



PROJECT NO. R.084087

Booth Dover Brouse Slater Fire Alarm Upgrades Tender

July 2020



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END OF SECTION

Part 1 General

1.1 WORK SEQUENCE

- .1 Construct Work in stages to accommodate Departmental Representative's continued use of premises during construction.
- .2 Co-ordinate Progress Schedule and co-ordinate with Departmental Representative Occupancy during construction.
- .3 Required stages:
 - .1 Install and commission new fire alarm devices.
 - .2 Installation of fire alarm network between the two existing fire alarm systems.
- .4 Maintain fire access/control.

1.2 CONTRACTOR USE OF PREMISES

- .1 Limit use of premises for Work and for access to allow:
 - .1 Departmental Representative occupancy.
- .2 Co-ordinate use of premises under direction of Departmental Representative.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.3 DEPARTMENTAL REPRESENTATIVE OCCUPANCY

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

1.4 EXISTING SERVICES

- .1 Where Work involves breaking into or connecting to existing services, give one-week 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 tenant operations.
- .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.
- .3 Provide temporary services when directed by Departmental Representative to maintain critical building and tenant systems.
- .4 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .5 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

- .6 Record locations of maintained, re-routed and abandoned service lines.

1.5 CONSTRUCTION PROGRESS SCHEDULE

- .1 Schedule and execute work with least possible interference or disturbance to the normal use of premises.
- .2 On award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When the Departmental Representative has reviewed schedule, take necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.
- .3 Carry out work during "regular hour", Monday to Friday from 07:00 to 18:00 hours for non-occupied spaces, basement.
- .4 Carry out work during "off hours", Monday to Friday from 18:00 to 07:00 hours for occupied spaces.
- .5 Give the Departmental Representative 48 hours notice for work to be carried out during "off hours".

1.6 REGULATORY REQUIREMENTS

- .1 References and Codes:
 - .1 Materials shall be new and work shall conform to the minimum applicable standards of the "References" indicated in the specification sections, the National Building Code of Canada 2015 (NBC) and all applicable Provincial and Municipal codes.
- .2 Building Smoking Environment:
 - .1 Smoking is not permitted in the Building. Obey smoking restrictions on building property.
- .3 Hazardous Material Discovery:
 - .1 Stop work immediately when material resembling spray or trowel-applied asbestos, Polychlorinated Biphenyl (PCB), mould or other designated substances is encountered during demolition work.
 - .1 Take preventative measure and promptly notify Departmental Representative.
 - .2 Do not proceed until written instructions have been received from Departmental Representative.

1.7 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.
- .2 Welding and cutting:
- .1 At least 1 week prior to commencing cutting, welding or soldering procedure, provide to Departmental Representative:
 - .1 Notice of intent, indicating devices affected, time and duration of isolation or bypass.
 - .2 Completed welding permit.
 - .3 Return welding permit to Departmental Representative immediately upon completion of procedures for which permit was issued.
 - .2 Comply with the National Building Code of Canada 2015 (NBC) as amended for fire safety in construction and the National Fire Code of Canada 2015 (NFC) as amended for fire prevention, firefighting and life safety in building in use.
 - .3 Before welding, soldering, grinding and/or cutting work, obtain a permit from the Real Property Service Provider or as directed by the Departmental Representative. No hot work shall be undertaken unless authorized by the Real Property Service Provider or Departmental Representative.
- .3 Where work requires interruption or cause activation of fire alarm systems:
- .1 Provide “Watchman Service” as described in NFC; In general, watchman service is defined as an individual conversant with “Fire Emergency Procedures”, performing fire picket duty within an unprotected and unoccupied (no workers) area once per hour or more often as directed by DR.
 - .2 Retain services of manufacturer for fire protection systems on daily basis or as approved by Departmental Representative, to isolate and protect all devices relating to:
 - .1 modification of fire alarms and/or
 - .2 cutting, welding, soldering or other construction activities that might activate fire protection systems.
 - .3 Immediately upon completion of work, restore fire protection systems to normal operation and verify that all devices are fully operational.
 - .4 Inform fire alarm system monitoring agency and local Fire Department immediately prior to isolation and immediately upon restoration of normal operation.

1.8 QUALITY CONTROL

- .1 Testing Services:

- .1 Provide safe working areas and assist with testing procedures, including provisions for materials or services and co-ordination, as required by testing agency and as authorized by Departmental Representative.
- .2 Where tests indicate non-compliance with specifications, contractor to pay for initial test and all subsequent testing of work to verify acceptability of corrected work.

1.9 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) – O.Reg. 860 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 1 week notice for work involving designated substances, hazardous substances, and before painting, caulking, installing carpet or using adhesives and other materials, that cause off gassing.

1.10 TEMPORARY UTILITIES

- .1 Existing services required for work, may be used by the Contractor without charge. Ensure capacity is adequate prior to imposing additional loads. Connect and disconnect at own expense and responsibility.
- .2 Notify the Departmental Representative and utility companies of intended interruption of services and obtain requisite permission.
- .3 Give the Departmental Representative 1 week notice related to each necessary interruption of any mechanical or electrical service throughout the course of the work. Keep duration of these interruptions to a minimum. Carry out all interruptions after normal working hours of the occupants, preferably on weekends.

1.11 CONSTRUCTION FACILITIES

- .1 Access Scaffold:
 - .1 Scaffolding: in accordance with CSA Z797-09 – Code of Practice for Access Scaffold.
 - .2 Provide design drawings, signed and sealed by qualified Professional Engineer licensed in the province of Ontario, where prescribed.
 - .3 Additions or modifications to scaffolding must be approved by Professional Engineer in writing.
- .2 Site Storage:
 - .1 The Departmental Representative will assign storage space that shall be equipped and maintained by the Contractor.
 - .2 Do not unreasonably encumber site with materials or equipment.
 - .3 Move stored products or equipment that interfere with operations of Departmental Representative or other contractors.

- .4 Obtain and pay for use of additional storage or work areas needed for operations.
- .5 Do not load or permit to load any part of work with weight or force that will endanger work.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Sanitary facilities: will be assigned for Contractor's personnel. Others shall not be used. Keep facilities clean.
- .5 Signage:
 - .1 Provide common-use signs related to traffic control, information, instruction, use of equipment, public safety devices, etcetera, in both official languages or by the use of commonly understood graphic symbols and to approval of the Departmental Representative.
 - .2 No advertising will be permitted on this project.
 - .3 Maintain approved signs and notices in good condition for duration of project and dispose of off site, on completion of project or earlier, as directed by Departmental Representative.

