, e.g. ‘KT-## PANEL ABCD CCT-1’.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control panel(s) and device(s).
- .7 Update record drawings to reflect addition of access control panel(s) and device(s), including panel designations, power source, as well as approximate route of conduit and location of junction box(es), for both power and communications wiring.
- .8 Connect new access control panel(s) to existing IT infrastructure at building.
- .9 Pre-requisite: None.

1.12 SCOPE OF WORK: A17

- .1 At Building 123 – Pesticide Storage, provide & install one (1) Kantech KT-400 (4 door) access control panel, and access control at three (3) single doors, as shown.
- .2 There is no existing emergency power at this building.
- .3 Connect each new access control panel to a dedicated 120V/15A circuit from the nearest 120/208V/3Ph-4W power panel board. Provide and install breaker(s) if new/spare breaker(s) are not available. Coordinate selection of power source with Facility Manager. Update panel directory of affected power panel(s) to reflect new load(s).

- .4 Provide new adhesive label (Brother or similar) on new access control panel(s) to reflect panel designation and power source, e.g. 'KT-## PANEL ABCD CCT-1'.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control panel(s) and device(s).
- .7 Update record drawings to reflect addition of access control panel(s) and device(s), including panel designations, power source, as well as approximate route of conduit and location of junction box(es), for both power and communications wiring.
- .8 Connect new access control panel(s) to existing IT infrastructure at building.
- .9 Note that there is no existing IT infrastructure to this building. Provision of IT infrastructure to connect this building to Building 34 – Maintenance Shop is addressed under scope of work M01. Make provisions from new access control panel(s) installed under this scope of work to connect IT infrastructure to be provided under scope of work M01, in coordination with AAFC staff.
- .10 Pre-requisite: None.

1.13 SCOPE OF WORK: A18

- .1 At Building 34 – Maintenance Shop, provide & install one (1) Kantech KT-300 (2 door) and one (1) Kantech KT-400 (4 door) access control panels, and access control at six (6) single doors, as shown.
- .2 There is no existing emergency power at this building.
- .3 Connect each new access control panel to a dedicated 120V/15A circuit from the nearest 120/208V/3Ph-4W panel board. Provide and install breaker(s) if new/spare breaker(s) are not available. Coordinate selection of power source with Facility Manager. Update panel directory of affected power panel(s) to reflect new load(s).
- .4 Provide new adhesive label (Brother or similar) on new access control panel(s) to reflect panel designation and power source, e.g. 'KT-## PANEL ABCD CCT-1'.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control panel(s) and device(s).
- .7 Update record drawings to reflect addition of access control panel(s) and device(s), including panel designations, power source, as well as approximate route of conduit and location of junction box(es), for both power and communications wiring.
- .8 Connect new access control panel(s) to existing IT infrastructure at building.
- .9 Pre-requisite: None.

1.14 SCOPE OF WORK: A19

- .1 At Building 86 – Dairy Barn, provide & install one (1) Kantech KT-300 (2 door) access control panel, and access control at two (2) single doors, as shown.
- .2 There is no existing emergency power at this building.
- .3 Connect each new access control panel to a dedicated 120V/15A circuit from the nearest 120/208V/3Ph-4W panel board. Provide and install breaker(s) if new/spare breaker(s) are not available. Coordinate selection of power source with Facility Manager. Update panel directory of affected power panel(s) to reflect new load(s).
- .4 Provide new adhesive label (Brother or similar) on new access control panel(s) to reflect panel designation and power source, e.g. ‘KT-## PANEL ABCD CCT-1’.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control panel(s) and device(s).
- .7 Update record drawings to reflect addition of access control panel(s) and device(s), including panel designations, power source, as well as approximate route of conduit and location of junction box(es), for both power and communications wiring.
- .8 Connect new access control panel(s) to existing IT infrastructure at building.
- .9 Pre-requisite: None.

1.15 SCOPE OF WORK: A20

- .1 At Building 120 – Engineering, provide & install one (1) Kantech KT-300 (2 door) and one (1) Kantech KT-400 (4 door) access control panels, and access control at five (5) single doors, as shown.
- .2 There is existing emergency power at this building.
- .3 Connect each new access control panel to a dedicated 120V/15A circuit from the nearest 120/208V/3Ph-4W emergency power panel board. Provide and install breaker(s) if new/spare breaker(s) are not available. Coordinate selection of power source with Facility Manager. Update panel directory of affected power panel(s) to reflect new load(s).
- .4 Provide new adhesive label (Brother or similar) on new access control panel(s) to reflect panel designation and power source, e.g. ‘KT-## PANEL ABCD CCT-1’.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control panel(s) and device(s).
- .7 Update record drawings to reflect addition of access control panel(s) and device(s), including panel designations, power source, as well as approximate route of conduit and location of junction box(es), for both power and communications wiring.

.8 Connect new access control panel(s) to existing IT infrastructure at building.

.9 Pre-requisite: None.

1.16 SCOPE OF WORK: A21

.1 At Building 130 – General Storage, provide & install one (1) Kantech KT-400 (4 door) access control panel, and access control at four (4) single doors, as shown.

.2 There is no existing emergency power at this building.

.3 Connect each new access control panel to a dedicated 120V/15A circuit from the nearest 120/208V/3Ph-4W panel board. Provide and install breaker(s) if new/spare breaker(s) are not available. Coordinate selection of power source with Facility Manager. Update panel directory of affected power panel(s) to reflect new load(s).

.4 Provide new adhesive label (Brother or similar) on new access control panel(s) to reflect panel designation and power source, e.g. ‘KT-## PANEL ABCD CCT-1’.

.5 Update programming of affected access control panel(s), and work station(s)/server(s).

.6 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control panel(s) and device(s).

.7 Update record drawings to reflect addition of access control panel(s) and device(s), including panel designations, power source, as well as approximate route of conduit and location of junction box(es), for both power and communications wiring.

.8 Connect new access control panel(s) to existing IT infrastructure at building.

.9 Pre-requisite: None.

1.17 SCOPE OF WORK: A22

.1 At LRC Building 102 – Basement Lab 442, provide & install access control as shown.

.2 Connect new access control devices to existing access control panel KT-10, including all required conduit, connectors, junction boxes, and associated materials.

.3 Update programming of affected access control panel(s), and work station(s)/server(s).

.4 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control device(s).

.5 Update record drawings to reflect addition of access control device(s), including approximate route of conduit and location of junction box(es), for all wiring.

.6 Pre-requisite: A10/A11.

1.18 SCOPE OF WORK: A23

.1 At LRC Building 102 – Basement Lab 418, provide & install access control as shown.

- .2 Connect new access control devices to existing access control panel KT-10, including all required conduit, connectors, junction boxes, and associated materials.
- .3 Update programming of affected access control panel(s), and work station(s)/server(s).
- .4 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control device(s).
- .5 Update record drawings to reflect addition of access control device(s), including approximate route of conduit and location of junction box(es), for all wiring.
- .6 Pre-requisite: A10/A11.

1.19 SCOPE OF WORK: A24

- .1 At LRC Building 102 – Basement Lab 403, provide & install access control as shown.
- .2 Connect new access control devices to existing access control panel KT-12, including all required conduit, connectors, junction boxes, and associated materials.
- .3 Update programming of affected access control panel(s), and work station(s)/server(s).
- .4 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control device(s).
- .5 Update record drawings to reflect addition of access control device(s), including approximate route of conduit and location of junction box(es), for all wiring.
- .6 Pre-requisite: A12/A13.

1.20 SCOPE OF WORK: A25

- .1 At LRC Building 102 – Basement Lab 409, provide & install access control as shown.
- .2 Connect new access control devices to existing access control panel KT-12, including all required conduit, connectors, junction boxes, and associated materials.
- .3 Update programming of affected access control panel(s), and work station(s)/server(s).
- .4 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control device(s).
- .5 Update record drawings to reflect addition of access control device(s), including approximate route of conduit and location of junction box(es), for all wiring.
- .6 Pre-requisite: A12/A13.

1.21 SCOPE OF WORK: A26

- .1 At LRC Building 102 – 1st Floor West Lab Block Service Corridor (1400), provide & install one (1) Kantech KT-400 (4 door) access control panel, as shown. New access control panel designation is KT-13.
- .2 There is existing emergency power at this building.

- .3 Connect each new access control panel to a dedicated 120V/15A circuit from existing 120/208V/3Ph-4W emergency power panel board E2M-4. Provide and install breaker(s) if new/spare breaker(s) are not available. Coordinate selection of power source with Facility Manager. Update panel directory of affected power panel(s) to reflect new load(s).
- .4 Provide new adhesive label (Brother or similar) on new access control panel(s) to reflect panel designation and power source, e.g. 'KT-13 PANEL E2M-4 CCT-#'.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control panel(s) and device(s).
- .7 Update record drawings to reflect addition of access control panel(s), including panel designations, power source, as well as approximate route of conduit and location of junction box(es), for both power and communications wiring.
- .8 Connect new access control panel(s) to existing IT infrastructure at building.
- .9 Pre-requisite: None.

1.22 SCOPE OF WORK: A27

- .1 At LRC Building 102 – Basement Lab 452, provide & install access control as shown.
- .2 Connect new access control devices to new access control panel KT-13, including all required conduit, connectors, junction boxes, and associated materials.
- .3 Update programming of affected access control panel(s), and work station(s)/server(s).
- .4 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control device(s).
- .5 Update record drawings to reflect addition of access control device(s), including approximate route of conduit and location of junction box(es), for all wiring.
- .6 Pre-requisite: A26.

1.23 SCOPE OF WORK: A28

- .1 At LRC Building 102 – Basement Lab 453, provide & install access control as shown.
- .2 Connect new access control devices to new access control panel KT-13, including all required conduit, connectors, junction boxes, and associated materials.
- .3 Update programming of affected access control panel(s), and work station(s)/server(s).
- .4 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control device(s).
- .5 Update record drawings to reflect addition of access control device(s), including approximate route of conduit and location of junction box(es), for all wiring.
- .6 Pre-requisite: A26.

1.24 SCOPE OF WORK: A29

- .1 At LRC Building 102 – Basement B-017 Double Doors (Administration Basement Hallway) – revise access control at double doors as shown – remove existing Request to Exit (REX), provide new Card Reader (CR) on B-017 side of door.
- .2 Turn over removed REX to Facility Manager.
- .3 Reprogram associated access control panel such that CR is required to open door in either direction, and so that doors fail secure.
- .4 Update programming of affected access control panel(s), and work station(s)/server(s).
- .5 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control device(s).
- .6 Update record drawings to reflect change of access control device(s), including approximate route of conduit and location of junction box(es), for all wiring.
- .7 Pre-requisite: None.

