

INAC - PELICAN FALLS RESIDENCES FIRE ALARM UPGRADE

SPECIFICATIONS

ISSUED FOR TENDER: JANUARY 29, 2018

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Part 1 – General

1.1 RELATED REQUIREMENTS

- .1 This section is part of all Divisions and shall be included by each discipline contractor.

1.2 TAXES

- .1 Pay all taxes properly levied by law (including Federal, Provincial and Municipal).

1.3 FEES, PERMITS and CERTIFICATES

- .1 Pay all fees and obtain all necessary municipal, provincial and federal permits. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work conforms to requirements of Authority having jurisdiction.

1.4 FIRE SAFETY REQUIREMENTS

- .1 Comply with both the National Building Code of Canada 2015 and the National Fire Code of Canada 2015 for safety of persons in buildings in the event of a fire and the protection of buildings from the effects of fire, as follows;
 - .1 The National Building Code (NBC): for fire safety and fire protection features that are required to be incorporated in a building during construction.
 - .2 The National Fire Code (NFC):
 - .1 The on-going maintenance and use of the fire safety and fire protection features incorporated in buildings.
 - .2 The conduct of activities that might cause fire hazards in and around buildings.
 - .3 Limitations on hazardous contents in and around buildings.
 - .4 The establishment of fire safety plans.
 - .5 Fire safety at construction and demolition sites.
 - .6 Retain all fire safety documents and standards on site.

1.5 HAZARDOUS MATERIALS

- .1 Hazardous Materials: product, substance, or organism that may cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .2 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and the provision of Material Safety Data Sheets (MSDS).

- .3 For work in occupied buildings, give the Department Representative 48 hours notice for work involving designated substances (Ontario Bill 208), hazardous substances (Canada Labour Code Part II Section 10), and before painting, caulking, installing carpet or using adhesives and other materials, that cause off gassing.

1.6 COST BREAKDOWN

- .1 Before submitting first progress claim, submit breakdown of Contract Amount in detail as directed by Departmental Representative and aggregating the Contract Amount. After approval by Departmental Representative cost breakdown will be used as the basis of progress payments.

1.7 CONTRACTOR USE OF PREMISES

- .1 Limit use of premises for Work and for access to allow:
 - .1 Owner occupancy.
- .2 No storage will be allowed within the building unless designated and approved by the Departmental Representative.
- .3 Contractor will have to bring daily the required materials.
- .4 Contractor will have to evacuate daily the demolished materials.
- .5 Co-ordinate use of premises under direction of Departmental Representative.
- .6 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .7 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .8 Repair or replace portions of existing work which have been altered during construction operations.
- .9 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.8 OWNER OCCUPANCY

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Co-operate with Occupants in scheduling operations to minimize conflict and to facilitate Occupant usage.

1.9 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to building operations, occupants, and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

- .2 Repair, patch, and paint any walls that are modified to conceal wiring.

1.10 EXISTING SERVICES

- .1 Where Work involves breaking into or connecting to existing services, give the Departmental Representative a 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to Occupants.
- .2 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

1.11 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
- .2 Other documents as specified.

1.12 CODES, REGULATIONS, ETC.

- .1 All contractors shall comply and perform work required by this contract according to:
 - .1 Ontario Building Code (OBC) 2012.
 - .2 National Building Code (NBC) 2915.
 - .3 CSA C22.1-2018, Canadian Electrical Code
 - .4 All local by-laws.
 - .5 Canadian Construction Safety code.
 - .6 All regulations set by authorities having jurisdiction.
 - .7 All other applicable standards, laws, codes, etc.
- .2 All materials and construction methods are to be in accordance with Ontario Provincial Standards and NBC specifications.

1.13 REQUIRED PERMITS, INSPECTIONS PERMITS, APPROVALS

- .1 The contractor is responsible for obtaining all required permits.
- .2 The contractor is responsible to get all required inspection permits and required inspections related to any permits.
- .3 The contractor is responsible for all the costs that could be related obtaining permits, getting inspections done, etc.

Part 2 Products

2.1 Materials

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises replacement of the fire alarm systems at thirteen Residences and one Staff House.

1.2 CONTRACT METHOD

- .1 Construct Work under single, stipulated price contract.

1.3 REGULATORY REQUIREMENTS

- .1 Perform Work in accordance with National Building Code (NBC) 2015, Ontario Building Code 2012 (OBC) including all amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.
- .3 Wherever codes, standards, regulations are referenced throughout the Contract Documents they shall mean the latest editions including amendments, supplements and revisions as of the date of bid closing.

1.4 SCHEDULE OF VALUES

- .1 Provide schedule of values supported by evidence as Departmental Representative may reasonably direct and when accepted by Departmental Representative, be used as basis for applications for payment.
- .2 Include statement based on schedule of values with each application for payment.
- .3 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as Departmental Representative may reasonably require to establish value and delivery of products.

1.5 SCHEDULING OF WORK

- .1 To ensure the fire alarm systems at each building are inoperable for the minimum amount of time while the Work is underway the Contractor shall:
 - .1 Provide a full complement of workers at each building to ensure the work proceeds continuously until substantial performance in that particular building.
 - .2 Ensure work does not commence until all materials are on site and ready for installation.
- .2 Suspending work in any one building, once it has started, due to an absence of workers or materials will not be permitted.
- .3 Show work sequence in construction schedule specified in this Section.

1.6 CONTRACTOR USE OF PREMISES

- .1 Limit use of premises for Work, for storage, and for access, to allow:
 - .1 Departmental Representative occupancy.
 - .2 Public usage.
- .2 Co-ordinate use of premises under direction of Departmental Representative.
- .3 Store materials, tools, and equipment in secure lockup. Clean up tools, equipment and materials prior to transporting them through premises.
- .4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.7 WORK RESTRICTIONS

- .1 Restricted hours of work: work within each facility is limited to the following:
 - .1 Weekdays: between the hours of 8:00 am and 4:00 pm.
 - .2 Weekends and statutory holidays: not permitted.
 - .3 Exemptions may be granted by the Departmental Representative for special circumstances, on an "as needed" basis. Notify Departmental Representative at least 72-hours ahead of each occurrence to allow for coordination with the Departmental Representative.
- .2 Building Smoking Environment: comply with smoking restrictions.