1.12 TEMPORARY BARRIERS AND ENCLOSURES

- .1 Maintain existing services to building and provide for personnel and vehicle access.
- .2 Hoarding:
 - .1 Design, erect and maintain temporary site enclosure and covered pedestrian walkways and provide protection, complete with signs and electrical lighting as required by authority having jurisdiction.
- .3 Dust Control:
 - .1 Provide dust tight screens or partitions to localize dust-generating activities, and for protection of workers, finished areas of work and public.
 - .2 Maintain and relocate protection until such work is complete.
 - .3 Protect all furnishings within work area with 0.102mm thick polyethylene film during construction. Remove film during non-construction hours and leave premises in clean, unencumbered and safe manner for normal daytime function.
- .4 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.
 - .1 The contractor shall agree to install proper site separation and identification in order to maintain 'Time and Space' at all times throughout the life of the project. When building operations staff, building staff or private sector maintenance personnel require access to operational equipment located in the construction area in order to operate the building, access shall be granted and proper coordination and communication must exist between all parties involved.
- .5 Protection:
 - .1 Protect work against damage until take-over.
 - .2 Protect adjacent work against the spread of dust and dirt beyond the work areas.
 - .3 Protect operatives and other users of site from all hazards.

1.13 COMMON PRODUCT REQUIREMENTS

- .1 Quality of Work:
 - .1 Carry out work using qualified licenced workers or apprentices in accordance with Provincial Act respecting manpower vocational training and qualification.
 - .2 Permit employees registered in Ontario apprenticeship program to perform specific tasks only if under direct supervision of qualified licenced workers.
 - .3 Determine permitted activities and tasks by apprentices, based on level of training attended and demonstration of ability to perform specific duties.
- .2 Storage, Handling and Protection:
 - .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions.
 - .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove packaging or bundling until required in work.
- .3 Manufacturer's Instructions: unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers

1.14 EXAMINATION AND PREPARATION

- .1 Examine site and conditions likely to affect work and be familiar and conversant with existing conditions.
- .2 Before commencing work, establish location and extent of services lines in area of work and notify Departmental Representative of findings.

1.15 EXECUTION

- .1 Cut, Patch and Make Good:
 - .1 Cut existing surfaces as required to accommodate new work.
 - .2 Remove all items so shown or specified.
 - .3 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.
- .2 Firestop and smoke seal systems: in accordance with CAN-ULC-S115-11 – Standard Method of Fire Test of Firestop Systems. Install around pipe, ductwork, cables, and other objects penetrating fire separations to provide fire resistance not less than the fire resistance rating of surrounding floor, ceiling, and wall assembly.
- .3 Sleeves, Hangers and Inserts: co-ordinate setting and packing of sleeves and supply and installation of hangers and inserts. Obtain Departmental Representative's approval before cutting into structure.
- .4 Unless otherwise specified, materials for removal become the Contractor's property and shall be taken from site.

1.16 WASTE MANAGEMENT

- .1 Comply with Environmental Protection Act, Ontario Regulations: O. Reg. 102/94 – Waste Audits and Waste Reduction Work Plans; and O. Reg. 103/94 – Industrial, Commercial and Institutional Source Separation Programs; for waste management on construction and demolition projects.
- .2 Conduct "waste audit" to determine what waste will be generated during construction and demolition operations. Prepare written "waste reduction work plan" and implement the principles to reduce, reuse and recycle materials to the extent that is possible.
- .3 Provide a "source separation program" to disassemble and collect in an orderly fashion the following "materials designated for alternative disposal" from the "general waste" stream:
 - .1 brick and Portland cement concrete;
 - .2 cardboard (corrugated);
 - .3 gypsum board (unfinished);
 - .4 steel; and
 - .5 wood (not including painted, treated or laminated wood).
- .4 Submit complete records of all removals from site for both "materials designated for alternative disposal" and "general waste" including:
 - .1 time and date of removal;
 - .2 description of material and quantities; and
 - .3 proof that materials have been received at an approved Waste Processing Site or certified Waste Disposal Site as required.

1.17 CLOSEOUT SUBMITTALS

- .1 Operational and Maintenance Manuals:
 - .1 Two (2) weeks prior to any scheduled training, submit to Departmental Representative one (1) digital copy and six (6) copies of approved Operations Data and Maintenance Manual in both official languages, compiled as follows:
 - .1 Bind data in vinyl hard cover 3 "D" ring type loose-leaf binders for 212 x 275|mm size paper. Binders must not exceed 75|mm thick or be more than 2/3 full.
 - .2 Enclose title sheet labelled "Operation Data and Maintenance Manual," project name, date and list of contents. Project name must appear on binder face and spine.
 - .3 Organize contents into applicable sections of work to parallel project specifications breakdown. Mark each section by labelled tabs protected with celluloid covers fastened to hard paper dividing sheets.
 - .2 Include following information plus data specified:
 - .1 Maintenance instruction for finished surface and materials.
 - .2 Copy of hardware and paint schedules.
 - .3 Description: operation of the equipment and systems defining start-up, shut-down and emergency procedures, and any fixed or adjustable set

- points that affect the efficiency of the operation. Include nameplate information such as make, size, capacity and serial number.
- .4 Maintenance: use clear drawings, diagrams or manufacturers' literature which specifically apply and detail the following:
 - .1 lubrication products and schedules;
 - .2 trouble shooting procedures;
 - .3 adjustment techniques; and
 - .4 operational checks.
 - .5 Suppliers' names, addresses and telephone numbers and components supplied by them must be included in this section. Components must be identified by a description and manufacturers part number.
 - .6 Guarantees showing:
 - .1 name and address of projects;
 - .2 guarantee commencement date (date of Interim Certificate of Completion);
 - .3 duration of guarantee;
 - .4 clear indication of what is being guaranteed and what remedial action will be taken under guarantee; and
 - .5 signature and seal of Guarantor.
 - .7 Additional material used in project listed under various Sections showing name of manufacturer and source of supply.
- .3 Spare parts: list all recommended spares to be maintained on site to ensure optimum efficiency. List all special tools appropriate to unique application. All parts/tools detailed must be identified as to manufacturer, manufacturer part number and supplier (including address).
- .4 Include one complete set of final shop drawings (bound separately) indicating corrections and changes made during fabrication and installation.
- .2 Records:
- .1 As work progresses, maintain accurate records to show deviations from contract drawings. Just prior to Departmental Representative's inspection for issuance of final certificate of completion, supply to the Departmental Representative one (1) set of white prints with all deviations neatly inked in. The Departmental Representative will provide two sets of clean white prints for this purpose.
- .3 Guarantees and Warranties:
- .4 Before completion of work collect all manufacturer's guarantees or warranties and deposit with Departmental Representative

1.18 CLEANING

- .1 Clean up as work progresses. At the end of each work period, and more often if ordered by the Departmental Representative, remove debris from site, neatly stack material for use, and clean up generally.
- .2 Upon completion remove scaffolding, temporary protection and surplus materials. Make good defects noted at this stage.