1.25 SCOPE OF WORK: A30

- .1 Delete existing access control from ‘Hallway Doors – 3rd Flr. Lab Block Southwest’, from Corridor 3500 to Corridor 3427.
- .2 Remove associated wiring back to access control panel KT-29.
- .3 Existing back boxes and conduit are to remain, for possible future re-use.
- .4 Provide new blank stainless steel cover plates for all removed devices.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect deletion of devices.
- .7 Update record drawings to reflect removal of devices, and remaining back boxes and conduit.
- .8 Turn over removed access control devices to Facility Manager.
- .9 Pre-requisite: None.

1.26 SCOPE OF WORK: A31

- .1 Delete existing access control from ‘Hallway Doors – 3rd Flr. Lab Block Southeast’, from Corridor 3500 to Corridor 3515.
- .2 Remove associated wiring back to access control panel KT-29.
- .3 Existing back boxes and conduit are to remain, for possible future re-use.
- .4 Provide new blank stainless steel cover plates for all removed devices.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect deletion of devices.

- .7 Update record drawings to reflect removal of devices, and remaining back boxes and conduit.
- .8 Turn over removed access control devices to Facility Manager.
- .9 Pre-requisite: None.

1.27 SCOPE OF WORK: A32

- .1 Delete existing access control from 'Hallway Doors – 3rd Flr. Lab Block Northwest', from Corridor 3500 to Corridor 3445.
- .2 Remove associated wiring back to access control panel KT-30.
- .3 Existing back boxes and conduit are to remain, for possible future re-use.
- .4 Provide new blank stainless steel cover plates for all removed devices.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect deletion of devices.
- .7 Update record drawings to reflect removal of devices, and remaining back boxes and conduit.
- .8 Turn over removed access control devices to Facility Manager.
- .9 Pre-requisite: None.

1.28 SCOPE OF WORK: A33

- .1 Delete existing access control from 'Hallway Doors – 3rd Flr. Lab Block Northeast', from Corridor 3500 to Corridor 3560.
- .2 Remove associated wiring back to access control panel KT-30.
- .3 Existing back boxes and conduit are to remain, for possible future re-use.
- .4 Provide new blank stainless steel cover plates for all removed devices.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect deletion of devices.
- .7 Update record drawings to reflect removal of devices, and remaining back boxes and conduit.
- .8 Turn over removed access control devices to Facility Manager.
- .9 Pre-requisite: None.

1.29 SCOPE OF WORK: A34

- .1 At LRC Building 102 – 3rd Floor Lab 3536, provide & install access control as shown.
- .2 Connect new access control devices to existing access control panel KT-29, including all required conduit, connectors, junction boxes, and associated materials.

- .3 Update programming of affected access control panel(s), and work station(s)/server(s).
- .4 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control device(s).
- .5 Update record drawings to reflect addition of access control device(s), including approximate route of conduit and location of junction box(es), for all wiring.
- .6 Pre-requisite: A30 or A31.

1.30 SCOPE OF WORK: A35

- .1 Delete existing access control from 'Hallway Doors – 2nd Flr. Lab Block Northwest', from Corridor 2400 to Corridor 2456.
- .2 Remove associated wiring back to access control panel KT-23.
- .3 Existing back boxes and conduit are to remain, for possible future re-use.
- .4 Provide new blank stainless steel cover plates for all removed devices.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect deletion of devices.
- .7 Update record drawings to reflect removal of devices, and remaining back boxes and conduit.
- .8 Turn over removed access control devices to Facility Manager.
- .9 Pre-requisite: None.

1.31 SCOPE OF WORK: A36

- .1 Delete existing access control from 'Hallway Doors – 2nd Flr. Lab Block Northeast', from Corridor 2400 to Corridor 2580.
- .2 Remove associated wiring back to access control panel KT-23.
- .3 Existing back boxes and conduit are to remain, for possible future re-use.
- .4 Provide new blank stainless steel cover plates for all removed devices.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect deletion of devices.
- .7 Update record drawings to reflect removal of devices, and remaining back boxes and conduit.
- .8 Turn over removed access control devices to Facility Manager.
- .9 Pre-requisite: None.

1.32 SCOPE OF WORK: A37

- .1 Delete existing access control from 'Hallway Doors – 2nd Flr. Lab Block Southwest', from Corridor 2400 to Corridor 2452.

- .2 Remove associated wiring back to access control panel KT-24.
- .3 Existing back boxes and conduit are to remain, for possible future re-use.
- .4 Provide new blank stainless steel cover plates for all removed devices.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect deletion of devices.
- .7 Update record drawings to reflect removal of devices, and remaining back boxes and conduit.
- .8 Turn over removed access control devices to Facility Manager.
- .9 Pre-requisite: None.

1.33 SCOPE OF WORK: A38

- .1 Delete existing access control from 'Hallway Doors – 2nd Flr. Lab Block Southeast', from Corridor 2400 to Corridor 2574.
- .2 Remove associated wiring back to access control panel KT-24.
- .3 Existing back boxes and conduit are to remain, for possible future re-use.
- .4 Provide new blank stainless steel cover plates for all removed devices.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect deletion of devices.
- .7 Update record drawings to reflect removal of devices, and remaining back boxes and conduit.
- .8 Turn over removed access control devices to Facility Manager.
- .9 Pre-requisite: None.

1.34 SCOPE OF WORK: A39

- .1 At LRC Building 102 – 2nd Floor Lab 2534, provide & install access control (1 door) and door position switch (1 door) as shown.
- .2 Connect new access control devices to existing access control panel KT-23, including all required conduit, connectors, junction boxes, and associated materials.
- .3 Update programming of affected access control panel(s), and work station(s)/server(s).
- .4 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control device(s).
- .5 Update record drawings to reflect addition of access control device(s), including approximate route of conduit and location of junction box(es), for all wiring.
- .6 Pre-requisite: A37 or A38.

1.35 SCOPE OF WORK: A40

- .1 Not used.

1.36 SCOPE OF WORK: A41

- .1 Not used.

1.37 SCOPE OF WORK: A42

- .1 Not used.

1.38 SCOPE OF WORK: A43

- .1 Not used.

1.39 SCOPE OF WORK: A44

- .1 At LRC Building 102 – Elevator Cab (off Corridor 1500), provide & install card reader to control access to Penthouse as shown.
- .2 Connect new access control devices to new access control panel KT-13, including all required conduit, connectors, junction boxes, and associated materials.
- .3 Integrate with existing elevator controller.
- .4 Contractor shall carry all costs associated with having Otis Elevator (Lethbridge Office) make all changes to elevator controller/programming necessary to provide card reader control, including provision and installation of all materials as may be required (e.g. traveller cable), and final testing / commissioning to modified controls.
- .5 Update programming of affected access control panel(s), and work station(s)/server(s).
- .6 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control device(s).
- .7 Update record drawings to reflect addition of access control device(s), including approximate route of conduit and location of junction box(es), for all wiring.
- .8 Pre-requisite: A26.

1.40 SCOPE OF WORK: A45

- .1 At LRC Building 102 – Rm. 3452, provide & install access control as shown.
- .2 Connect new access control devices to existing access control panel KT-29, including all required conduit, connectors, junction boxes, and associated materials.
- .3 Update programming of affected access control panel(s), and work station(s)/server(s).
- .4 Update onsite documentation with printed / typewritten page(s) to reflect addition of access control device(s).

- .5 Update record drawings to reflect addition of access control device(s), including approximate route of conduit and location of junction box(es), for all wiring.
- .6 Pre-requisite: A30 or A31.

1.41 SCOPE OF WORK: A46

- .1 At LRC Building 102 – Stores SC27 Interior Double Doors, remove existing maglocks and retrofit with new electric strikes as shown.
- .2 Include all required conduit, connectors, junction boxes, and associated materials.
- .3 Update programming of affected access control panel(s), and work station(s)/server(s).
- .4 Update onsite documentation with printed / typewritten page(s) to reflect change of access control device(s).
- .5 Update record drawings to reflect change of access control device(s), including approximate route of conduit and location of junction box(es), for all wiring.
- .6 Pre-requisite: None.

1.42 SCOPE OF WORK: M01

- .1 At Bldg. 123 (Pesticide Storage) and Bldg. 34 (Maintenance Shop), provide Proxim Wireless Tsunami Quickbridge 825 Series Ethernet bridge, or approved equal.
- .2 At Bldg. 34 (Maintenance Shop), connect Ethernet bridge to existing IT infrastructure to extend IT infrastructure to Bldg. 123 (Pesticide Storage).
- .3 At Bldg. 123 (Pesticide Storage), connect from Ethernet bridge to new access control panel(s), to provide IT connectivity to existing access control system via Bldg. 34 (Maintenance Shop) existing IT infrastructure.
- .4 Update onsite documentation in coordination with AAFC IT staff to reflect IT additions/modifications.
- .5 Update record drawings to reflect addition of IT connectivity devices, power circuits used to feed added/modified devices, as well as approximate route of conduit and location of junction box(es), for both power and communications cabling. Provide updated typewritten panel directories for affected panelboards.
- .6 Pre-requisite: None.

1.43 SCOPE OF WORK: M02

- .1 This scope of work includes all aspects related to providing a new powered Jail Road Gate, complete with remote gate operation, card reader gate control (both sides), CCTV camera, intercom (to connect to Commissionaire's desk), etc. as shown on the plans and details. This new gate replaces an existing manual gate.
- .2 The existing Jail Road gate is to be removed, in coordination with the Facility Manager.