1.8 OCCUPANCY

- .1 Departmental Representative will occupy premises during entire construction period for execution of normal operations.
- .2 Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate Departmental Representative usage.

1.9 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 Refer to Section 01 35 16 - Alteration Project Procedures.
- .2 Execute work with least possible interference or disturbance to building operations, building occupants, public and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.
- .3 Prior to start of any alteration work, arrange with the Departmental Representative a work schedule satisfactory to operational requirements of the existing facility.
- .4 The Departmental Representative shall vacate only those areas designated for alteration work.
- .5 Confine construction activities to designated work areas. Do not store materials, tools or equipment outside of designated work areas.
- .6 Prevent migration of dust and debris into occupied areas.
- .7 Establish access routes to and from the work areas. Use only designated access routes for movement of workers, tools, equipment, materials, and construction debris.

- .8 Where work must proceed in occupied areas clean up at the end of each workday. Place tools, equipment, and materials into secure lock-up.
- .9 Provide temporary protection to cut and partially finished surfaces to protect building occupants and general public from possible injury.

1.10 EXISTING SERVICES

- .1 Prior to start of Work identify and confirm the location of all mechanical and electrical services within or passing through construction areas. Confirm their origin and destination.
- .2 Where services are concealed within walls, floors, or ceilings and cannot be visually identified use electronic scanning devices or other acceptable means to locate and identify concealed services.
- .3 Notify Departmental Representative of intended interruption of services and obtain required permission. Follow Departmental Representative's Lockout/Tagout procedures.
- .4 Where Work involves shut down or interruption to existing services give Departmental Representative 48-hours notification for necessary interruption throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by Departmental Representative.
- .5 Do not shut off, disconnect, or remove existing mechanical and electrical services without prior notification of the Departmental Representative.
- .6 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .7 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .8 Include for required connections, temporary or permanent, for continuance of existing services.
- .9 Record locations of maintained, re-routed and abandoned service lines.

1.11 LOOSE FURNISHINGS

- .1 Remove and relocate loose furnishings and portable equipment such as desks, chairs, telephones and other portable items within work areas.

1.12 PROTECTIVE COVERS

- .1 Where furniture, furnishings, cabinet work or other finished work is adjacent to or in areas where alteration work is in progress provide covers to protect against construction debris and dust.
- .2 Remove covers and clean up after each work stage.

1.13 PROJECT MEETINGS

- .1 The Departmental Representative will provide a room within the existing buildings for project meetings. The location may vary throughout the project depending on the sequencing of the Work.

- .2 Designate times of meetings and notify all parties concerned, including Subcontractors, to attend. Provide attendees with an agenda for each meeting at least one day before the meeting.
- .3 Chair meetings, record minutes, and distribute minutes to all attending parties within four working days after meeting.
- .4 Start-Up Meeting:
 - .1 After Award of Contract, but before start of Work, convene a start-up meeting to discuss and resolve administrative procedures and responsibilities.
- .5 Job Progress Meetings:
 - .1 Convene job progress meetings at bi-weekly intervals to ensure proper coordination of the Work.

1.14 CLOSEOUT SUBMITTALS

- .1 Administration:
 - .1 Provide separate closeout submittals for each location to facilitate administration and sequencing of the Work.
 - .2 Clearly identify the separate locations on each document.
- .2 Two (2) weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, three (3) final copies of operating and maintenance manuals in English.
- .3 Organize data in the form of an instructional manual. Bind contents in to hard covered, 3 'D' ring binder, loose leaf, letter size format with spine and face pockets.
- .4 Identify each binder with typed or printed title 'Project Record Documents'; title of project and identify subject matter of contents.
- .5 Contents:
 - .1 Table of Contents
 - .2 Date of submission
 - .3 Addresses and telephone numbers of Departmental Representative and Contractor, with name of responsible parties.
 - .4 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
 - .5 Record drawings: marked up prints of drawings showing deviations from Contract Documents.
 - .6 Description of unit or system, and component parts, function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts. Include installed colour coded wiring diagrams.
 - .7 Product Data: identify specific products and component parts, and data applicable to installation
- .6 Maintenance Materials:

- .1 Provide spare parts, maintenance materials, special tools specifically requested in respective specification sections.
- .2 Deliver to site and turn over to Departmental Representative.
- .7 Warranties.
 - .1 Include warranties in maintenance manual.
 - .2 Obtain warranties, executed in duplicate by subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work.
 - .3 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
- .8 Record Drawings:
 - .1 Record information on an electronic set of as-built drawings in PDF format. AutoCAD record drawings will be provided by the Departmental Representative based on the markups provided by the Contractor.
 - .2 Annotate with coloured pens, maintaining separate colours for each major system, for recording changed information.
 - .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
 - .4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .2 Field changes of dimension and detail.
 - .3 Changes made by change orders.
 - .4 Details not on original Contract Drawings.
 - .5 References to related shop drawings and modifications.
 - .5 Specifications: legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
 - .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- .9 Equipment and Systems:
 - .1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
 - .2 Include installed colour coded wiring diagrams.

- .3 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- .4 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .5 Include manufacturer's printed operation and maintenance instructions.
- .6 Provide list of original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .7 Include test and balancing reports.
- .8 Additional requirements: As specified in individual specification sections.

1.15 TEMPORARY FACILITIES AND CONTROLS

- .1 Temporary Power
 - .1 A limited amount of power will be available from building supply.
 - .2 Do not shut down or turn off any breakers without Departmental Representative's permission.
 - .3 Do not overload systems.
 - .4 Make good damage to electrical systems caused by use under this Contract.
 - .5 Use only designated outlets.
- .2 Fire Protection:
 - .1 Provide and maintain adequate temporary fire protection equipment during performance of Work, as required by governing Codes, regulations and By-Laws.
- .3 Site Storage/Loading:
 - .1 Confine work and operations of employees to work areas.
 - .2 Do not unreasonably encumber premises with products, materials, tools and equipment.
 - .3 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.
 - .4 Keep work areas clean at all times. Do not allow materials and waste to accumulate in public areas.
- .4 Sanitary Facilities:
 - .1 Washrooms within the buildings are available for workers. Keep in clean and sanitary condition at all times.
 - .2 Use only designate facilities.
- .5 Parking:
 - .1 A limited number of parking spaces will be available for workers. Use only designated spaces.