- .3 Clean and polish glass, mirrors, ceramic tile, aluminum, chrome, stainless steel, baked or porcelain enamel, plastic laminate and other plastic surfaces, floors, hardware and washroom fixtures. Clean manufactured articles in accordance with manufacturer's written instructions.
- .4 Clean areas under contract to a condition equal to what previously existed and to approval of Departmental Representative.

1.19 SECURITY ESCORT

- .1 All personnel employed on this project shall be escorted when executing work in non-public areas during normal working hours. Personnel shall be escorted in all areas after normal working hours.
- .2 Submit an escort request to Departmental Representative at least 14 days before the service is needed. For requests submitted within the time mentioned above, the Departmental Representative will pay for the costs of the security escort. The cost incurred by a late request will be charged to the Contractor.
- .3 Any escort request may be cancelled free of charge if notification of cancellation is given at least 4 hours before the scheduled time of the escort. The cost incurred by a late cancellation will be charged to the Contractor.
- .4 The calculation of costs will be based on the average hourly rate of a security officer for a minimum of 8 hours per day for a late service request and 4 hours for late cancellations.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Federal Legislation
 - .1 Canada Labour Code, Part II, section 124 and 125.
 - .1 Canada Occupational Health and Safety Regulations
 - .2 Transportation of Dangerous Goods Act, 1992 (TDGA)
 - .3 Canada Consumer Product Safety Act
 - .1 Surface Coating Materials Regulations SOR/2005-109.
 - .4 Canadian Environmental Protection Act, 1999 (CEPA)
 - .1 PCB Regulations (SOR/2008-273)
 - .2 Federal Halocarbon Regulations, 2003 (SOR/2003-289)
- .2 Provincial Legislation
 - .1 Ontario Occupational Health and Safety Act, R.S.O. 1990, 2010 edition.
 - .1 Ontario Regulation 490/09 – Designated Substances (O.Reg. 490/09).
 - .2 Ontario Regulation 278/05 – Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations, (O.Reg. 278/05).
 - .3 Ontario Regulation 213/91 for Construction Projects (O.Reg. 213/91)
 - .2 Ontario Environmental Protection Act, R.R.O. 1990,
 - .1 Ontario Regulation 347/09, General – Waste Management (O.Reg. 347/09).
 - .2 Ontario Regulations 362/90 – Waste Management, PCBs (O.Reg. 362/90)
 - .3 Ontario Regulation 463/10, Ozone Depleting Substances and Other Halocarbons (O.Reg. 463/10).
- .3 Canadian General Standards Board (CGSB).
- .4 Canadian Standards Association (CSA International). CAN/CSA-Z94.4-11 - Respiratory Protection
- .5 Underwriters' Laboratories of Canada (ULC).

1.2 DEFINITIONS

Asbestos-Containing Materials (ACMs): means material that contains 1 per cent or more asbestos by dry weight as per Canada Occupational Health and Safety Regulations or 0.5 per cent or more asbestos by dry weight as per Ontario Regulation 278/05. For the purpose of this project, Asbestos-Containing Material means a material that contains 0.5 per cent or more asbestos by dry weight.

Friable Material: material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.

Lead-Containing Material: Paint or surface coating that contains concentrations of lead above the Federal Canada Consumer Product Safety Act's limit of 90 ppm.

Time-weighted average exposure limit (TWAEEL): the time-weighted average airborne concentration of a biological or chemical agent to which a worker may be exposed in a work day or work week as prescribed by the Canada Occupational Health and Safety Regulations and by Ontario Regulation 490/09 Designated Substances, as amended.

1.3 DESIGNATED SUBSTANCES

Confirm with the Departmental Representative that no additional designated substances have been brought to the project area prior to beginning work.

Additional designated substances and hazardous materials may exist outside the accessible survey areas but are beyond the scope of this project.

Should any additional material, suspected to be a designated substance, be encountered within the project area, any disturbance of such material must be stopped, precautionary measures taken, and the Departmental Representative must be notified immediately. Do not proceed until written instructions have been received.

- .1 ACRYLONITRILE: Not Identified
- .2 ARSENIC: Not Identified
- .3 ASBESTOS: **Identified**

Based on the project-specific designated substance survey completed by WSP (January 29, 2020), the following materials contain regulated amounts of asbestos:

- Textured coating wall covering (with adhered drywall joint compound backing) – within second floor of the Booth building;
- Two phase plaster coating (white smooth coat and grey rough coat) on columns and washroom ceilings – throughout Booth building;
- Grey cementitious pipe elbow insulation - within the basement and 2nd floor of the Booth building;
- Drywall joint compound – within the 2nd floor of the Booth building;
- Drywall joint compound – within the 3rd floor of the Booth building.

Refer to project-specific designated substance survey report, prepared by WSP (January 29, 2020) for complete list of non-asbestos containing materials.

- .4 BENZENE: Not Identified
- .5 COKE OVEN EMISSIONS: Not identified
- .6 ETHYLENE OXIDE: Not Identified
- .7 ISOCYANATES: Not Identified
- .8 LEAD: **Identified**

Based on the project-specific designated substance survey completed by WSP (January 29, 2020), the following painted surfaces contain lead concentrations above 90 ppm:

- Grey interior floor paint – basement of Booth building;

- White interior wall paint – basement walls of Booth building;
- Beige ceiling and wall paint – original plaster ceiling, columns and wall surfaces of Booth building.

Lead-acid batteries are suspected to be present within emergency lighting and exit signs observed throughout the project area.

.9 **MERCURY: Identified**

Mercury is suspected to be present in the following:

- Fluorescent light fixtures containing fluorescent light tubes were observed throughout the project area. Fluorescent light tubes contain mercury in a vapour form and in the phosphor coating on the lamp tube.

.10 **SILICA: Identified**

Free crystalline silica is expected to be present in the following materials:

- Concrete and cement materials,
- Cementitious plaster and parging,
- Ceiling tiles, and
- Drywall.

.11 **VINYL CHLORIDE MONOMER: Not Identified**

.12 **POLYCHLORINATED BIPHENYLS (PCBs): Not Identified**

.13 **MOULD: Not Identified**

.14 **HALOCARBONS: Not Identified**

.15 **OTHER HAZARDOUS MATERIALS: Not Identified**

1.4 **RECOMMENDATIONS**

.1 **ASBESTOS**

- .1 All work must be done in accordance with Canada Occupational Health and Safety Regulations (as amended) and O.Reg. 278/05 (as amended). In the event of conflict between the federal and provincial regulations, the most stringent procedures shall apply.
- .2 The disturbance of ACMs on construction and demolition projects by the Canada Occupational Health and Safety Regulations and in the province of Ontario by O.Reg. 278/05, as amended. These Regulations classifies all asbestos disturbances as Low Risk (Type 1), Moderate Risk (Type 2), or High Risk (Type 3), each of which has defined precautionary measures. All asbestos materials are subject to specific handling and disposal precautions, and must be removed prior to demolition. The Ontario Ministry of Labour (MoL) must be notified of any project involving removal of more than a minor amount (e.g. typically 1 square metre) of friable asbestos material.
- .3 Type 1 work procedures can be used for fastening conduits to walls where asbestos was identified, provided the work is completed using wetting techniques and non-powered hand tools. If these conditions cannot be met, then more

stringent (e.g., Type 2) procedures are necessary. Disturbance of larger areas (greater than one square meter for drywall) of asbestos containing wall, ceiling or columns material will require a minimum of Type 2 work procedures.