- .3 The new Jail Road gate will be located approx. 80' South of the existing intersection. The exact location is to be coordinated with the Facility Manager.
- .4 At existing Weather Station, existing panelboard is to be replaced with new, including weatherproof enclosure to replace existing, with panelboard type and configuration to match existing, sized so as to provide additional breakers required to sub-feed panelboard in enclosure at Jail Road gate and minimum additional three (3) breaker spaces. Panelboard replacement includes re-servicing all existing loads fed from existing panelboard. Coordinate with Facility Manager.
- .5 Contractor is to provide an install the following items as part of this new gate, in accordance with manufacturer's instructions, the plans, details, and specifications in this package, in complete coordination with the Facility Manager:
 - .1 Gate: Automatic Systems BL 52 gate, including structure for gate base unit and gate 'saddle' as detailed. Road is approximately 27' wide – confirm/coordinate exact gate arm length required onsite. Complete with optional features:
 - .1 Barrier Arm: Confirm/coordinate exact length required onsite.
 - .2 Barrier Arm Signage: STOP sign with a diameter of 300mm, to be mounted at midpoint of gate arm.
 - .3 Heater: Additional heater to provide for operation below -25 degrees C (-13 degrees F). Coordinate and account for additional power required in electrical service to gate base unit.
 - .4 Actuation Devices: Gate shall allow for operation from access control system (card readers on adjacent pedestals / existing Kantech Access Control System), as well as remote operation from bush buttons located at Commissionaire's desk at LRC Building 102.
 - .2 Fence: Extend / modify / re-route existing fence to extend to new gate location. Coordinate exact routing/details with Facility Manager.
 - .3 Enclosure: AC Dandy or approved equal enclosure, EEMAC/NEMA TYPE 4X/IP56, approx. 48" H x 36" W x 10" Min. Deep, dual door, Model # DB-2D-48-36-10-HHB. Final size to be confirmed following final selection and layout of equipment and conduit to be installed.
 - .1 Enclosure heater: CSA approved min. 300W, complete with adjustable thermostat is to be provided with enclosure and wired in to panel to be provided.
 - .4 Panelboard – to be installed in enclosure. 120/208V/3Ph-4W/100A/12cct panelboard, to power gate, lights, enclosure heater, and other electronics noted herein. Provide and install all required breakers. Power is to be run direct buried in ditch back to Weather Station and fed from existing distribution with 60A breaker. Coordinate panel type (120/208V/3Ph-4W vs. 120/240V/1Ph-3W), feeder, and breaker type to match existing power source at Weather Station.
 - .5 Access Control Panel – to be installed in enclosure. Kantech KT-100 or KT-300 panel as required to connect noted card readers and intercom, and provide remote operation of gate from Commissionaire's desk remote gate operation push button. Provide new adhesive label (Brother or similar) on new access control

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- panel(s) to reflect panel designation and power source, e.g. 'KT-## PANEL ABCD CCT-1'.
- .6 CCTV NVR – to be installed in enclosure. American Dynamics VideoEdge 4-channel IP encoder, to record and connect CCTV camera to central CCTV video viewing/recording at Bldg. 102.
 - .7 Network switch – POE IP network switch (minimum 4-port), to be procured and installed by the Contractor.
 - .8 Intercom Network Interface Unit – Provide Kintronics IP7-ST Network Interface Unit, or approved equal, to connect to pedestal mounted intercom and network switch. Network Interface Unit shall support operation over wireless network. Complete intercom system/installation shall be of one manufacturer, including base station at Commissionaire's desk in LRC Building 102, Network Interface Units, and intercom stations mounted on pedestal or other.
 - .9 Post: 6" x 6" pressure treated wood post, including structure as detailed.
 - .10 Sign: Powder coated / baked enamel metal sign, approx. 24" x 36" to be installed on post as detailed. Verbiage to be provided by Facility Manager.
 - .11 Wireless IT connectivity, to be installed on post: Provide Proxim Wireless Tsunami Quickbridge 825 Series Ethernet bridge, or approved equal. Tie in to IT hardware in enclosure to provide connectivity of access control, intercom, CCTV and remote gate operation to Bldg. 102.
 - .12 Wireless IT connectivity, to be installed in line of sight at ceiling of 2nd floor of Bldg. 102 on SE exterior wall: Provide Proxim Wireless Tsunami Quickbridge 825 Series Ethernet bridge, or approved equal. Tie in to IT infrastructure in Bldg. 102 to provide connectivity of access control, intercom, CCTV and remote gate operation at Jail Road Gate.
 - .13 Lights: Provide two post mounted lights, one each to light signage mounted below on post and gate area. Hubbell Dusk-To-Dawn DDL LED luminaire complete with integral photo electric control, Catalogue # DDL-9L-1 or approved equal.
 - .14 Provide one (1) American Dynamics Illustra Flex 800 Bullet POE IP Day/Night camera, or approved equal, 3MP, 9-22mm varifocal lens, complete with integral heater to be mounted on post and cabled back to POE network switch / CCTV NVR in enclosure, for viewing and recording at Bldg. 102.
 - .15 Pedestal (Entry): Provide min. 4" square hot dipped galvanized pedestal complete with base plate, including structure as detailed.
 - .16 Access Control (Entry):
 - .1 Provide Kantech HID Proximity card reader, mounted on pedestal, connected to access control panel in enclosure.
 - .2 Provide intercom station, mounted on pedestal, to connect to Commissionaire's desk intercom base station via Network Interface Unit at enclosure. Intercom station shall be Kintronics CIS4-ST IP Vandal Resistant Intercom with hooded, surface mount, outdoor enclosure, integral speaker/microphone and momentary, normally open, push-to-call button, or approved equal. Complete intercom system/installation shall be of one manufacturer, including base station at Commissionaire's

desk in LRC Building 102, Network Interface Units, and intercom stations mounted on pedestal or other.

- .17 Pedestal (Exit): Provide min. 4" square hot dipped galvanized pedestal complete with base plate, including structure as detailed.
- .18 Access Control (Exit):
 - .1 Provide Kantech HID Proximity card reader, mounted on pedestal, connected to access control panel in enclosure.
- .6 Update onsite documentation with printed / typewritten page(s) to reflect modifications/additions to access control system, CCTV, updated printed/typewritten panelboard directories for affected panelboard(s).
- .7 Update record drawings to reflect modifications/additions to access control system, CCTV, power panelboards, as well as approximate routing of conduit and location of junction box(es), for both power and communications wiring.
- .8 Provide new adhesive label (Brother or similar) on new access control panel(s) to reflect panel designation and power source, e.g. 'KT-## PANEL ABCD CCT-1'.
- .9 Update programming of affected access control panel(s), and work station(s)/server(s).
- .10 Pre-requisite: M05 (Intercom Base Station).

1.44 SCOPE OF WORK: M03

- .1 Power: Within Bldg. 86, Contractor shall provide and install a new 120/208V/3Ph-4W/100A/30cct panelboard in the main electrical room, to be sub-fed from existing panel at same location. Source panel to be confirmed by Facility Manager. Contractor shall provide and install 3-pole 60A breaker in source panel, coordinating shutdowns as may be required with Facility Manager, as well as required breakers in new panel for loads outlined in scopes of work M04, and M06, and minimum 10% spare 15A-1-pole breakers in new panel.
- .2 Provide printed / typewritten panel directory for affected panelboards to reflect all changes/additions to loads, as well as spare breakers and breaker spaces.
- .3 Pre-requisite: None.

1.45 SCOPE OF WORK: M04

- .1 This scope of work includes all aspects related to providing a new powered gate NE of Bldg. 86, complete with remote gate operation, card reader gate control (both sides), etc. as shown on the plans and details. This new gate replaces an existing manual gate.
- .2 The existing gate NE of Bldg. 86 is to be removed, in coordination with the Facility Manager.
- .3 The new gate NE of Bldg. 86 will be located in approximately the same location as the existing gate. The exact location is to be coordinated with the Facility Manager.

- .4 Contractor is to provide an install the following items as part of this new gate, in accordance with manufacturer's instructions, the plans, details, and specifications in this package, in complete coordination with the Facility Manager:
 - .1 Power: Power for gate is to be fed from new panel in Bldg. 86 main electrical room.
 - .2 Gate: Automatic Systems BL 52 gate, including structure for gate base unit and gate 'saddle' as detailed. Road is approximately 32' wide – confirm/coordinate exact gate arm length required onsite. Complete with optional features:
 - .1 Barrier Arm: Confirm/coordinate exact length required onsite.
 - .2 Barrier Arm Signage: STOP sign with a diameter of 300mm, to be mounted at midpoint of gate arm.
 - .3 Heater: Additional heater to provide for operation below -25 degrees C (-13 degrees F). Coordinate and account for additional power required in electrical service to gate base unit.
 - .4 Actuation Devices: Gate shall allow for operation from access control system (card readers on adjacent pedestals / existing Kantech Access Control System), as well as remote operation from bush buttons located at Commissionaire's desk at LRC Building 102.
 - .3 Fence: Extend / modify / re-route existing fence to extend to new gate location. Coordinate exact routing/details with Facility Manager.
 - .4 Access Control Panel – access control devices shall be connected to existing Kantech KT access control panel within Bldg. 86.
 - .5 Intercom Network Interface Unit – Provide Kintronics IP7-ST Network Interface Unit, or approved equal, to connect to pedestal mounted intercom and network switch. Network Interface Unit shall support operation over wireless network. Complete intercom system/installation shall be of one manufacturer, including base station at Commissionaire's desk in LRC Building 102, Network Interface Units, and intercom stations mounted on pedestal or other. Coordinate location of Network Interface Unit with Building 86 with Facility Manager.
 - .6 Post: 6" x 6" pressure treated wood post, including structure as detailed.
 - .7 Sign: Powder coated / baked enamel metal sign, approx. 24" x 36" to be installed on post as detailed. Verbiage to be provided by Facility Manager.
 - .8 Pedestal (Entry): Provide min. 4" square hot dipped galvanized pedestal complete with base plate, including structure as detailed.
 - .9 Access Control (Entry):
 - .1 Provide Kantech HID Proximity card reader, mounted on pedestal, connected to existing Kantech KT access control panel in Bldg. 86.
 - .2 Provide intercom station, mounted on pedestal, to connect to Commissionaire's desk intercom base station via Network Interface Unit at enclosure. Intercom station shall be Kintronics CIS4-ST IP Vandal Resistant Intercom with hooded, surface mount, outdoor enclosure, integral speaker/microphone and momentary, normally open, push-to-call button, or approved equal. Complete intercom system/installation shall be of one manufacturer, including base station at Commissionaire's

desk in LRC Building 102, Network Interface Units, and intercom stations mounted on pedestal or other.

- .10 Pedestal (Exit): Provide min. 4" square hot dipped galvanized pedestal complete with base plate, including structure as detailed.
- .11 Access Control (Exit):
 - .1 Provide Kantech HID Proximity card reader, mounted on pedestal, connected to existing Kantech KT access control panel in Bldg. 86.
- .5 Update onsite documentation with printed / typewritten page(s) to reflect modifications/additions to access control system, CCTV, updated printed/typewritten panelboard directories for affected panelboard(s).
- .6 Update record drawings to reflect modifications/additions to access control system, CCTV, power panelboards, as well as approximate routing of conduit and location of junction box(es), for both power and communications wiring.
- .7 Update programming of affected access control panel(s), and work station(s)/server(s).
- .8 Pre-requisite: M03 (Power), M05 (Intercom Base Station).

1.46 SCOPE OF WORK: M05

- .1 This scope of work includes all aspects related to providing, installing, configuring, and testing a new intercom system base station, associated hardware and software, at the Commissionaire's Desk in LRC Building 102, to connect to intercom stations to be installed under separate scopes of work, e.g. at gates.
- .2 Provide white POE IP desktop intercom base station on Commissionaire's Desk in LRC Building 102, Kintronics EDW-PoE, or approved equal, to be connected to POE network switch, so as to provide connectivity to intercom stations to be installed under separate scopes of work. Coordinate location of intercom base station with Facility Manager. Complete intercom system/installation shall be of one manufacturer, including base station at Commissionaire's desk in LRC Building 102, Network Interface Units, and intercom stations mounted on pedestal or other.
- .3 Coordinate installation of central software to manage intercom system with Facility Manager and AAFC IT staff.
- .4 Pre-requisite: None.