1.16 CLEANING AND WASTE MANAGEMENT

- .1 Conduct cleaning and disposal operations to comply with Departmental Representative's requirements, local ordinances and anti-pollution laws.
- .2 Remove waste materials and debris from the site at regularly scheduled times or dispose of as otherwise directed by the Departmental Representative.
- .3 Provide on-site containers for collection of waste materials, and debris. Do not use Departmental Representative's waste containers.
- .4 Maintain the Work in tidy condition, free from accumulation of waste products and debris.
- .5 When the Work is complete, remove surplus products, tools, construction tools and equipment. Remove waste products and debris and leave the Work clean and suitable for occupancy by the Departmental Representative.

1.17 DEMONSTRATION AND TRAINING

- .1 Provide separate demonstration and training sessions for each location of the Work.
- .2 Demonstrate operation and maintenance of equipment and systems to Departmental Representative's personnel two (2) weeks prior to date of substantial performance.
- .3 Departmental Representative: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
- .4 Preparation:
 - .1 Verify conditions for demonstration and instructions comply with requirements.
 - .2 Verify designated personnel are present.
 - .3 Ensure equipment has been inspected and put into operation in accordance with the Contract.
 - .4 Ensure testing, adjusting, and balancing has been performed and equipment and systems are fully operational.
- .5 Demonstration and Instructions:
 - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.
 - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
 - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.
- .6 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's review.
- .7 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

- .8 Give time and date of each demonstration, with list of persons present.
- .9 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.
- .10 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
 - .1 Instruct Departmental Representative's personnel.
 - .2 Provide written report that demonstration and instructions have been completed.

1.18 ADDITIONAL MATERIALS AND EQUIPMENT

- .1 Provide the following additional materials and equipment. In all cases, include supply, installation, wiring, connection and verification. Any additional devices not requested during execution of this project are to be turned over to the Departmental Representative for use as spare materials.
 - .1 Two (2) fire alarm manual station², each tied to a fire alarm panel within 20m.
 - .2 Two (2) smoke detectors, each tied to fire alarm panel within 20m.
 - .3 Two (2) thermal detector², each tied to fire alarm panel within 20m.
 - .4 One (1) supervisory module, tied to fire alarm panel within 20m.
 - .5 One (1) individually programmable 4-zone control module, tied to fire alarm panel within 20m.
 - .6 Five (5) combination horn/strobe units, each tied to a fire alarm annunciation circuit within 10m.
 - .7 Five (5) piezoelectric signaling devices, each installed in a resident bedroom and tied to a fire alarm annunciation circuit within 15m.
 - .8 Two (2) isolation modules for a fire alarm circuit.

Part 2 Product

2.1 NOT APPLICABLE

Part 3 Execution

3.1 NOT APPLICABLE

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 11 00 – Summary of Work.

1.2 ADMINISTRATIVE

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative's review.
- .10 Keep one reviewed copy of each submission on site.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .3 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .4 Accompany submissions with transmittal letter, containing:
 - .1 Date.

- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.
- .5 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Installation details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Wiring diagrams.
 - .8 Relationship to adjacent work.
- .6 After Departmental Representative's review, distribute copies.
- .7 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .8 Submit electronic of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .9 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .10 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .11 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.

- .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .12 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .13 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .14 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .15 Delete information not applicable to project.
- .16 Supplement standard information to provide details applicable to project.
- .17 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .18 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

Part 2 Product

2.1 NOT APPLICABLE

Part 3 Execution

3.1 NOT APPLICABLE

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.

1.2 REFERENCE STANDARDS

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Province of Ontario
 - .1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990, c.0.1, as amended and O. Reg. 213/91 as amended - Updated 2017.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- .3 Submit 1 digital copy of Contractor's authorized representative's work site health and safety inspection reports weekly to Departmental Representative.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 working days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 working days after receipt of comments from Departmental Representative.
- .8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.4 FILING OF NOTICE

- .1 File Notice of Project with authorities prior to beginning of Work.
- .2 Contractor shall be responsible and assume the Principal Contractor role for each work zone. Contractor shall provide a written acknowledgement of this responsibility with 3 weeks of contract award.

1.5 SAFETY ASSESSMENT

- .1 The contractor shall review the Designated Substance Survey completed by True Grit Engineering dated March 27th, 2017. The Contractor shall take all precautions and measures identified within the report prior to commencement and throughout construction.
- .2 Perform site specific safety hazard assessment related to project.

1.6 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.7 PROJECT/SITE CONDITIONS

- .1 Work at site will involve contact with:
 - .1 Departmental Representative.

1.8 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.9 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.10 COMPLIANCE REQUIREMENTS

- .1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.
- .2 Comply with R.S.Q., c. S-2.1, an Act respecting Health and Safety, and c. S-2.1, r.4 Safety Code for the Construction Industry.
- .3 Comply with Occupational Health and Safety Regulations, 1996.
- .4 Comply with Occupational Health and Safety Act, General Safety Regulations, O.I.C.
- .5 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.11 UNFORSEEN HAZARDS

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.
- .2 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Health and Safety co-ordinator and follow procedures in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.12 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative.

1.13 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.14 WORK STOPPAGE

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 **Execution**
3.1 **NOT USED**
 .1 Not used.

END OF SECTION

Part 1 General**1.1 WASTE MANAGEMENT GOALS**

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PSPC's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.
- .2 PSPC's waste management goal: to divert a minimum 75 percent of total Project Waste from landfill sites.
- .3 Specific material target percentages for reuse and/or recycling:
- .4 Electrical - wiring/conduits/boxes: 25%
- .5 Packaging: 70%
- .6 Target percentage goals are achievable for waste diversion. Contractor to review and confirm Departmental Representative's Waste Audit acceptable values.
- .7 Protect environment and prevent environmental pollution damage.

1.2 REFERENCE STANDARDS

- .1 Ontario Ministry of Environment
 - .1 Ontario Environmental Protection Act (EPA)
 - .1 Regulation 102/94, Waste Audits and Waste Reduction Workplans.
 - .2 Regulation 103/94, Source Separation Programs.
- .2 Canadian Construction Association (CCA)
 - .1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.
- .3 Public Works and Government Services Canada (PSPC)
 - .1 2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.