- .4 Type 2 (glove bag) or Type 3 work procedures must be used for the removal of friable material such as the grey cementitious pipe insulation.
- .5 Disposal of asbestos waste must be done in accordance with “General – Waste Management” O.Reg. 347/90 (as amended) under the Ontario Environmental Protection Act and the federal Transportation of Dangerous Goods Act. The waste must be disposed at a licensed waste disposal site. Proper notification must be issued to the Departmental Representative prior to transportation of waste.

.2 LEAD

- .1 Follow recommendations provided in the Ontario Ministry of Labour (MoL) Guideline entitled “Guideline: Lead on Construction Projects”. This guideline classifies all lead disturbances as Type 1, Type 2a, Type 2b, Type 3a or Type 3b work, and assigns different levels of respiratory protection and work procedures for each classification.
- .2 Work procedures and personal protective equipment must be used to ensure that workers are not exposed to airborne lead levels that exceed the TWAEL of 0.05 milligram per cubic metre (mg/m³) prescribed by O.Reg. 490/09.
- .3 The use of mechanically-powered tools or torches on lead-containing materials increases the concentration of airborne lead dust or fumes requiring more stringent respiratory protection and controlled work procedures.
- .4 Even at low concentrations, there may be a potential for exposure to high concentrations of lead depending on the activities performed that disturb the lead-containing materials. At low lead concentrations, conducting a risk assessment to assess the potential for exposure is required to determine the need to follow precautionary measures.
- .5 Disposal of construction waste containing lead must be done in accordance with O.Reg. 347/90 – General Waste Management, as amended, under the Ontario Environmental Protection Act and the federal Transportation of Dangerous Goods Act. The classification of the waste is dependent upon the result(s) of leachate test(s). The waste can be classified as “hazardous,” “non-hazardous” or “registerable solid waste” depending on the results of the leachate test.

.3 MERCURY

- .1 All work involving disturbance of mercury-containing equipment must be done in accordance with O.Reg. 490/09.
- .2 Follow recommendations provided in the MoL Guideline entitled “The Safe Handling of Mercury: A Guide for the Construction Industry”. This document provides advice on how to reduce the risk of mercury exposure, and outlines clean-up methods for spills.
- .3 When removal of fluorescent light tubes is required, the tubes should be removed intact from the fixtures. Other sources of liquid mercury should be removed intact to prevent worker exposure.
- .4 Disposal of waste containing mercury must be done in accordance with “General – Waste Management” O.Reg. 347/90 (as amended) under the Ontario

Environmental Protection Act and the federal Transportation of Dangerous Goods Act.

.4 SILICA

- .1 Comply with O.Reg. 490/09 when performing works that may disturb silica-containing materials. The regulation provides requirements for allowable exposure levels.
- .2 Silica dust can be generated through such processes as blasting, grinding, crushing, and sandblasting silica-containing material. Since silica is present in select materials within the project area, appropriate respiratory protection and ventilation must be donned during the demolition and modifications of these structures.
- .3 Follow recommendations provided in the MoL Guideline entitled "Guideline: Silica on Construction Projects". This document classifies all silica disturbances as Type 1, Type 2 or Type 3 work, and assigns different levels of respiratory protection and work procedures for each classification. These work procedures shall be followed when performing work involving the disturbance of silica-containing materials.

END OF SECTION

1 General

1.1 PRECONSTRUCTION MEETING

- .1 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .2 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .3 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

1.2 PROGRESS MEETINGS

- .1 Agenda to include the following:
 - .1 Problems which impede construction schedule.
 - .2 Review of off-site fabrication delivery schedules.
 - .3 Corrective measures and procedures to regain projected schedule.
 - .4 Revision to construction schedule.
 - .5 Progress schedule, during succeeding work period.
 - .6 Review submittal schedules: expedite as required.
 - .7 Maintenance of quality standards.
 - .8 Review proposed changes for effect on construction schedule and on completion date.
 - .9 Other business.

2 Products

2.1 NOT USED

- .1 Not Used.

3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

1 General

1.1 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 review.
- .10 Keep one reviewed copy of each submission on site.

1.2 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 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3 Allow 10 days for Departmental Representative's review of each submission.
- .4 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.
- .5 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.
- .6 Accompany submissions with transmittal letter, in duplicate, 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.

- .7 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 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .8 After Departmental Representative's review, distribute copies.
- .9 Submit 3 copies 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.
- .10 Submit 3 copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .11 Submit 3 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.
- .12 Submit 3 copies of manufacturer's instructions for requirements requested in
- .13 Submit 3 copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

- .14 Submit 3 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.

1.3 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's attention.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples 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.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

2 Products

2.1 NOT USED

-
- .1 Not Used.

3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 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.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 00 10 - General Instructions.
- .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 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.3. prior to commencement of work. The plan shall be coordinated with, and integrated into the existing Building Emergency Procedures and Evacuation Plan at the site. Department Representative will provide Building Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Departmental Representative no later than 14 days before commencing work.
- .3 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .4 Submit copies of incident and accident reports.
- .5 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 47 15- Sustainable Requirements: Construction and Section 01 00 10 - General Instructions.
- .6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor.
- .7 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.
- .8 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.
- .9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
- .10 Immediately after award of Contract, submit Workers' Compensation Board status and transcription of insurance.

1.3 FILING OF NOTICE

- .1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.4 SAFETY ASSESSMENT

- .1 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

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

1.6 REGULATORY REQUIREMENTS

- .1 Do Work in accordance with Section 01 00 10 - General Instructions.
- .2 Health and Safety considerations required to ensure that Department Representative shows due diligence towards health and safety on construction sites, and meets the requirements laid out in the PSPC Policy on Occupational Health and Safety (007); the Directive on Construction Occupational Health and Safety (007-2); and the Standard on Construction Occupational Health and Safety.

1.7 PROJECT/SITE CONDITIONS

- .1 Work at site will involve contact with:
 - .1 Asbestos
 - .2 Lead
 - .3 Mercury
 - .4 Silica

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 Employ and assign to work a Competent Person as the Supervisor to be on site during execution of work, and enforce safety requirements of Contract Documents, applicable federal, provincial and local statutes, regulations and ordinances and with site-specific Health and Safety Plan. The Supervisor shall be an employee of the Constructor.