1.47 SCOPE OF WORK: M06

- .1 This scope of work includes all aspects related to providing a new powered gate SE of Bldg. 38, complete with remote gate operation, card reader gate control (both sides), CCTV camera, etc. as shown on the plans and details. This new gate replaces an existing manual gate.
- .2 The existing gate SE of Bldg. 38 is to be removed, in coordination with the Facility Manager.

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- .3 The new gate SE of Bldg. 38 will be set back from the road. The exact location is to be coordinated with the Facility Manager.
 - .4 Contractor is to provide and install the following items as part of this new gate, in accordance with manufacturer's instructions, the plans, details, and specifications in this package, in complete coordination with the Facility Manager:
 - .1 Power: Power for gate and other equipment at this gate shall be powered from the new panelboard to be installed in the enclosure.
 - .2 Gate: Automatic Systems BL 52 gate, including structure for gate base unit and gate 'saddle' as detailed. Road is approximately 30' wide – confirm/coordinate exact gate arm length required onsite. Complete with optional features:
 - .1 Barrier Arm: Confirm/coordinate exact length required onsite.
 - .2 Barrier Arm Signage: STOP sign with a diameter of 300mm, to be mounted at midpoint of gate arm.
 - .3 Heater: Additional heater to provide for operation below -25 degrees C (-13 degrees F). Coordinate and account for additional power required in electrical service to gate base unit.
 - .4 Actuation Devices: Gate shall allow for operation from access control system (card readers on adjacent pedestals / existing Kantech Access Control System), as well as remote operation from bush buttons located at Commissionaire's desk at LRC Building 102.
 - .3 Fence: Extend / modify / re-route existing fence to extend to new gate location. Coordinate exact routing/details with Facility Manager.
 - .4 Enclosure: AC Dandy or approved equal enclosure, EEMAC/NEMA TYPE 4X/IP56, approx. 48" H x 36" W x 10" Min. Deep, dual door, Model # DB-2D-48-36-10-HHB. Final size to be confirmed following final selection and layout of equipment and conduit to be installed.
 - .1 Enclosure heater: CSA approved min. 300W, complete with adjustable thermostat is to be provided with enclosure and wired in to panel to be provided.
 - .5 Panelboard – to be installed in enclosure. 120/208V/3Ph-4W/100A/12cct panelboard, to power gate, lights, enclosure heater, and other electronics noted herein. Provide and install all required breakers. Power is to be run direct buried back to Bldg. 86 and fed from new panelboard provided in scope of work M03.
 - .6 Access Control Panel – to be installed in enclosure. Kantech KT-100 or KT-300 panel as required to connect noted card readers, and provide remote operation of gate from Commissionaire's desk remote gate operation push button. Provide new adhesive label (Brother or similar) on new access control panel(s) to reflect panel designation and power source, e.g. 'KT-## PANEL ABCD CCT-1'.
 - .7 CCTV NVR – to be installed in enclosure. American Dynamics VideoEdge 4-channel IP encoder, to record and connect CCTV camera to central CCTV video viewing/recording at Bldg. 102.
 - .8 Network switch – POE IP network switch (minimum 4-port), to be procured and installed by the Contractor.
 - .9 Post: 6" x 6" pressure treated wood post, including structure as detailed.

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- .10 Sign: Powder coated / baked enamel metal sign, approx. 24" x 36" to be installed on post as detailed. Verbiage to be provided by Facility Manager.
 - .11 IT connectivity: IT connectivity of items within this scope of work is to be via Bldg. 86.
 - .12 Lights: Provide two post mounted lights, one each to light signage mounted below on post and gate area. Hubbell Dusk-To-Dawn DDL LED luminaire complete with integral photo electric control, Catalogue # DDL-9L-1 or approved equal.
 - .13 Provide one (1) American Dynamics Illustra Flex 800 Bullet POE IP Day/Night camera, or approved equal, 3MP, 9-22mm varifocal lens, complete with integral heater to be mounted on post and cabled back to POE network switch / CCTV NVR in enclosure, for viewing and recording at Bldg. 102.
 - .14 Pedestal (Entry): Provide min. 4" square hot dipped galvanized pedestal complete with base plate, including structure as detailed.
 - .15 Access Control (Entry):
 - .1 Provide Kantech HID Proximity card reader, mounted on pedestal, connected to access control panel in enclosure.
 - .16 Pedestal (Exit): Provide min. 4" square hot dipped galvanized pedestal complete with base plate, including structure as detailed.
 - .17 Access Control (Exit):
 - .1 Provide Kantech HID Proximity card reader, mounted on pedestal, connected to access control panel in enclosure.
 - .5 Update onsite documentation with printed / typewritten page(s) to reflect modifications/additions to access control system, CCTV, updated printed/typewritten panelboard directories for affected panelboard(s).
 - .6 Update record drawings to reflect modifications/additions to access control system, CCTV, power panelboards, as well as approximate routing of conduit and location of junction box(es), for both power and communications wiring.
 - .7 Provide new adhesive label (Brother or similar) on new access control panel(s) to reflect panel designation and power source, e.g. 'KT-## PANEL ABCD CCT-1'.
 - .8 Update programming of affected access control panel(s), and work station(s)/server(s).
 - .9 Pre-requisite: M03 (Power), M04 (Network switch, CCTV NVR).

1.48 SCOPE OF WORK: M07

- .1 This scope of work includes all aspects related to providing, installing, configuring, and testing a new desktop pushbutton control, to be located on the Commissionaire's Desk in LRC Building 102, to remotely operate powered gates to be installed under scopes of work M02, M04, and M06.
- .2 Provide painted metal or stainless steel enclosure with commercial-grade pushbuttons, minimum three (3) pushbuttons, to connect to and provide remote operation of powered gates to be installed under scopes of work M02, M04, and M06. Coordinate placement of

pushbutton enclosure with Facility Manager. Coordinate specification and connectivity requirements for pushbuttons with gate manufacturer to ensure operability.

- .3 Pre-requisite: M02, M04, M06 (Gate Base Unit with controller).

1.49 SCOPE OF WORK: M08

- .1 Not used.

1.50 SCOPE OF WORK: M09

- .1 At LRC Building 102 – Data Centre 3450, provide and install expanded metal mesh to fully close in West wall above ceiling. Affix expanded metal mesh to existing studs above ceiling and make secure.
- .2 Fully coordinate work with Facility Manager with respect to timing and all preparatory work and clean up that may be required to prevent impeding function of data centre.
- .3 Pre-requisite: None.

1.51 SCOPE OF WORK: C01

- .1 This scope of work includes the removal of the existing Intevo CCTV Video DVR, replacement with a new American Dynamics VideoEdge NVR and Victor VM server, and all associated work to provide for live viewing, recording, and playback of all existing CCTV cameras and those added under this contract, as well as integration with the existing access control system in use so as to provide popup of designated CCTV cameras with access control activity/alarm.
- .2 Remove existing Kantech Intevo DVR from closet behind Commissionaire’s desk and turn over to Facility Manager.
- .3 Provide new wall mount enclosure (min. 20U) complete with 19” rails and all required mounting hardware, to be wall mounted in closet behind Commissionaire’s desk to house new NVR, VM server, and associated hardware. Enclosure shall include minimum one PDU sized to feed equipment outlined herein. Provide bond of new enclosure to existing building ground system.
- .4 Provide new American Dynamics VideoEdge NVR in new wall mount enclosure. NVR minimum storage of all cameras at maximum image quality shall be forty five (45) days, plus 25% spare capacity for future growth. Coordinate SSA and licensing requirements with Facility Manager (minimum one (1) year license for all existing/new cameras). Provide all associated setup/configuration, testing/commissioning, documentation and training of site staff.
- .5 Provide new American Dynamics Victor Video Management server in new wall mount enclosure, with ‘Basic Client’ workstation configuration as a minimum and all associated setup/configuration, testing/commissioning, documentation and training of site staff.

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- .6 Setup/configuration, testing/commissioning, documentation and training is to include full live viewing, recording, and playback of all existing/new CCTV cameras at existing monitors on Commissionaire's desk, as well as complete integration with existing Kantech access control server(s) to provide automatic popup of designated CCTV cameras with access control activity/alarm.
 - .7 All modifications/additions affecting existing IT infrastructure shall be coordinated fully with AAFC IT staff.
 - .8 Update onsite documentation with printed / typewritten page(s) to reflect modifications/additions to CCTV infrastructure, and updated printed/typewritten panelboard directories for affected panelboard(s).
 - .9 Update record drawings to reflect modifications/additions to CCTV infrastructure, power panelboards, as well as approximate routing of conduit and location of junction box(es), for both power and communications wiring.
 - .10 Update programming of affected access control panel(s), and work station(s)/server(s).
 - .11 Pre-requisite: None.

1.52 SCOPE OF WORK: C10

- .1 In Building 100, provide one network switch – POE IP network switch (minimum 4-port), to be procured and installed by the Contractor. Switch location and power source to be coordinated with Facility Manger. Connect to existing IT infrastructure at Building 100 in coordination with AAFC IT staff.
- .2 In Building 100, provide one CCTV NVR – American Dynamics VideoEdge 4-channel IP encoder, to record and connect CCTV camera(s) to central CCTV video viewing/recording at Bldg. 102. NVR location and power source to be coordinated with Facility Manager. Connect to existing IT infrastructure at Building 100 in coordination with AAFC IT staff.
- .3 CCTV: Provide one (1) American Dynamics Illustra Flex 800 Bullet POE IP Day/Night camera, or approved equal, 3MP, 9-22mm varifocal lens, complete with integral heater to be mounted on North exterior wall of Building 100 and cabled back to POE network switch / CCTV NVR in Building 100, for viewing and recording at Bldg. 102. Point of view: Fuel tanks North of Building 100 / West of Building 122.
- .4 Pre-requisite: None.

1.53 SCOPE OF WORK: C11

- .1 CCTV: Provide one (1) American Dynamics Illustra Flex 800 Bullet POE IP Day/Night camera, or approved equal, 3MP, 9-22mm varifocal lens, complete with integral heater to be mounted on North/Northeast exterior wall of Building 86 and cabled back to POE network switch / CCTV NVR in Building 86, for viewing and recording at Bldg. 102. Point of view: Gate NE of Building 86.

- .2 Pre-requisite: M04 (Network switch, CCTV NVR).

1.54 SCOPE OF WORK: C12

- .1 CCTV: Provide one (1) American Dynamics Illustra Flex 800 Bullet POE IP Day/Night camera, or approved equal, 3MP, 9-22mm varifocal lens, complete with integral heater to be mounted on South/South East exterior wall of Building 86 and cabled back to POE network switch / CCTV NVR in Building 86, for viewing and recording at Bldg. 102. Point of view: Gate SE of Building 86.
- .2 Pre-requisite: M04 (Network switch, CCTV NVR).