1.3 USE OF SITE AND FACILITIES

- .1 Execute Work with minimal interference and disturbance to normal use of premises.

1.4 WASTE PROCESSING SITES

- .1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.

1.5 STORAGE, HANDLING AND PROTECTION

- .1 Unless specified otherwise, materials for removal become Contractor's property.
- .2 Protect, stockpile, store and catalogue salvaged items.
- .3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

- .4 Protect surface drainage, mechanical and electrical from damage and blockage.
- .5 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .6 Separate and store materials produced during project in designated areas.
- .7 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
- .8 Dispose of construction debris, abandoned equipment and materials off site via designated access routes.
- .9 Do not allow demolition debris to accumulate within the building or on site. Remove debris on a regular basis.
- .10 Do not allow waste and debris to block access routes to and from exits, fire lanes, or impede access to the building.
- .11 Do not use Departmental Representative's waste containers for waste removal.
- .12 Provide suitable waste containers. Locate large waste containers on Departmental Representative's property only in areas acceptable to the Departmental Representative.
- .13 DISPOSAL OF WASTES
- .14 Do not bury rubbish or waste materials.
- .15 Do not dispose of waste into waterways, storm, or sanitary sewers.
- .16 Remove materials on-site as Work progresses.

1.6 SCHEDULING

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

Part 2 Products

2.1 NOT APPLICABLE

Part 3 Execution

3.1 APPLICATION

- .1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 GENERAL

- .1 This Section covers items common to Sections of Divisions 26 and 28. This section supplements requirements of Division 01.

1.2 CODES AND STANDARDS

- .1 Do complete installation in accordance with the current edition of the Canadian Electrical Code, Provincial, Municipal, and other codes, rules and regulations and requirements of local authorities having jurisdiction.
- .2 CSA Group
 - .1 CSA C22.1-2018, Canadian Electrical Code.
- .3 Canada National Standards (CAN)
 - .1 CAN3 C235-83(R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

1.3 VOLTAGE RATINGS

- .1 Operating voltages: to CAN3-C235(R2015).
- .2 Equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.4 PERMITS, FEES AND INSPECTION

- .1 Submit to Electrical Safety Authority the necessary number of drawings and specifications for examination and approval prior to commencement of work.
- .2 Pay associated fees.
- .3 Notify Departmental Representative of changes required by Electrical Safety Authority prior to making changes.
- .4 Furnish Certificates of Acceptance from authorities having jurisdiction on completion of work to Departmental Representative.

1.5 SHOP DRAWINGS

- .1 Submit shop drawings, product data and samples in accordance with Division 01. The submission shall be reviewed, signed and processed as described in Division 01.
- .2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.3 Where applicable, include wiring, line and schematic diagrams. Include wiring drawings or diagrams showing interconnection with work of other Sections. Include sequence of operation diagram for the fire alarm system.

.4 Content

- .1 Shop drawings submitted title sheet.
- .2 Data shall be specific and technical.
- .3 Identify each piece of equipment.
- .4 Advertising literature will be rejected.
- .5 The project and equipment designations shall be identified on each document.

.5 Electronic Submission

- .1 All shop drawings to be submitted electronically in PDF format.

.6 Coordination

- .1 Where electrical equipment requires support, or backing by other trades or mechanical connections, the shop drawings shall also be circulated through the other "services" contractor(s) prior to submission to the Departmental Representative.

1.6 DRAWINGS AND MEASUREMENTS

- .1 Drawings are generally diagrammatic, are intended to indicate the scope and general arrangement of work and are not detailed installation drawings. Do not scale the drawings.
- .2 Location of existing equipment and conduits shown on drawings is approximate. Contractor to verify exact location of equipment as required.
- .3 Take field measurements, where equipment and material dimensions are dependent upon building dimensions.

1.7 PROJECT COORDINATION

- .1 Check drawings to verify space and headroom limitations for work to be installed. Coordinate work with all trades and make changes to facilitate a satisfactory installation. Make no deviations to the design intent involving extra cost without the Departmental Representative's written approval.
- .2 The drawings indicate the general location and route to be followed by the electrical / communication / life safety system services. Where details are not shown on the drawings or only shown diagrammatically, the services shall be installed in such a way as to conserve head room and interfere as little as possible with the free use of space through which they pass. Service lines shall run parallel to building lines. All services in the ceiling shall be kept as tight as possible to beams or other limiting members at high level. All services shall be coordinated in elevation to ensure that they are concealed in the ceiling or structural space provided unless detailed otherwise on drawings.

- .3 Work out all interference problems on the site and coordinate all work before fabricating, or installing any material or equipment. Where necessary, produce interference/coordination drawings showing exact locations of electrical systems or equipment within service areas, shafts and the ceiling space. Distribute copies of the final interference/coordination drawings to the Departmental Representative and all affected parties.
- .4 Ensure that all materials and equipment fit into the allotted spaces and that all equipment can be properly serviced and replaced, if and when required. Advise the Departmental Representative of space problems before installing any material or equipment. Demonstrate to the Departmental Representative on completion of the work that all equipment installed can be properly, safely serviced and replaced, if and when required.

1.8 EQUIPMENT IDENTIFICATION

- .1 Identify equipment with nameplates as follows:
 - .2 Nameplates:
 - .1 Lamacoid 3 mm thick plastic engraving sheet, black face, white core, mechanically attached with self tapping screws.

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

- .3 Allow for average of twenty-five (25) letters per nameplate.
- .4 Identification to be English.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Terminal cabinets and pull boxes: indicate system and voltage.
- .7 Transformers: indicate capacity, primary and secondary voltages.
- .8 Whenever equipment is hidden by ceiling panels, raised floor panels, or access hatches, provide visible labels on the corresponding panel, t-bar ceiling grid or hatch. Labels to match existing.

1.9 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, either numbered or colored plastic tapes, on both ends of branch circuit wiring, fire alarm wiring and control / interface wiring.
- .2 Maintain phase sequence and color coding throughout.

- .3 Color code: to CSA C22.1-2018, Canadian Electrical Code.
- .4 Use color coded wires in communication cables, matched throughout system.