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.

1.11 UNFORSEEN HAZARDS

- .1 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 HEALTH AND SAFETY CO-ORDINATOR

- .1 Confirm if constructor will have an onsite H&S Coordinator

1.13 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.

1.14 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.

1.15 BLASTING

- .1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Departmental Representative.

1.16 POWDER ACTUATED DEVICES

- .1 Use powder actuated devices only after receipt of written permission from Departmental Representative.

1.17 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.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 01 Sections take precedence over technical specifications in other Divisions of this Project Manual.

1.2 REFERENCE STANDARDS

- .1 Environmental Choice Program
 - .1 CCD-045-95, Sealant and Caulking Compounds.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 00 10 - General Instructions.
- .2 Submittals required:
 - .1 Compliance Report indicating requirement to purchase energy efficient and environmentally benign products.
 - .2 Use Report indicating understanding of requirement to use materials and methods of construction, which improve energy and water efficiency, reduce hazardous by-products, and use recycled materials, or materials, which can be reused.
- .3 Submit WHMIS MSDS. Indicate VOC emissions, prior to installation or use:
 - .1 Adhesives.
 - .2 Caulking compounds.
 - .3 Sealants.
 - .4 Insulating materials.
 - .5 Fireproofing or fire stopping materials.
 - .6 Paints.
 - .7 Carpets.
 - .8 Floor and wall patching or levelling materials.
 - .9 Lubricants.
 - .10 Clear finishes for wood surfaces.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-warranty Meeting:
 - .1 Convene meeting one week prior to contract completion with Departmental Representative to:
 - .1 Verify Project requirements.
 - .2 Review warranty requirements, manufacturer's installation instructions.
 - .2 Departmental Representative to establish communication procedures for:
 - .1 Notifying construction warranty defects.
 - .2 Determine priorities for type of defects.
 - .3 Determine reasonable response time.
 - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
 - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 00 10 - General Instructions.
- .2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative four final copies of operating and maintenance manuals in English and French.
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings.
 - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.

- .8 Drawings: provide with reinforced punched binder tab.
 - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dwg format on CD.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data.
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
- .6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.

- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- .1 Record information on set of black line opaque drawings, provided by Departmental Representative.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 Referenced Standards to related shop drawings and modifications.
- .5 Specifications: 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.
- .7 Provide digital photos, if requested, for site records.

1.7 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.

- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports.
- .15 Additional requirements: as specified in individual specification sections.

1.8 MATERIALS AND FINISHES

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
 - .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

1.9 MAINTENANCE MATERIALS

- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.

- .1 Submit inventory listing to Departmental Representative.
- .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.
- .2 Extra Stock Materials:
 - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit prior to final payment.
- .3 Special Tools:
 - .1 Provide special tools, in quantities specified in individual specification section.
 - .2 Provide items with tags identifying their associated function and equipment.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.

1.10 DELIVERY, STORAGE AND HANDLING

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.11 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.

- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Department Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 12 month warranty inspection, measured from time of acceptance, by Departmental Representative.
- .9 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include fire protection, sprinkler systems, alarm systems.
 - .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
 - .7 Cross-reference to warranty certificates as applicable.
 - .8 Starting point and duration of warranty period.
 - .9 Summary of maintenance procedures required to continue warranty in force.
 - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
 - .11 Organization, names and phone numbers of persons to call for warranty service.
 - .12 Typical response time and repair time expected for various warranted equipment.

- .4 Contractor's plans for attendance at 12 months post-construction warranty inspections.
- .5 Procedure and status of tagging of equipment covered by extended warranties.
- .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
 - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.12 WARRANTY TAGS

- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water-resistant tag approved by Departmental Representative.
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
 - .1 Type of product/material.
 - .2 Model number.
 - .3 Serial number.
 - .4 Contract number.
 - .5 Warranty period.
 - .6 Inspector's signature.
 - .7 Construction Contractor.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Demonstrate operation and maintenance of equipment and systems to Department Representative two weeks prior to date of final inspection.
- .2 Department Representative: provide list of personnel to receive instructions, and coordinate their attendance at agreed-upon times.
- .3 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.
 - .4 Ensure testing, adjusting, and balancing has been performed and equipment and systems are fully operational.
- .4 Demonstration and Instructions:
 - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, at scheduled times, at the equipment 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.
- .5 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 00 10 - General Instructions.
- .2 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 approval.
- .3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4 Give time and date of each demonstration, with list of persons present.
- .5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.3 QUALITY ASSURANCE

- .1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
 - .1 Instruct Department Representative.

- .2 Provide written report that demonstration and instructions have been completed.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Comply with requirements of this Section when performing the following work:
 - .1 Removal of non-friable asbestos-containing material, if the material is removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
 - .2 Removal of non-friable asbestos-containing materials if the material is removed by breaking, cutting, drilling, abrading, grinding or vibrating, if the material is wetted to control the spread of dust and fibres, and the work is only done by non-powered hand-held tools. If these conditions cannot be met, then more stringent (Moderate or High Risk) work procedures are required.
- .2 Refer to the Specification Section 01 14 25 – Designated Substance Report for details on asbestos-containing materials.

1.2 RELATED SECTIONS

- .1 Section 01 14 25 – Designated Substances
- .2 Section 02 89 00 – Silica Precautionary Measures

1.3 REFERENCES

- .1 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.205-03, Sealer for Application of Asbestos-Fibre Releasing Materials.
- .2 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .4 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .5 Ontario Environmental Protection Act, R.R.O 1990,
 - .1 General – Waste Management, O. Reg. 347/90, as amended.
- .6 Underwriters' Laboratories of Canada (ULC).
- .7 National Joint Council (NJC).
 - .1 Part XI – Hazardous Substances.
- .8 Canada Labour Code Part II, section 124 and 125.
 - .1 Canada Occupational Health and Safety Regulations
- .9 Ontario Ministry of Labour (MoL).
 - .1 Occupational Health and Safety Act, R.S.O 1990, c. O1 (OSHA)

- .1 O.Reg. 278/05 – Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations, as amended
- .2 Ontario Occupational Health and Safety Act, R.S.O. 1990, Regulation 490/09 “Designated Substances”, as amended.
- .3 O.Reg. 213/91 - “Construction Projects”, as amended.