1.55 SCOPE OF WORK: C13

- .1 CCTV: Provide one (1) American Dynamics Illustra Flex 800 Bullet POE IP Day/Night camera, or approved equal, 3MP, 9-22mm varifocal lens, complete with integral heater to be mounted on East exterior wall of Building 102 and cabled back to network switch / NVR in Building 102, for viewing and recording at Bldg. 102. Point of view: Fleet parking East of Building 102 / West of Building 22.
- .2 Pre-requisite: None.

1.56 SCOPE OF WORK: C14

- .1 In LRC Building 102 – Replace four (4) existing analog CCTV cameras with new American Dynamics Illustra 610 Mini-Dome Indoor POE IP cameras, or approved equal.
- .2 Provide Nitek Etherstretch Coax-to-UTP Video Balun Transceivers, or approved equal, at both ends of existing coax cabling and connect to existing DVR in closet behind Commissionaire’s desk.
- .3 Pre-requisite: None.

1.57 SCOPE OF WORK: C15

- .1 In Building 22, provide one network switch – POE IP network switch (minimum 4-port), to be procured and installed by the Contractor. Switch location and power source to be coordinated with Facility Manger. Connect to existing IT infrastructure at Building 22 in coordination with AAFC IT staff.
- .2 In Building 22, provide one CCTV NVR – American Dynamics VideoEdge 4-channel IP encoder, to record and connect CCTV camera(s) to central CCTV video viewing/recording at Bldg. 102. NVR location and power source to be coordinated with Facility Manager. Connect to existing IT infrastructure at Building 22 in coordination with AAFC IT staff.
- .3 CCTV: Provide one (1) American Dynamics Illustra Flex 800 Bullet POE IP Day/Night camera, or approved equal, 3MP, 9-22mm varifocal lens, complete with integral heater to be mounted on North exterior wall of Building 22 and cabled back to POE network

switch / CCTV NVR in Building 22, for viewing and recording at Bldg. 102. Point of view: Gate North of Building 22 / Equipment Storage area NE of Building 22.

- .4 Pre-requisite: None.

1.58 SCOPE OF WORK: C16

- .1 In Building 34, provide one network switch – POE IP network switch (minimum 4-port), to be procured and installed by the Contractor. Switch location and power source to be coordinated with Facility Manger. Connect to existing IT infrastructure at Building 34 in coordination with AAFC IT staff.
- .2 In Building 34, provide one CCTV NVR – American Dynamics VideoEdge 4-channel IP encoder, to record and connect CCTV camera(s) to central CCTV video viewing/recording at Bldg. 102. NVR location and power source to be coordinated with Facility Manager. Connect to existing IT infrastructure at Building 34 in coordination with AAFC IT staff.
- .3 CCTV: Provide three (3) American Dynamics Illustra Flex 800 Bullet POE IP Day/Night cameras, or approved equal, 3MP, 9-22mm varifocal lens, complete with integral heater, mounted as noted below and each cabled back to POE network switch / CCTV NVR in Building 34, for viewing and recording at Bldg. 102.
- .1 Camera 1 - To be mounted on East exterior wall of Building 34. Point of view: Fuel tanks East of Building 34 and surrounding area.
- .2 Camera 2 – To be mounted on North/Northeast exterior wall of Building 34. Point of view: Gate NE of Building 34 and approach.
- .3 Camera 3 – To be mounted on North/Northwest exterior wall of Building 34. Point of view: Equipment Storage area Northwest of Building 34.
- .4 Pre-requisite: None.

1.59 SCOPE OF WORK: C17

- .1 In Building 120, provide one network switch – POE IP network switch (minimum 4-port), to be procured and installed by the Contractor. Switch location and power source to be coordinated with Facility Manger. Connect to existing IT infrastructure at Building 120 in coordination with AAFC IT staff.
- .2 In Building 120, provide one CCTV NVR – American Dynamics VideoEdge 4-channel IP encoder, to record and connect CCTV camera(s) to central CCTV video viewing/recording at Bldg. 102. NVR location and power source to be coordinated with Facility Manager. Connect to existing IT infrastructure at Building 120 in coordination with AAFC IT staff.
- .3 CCTV: Provide one (1) American Dynamics Illustra Flex 800 Bullet POE IP Day/Night camera, or approved equal, 3MP, 9-22mm varifocal lens, complete with integral heater to be mounted on East exterior wall of Building 120 and cabled back to POE network switch / CCTV NVR in Building 120, for viewing and recording at Bldg. 102. Point of view: Area between Buildings 120 and 87.

.4 Pre-requisite: None.

1.60 SCOPE OF WORK: C18

- .1 In Building 87, provide one network switch – POE IP network switch (minimum 4-port), to be procured and installed by the Contractor. Switch location and power source to be coordinated with Facility Manger. Connect to existing IT infrastructure at Building 87 in coordination with AAFC IT staff.
- .2 In Building 87, provide one CCTV NVR – American Dynamics VideoEdge 4-channel IP encoder, to record and connect CCTV camera(s) to central CCTV video viewing/recording at Bldg. 102. NVR location and power source to be coordinated with Facility Manager. Connect to existing IT infrastructure at Building 87 in coordination with AAFC IT staff.
- .3 CCTV: Provide two (2) American Dynamics Illustra Flex 800 Bullet POE IP Day/Night cameras, or approved equal, 3MP, 9-22mm varifocal lens, complete with integral heater, mounted as noted below and each cabled back to POE network switch / CCTV NVR in Building 87, for viewing and recording at Bldg. 102.
 - .1 Camera 1 - To be mounted on North exterior wall of Building 87. Point of view: Roadway North of Building 87.
 - .2 Camera 2 – To be mounted on North/Northeast exterior wall of Building 87. Point of view: Gate NE of Building 87 and approach.
- .4 Pre-requisite: None.

END OF SECTION

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TAG	DEVICE TYPE	ID	NODE	PHYSICAL LOCATION / DESCRIPTION	POWER SOURCE	GATEWAY	SCOPE
KT-1	CONTROLLER	KT-1	LRC Trunk 1.1	LRC Bldg. 102 - 1st Floor West Lab Block Service Corridor (1400) - West End	PANEL E2M-4 CCT-2	Server Gateway / Room 1563	Existing N/C
KT-1	DOOR	DOOR # 1	KT-1	Stairwell - Basement Lab Block Northwest Door	KT-1	Server Gateway / Room 1563	Existing N/C
KT-2	CONTROLLER	KT-2	LRC Trunk 1.2	LRC Bldg. 102 - 1st Floor West Lab Block Service Corridor - West End	PANEL E2M-4 CCT-4	Server Gateway / Room 1563	Existing N/C
KT-2	DOOR	DOOR # 1	KT-2	Basement - L-094	KT-2	Server Gateway / Room 1563	Existing N/C
KT-2	DOOR	DOOR # 2	KT-2	Basement - L-095	KT-2	Server Gateway / Room 1563	Existing N/C
KT-3	CONTROLLER	KT-3	LRC Trunk 1.3	LRC Bldg. 102 - Basement Room 505 door - above ceiling tile	PANEL E2M-4	Server Gateway / Room 1563	Existing N/C
KT-3	DOOR	DOOR # 1	KT-3	Lower Level Library	KT-3	Server Gateway / Room 1563	Existing N/C
KT-3	DOOR	DOOR # 2	KT-3	Entrance - Front Foyer West	KT-3	Server Gateway / Room 1563	Existing N/C
KT-4	CONTROLLER	KT-4	LRC Trunk 1.4	LRC Bldg. 102 - Electrical Room beside South Elevator Room	PANEL EEEE	Server Gateway / Room 1563	Existing N/C
KT-4	DOOR	DOOR # 1	KT-4	B-017 Double doors (Administration Basement Hallway)	KT-4	Server Gateway / Room 1563	REVISE
KT-4	DOOR	DOOR # 2	KT-4	B-017 Door (Dan Ethiers Laboratory)	KT-4	Server Gateway / Room 1563	Existing N/C
KT-5	CONTROLLER	KT-5	LRC Trunk 1.5	LRC Bldg. 102 - South Elevator Service Room	PANEL EEEE	Server Gateway / Room 1563	Existing N/C
KT-5	DOOR	DOOR # 1	KT-5	South Elevator	KT-5	Server Gateway / Room 1563	Existing N/C
KT-5	DOOR	DOOR # 2	KT-5	Stairwell-Administration Basementh South	KT-5	Server Gateway / Room 1563	Existing N/C
KT-6	CONTROLLER	KT-6	LRC Trunk 1.6	LRC Bldg. 102 - AAFRD Basement Storage Room - West Wall	PANEL LBCBPOIOC	Server Gateway / Room 1563	Existing N/C
KT-6	DOOR	DOOR # 1	KT-6	Stairwell-AAFRD Basement West	KT-6	Server Gateway / Room 1563	Existing N/C
KT-6	DOOR	DOOR # 2	KT-6	Entrance-AAFRD West	KT-6	Server Gateway / Room 1563	Existing N/C
KT-7	CONTROLLER	KT-7	LRC Trunk 1.7	LRC Bldg. 102 - 1st Floor East Lab Block Service Corridor (1502) - East End - Above Door	PANEL E-22 CCT-20	Server Gateway / Room 1563	Existing N/C
KT-7	DOOR	DOOR # 1	KT-7	Stairwell - 1st Flr. Lab Block Northeast Door	KT-7	Server Gateway / Room 1563	Existing N/C
KT-7	DOOR	DOOR # 2	KT-7	Stairwell - 1st Flr. Lab Block Southeast Door	KT-7	Server Gateway / Room 1563	Existing N/C
KT-8	CONTROLLER	KT-8	LRC Trunk 1.8	LRC Bldg. 102 - 1st Floor East Lab Block Service Corridor (1502) - East End - Above Door	PANEL E-22 CCT-20	Server Gateway / Room 1563	Existing N/C
KT-8	DOOR	DOOR # 1	KT-8	Room 1600 - Bioassay Quarantine (1548) Door	KT-8	Server Gateway / Room 1563	Existing N/C
KT-8	DOOR	DOOR # 2	KT-8	Room 1548 - Bio - Control Wing (1548) door	KT-8	Server Gateway / Room 1563	Existing N/C
KT-9	CONTROLLER	KT-9	LRC Trunk 1.9	LRC Bldg. 102 - Door 1431 above ceiling tile	E2M-4	Server Gateway / Room 1563	Existing N/C
KT-9	DOOR	DOOR # 1	KT-9	Entrance - 1st Flr. Lab Block Northwest	KT-9	Server Gateway / Room 1563	Existing N/C