1.10 CONDUIT AND CABLE IDENTIFICATION

- .1 Color code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals. In case of wall, ceiling, or floor penetrations conduit to be labeled on both sides of the penetration.
- .3 Colors: 25 mm wide prime color and 20 mm wide auxiliary color.

	Prime	Auxiliary
up to 250 V	Yellow	
Fire Alarm System	Red	
Other Communication Systems	Green	Blue
Other Security Systems	Red	Yellow

1.11 MANUFACTURERS AND CSA/ULC LABELS/CERTIFICATION DIAGRAMS

- .1 Visible and legible, after equipment is installed.

1.12 WARNING SIGNS

- .1 As specified and to meet requirements of Electrical Safety Authority and Departmental Representative.
- .2 Mechanically-fastened lamacoid signs, minimum size 175 x 250 mm.

1.13 WARRANTY

- .1 Use of installed equipment during construction shall not shorten or alter the warranty period as specified in the Division 01.
- .2 Take note of any extended warranties specified.
- .3 Furnish a written warranty stating that all work executed under these Divisions will be free from defects of material and workmanship for a period of one (1) year from the date of substantial performance.
- .4 Promptly investigate any electrical or control malfunction, and repair or replace all such defective work, and all other damages thereby which becomes defective during the time of the warranty.

1.14 RESPONSIBILITIES

- .1 Protect equipment and material from the weather, moisture, dust and physical damage.
- .2 Cover equipment openings and open ends of conduit, piping and pullboxes as work progresses. Failure to do so will result in the trade being required to adequately clean or replace materials and equipment at no extra cost to the Departmental Representative.
- .3 Protect all existing services encountered. Obtain instructions from the Departmental Representative when existing services require relocation or modification.
- .4 Restore damaged or marred factory finish to factory quality.

1.15 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for incorporation into maintenance manual specified in Division 01 and as follows:
- .2 Include in operations and maintenance data:
 - .1 Details of design elements, construction features, component function and maintenance requirements, to permit effective operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.
 - .2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.
 - .3 Wiring and schematic diagrams.
 - .4 Details on existing components connected to the installation, which were not supplied / installed under the current installation.
 - .5 Names and addresses of local suppliers for items included in maintenance manuals.
- .3 Include in the manual the following major sections:
 - .1 Title page (in plastic cover).
 - .2 Comprehensive description of the operation of the systems, including the function of each item of equipment within the system.
 - .3 Detailed instructions for the normal maintenance of all systems and equipment installed including procedures and frequency of operational checks and service and trouble shooting instructions.
 - .4 Local source of supply for each item of equipment.
 - .5 Wiring and control diagrams.
 - .6 Spare parts list.
 - .7 Copies of guarantees and certificates.
 - .8 Manufacturer's maintenance brochures and shop drawings.

- .4 The manual information shall be bound in a three "D-ring" hard back reinforced vinyl covered ("bar lock" post type where more than 50mm rings required) binder c/w index tab separators to divide the different sections.
- .5 Submit a draft copy to the Departmental Representative for approval ten (10) business days prior to start up of the systems and equipment.
- .6 Submit three (3) copies in the final approved form.

1.16 PROJECT RECORD DRAWINGS

- .1 Provide project record documents as specified in Division 01 as further called for in this Division.
- .2 During the construction period, keep on Site a clean set of drawings marked up to reflect the "As-Built" state, for examination by the Departmental Representative on a regular basis. Include elevations and detailed locations of cables, conduit systems, junction and pull boxes.
- .3 Submit "As-Built" drawings and specifications to the Departmental Representative prior to Total Performance of the contract.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

- .1 Equipment and material to be CSA approved in accordance with Canadian Electrical Code article 2-024. Where there is no alternative to supplying equipment, which is not CSA approved, obtain special approval from Electrical Safety Authority.

2.2 WORKMANSHIP

- .1 Workmanship shall be in accordance with well established practice and standards accepted and recognized by the Departmental Representative and the Trade.
- .2 The Departmental Representative shall have the right to reject any item of work that does not conform to the Contract Documents or accepted standards of performance, quietness of operation, finish or appearance.

2.3 CONDUIT AND CABLE INSTALLATION

- .1 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .2 If cable / conduit installation requires coring, review the proposed cable / conduit routing with the Departmental Representative prior to coring the building. Keep coring and penetration of rated walls to a minimum. Neatly seal all exterior and rated wall penetrations on both sides of the wall.

- .3 Where surface raceways are used, the raceway is to be metal, not PVC.
- .4 Utilize FT6 rated cable for fire alarm installations.

2.4 FIELD QUALITY CONTROL

- .1 All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks - the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.
- .2 The work of this division to be carried out by a contractor who holds a valid Master Electrical contractor license as issued by the Province that the work is being constructed.
- .3 Conduct and pay for following tests:
 - .1 Fire Alarm Verification
- .4 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
- .5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .6 Submit test results for Departmental Representative's review.

2.5 CLEANING

- .1 Do final cleaning in accordance with Division 01.
- .2 At time of final cleaning, clean surfaces that have been exposed to construction dust and dirt. Remove finger prints from reflective surfaces.
- .3 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .4 Clean and prime paint exposed non-galvanized hangers, racks, fastenings to prevent rusting.

2.6 CARE, OPERATION AND START-UP

- .1 Instruct operating personnel in the setup, operation, care and maintenance of systems, system equipment and components in accordance with Division 01.
- .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 all aspects of its care and operation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Materials and installation for wire and box connectors.

1.2 EQUIPMENT STANDARD REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA C22.2 No. 0-10(R2015) – General Requirements – Canadian Electrical Code, Part II
 - .2 Equipment certified by a certification organization accredited by the Standards Council of Canada in accordance with the requirements of CSA standards.
- .2 Where such CSA standards do not exist, or are not applicable, equipment shall be certified in accordance with other recognized documents, or conform to the requirements of the regulatory authority having jurisdiction.

Part 2 Products

2.1 MATERIALS

- .1 Pressure type wire connectors to: CSA C22.2, with current carrying parts of suitable material sized to fit conductors as required.
- .2 Clamps or connectors as required to: CSA-C22.2.

Part 3 Execution

3.1 INSTALLATION

- .1 All installations shall be in accordance with connector manufacturer recommendations.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.