1.4 DEFINITIONS

- .1 HEPA vacuum: DOP tested High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .2 Amended Water: water with non-ionic surfactant wetting agent added to reduce surface tension of water to allow thorough wetting of fibres.
- .3 Asbestos-Containing Materials (ACMs): materials that contain 0.5 percent or more asbestos by dry weight, identified under Existing Conditions including fallen materials and settled dust.
- .4 Asbestos Work Area: area where work takes place which will, or may, disturb ACMs.
- .5 Authorized Visitors: Departmental Representative, and representative(s) of regulatory agencies.
- .6 Competent worker: in relation to specific work, means a worker who:
 - .1 Is qualified because of knowledge, training and experience to perform the work.
 - .2 Is familiar with the provincial laws and with the provisions of the regulations that apply to the work.
 - .3 Has knowledge of all potential or actual danger to health or safety in the work.
- .7 DOP Test: testing method used to determine integrity of unit using Dispersed Oil Particulate (DOP) HEPA-filter leak test.
- .8 Friable material: means material that:
 - .1 When dry, can be crumbled, pulverized or powdered by hand pressure, or is crumbled, pulverized or powdered.
- .9 Hazardous Material Workplan: A brief report identifying the location and quantities of hazardous materials and the methods that will be used to remove, store, transport and dispose of them.
- .10 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- .11 Occupied Area: any area of the building or work site that is outside Asbestos Work Area.
- .12 Polyethylene: rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.
- .13 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Sprayer must have appropriate capacity for work.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit proof satisfactory to the Departmental Representative that suitable arrangements have been made to dispose of asbestos-containing waste in accordance with requirements of authority having jurisdiction.
- .2 Submit Provincial/Territorial and/or local requirements for Notice of Project Form.
- .3 Submit proof of Contractor's Asbestos Liability Insurance.
- .4 Submit to the Departmental Representative necessary permits for transportation and disposal of asbestos-containing waste and proof that asbestos-containing waste has been received and properly disposed.
- .5 Submit proof that all asbestos workers and/or supervisor have received appropriate training and education by a competent person in the hazards of asbestos exposure, good personal hygiene and work practices while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing.
- .6 Submit proof satisfactory to Departmental Representative that employees have appropriate respirator fitting and testing (fit test certificates). Workers must be fit-tested (qualitative as a minimum) with respirator that is personally issued.
- .7 Asbestos abatement section within Hazardous Material Work Plan.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial/Territorial, and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications, more stringent requirement applies. Comply with regulations in effect at time Work is performed.
- .2 Health and Safety:
Safety Requirements: worker protection.
 - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:
 - .1 As a minimum, air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.

- .2 Disposable-type protective clothing (high-density polyethylene protective clothing (Tyvek or similar, as approved by Departmental Representative) that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective clothing shall consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing to include suitable footwear, and to be repaired or replaced if torn.
- .2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
- .3 Before leaving Asbestos Work Area, the worker can decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before removal from the work area, and removed from the work area frequently and at regular intervals.
- .4 Facilities for washing hands and face shall be provided within or close to the Asbestos Work Area.
- .5 Ensure workers wash hands and face when leaving Asbestos Work Area.
- .6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Separate for reuse, and recycling and place in designated containers steel, metal, plastic waste in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers. Location and transportation of all on-site waste containers must be approved by Departmental Representative in writing prior to work.
- .5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .6 Fold up metal banding, flatten and place in designated area for recycling.
- .7 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 0.15 mm thick bags or leak proof drums. Label containers with appropriate warning labels.
- .8 Provide waste manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial. All waste landfill manifests are to be provided to the Departmental Representative at the end of the project.

1.8 EXISTING CONDITIONS

- .1 Refer to the Specification Section 01 14 25 – Designated Substance Report for details on asbestos-containing materials.
- .2 Notify Departmental Representative of asbestos-containing material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material pending instructions from Departmental Representative.

1.9 SCHEDULING

- .1 Hours of Work: perform work involving asbestos abatement located at the Building during hours specified by Departmental Representative. **The work schedule must be approved in writing by the Departmental Representative in advance of work.** Contractor shall be available to work continuously from beginning to end of project.

1.10 PERSONNEL TRAINING

- .1 Before beginning Work, provide Departmental Representative with satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing.
- .2 Instruction and training related to respirators includes, following minimum requirements:
 - .1 Fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by a competent, qualified person.

Part 2 Products

2.1 MATERIALS

- .1 Drop Sheets:
 - .1 Polyethylene: 0.15 mm thick.
 - .2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.
- .2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in a concentration to provide thorough wetting of asbestos-containing material.
- .3 Asbestos waste containers: Metal or fibre - type acceptable to dump operator with tightly fitting covers and 0.15 mm minimum thickness sealable polyethylene liners.
 - .1 Inner container: 0.15 mm thick sealable polyethylene waste bag.
 - .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
 - .3 Label containers in accordance with applicable Regulations. Label in both official languages.

Part 3 Execution

3.1 SUPERVISION

- .1 Minimum of one Supervisor for every ten workers is required inside the asbestos work areas at all times.
- .2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos-containing materials.

3.2 PROCEDURES

- .1 Before beginning Work, isolate Asbestos Work Area using, at a minimum, preprinted cautionary asbestos warning signs in both official languages that are visible at access routes to Asbestos Work Area.
 - .1 Remove visible dust from surfaces in the work area where dust is likely to be disturbed during course of work.
 - .2 Use HEPA vacuum, or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate.
 - .3 Do not use compressed air to clean up or remove dust from any surface.
- .2 Prevent spread of dust from Asbestos Work Area using measures appropriate to work to be done.
 - .1 Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over flooring in Asbestos Work Area where dust and contamination cannot otherwise be safely contained.
- .3 Wet materials containing asbestos to be cut, ground, abraded, scraped, drilled, or otherwise disturbed unless wetting creates hazard or causes damage.
 - .1 Use garden reservoir type low - velocity fine - mist sprayer.
 - .2 Perform Work to reduce dust creation to lowest levels practicable.
 - .3 Work will be subject to visual inspection.
 - .4 Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
- .4 Cutting, shaping, grinding, drilling, abrading or otherwise disturbing non-friable asbestos-containing materials shall be executed using non-powered hand-tools only.
- .5 Clean-Up:
 - .1 Frequently during Work and immediately after completion of Work, clean up dust and asbestos-containing waste using HEPA vacuum or by damp mopping.
 - .2 Place dust and asbestos-containing waste in sealed dust-tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste; wet and fold these items to contain dust, then place in plastic bags.
 - .3 Clean exterior of each waste-filled bag using damp cloths or HEPA vacuum and place in second clean waste bag immediately prior to removal from Asbestos Work Area.
 - .4 Seal waste bags and remove from site. Dispose of in accordance with requirements of Provincial and Federal Authority having jurisdiction. Supervise

dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that guidelines and regulations for asbestos disposal are followed.

- .5 Perform final thorough clean-up of Work areas and adjacent areas affected by Work using HEPA vacuum.