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TAG	DEVICE TYPE	ID	NODE	PHYSICAL LOCATION / DESCRIPTION	POWER SOURCE	GATEWAY	SCOPE
KT-9	DOOR	DOOR # 2	KT-9	Stairwell - 1st Flr. Lab Block Northwest	KT-9	Server Gateway / Room 1563	Existing N/C
KT-10	CONTROLLER	KT-10	LRC Trunk 1.10	LRC Bldg. 102 - 1st Floor West Lab Block Service Corridor (1400) - East End - Above Door	PANEL E2M-4 CCT-1	Server Gateway / Room 1563	DOOR CHANGES
KT-10	DOOR	DOOR # 1	KT-10	Hallway Doors - 1st Flr. Lab Block Southwest	KT-10	Server Gateway / Room 1563	DELETE / RE-USE
KT-10	DOOR	DOOR # 2	KT-10	Hallway Doors - 1st Flr. Lab Block Southeast	KT-10	Server Gateway / Room 1563	DELETE / RE-USE
KT-10	DOOR	DOOR # 1	KT-10	Basement Lab 442	KT-10	Server Gateway / Room 1563	NEW DOOR
KT-10	DOOR	DOOR # 2	KT-10	Basement Lab 418	KT-10	Server Gateway / Room 1563	NEW DOOR
KT-11	CONTROLLER	KT-11	LRC Trunk 1.11	LRC Bldg. 102 - 1st Floor West Lab Block Service Corridor (1400) - East End	PANEL LBCB125 CCT-3	Server Gateway / Room 1563	Existing N/C
KT-11	DOOR	DOOR # 1	KT-11	Hallway Doors - Front Foyer North	KT-11	Server Gateway / Room 1563	Existing N/C
KT-11	DOOR	DOOR # 2	KT-11	Hallway Doors - 2nd Floor Catwalk	KT-11	Server Gateway / Room 1563	Existing N/C
KT-12	CONTROLLER	KT-12	LRC Trunk 1.12	LRC Bldg. 102 - 1st Floor West Lab Block Service Corridor (1400) - East End - Above Door	PANEL E2M-4 CCT-1	Server Gateway / Room 1563	DOOR CHANGES
KT-12	DOOR	DOOR # 1	KT-12	Hallway Doors - 1st Flr. Lab Block Northwest	KT-12	Server Gateway / Room 1563	DELETE / RE-USE
KT-12	DOOR	DOOR # 2	KT-12	Hallway Doors - 1st Flr. Lab Block Northeast	KT-12	Server Gateway / Room 1563	DELETE / RE-USE
KT-12	DOOR	DOOR # 1	KT-12	Basement Lab 403	KT-12	Server Gateway / Room 1563	NEW DOOR
KT-12	DOOR	DOOR # 2	KT-12	Basement Lab 409	KT-12	Server Gateway / Room 1563	NEW DOOR
KT-13	CONTROLLER	KT-13	LRC Trunk TBD	LRC Bldg. 102 - 1st Floor West Lab Block Service Corridor (1400)	PANEL E2M-4 CCT TBD	Server Gateway / Room 1563	NEW
KT-13	DOOR	DOOR # 1	KT-13	Basement Lab 452	KT-13	Server Gateway / Room 1563	NEW DOOR
KT-13	DOOR	DOOR # 2	KT-13	Basement Lab 453	KT-13	Server Gateway / Room 1563	NEW DOOR
KT-13	DOOR	DOOR # 3	KT-13	Elevator Cab (off Corridor 1500)	KT-13	Server Gateway / Room 1563	NEW DOOR
KT-14	CONTROLLER	KT-14	LRC Trunk 1.13	LRC Bldg. 102 - Room 1310	SS	Server Gateway / Room 1563	Existing N/C
KT-14	DOOR	DOOR # 1	KT-14	Room 1312 - Executive Offices	KT-14	Server Gateway / Room 1563	Existing N/C
KT-14	DOOR	DOOR # 2	KT-14	Room 1312 - Executive Boardroom	KT-14	Server Gateway / Room 1563	Existing N/C
KT-15	CONTROLLER	KT-15	LRC Trunk 1.14	LRC Bldg. 102 - Video Equipment Closet behind Commissionaries	EEEE	Server Gateway / Room 1563	Existing N/C
KT-15	DOOR	DOOR # 1	KT-15	Room 1314 - Audio/Visual Storage Room	KT-15	Server Gateway / Room 1563	Existing N/C
KT-15	DOOR	DOOR # 2	KT-15	Entrance - Front Foyer East	KT-15	Server Gateway / Room 1563	Existing N/C
KT-16	CONTROLLER	KT-16	LRC Trunk 2.1	LRC Bldg. 102 - SW-1 Vivarium East entrance above door	EEE	Server Gateway / Room 1563	Existing N/C

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TAG	DEVICE TYPE	ID	NODE	PHYSICAL LOCATION / DESCRIPTION	POWER SOURCE	GATEWAY	SCOPE
KT-16	DOOR	DOOR # 1	KT-16	Door 1563 - Carey's Office	KT-16	Server Gateway / Room 1563	Existing N/C
KT-16	DOOR	DOOR # 2	KT-16	Entrance - North Vivarium door	KT-16	Server Gateway / Room 1563	Existing N/C
KT-17	CONTROLLER	KT-17	LRC Trunk 2.2	LRC Bldg. 102 - Room SC-10 North Wall	EEE	Server Gateway / Room 1563	Existing N/C
KT-17	DOOR	DOOR # 1	KT-17	Hallway doors - SC25 Stores to Main hallway	KT-17	Server Gateway / Room 1563	Existing N/C
KT-17	DOOR	DOOR # 2	KT-17	Entrance - SC25 North doors	KT-17	Server Gateway / Room 1563	Existing N/C
KT-18	CONTROLLER	KT-18	LRC Trunk 2.3	LRC Bldg. 102 - SC Main Corridor West End (SC30)	EEE	Server Gateway / Room 1563	Existing N/C
KT-18	DOOR	DOOR # 1	KT-18	Entrance - Hall 1562 West doors	KT-18	Server Gateway / Room 1563	Existing N/C
KT-18	DOOR	DOOR # 2	KT-18	Door SW-1 - Vivarium East Access	KT-18	Server Gateway / Room 1563	Existing N/C
KT-19	CONTROLLER	KT-19	LRC Trunk 2.4	LRC Bldg. 102 - Next to SE -36 West Double doors	EEE	Server Gateway / Room 1563	Existing N/C
KT-19	DOOR	DOOR # 1	KT-19	Hallway Doors - SE36 - Phytotron/ Header House South	KT-19	Server Gateway / Room 1563	Existing N/C
KT-20	CONTROLLER	KT-20	LRC Trunk 2.5	LRC Bldg. 102 - Next to SE44 Door	EEE	Server Gateway / Room 1563	Existing N/C
KT-20	DOOR	DOOR # 1	KT-20	Hallway Doors - SE44 - Header House North	KT-20	Server Gateway / Room 1563	Existing N/C
KT-20	DOOR	DOOR # 2	KT-20	Entrance - SE47 Head House North	KT-20	Server Gateway / Room 1563	Existing N/C
KT-21	CONTROLLER	KT-21	LRC Trunk 2.6	LRC Bldg. 102 - Room 1702 Data Room	-	Server Gateway / Room 1563	Existing N/C
KT-21	DOOR	DOOR # 1	KT-21	Entrance door 1710 - Food Processing West Wing	KT-21	Server Gateway / Room 1563	Existing N/C
KT-21	DOOR	DOOR # 2	KT-21	Entrance Door 1712C - Header House East	KT-21	Server Gateway / Room 1563	Existing N/C
KT-22	CONTROLLER	KT-22	LRC Trunk 1.15	LRC Bldg. 102 - 2nd Floor West Lab Block Service Corridor - West End	E2B-1`	Server Gateway / Room 1563	Existing N/C
KT-22	DOOR	DOOR # 1	KT-22	Stairwell - 3rd Flr. Lab Block Northwest - Door 3429	KT-22	Server Gateway / Room 1563	Existing N/C
KT-22	DOOR	DOOR # 2	KT-22	Stairwell - 2nd Flr. Lab Block Northwest - Door 2431	KT-22	Server Gateway / Room 1563	Existing N/C
KT-23	CONTROLLER	KT-23	LRC Trunk 1.16	LRC Bldg. 102 - 2nd Floor West Lab Block Service Corridor - East End	E2B-1`	Server Gateway / Room 1563	DOOR CHANGES
KT-23	DOOR	DOOR # 1	KT-23	Hallway Doors - 2nd Floor Lab Block Northwest	KT-23	Server Gateway / Room 1563	DELETE / RE-USE
KT-23	DOOR	DOOR # 2	KT-23	Hallway doors - 2nd Floor Lab Block Northeast	KT-23	Server Gateway / Room 1563	DELETE / RE-USE
KT-23	DOOR	DOOR # 1	KT-23	Second Floor Lab 2534	KT-23	Server Gateway / Room 1563	NEW DOOR
KT-24	CONTROLLER	KT-24	LRC Trunk 1.17	LRC Bldg. 102 - 2nd Floor West Lab Block Service Corridor - East End	E2B-1`	Server Gateway / Room 1563	DOOR CHANGES
KT-24	DOOR	DOOR # 1	KT-24	Hallway Doors - 2nd Floor Lab Block Southwest	KT-24	Server Gateway / Room 1563	DELETE / RE-USE