1.2 REFERENCES

- .1 CSA C22.2 No .0.3-09(R2014), Test Methods for Electrical Wires and Cables
- .2 CSA C22.2 No. 75-17, Thermoplastic Insulated Wires and Cables (Trinational standard with UL 83 and NMX-J-010-ANCE-2017)

Part 2 Products

2.1 BUILDING WIRES

- .1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
- .2 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90.

2.2 FIRE ALARM SYSTEM WIRING

- .1 Fire Alarm System Wiring:
 - .1 New conductors to be copper, to CSA C22.2 No. 75 and as follows:
 - .1 Conductor Insulation: Minimum rating 300-V. Single conductor RW90 XLPE.
 - .2 Multi-conductor cables 105°C with outer PVC jacket, colour coded, FAS rated.
 - .2 New conductor sizes as follows:
 - .1 Minimum conductor size for signal and alarm initiating circuits shall be #16 AWG.
 - .2 Minimum conductor size for AC circuits shall be #12 AWG.
 - .3 Minimum conductor size for visual signal appliance circuits shall be #12 AWG.
 - .4 Size all fire alarm wiring for maximum 3% voltage drop at maximum load to last device in run.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CSA C22.1-2018, Canadian Electrical Code, Part 1 (24th edition), Safety Standard for Electrical Installations.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm square or larger outlet boxes as required for special devices.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 Combination boxes with barriers where outlets for more than one system, or circuits with various voltages are grouped.
- .6 Boxes in wet locations and on the exterior of the building to be CSA type 3R.

2.2 FITTINGS - GENERAL

- .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 32 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.
- .5 Compression fittings on CSA type 3R boxes.

Part 3 Execution

3.1 INSTALLATION

- .1 Support boxes independently of connecting conduits.
- .2 Provide correct size of openings in boxes for conduit, and cable connections. Reducing washers are not allowed.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware.
 - .2 CSA C22.2 No. 56-17, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .3 CSA C22.2 No. 83-M1985(R2017), Electrical Metallic Tubing.

Part 2 Products

2.1 CONDUITS

- .1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings. Use compression type EMT couplings and fittings on exterior installations and in damp locations.
- .2 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

2.2 CONDUIT FASTENINGS

- .1 One hole steel straps to secure surface conduits 50 mm and smaller. Two hole steel straps for conduits larger than 50 mm.
- .2 Channel type supports for two or more conduits.
- .3 Threaded rods, 6 mm dia., to support suspended channels.

2.3 CONDUIT FITTINGS

- .1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.
- .2 Factory "ells" where 90E bends are required for 25 mm and larger conduits.

2.4 FISH CORD

- .1 Polypropylene.

Part 3 Execution

3.1 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 and in unfinished areas.

- .3 Use liquid tight flexible metal conduit for connection in damp, wet or corrosive locations.
- .4 Minimum conduit size: 19 mm.
- .5 Bend EMT conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .6 Mechanically bend steel conduit over 19 mm dia.
- .7 Install fish cord in empty conduits.
- .8 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- .9 Dry conduits out before installing wire.
- .10 Firestop any fire rated wall penetrations.

3.2 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
- .3 Group conduits wherever possible on suspended channels.
- .4 Do not pass conduits through structural members except as permitted by the Structural Engineer.
- .5 Do not locate conduits less than 75 mm parallel to hot water lines with minimum of 25 mm at crossovers.

3.3 CONCEALED CONDUITS

- .1 Run parallel or perpendicular to building lines.

END OF SECTION

Part 1 General

1.1 REGULATORY REQUIREMENTS

- .1 Installation subject to approval, inspection and test of the Departmental Representative and the Authority Having Jurisdiction for final acceptance.
- .2 All equipment to be listed by Underwriters Laboratories of Canada, compatible for forming an integrated fire alarm system.
- .3 Verification shall conform to the requirements of CAN/ULC-S537 / CAN/ULC-S524, latest edition. Fire department notification shall be in conformance with CAN/ULC-S561.
- .4 Comply with requirements of National Building Code of Canada, Ontario Building Code and authorities having jurisdiction.
- .5 System installers shall be qualified to perform the work in the Province of Ontario.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CSA C22.2 No. 208-14, Fire Alarm and Signal Cable.
- .2 Underwriters Laboratories of Canada (CAN/ULC)
 - .1 CAN/ULC-S537-13, Verification of Fire Alarm Systems
 - .2 CAN/ULC-S524-14, Standard for the Installation of Fire Alarm Systems.
 - .3 CAN/ULC-S561-06, Installation and Services for Fire Signal Receiving Centres and Systems, includes Amendment 1 (Sept 2006).
- .3 National Building Code of Canada (NBC) 2015
- .4 Ontario Building Code 2012

1.3 GENERAL REQUIREMENTS

- .1 This section of the specification includes the furnishing, installation and connection of a microprocessor controlled, intelligent fire alarm equipment required to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panels, auxiliary control devices, annunciators, power supplies, and wiring as shown on the drawings and specified herein and elsewhere in Division 28.
- .2 System to be complete with all necessary components to provide functions required whether or not each and every item is mentioned. All components to be production proven models. Custom designed units will only be considered for those items that are not currently available on commercial market.
- .3 Before proceeding with equipment ordering, submit to the Departmental Representative for approval a complete detailed proposal as outlined in Clause 1.4, Shop Drawings.
- .4 Provide all conduit, pullboxes, junction boxes, device boxes and terminal panels required.
- .5 All wiring for systems to be PVC insulated, shielded, twisted pair, multi-conductor or coaxial, as called for or as required. All wiring for system to be installed in EMT conduit.
- .6 Selection of type of cable to be at discretion of system installer but the system shall meet all code requirements when complete, and must perform to the complete satisfaction of the Departmental Representative. All wiring to be terminated in terminal panels, junction boxes, etc. on suitable terminal strips or blocks, and to be neatly installed, laced and tagged where required. All terminals in terminal panels and junction boxes to be made with solderless connectors to terminal blocks with separate terminal for each conductor.