3.3 INSPECTION

- .1 Perform inspection of Asbestos Work Area to confirm compliance with specification and governing authority requirements. Deviation(s) from these requirements that have not been approved in writing by Departmental Representative may result in Work stoppage, at no cost to Departmental Representative.
- .2 Departmental Representative may inspect Work at any time during the project for:
 - .1 Adherence to specific procedures and materials.
 - .2 Final cleanliness and completion.
 - .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.
- .3 When asbestos leakage from Asbestos Work Area has occurred or is likely to occur Departmental Representative may order Work shutdown.
- .4 No additional costs will be allowed by the Contractor for additional labour or materials required to provide specified performance level.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This section specifies requirements and procedures for silica precautionary measures. This section conforms to the requirements of the Ontario Occupational Health and Safety Act, R.S.O. 1990, Regulation 490/09 “Designated Substances”.
- .2 Comply with the requirements of this Section when performing the following work:
 - .1 Work at site which may involve contact with silica dust generated through such processes as sawing, cutting, grinding, blasting and/or breaking of the silica containing material.
 - .2 Refer to the following documentation for details on silica-containing materials:
 - .1 Specification Section 01 14 25 – Designated Substances.

1.2 RELATED SECTIONS

- .1 Section 01 14 25 – Designated Substances
- .2 Section 02 82 00.01 – Asbestos Abatement: Minimum Precautions

1.3 REFERENCES

- .1 Comply with current Federal, Provincial, and local requirements pertaining to silica, provided that in case of conflict among these requirements or with these specifications the more stringent requirement applies. Comply with regulations in effect at time work is performed.
- .2 Federal Legislation
 - .1 Canada Labour Code and associated regulations.
- .3 Provincial legislation
 - .1 Ontario Occupational Health and Safety Act, R.S.O. 1990, Regulation 490/09 “Designated Substances”.

1.4 DEFINITIONS

- .1 Dangerous Goods: product, substance, or organism that is specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 Hazardous Material: product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .3 Hazardous Material Workplan: A brief report identifying the location and quantities of hazardous materials and the methods that will be used to remove, store, transport and dispose of them.
- .4 Workplace Hazardous Materials Information System (WHMIS): Canada-wide system designed to give employers and workers information about hazardous materials used in workplace. Under WHMIS, information on hazardous materials is provided on container

labels, material safety data sheets (MSDS), and worker education programs. WHMIS is put into effect by combination of federal and provincial laws.

1.5 SUBMITTALS

- .1 Silica abatement section within Hazardous Material Work Plan.

1.6 PRECAUTIONARY MEASURES AND PROCEDURES

- .1 Execute work by methods to minimize raising silica dust from demolition operations. Where practical, wet methods or a dust collection system should be used to reduce dust.
- .2 Adequate ventilation, including local exhaust ventilation, should be maintained to prevent the accumulation and recirculation of harmful concentrations of free crystalline silica in the work area.
- .3 As practical, processes that generate silica dust should be completed in enclosed areas wherever possible to prevent the spread of silica dust outside of the work area.
- .4 Implement and maintain silica dust control measures during work to ensure that silica levels do not exceed allowable limits.
- .5 Departmental Representative may stop work at any time when release of silica dust to adjacent area is suspected. Contractor must discuss procedures that Contractor proposes to resolve problem. Make all necessary changes to operations prior to resuming any demolition activities that may cause release of silica dust at no extra cost to the Departmental Representative.
- .6 Silica dust should be cleaned from machinery and work surfaces by wet sweeping, the use of sweeping compounds or vacuum cleaners fitted with a HEPA filter to prevent the recirculation of dusty air. Cleaning methods such as blowing with compressed air or dry sweeping should be avoided. Where exposure to free crystalline silica occurs, protective work clothing should be vacuumed before removal.
- .7 Store material containing silica dust in closed containers or use other appropriate means to prevent dust from becoming airborne.

1.7 PERSONAL PROTECTIVE EQUIPMENT

- .1 Anticipated minimum levels of personal protection based on work activity involving silica dust are listed below and are in addition to the personal protective equipment required for the completion of the demolition activities. Personal protection are dependent on the work practices and associated silica exposure risks.
 - .1 Air purifying half-mask respirator equipped with HEPA filter cartridges or supplied-air type, personally issued to the worker and marked as to efficiency and purpose, and acceptable to the Provincial Authority having jurisdiction as suitable for silica and the level of silica exposure in the Work Area. If disposable type filters are used, provide sufficient filters so that workers can install new filters following disposal of used filters and before re-entering contaminated areas.
 - .2 Eye Protection: Goggles, Safety glasses with side shields, or Face shield.
 - .3 If requested by a worker,
 - .1 Hand Protection: Gloves

.2 Clothing: Full body protective clothing

1.8 AIR MONITORING

- .1 If air monitoring shows that work areas contain crystalline silica above the specified action levels, these areas shall be cleaned by previously outlined methods at no additional cost to the Departmental Representative.

1.9 PERMITS

- .1 Contractor is responsible to obtain all necessary permits, licenses and approvals to conduct the abatement (e.g. Ontario Ministry of the Environment (MOE) waste generating number, etc.).

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

1 General

1.1 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
 - .2 Underwriter's Laboratories of Canada (ULC).
 - .1 CAN/ULC-S101-14, Standard Methods of for Fire Endurance Tests of Building Construction and Materials.
 - .2 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .3 CAN/ULC-S115-11, Standard Method of Fire Tests of Firestop Systems.
 - .3 National Research Council (NRC).
 - .1 National Building Code of Canada (NBCC).

1.2 DEFINITIONS

- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
- .4 Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of non-combustible construction or have "0" annular space in buildings of combustible construction.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.
 - .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - HEALTH AND SAFETY REQUIREMENTS.
 - .3 Shop Drawings:
 - .1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.
 - .2 Construction details should accurately reflect actual job conditions.
 - .4 Quality assurance submittals: submit the following:
 - .1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
 - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of
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applied fire stopping with specifications for specified performance characteristics and physical properties.

- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company specializing in fire stopping installations.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .2 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.
- .2 Storage and Protection:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse

2 Products

2.1 MATERIALS

- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
 - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended for.
 - .2 Fire stop system rating: to match wall or floor.
 - .2 Service penetration assemblies: systems tested to CAN-ULC-S115.
 - .3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
 - .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
 - .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
 - .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
 - .7 Primers: to manufacturer's recommendation for specific material, substrate, and
-

- end use.
- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .10 Sealants for vertical joints: non-sagging.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
 - .1 Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

3.4 SEQUENCES OF OPERATION

- .1 Proceed with installation only when submittals have been reviewed by Departmental Representative.
- .2 Install floor fire stopping before interior partition erections.

3.5 FIELD QUALITY CONTROL

- .1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
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3.6 CLEANING

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.7 SCHEDULE

- .1 Fire stop and smoke seal at:
 - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Edge of floor slabs at curtain wall and precast concrete panels.
 - .3 Top of fire-resistance rated masonry and gypsum board partitions.
 - .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
 - .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - .6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
 - .7 Openings and sleeves installed for future use through fire separations.
 - .8 Around mechanical and electrical assemblies penetrating fire separations.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 28 31 00 Fire Alarm System.