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TAG	DEVICE TYPE	ID	NODE	PHYSICAL LOCATION / DESCRIPTION	POWER SOURCE	GATEWAY	SCOPE
KT-24	DOOR	DOOR # 2	KT-24	Hallway doors - 2nd Floor Lab Block Southeast	KT-24	Server Gateway / Room 1563	DELETE / RE-USE
KT-25	CONTROLLER	KT-25	LRC Trunk 1.18	LRC Bldg. 102 - 2nd Floor East Lab Block Service Corridor - East End	E22-1	Server Gateway / Room 1563	Existing N/C
KT-25	DOOR	DOOR # 1	KT-25	Stainwell - 2nd Floor Lab Block Northeast Door	KT-25	Server Gateway / Room 1563	Existing N/C
KT-25	DOOR	DOOR # 2	KT-25	Stainwell - 2nd Floor Lab Block Southeast Door	KT-25	Server Gateway / Room 1563	Existing N/C
KT-26	CONTROLLER	KT-26	LRC Trunk 1.19	LRC Bldg. 102 - AAFRD 2nd Floor East Entrance - South Closet	EEEE	Server Gateway / Room 1563	Existing N/C
KT-26	DOOR	DOOR # 1	KT-26	AAFRD 1st Floor - East Access	KT-26	Server Gateway / Room 1563	Existing N/C
KT-26	DOOR	DOOR # 2	KT-26	AAFRD 2nd Floor - East Access	KT-26	Server Gateway / Room 1563	Existing N/C
KT-27	CONTROLLER	KT-27	LRC Trunk 1.20	Rm. 2017	-	Server Gateway / Room 1563	Existing N/C
KT-27	DOOR	DOOR # 1	KT-27	Room 2020 - Administration Finance Room	KT-27	Server Gateway / Room 1563	Existing N/C
KT-27	DOOR	DOOR # 2	KT-27	Room 2021 - Administration Human Resources Room	KT-27	Server Gateway / Room 1563	Existing N/C
KT-28	CONTROLLER	KT-28	LRC Trunk 1.21	LRC Bldg. 102 - AAFRD 2nd Floor East Entrance - South Closet	EEEE	Server Gateway / Room 1563	Existing N/C
KT-28	DOOR	DOOR # 1	KT-28	Door 2009 - Administration Main Access	KT-28	Server Gateway / Room 1563	Existing N/C
KT-28	DOOR	DOOR # 2	KT-28	Door 2003 - Library Main Access	KT-28	Server Gateway / Room 1563	Existing N/C
KT-29	CONTROLLER	KT-29	LRC Trunk 1.22	LRC Bldg. 102 - 3rd Floor East Lab Block Service Corridor - West End	E22-1	Server Gateway / Room 1563	DOOR CHANGES
KT-29	DOOR	DOOR # 1	KT-29	Hallway Doors - 3rd Floor Lab Block Southwest	KT-29	Server Gateway / Room 1563	DELETE / RE-USE
KT-29	DOOR	DOOR # 2	KT-29	Hallway doors - 3rd Floor Lab Block Southeast	KT-29	Server Gateway / Room 1563	DELETE / RE-USE
KT-29	DOOR	DOOR # 1	KT-29	Third Floor Lab 3536	KT-29	Server Gateway / Room 1563	NEW DOOR
KT-29	DOOR	DOOR # 2	KT-29	Rm. 3452	KT-29	Server Gateway / Room 1563	NEW DOOR
KT-30	CONTROLLER	KT-30	LRC Trunk 1.23	LRC Bldg. 102 - 3rd Floor East Lab Block Service Corridor - West End	E22-1	Server Gateway / Room 1563	DOOR CHANGES
KT-30	DOOR	DOOR # 1	KT-30	Hallway Doors - 3rd Floor Lab Block Northwest	KT-30	Server Gateway / Room 1563	DELETE / RE-USE
KT-30	DOOR	DOOR # 2	KT-30	Hallway doors - 3rd Floor Lab Block Northeast	KT-30	Server Gateway / Room 1563	DELETE / RE-USE
KT-31	CONTROLLER	KT-31	LRC Trunk 1.26	LRC Bldg. 102 - 2nd Floor West Lab Block Service Corridor - East End	E2B-1	Server Gateway / Room 1563	Existing N/C
KT-31	DOOR	DOOR # 1	KT-31	Room 3442 - Computer Room	KT-31	Server Gateway / Room 1563	Existing N/C
KT-32	CONTROLLER	KT-32	LRC Trunk 1.24	LRC Bldg. 102 - 3rd Floor East Lab Block Service Corridor - East End	E22-1	Server Gateway / Room 1563	Existing N/C
KT-32	DOOR	DOOR # 1	KT-32	Stainwell - 3rd Floor Lab Block Northeast - Door 3555	KT-32	Server Gateway / Room 1563	Existing N/C

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KT-32	DOOR	DOOR # 2	KT-32	Stairwell - 3rd Floor Lab Block Southeast - Door 3527	KT-32	Server Gateway / Room 1563	Existing N/C
KT-33	CONTROLLER	KT-33	LRC Trunk 2.7	LRC Bldg. 102 - Stores Elevator Service Room	Stores Elev. Rm.	Server Gateway / Room 1563	Existing N/C
KT-33	DOOR	DOOR # 1	KT-33	Stores Elevator	KT-33	Server Gateway / Room 1563	Existing N/C
KT-34	CONTROLLER	KT-34	LRC Trunk 2.8	LRC Bldg. 102 - Headerhouse / Control - Above Greenhouse 'G' Entrance	EM2-1	Server Gateway / Room 1563	Existing N/C
KT-36	CONTROLLER	KT-36	LRC Trunk 1.25	LRC Bldg. 102 - Room B-12 - Basement	EEEE	Server Gateway / Room 1563	Existing N/C
KT-36	DOOR	DOOR # 1	KT-36	Entrance - South door to Cafeteria	KT-36	Server Gateway / Room 1563	Existing N/C
BLDG 22	CONTROLLER	BLDG 22	KT-1	Electrical Room	Building 22 CCT TBD	Server Gateway / Room 1563	NEW
BLDG 22	DOOR	DOOR # 1	BLDG 22	Exterior Door (West)	Building 22 KT-1	Server Gateway / Room 1563	NEW DOOR
BLDG 22	DOOR	DOOR # 2	BLDG 22	Exterior Door (South)	Building 22 KT-1	Server Gateway / Room 1563	NEW DOOR
BLDG 22	DOOR	DOOR # 3	BLDG 22	Exterior Door (South)	Building 22 KT-1	Server Gateway / Room 1563	NEW DOOR
BLDG 22	DOOR	DOOR # 4	BLDG 22	Exterior Door (East)	Building 22 KT-1	Server Gateway / Room 1563	NEW DOOR
BLDG 22	CONTROLLER	BLDG 22	KT-2	Electrical Room	Building 22 CCT TBD	Server Gateway / Room 1563	NEW
BLDG 22	DOOR	DOOR # 1	BLDG 22	Exterior Door (NE)	Building 22 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 22	DOOR	DOOR # 2	BLDG 22	Exterior Door (NW)	Building 22 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 34	CONTROLLER	BLDG 34	KT-1	Building 34	Building 34	Server Gateway / Room 1563	Existing N/C
BLDG 34	DOOR	DOOR # 1	BLDG 34	Exterior Door (South)	Building 34 KT-1	Server Gateway / Room 1563	Existing N/C
BLDG 34	CONTROLLER	BLDG 34	KT-2	Hallway	Building 34 CCT TBD	Server Gateway / Room 1563	NEW
BLDG 34	DOOR	DOOR # 1	BLDG 34	Exterior Door (SW)	Building 34 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 34	DOOR	DOOR # 2	BLDG 34	Exterior Door (SW)	Building 34 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 34	DOOR	DOOR # 3	BLDG 34	Exterior Door (East)	Building 34 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 34	DOOR	DOOR # 4	BLDG 34	Exterior Door (NE)	Building 34 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 34	CONTROLLER	BLDG 34	KT-3	Hallway	Building 34 CCT TBD	Server Gateway / Room 1563	NEW
BLDG 34	DOOR	DOOR # 1	BLDG 34	Exterior Door (North)	Building 34 KT-3	Server Gateway / Room 1563	NEW DOOR
BLDG 34	DOOR	DOOR # 2	BLDG 34	Exterior Door (NW)	Building 34 KT-3	Server Gateway / Room 1563	NEW DOOR
BLDG 86	CONTROLLER	BLDG 86	KT-1	Building 86	Building 86	Server Gateway / Room 1563	NEW DOOR Repair/ Replace

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TAG	DEVICE TYPE	ID	NODE	PHYSICAL LOCATION / DESCRIPTION	POWER SOURCE	GATEWAY	SCOPE
BLDG 86 KT-1	GATE ACS	GATE	BLDG 86 KT-1	Dairy Barn Electric Gate Access Control	Building 86 KT-1	Server Gateway / Room 1563	Repair/ Replace
BLDG 86 KT-2	CONTROLLER	BLDG 86 KT-2	BLDG 86 KT-2	Corridor	Building 86 KCCCT TBD	Server Gateway / Room 1563	NEW
BLDG 86 KT-2	DOOR	DOOR # 1	BLDG 86 KT-2	Exterior Door (NE)	Building 86 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 86 KT-2	DOOR	DOOR # 2	BLDG 86 KT-2	Exterior Door (East)	Building 86 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 87 KT-1	CONTROLLER	BLDG 87 KT-1	BLDG 87 KT-1	Main Floor Open Area	Building 87 CCT TBD	Server Gateway / Room 1563	NEW
BLDG 87 KT-1	DOOR	DOOR # 1	BLDG 87 KT-1	Exterior Door (SE)	Building 87 KT-1	Server Gateway / Room 1563	NEW DOOR
BLDG 87 KT-1	DOOR	DOOR # 2	BLDG 87 KT-1	Exterior Door (SW)	Building 87 KT-1	Server Gateway / Room 1563	NEW DOOR
BLDG 87 KT-1	DOOR	DOOR # 3	BLDG 87 KT-1	Exterior Door (NE)	Building 87 KT-1	Server Gateway / Room 1563	NEW DOOR
BLDG 118 KT-1	CONTROLLER	BLDG 118 KT-1	BLDG 118 KT-1	Room A129	Building 118 Building 118	Server Gateway / Room 1563	Existing N/C
BLDG 118 KT-1	DOOR	DOOR # 1	BLDG 118 KT-1	Exterior Door (SW)	Building 118 KT-1	Server Gateway / Room 1563	Existing N/C
BLDG 118 KT-1	DOOR	DOOR # 2	BLDG 118 KT-1	Exterior Door (East)	Building 118 KT-1	Server Gateway / Room 1563	Existing N/C
BLDG 118 KT-2	CONTROLLER	BLDG 118 KT-2	BLDG 118 KT-2	Room A129	Building 118 CCT TBD	Server Gateway / Room 1563	NEW
BLDG 118 KT-2	DOOR	DOOR # 1	BLDG 118 KT-2	Exterior Door (South)	Building 118 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 118 KT-2	DOOR	DOOR # 2	BLDG 118 KT-2	Exterior Door (SE)	Building 118 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 120 KT-1	CONTROLLER	BLDG 120 KT-1	BLDG 120 KT-1	Main Electrical Room	Building 120 CCT TBD	Server Gateway / Room 1563	Existing N/C
BLDG 120 KT-2	CONTROLLER	BLDG 120 KT-2	BLDG 120 KT-2	Main Electrical Room	Building 120 CCT TBD	Server Gateway / Room 1563	NEW
BLDG 120 KT-2	DOOR	DOOR # 1	BLDG 120 KT-2	Exterior Door (SW)	Building 120 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 120 KT-2	DOOR	DOOR # 2	BLDG 120 KT-2	Exterior Door (South)	Building 120 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 120 KT-2	DOOR	DOOR # 3	BLDG 120 KT-2	Exterior Door (SE)	Building 120 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 120 KT-2	DOOR	DOOR # 4	BLDG 120 KT-2	Exterior Door (NW)	Building 120 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 120 KT-3	CONTROLLER	BLDG 120 KT-3	BLDG 120 KT-3	Main Electrical Room	Building 120 CCT TBD	Server Gateway / Room 1563	NEW
BLDG 120 KT-3	DOOR	DOOR # 1	BLDG 120 KT-3	Exterior Door (North)	Building 120 KT-3	Server Gateway / Room 1563	NEW DOOR
BLDG 123 KT-1	CONTROLLER	BLDG 123 KT-1	BLDG 123 KT-1	Laboratory	Building 123 CCT TBD	Server Gateway / Room 1563	NEW
BLDG 123 KT-1	DOOR	DOOR # 1	BLDG 123 KT-1	Exterior Door (West)	Building 123 KT-1	Server Gateway / Room 1563	NEW DOOR
BLDG 123 KT-1	DOOR	DOOR # 2	BLDG 123 KT-1	Exterior Door (East)	Building 123 KT-1	Server Gateway / Room 1563	NEW DOOR