1.4 TECHNICAL REQUIREMENTS

- .1 Equipment to be certified to the applicable ULC product standards at time of tender.
- .2 System to be electrically supervised as required by ULC and specified herein.
- .3 System operation shall not require personnel with special computer operation skills. User operating language to be based on English type commands.
- .4 System to be zoned, annunciated, non-coded, single stage, microprocessor based, utilizing end devices, distribution and control. System shall be complete with all necessary hardware, software and memory, specifically tailored for this installation.

1.5 SYSTEM SUPERVISION

- .1 Fire alarm manual and automatic detection circuits and network lines to be fully supervised utilizing a Data Communication Link Class A (DCLA).

- .2 Complete system to be supervised against failure of operating power, open circuits, and ground faults. Supervision to be maintained on all circuits even in the event of a power failure, when the system is on battery standby. Any of the above shall cause trouble buzzer to sound at the main control panel and at annunciators and also light a common trouble lamp in the same panels. Trouble on system to produce a tone distinct from the tone of the alarm signals.
- .3 System to incorporate a silencing switch in the main fire alarm control panel, which when operated, silences the trouble signal but caused the trouble lamp to remain illuminated until the trouble is cleared and the system returned to normal. Upon return to normal, trouble signal lamp shall be automatically reset to normal.

1.6 SYSTEM OPERATION

- .1 Operation of any fire alarm signal initiating device to automatically perform the following functions:
 - .1 Activate general Temporal style alarm signal throughout the building.
 - .2 Activate synchronized visual devices (strobes) throughout the building.
 - .3 Provide visual annunciation at the main panel and all remote annunciators of fire status of alarmed zones.
 - .4 Allow the signal to be manually silenced at the Fire Alarm Control Panel within the provision of NBCC 2015, article 3.2.4.6.

1.7 SYSTEM OPERATION FROM FIRE ALARM CONTROL PANEL

- .1 New Fire Alarm Control Panel (FACP) to be located as shown on the drawings.
- .2 The Fire Alarm Control Panel is to incorporate the following operational features and information:
 - .1 Indication of fire alarm status in any zone or area.
 - .2 Indication of any trouble or circuit supervision fault in system.
 - .3 Silence general alarm audible signal after 1 minute of signaling.
 - .4 Reset system after all alarm devices have been restored to their normal condition.

1.8 SUBMITTALS

- .1 Shop drawings to be submitted as outlined in Div 01, Section 26 05 00 and this section.
- .2 Shop drawings to include the following diagrams:
 - .1 Equipment panel elevations for FACP and annunciator panels. Elevations to indicate component layouts, cable routing and terminal blocks.
 - .2 Detail drawings of all control panels and annunciator panels indicating material, finish component models, housing requirements and mounting details.
 - .3 Complete engineering drawings of all custom made components indicating all materials, gauges, finishes and wiring diagrams.

- .4 Complete system block diagrams indicating all components, interconnection and cabling.
- .5 Complete detailed system circuit and riser diagrams indicating:
 - .1 Main control panel
 - .2 Alarm devices
 - .3 Annunciators
 - .4 Auxiliary interconnections
 - .5 Component layout
 - .6 Identification schedules
 - .7 Zone wiring designations
 - .8 Panel interconnect wiring
 - .9 Detailed wiring connections and wire designations
- .6 Complete wiring diagram showing terminal identification, cable type and cable designation.
- .3 Provide factory data sheets for the following:
 - .1 Fire alarm control panel, annunciator panels, and control units, indicating:
 - .1 All materials,
 - .2 Finishes,
 - .3 Layouts,
 - .4 Proposed labeling.
 - .2 All system devices indicating:
 - .1 Typical wiring connections,
 - .2 Installation instructions,
 - .3 Control settings,
 - .4 Component limitations.

1.9 OPERATION AND MAINTENANCE DATA

- .1 Comply with requirements of Div 01 and Section 26 05 00.

1.10 SPARE PARTS AND MAINTENANCE MATERIALS

- .1 Spare parts and maintenance materials required:
 - .1 Twenty (20) replacement glass rods for manual alarm stations (if applicable).

1.11 SOURCE OF SUPPLY

- .1 Complete fire alarm system shall be supplied by a single manufacturer.

1.12 SYSTEM MAINTENANCE AND TESTING FACILITY

- .1 At the Fire Alarm Control Panel provide facilities to perform the following functions:
 - .1 Silent test.
 - .2 Central station disconnect.
 - .3 Master switch to bypass all auxiliary functions.

- .4 Bypass audible and visual signal devices. Audible and visual signal devices to be configured such that bypass shall allow for isolation of each floor for testing / troubleshooting purposes.
- .2 Activation of any or all of these functions shall place a trouble signal on the system.
 - .1 Facilities described above shall be through the use of toggle or pushbutton type switches. Each switch to be equipped with a red LED to indicate switch has been activated.

Part 2 Products

2.1 MAIN FIRE ALARM CONTROL PANEL

- .1 The main FACP Central Console shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: detectors, annunciators, and other system controlled devices.
- .2 Of code gauge construction with full viewing windows, hinged key locked front cover and painted panels in colors as selected by Departmental Representative.
- .3 System Capacity and General Operation
 - .1 The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit liquid crystal display and/or color coded system status LEDs.
 - .2 All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the fire alarm control panel.
 - .3 System to be sized to accommodate all functions and devices as shown on the drawings and in the specifications. Provide additional 50% spare capacity. System to incorporate all printed circuit boards, etc. required to provide spare capacity.
 - .4 All visual and audible signaling circuits to include 50% spare capacity for additional signaling devices.
- .4 In control panel install main CPU and associated modules to operate the system. System construction to be modular with solid state, microprocessor based electronics.
- .5 System to be complete with digital style auto dialer to notify monitoring agency of the occurrence of a fire condition. Auto dialer to be complete with line seizure feature.
- .6 Central Processing Unit
 - .1 The Central Processing Unit shall communicate with, monitor, and control all other modules within the control panel. Removal, disconnection or failure of any control panel module shall be detected and reported to the system display by the Central Processing Unit.

- .2 The Central Processing Unit shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Such control-by-event programs shall be held in non-volatile programmable memory, and shall not be lost with system primary and secondary power failure.
- .3 The Central Processing Unit shall also provide a real-time clock for time annotation of all system events. The time-of-day and date shall not be lost if system primary and secondary power supplies fail.
- .4 The CPU shall be capable of being programmed on site without requiring the use of any external programming equipment. Systems that require the use of external programmers or change of EPROMs are not acceptable.
- .5 The CPU and associated equipment are to be protected so that they will not be affected by voltage surges or line transients consistent with UL864 standards.
- .7 The system to provide following features:
 - .1 The system to be capable of on-site programming to accommodate and facilitate expansion, building parameter changes or changes required by the Departmental Representative and/or local codes.
 - .2 To accommodate and facilitate scope changes, initiation circuits shall be individually configured on site to provide either ALARM/TROUBLE operation, alarm only, trouble only, current limited alarm, no alarm, normally closed device monitoring, a non-latching circuit, or an alarm verification circuit.
 - .3 Control panel to have a dedicated:
 - .1 Alarm LED with acknowledge switch.
 - .2 Supervisory LED with acknowledge switch.
 - .3 Trouble LED with acknowledge switch.
 - .4 The control panel to have the capability of annunciating a trouble reminder audibly and visually. This feature is to be programmable at specific time intervals, thus reminding the Departmental Representative that a trouble has been silenced and should be serviced.
 - .5 The system shall be complete with battery standby, of sufficient capacity to operate the system in standby mode for a period of 24 hours, and have sufficient capacity to sound the signals for 30 minutes at the end of the standby period.
 - .6 The system shall be complete with power supplies, batteries and battery chargers to accommodate all requirements for system power to meet ULC standards.
- .8 The main FACP shall perform the following functions:
 - .1 Supervise and monitor all detectors connected to the system for normal, trouble and alarm conditions.
 - .2 Supervise all initiating signaling and notification circuits throughout the facility by way of connection to monitor and control modules.
 - .3 Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed.
 - .4 Visually and audibly annunciate any trouble, supervisory, security or alarm condition on panel display, and annunciators.

- .1 When a fire alarm condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:
 - .1 The system alarm LED shall flash.
 - .2 A local piezo-electric audible device in the control panel shall sound a distinctive signal.
 - .3 All system outputs assigned via pre-programmed equations for a particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
- .2 When a trouble condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:
 - .1 The system trouble LED shall flash.
 - .2 A local piezo-electric audible device in the control panel shall sound a distinctive signal.
 - .3 All system outputs assigned via pre-programmed equations for a particular point in trouble shall be executed, and the associated system outputs (trouble notification appliances and/or relays) shall be activated.
- .3 When a supervisory condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:
 - .1 The system trouble LED shall flash.
 - .2 A local piezo-electric audible device in the control panel shall sound a distinctive signal.
 - .3 All system outputs assigned via pre-programmed equations for a particular point in trouble shall be executed, and the associated system outputs (notification appliances and/or relays) shall be activated.

2.2 SIGNAL POWER SUPPLY

- .1 Power Supply as follows:
 - .1 Rectifier and Battery Charger:
 - .1 Designed to automatically maintain battery bank fully charged.
 - .2 Sized to recharge batteries in 24 hours minimum.
 - .3 Designed to operate system when batteries are disconnected.
 - .4 Temperature compensated.
 - .5 Provide battery connection supervision.
 - .2 Battery Bank: Gel-cell type.
 - .3 Capacity: Designed to operate system under supervisory load condition for 24 hours and then have sufficient power to provide 30 minutes of continuous operation of the signal appliances without recharging.
 - .4 Mounting integral with Fire Command Panel.

2.3 WIRE AND CABLE

- .1 Conductors: Copper, to CSA C22.2 No. 208 and as follows:
 - .1 Conductor Insulation: Minimum rating 300 volts.
 - .2 Single conductor RW90 X-link.

- .3 Multi-conductor cables shall be FAS Type cable, 105°C with outer PVC jacket, color coded.
- .4 New conductor sizes as follows:
 - .1 Minimum conductor size for audible signal and alarm initiating circuits shall be #16 AWG.
 - .2 Minimum conductor size for AC circuits shall be #12 AWG.
 - .3 Minimum conductor size for auxiliary 24V circuits shall be #14 AWG.
 - .4 Size all fire alarm wiring for maximum 3% voltage drop at maximum load at last device in run.
 - .5 Visual signal appliance minimum #12 AWG.

2.4 FIRE ALARM MANUAL STATION

- .1 Fire alarm manual stations shall be:
 - .1 Labeled in English

Part 3 Execution

3.1 INSTALLATION

- .1 System installation shall conform to CAN-S524.
- .2 Provide 19 mm conduit and 2#14 conductors to telephone backboard for FACP tie-in.
- .3 Provide a label on the main fire alarm panel indicating the software version installed and the date of installation. Ensure that the latest software version and date are indicated on the label at the time of commissioning.

3.2 WIRING

- .1 Make conductor terminations in panel on terminal strips with separate terminal for each conductor.
- .2 Neatly install all wiring, clamped with nylon cable straps or laced with jute cord.
- .3 Identify all conductors, cables and terminal strips as indicated on shop drawings.
- .4 Attach wiring diagram to inside of panel door.
- .5 All wiring to be installed in EMT conduit.
- .6 All backboxes in exposed installations to be as provided by system manufacturer.

3.3 FIRE ALARM VERIFICATION

- .1 Contractor to include in his base bid all costs for fire alarm system verification and any additional costs to change or alter operation or installation to meet the intent of the specification or regulatory code.

3.4 PROTECTION OF COMPLETED WORK

- .1 Protect equipment in areas of construction to prevent the entry of dust, paint and any other foreign matter into the devices or panels.

3.5 TRAINING

- .1 System installer to conduct training program for designated maintenance and operating personnel. Program to include but not be limited to the following:
 - .1 Operation: designated personnel to be trained to accomplish and understand all aspects of the system operation.
 - .2 Maintenance: designated personnel to be trained to perform routine maintenance on the system.
- .2 Training period schedule to be established by the Departmental Representative. Training periods to take place after building completion system verification.
- .3 Contractor to provide a site-specific step-by-step quick reference operating instructions. Instructions to address all common operation and maintenance tasks including but not limited to:
 - .1 Disabling panel for testing
 - .2 Bypassing fire alarm detector(s) / annunciator(s) for testing
 - .3 Acknowledgement of alarm or trouble signal
 - .4 Fire Drill Training

END OF SECTION