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TAG	DEVICE TYPE	ID	NODE	PHYSICAL LOCATION / DESCRIPTION	POWER SOURCE	GATEWAY	SCOPE
BLDG 123 KT-1	DOOR	DOOR # 3	BLDG 123 KT-1	Exterior Door (NE)	Building 123 KT-1	Server Gateway / Room 1563	NEW DOOR
BLDG 130 KT-1	CONTROLLER	BLDG 130 KT-1	BLDG 130 KT-1	Maintenance/Grounds Storage	Building 130 KT-1	Server Gateway / Room 1563	Existing N/C
BLDG 130 KT-1	DOOR	DOOR # 1	BLDG 130 KT-1	Exterior Door (SW)	Building 130 KT-1	Server Gateway / Room 1563	Existing N/C
BLDG 130 KT-1	DOOR	DOOR # 2	BLDG 130 KT-1	Exterior Door (SE)	Building 130 KT-1	Server Gateway / Room 1563	Existing N/C
BLDG 130 KT-1	DOOR	DOOR # 3	BLDG 130 KT-1	Exterior Door (NW)	Building 130 KT-1	Server Gateway / Room 1563	Existing N/C
BLDG 130 KT-2	CONTROLLER	BLDG 130 KT-2	BLDG 130 KT-2	Maintenance/Grounds Storage	Building 130 CCT TBD	Server Gateway / Room 1563	NEW
BLDG 130 KT-2	DOOR	DOOR # 1	BLDG 130 KT-2	Exterior Door (South)	Building 130 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 130 KT-2	DOOR	DOOR # 2	BLDG 130 KT-2	Exterior Door (SE)	Building 130 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 130 KT-2	DOOR	DOOR # 3	BLDG 130 KT-2	Exterior Door (NE)	Building 130 KT-2	Server Gateway / Room 1563	NEW DOOR
BLDG 130 KT-2	DOOR	DOOR # 4	BLDG 130 KT-2	Exterior Door (North)	Building 130 KT-2	Server Gateway / Room 1563	NEW DOOR

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TAG	LOCATION	DESCRIPTION	NOTES	SCOPE
1	LOBBY 1330	MINIDOME IP CAMERA, FIXED VARIFOVAL, AMERICAN DYNAMICS 600 SERIES, CABLED TO EXISTING KANTECH INTEVO DVR IN CLOSET BEHIND COMMISSIONAIRE'S DESK		Existing N/C
2	LOBBY 1330	MINIDOME IP CAMERA, FIXED VARIFOVAL, AMERICAN DYNAMICS 600 SERIES, CABLED TO EXISTING KANTECH INTEVO DVR IN CLOSET BEHIND COMMISSIONAIRE'S DESK		Existing N/C
3	LOBBY 1330	MINIDOME IP CAMERA, FIXED VARIFOVAL, AMERICAN DYNAMICS 600 SERIES, CABLED TO EXISTING KANTECH INTEVO DVR IN CLOSET BEHIND COMMISSIONAIRE'S DESK		Existing N/C
4	EXT. LOBBY 1330	EXTERIOR IP CAMERA, FIXED VARIFOVAL, AMERICAN DYNAMICS 600 SERIES, CABLED TO EXISTING KANTECH INTEVO DVR IN CLOSET BEHIND COMMISSIONAIRE'S DESK	TO BE INSTALLED UNDER SEPARATE CONTRACT	Existing N/C
5	EXT. LOBBY 1330	EXTERIOR IP CAMERA, FIXED VARIFOVAL, AMERICAN DYNAMICS 600 SERIES, CABLED TO EXISTING KANTECH INTEVO DVR IN CLOSET BEHIND COMMISSIONAIRE'S DESK	TO BE INSTALLED UNDER SEPARATE CONTRACT	Existing N/C
6	WEST STAIRWELL @ A144, MAIN FLOOR	ANALOG CAMERA, CABLED TO EXISTING DVR IN CLOSET BEHIND COMMISSIONAIRE'S DESK	REFER TO SCOPE OF WORK C14	REPLACE
7	STAIRWELL 1434, MAIN FLOOR	ANALOG CAMERA, CABLED TO EXISTING DVR IN CLOSET BEHIND COMMISSIONAIRE'S DESK	REFER TO SCOPE OF WORK C14	REPLACE
8	STAIRWELL	ANALOG CAMERA, CABLED TO EXISTING DVR IN CLOSET BEHIND COMMISSIONAIRE'S DESK	REFER TO SCOPE OF WORK C14	REPLACE
9	STAIRWELL	ANALOG CAMERA, CABLED TO EXISTING DVR IN CLOSET BEHIND COMMISSIONAIRE'S DESK	REFER TO SCOPE OF WORK C14	REPLACE
10	CLOSET ADJACENT TO 1006	EXISTING CAMERA		Existing N/C
11	STORES ENTRANCE SC28	EXISTING IP CAMERA, FIXED VARIFOVAL, AMERICAN DYNAMICS 600 SERIES		Existing N/C
12	EXT. STORES SC4	IP CAMERA, FIXED VARIFOVAL, AMERICAN DYNAMICS 600 SERIES, CABLED TO EXISTING KANTECH INTEVO DVR IN CLOSET BEHIND COMMISSIONAIRE'S DESK		Existing N/C
13	EXT. OPPOSITE OFFICE 1563	IP CAMERA, FIXED VARIFOVAL, AMERICAN DYNAMICS 600 SERIES, CABLED TO EXISTING KANTECH INTEVO DVR IN CLOSET BEHIND COMMISSIONAIRE'S DESK		Existing N/C
14	SOUTH STAIRWELL A160, MAIN FLOOR	IP CAMERA, FIXED VARIFOVAL, AMERICAN DYNAMICS 600 SERIES, CABLED TO EXISTING KANTECH INTEVO DVR IN CLOSET BEHIND COMMISSIONAIRE'S DESK		Existing N/C

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TAG	LOCATION	DESCRIPTION	NOTES	SCOPE
15	PARKING LOT SW OF LRC BLDG. 102	POLE MOUNTED EXISTING SIGHTLOGIX CAMERA	TO BE INSTALLED UNDER SEPARATE CONTRACT	Existing N/C
16	PARKING LOT SW OF LRC BLDG. 102	POLE MOUNTED EXISTING SIGHTLOGIX CAMERA	TO BE INSTALLED UNDER SEPARATE CONTRACT	Existing N/C
17	PARKING LOT SW OF LRC BLDG. 102	POLE MOUNTED EXISTING IP CAMERA, AMERICAN DYNAMICS 600 SERIES	TO BE INSTALLED UNDER SEPARATE CONTRACT	Existing N/C
18	PARKING LOT SW OF LRC BLDG. 102	POLE MOUNTED EXISTING IP CAMERA, AMERICAN DYNAMICS 600 SERIES	TO BE INSTALLED UNDER SEPARATE CONTRACT	Existing N/C
19	NW EXT. WALL BLDG. 100	FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, MOUNTED TO NW EXTERIOR WALL OF BLDG. 100, POV - FUEL TANKS NORTH OF BLDG. 100 / WEST OF BLDG. 122 & ADJACENT ROADWAY	REFER TO SCOPE OF WORK C10	NEW
20	EXTERIOR BLDG. 86	FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, MOUNTED TO EXTERIOR NE WALL OF BLDG. 86, POV - GATE NE OF BLDG. 86 & ADJACENT ROADWAY	REFER TO SCOPE OF WORK C11	NEW
21	EXTERIOR BLDG. 86	FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, MOUNTED TO EXTERIOR SE WALL OF BLDG. 86 - POV - GATE BETWEEN/EAST OF BLDGS. 86 & 36, AND ADJACENT ROADWAY	REFER TO SCOPE OF WORK C12	NEW
22	EXT. BLDG. 102	FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, MOUNTED TO EXTERIOR EAST WALL OF BLDG. 102 - POV - FLEET PARKING AREA EAST OF BLDG. 102 / WEST OF BLDG. 22	REFER TO SCOPE OF WORK C13	NEW
23	EXT. BLDG. 34	FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, MOUNTED TO EXTERIOR EAST WALL OF BLDG. 34, POV - FUEL TANKS EAST OF BLDG. 34	REFER TO SCOPE OF WORK C16	NEW
24	EXT. BLDG. 34	FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, MOUNTED TO EXTERIOR NE WALL OF BLDG. 34, POV - GATE NE OF BLDG. 34	REFER TO SCOPE OF WORK C16	NEW
25	EXT. BLDG. 34	FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, MOUNTED TO EXTERIOR NW WALL OF BLDG. 34, POV - EQUIPMENT STORAGE AREA NW OF BLDG. 34	REFER TO SCOPE OF WORK C16	NEW
26	EXT. BLDG. 22	FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, MOUNTED TO EXTERIOR NORTH WALL OF BLDG. 22, POV - GATE/EQUIPMENT STORAGE AREA NE OF BLDG. 22	REFER TO SCOPE OF WORK C15	NEW
27	EXT. BLDG. 120	FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, MOUNTED TO EXTERIOR EAST WALL OF BLDG. 120, POV - STORAGE AREA BETWEEN BUILDINGS 120 AND 87	REFER TO SCOPE OF WORK C17	NEW
28	EXT. BLDG. 87	FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, MOUNTED TO EXTERIOR NORTH WALL OF BLDG. 87, POV - ROAD NORTH OF BLDG. 87	REFER TO SCOPE OF WORK C18	NEW

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TAG	LOCATION	DESCRIPTION	NOTES	SCOPE
29	EXT. BLDG. 87	FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, MOUNTED TO EXTERIOR NORTH/NORTH EAST WALL OF BLDG. 87, POV - GATE NE OF BLDG. 87	REFER TO SCOPE OF WORK C18	NEW
30	JAIL ROAD GATE	POST MOUNTED FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, POV - JAIL ROAD GATE & APPROACH	REFER TO SCOPE OF WORK M02	NEW
31	GATE SE OF BLDG. 38	POST MOUNTED FIXED VARIFOCAL POE IP DAY/NIGHT CAMERA C/W INTEGRAL HEATER, POV - GATE SE OF BLDG. 38 & APPROACH	REFER TO SCOPE OF WORK M06	NEW