1.2 REFERENCE STANDARDS

- .1 CSA Group
 - .1 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.
 - .2 CAN3-C235-83(R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122-[2000], The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 DEFINITIONS

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 00 10 - General Instructions.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets.
- .3 Shop drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
 - .2 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 co-ordinated installation.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
 - .5 Submit electronic copies of shop drawings and product data to departmental representative for review. Provide copies of reviewed shop drawings for maintenance manuals.
 - .6 If changes are required, notify Departmental Representative of these changes before they are made.
- .4 Certificates:

- .1 Provide CSA certified material and equipment.
 - .2 Where CSA certified equipment and material is not available, submit such material and equipment to inspection authorities for special approval before delivery to site.
 - .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 Departmental Representative.
- .5 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

Part 2 Products

2.1 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/labels for control items in French/English.

2.2 MATERIALS AND EQUIPMENT

- .1 Provide equipment and material in accordance with Section 01 00 10 - General Instructions.
- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

2.3 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of Departmental Representative and inspection authorities.
- .2 Decal signs, minimum size 175 x 250 mm.

2.4 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for copper conductors.

2.5 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates/labels as follows:
 - .1 Nameplates: lamacoid 3 mm thick plastic engraving sheet red face, white core, mechanically attached with self tapping screws.
 - .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 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on nameplates/labels to be approved by /Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five 25 letters per nameplate/label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Identify equipment with Size 3 labels.
- .7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .8 Terminal cabinets and pull boxes: indicate system and voltage.
- .9 Transformers: indicate capacity, primary and secondary voltages.
- .10 Devices: Indicate source panel and circuit number.

2.6 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes numbered, 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.

2.7 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour 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.
- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

Type	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

2.8 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.Execution

2.9 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

2.10 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise.

2.11 NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

2.12 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete.
 - .1 Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.
- .2 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

2.13 LOCATION OF OUTLETS

- .1 Locate outlets in accordance with Section 26 05 32- Outlet Boxes, Conduit Boxes and Fittings.
- .2 Do not install outlets back-to-back in wall; allow minimum 600 mm horizontal clearance between boxes.

- .3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

2.14 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 Telephone and interphone outlets: 300 mm.
 - .2 Wall mounted telephone and interphone outlets: 1200 mm.

2.15 CO-ORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

2.16 FIELD QUALITY CONTROL

- .1 Conduct following tests in accordance with Section 01 00 10 - General Instructions.
 - .1 Circuits originating from branch distribution panels.
 - .2 Systems: fire alarm.
 - .3 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
- .2 Carry out tests in presence of Departmental Representative.
- .3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

2.17 SYSTEM STARTUP

- .1 Instruct operating personnel and Departmental Representative 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.

2.18 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.

- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 10 - General Instructions.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 00 10 - General Instructions.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 28 31 00 Fire Alarm System

1.2 REFERENCE STANDARDS

- .1 CSA International
 - .1 CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.
 - .2 CAN/CSA-C22.2 No.65-18, Wire Connectors (Tri-National Standard with NMX-J-543-ANCE and UL 486A-486B).
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
- .3 National Electrical Manufacturers Association (NEMA)

Part 2 Products

2.1 MATERIALS

- .1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.
- .2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Bushing stud connectors: to EEMAC 1Y-2 and NEMA to consist of:
 - .1 Connector body and stud clamp for round and stranded copper conductors.
 - .2 Clamp for stranded copper conductors.
 - .3 Stud clamp bolts.
 - .4 Bolts for copper conductors.
 - .5 Sized for conductors as indicated.
- .4 Clamps or connectors for mineral insulated cable, flexible conduit, armoured cable, as required to: CAN/CSA-C22.2 No.18.

Part 3 Execution

3.1 INSTALLATION

- .1 Remove insulation carefully from ends of conductors and:
 - .1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.
 - .2 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.
 - .3 Install bushing stud connectors in accordance with NEMA and EEMAC 1Y-2.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 28 31 00 Fire Alarm System

1.2 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.2 No. 0.3-09 (R2014), Test Methods for Electrical Wires and Cables, Includes Update No. 1 (2010)
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 ULC-S139-17, Standard for Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control, and Data Cables

1.3 PRODUCT DATA

- .1 Provide product data in accordance with Section 01 00 10 - General Instructions.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Packaging Waste Management: remove for recycling in accordance with Section 01 00 10 - General Instructions.

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 600V insulation of cross-linked thermosetting polyethylene material rated RW90.
- .3 Copper conductors: size as indicated, with thermoplastic insulation type TWH 90 rated at 600 V.

2.2 LIFE SAFETY WIRING

- .1 Solid tinned copper, annealed conductors with coded PVC insulation, and with overall red PVC jacket. Type FAS 90.
- .2 For the following applications.
 - .1 Data loops on each floor and each zone.
 - .2 All audible and strobe circuits.
 - .3 Network cabling between the two fire alarm panels, remote annunciator panel.

2.3 ARMOURED CABLES

- .1 Conductors: insulated, copper, size as indicated.

- .2 Type: FAS 90 or AC90.
- .3 Armour: interlocking type fabricated from galvanized steel strip.
- .4 Type: flame retardant PVC ACWU90 jacket over thermoplastic armour and compliant to applicable Building Code classification for this project.
- .5 Connectors: anti short connectors.
- .6 Armoured cable is to only be installed from roof slab junction boxes to suspended ceiling boxes.

Part 3 Execution

3.1 GENERAL CABLE INSTALLATION

- .1 Terminate cables in accordance with Section 26 05 20- Wire and Box Connectors - (0-1000 V).
- .2 Cable Colour Coding: to Section 26 05 00- Common Work Results for Electrical.
- .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. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
- .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.

3.2 INSTALLATION OF BUILDING WIRES

- .1 Install all building wiring as follows:
 - .1 In conduit systems in accordance with Section 26 05 34- Conduits, Conduit Fastenings and Conduit Fittings.

3.3 INSTALLATION OF LIFE SAFETY WIRES

- .1 Install all life safety wiring as follows:
 - .1 In conduit systems in accordance with Section 26 05 34- Conduits, Conduit Fastenings and Conduit Fittings.

3.4 INSTALLATION OF ARMoured CABLES

- .1 Group cables wherever possible on channels.
- .2 Terminate cables in accordance with section 26 05 20 – Wire and Box Connectors – 0-1000V.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 28 31 00 Fire Alarm System

1.2 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-18, Canadian Electrical Code, Part 1, 24th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 00 10 - General Instructions.
- .2 Product Data:
 - .1 Submit manufacturer s instructions, printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 00 10 - General Instructions and with manufacturer s written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer s name and address.

Part 2 Products

2.1 SUPPORT CHANNELS

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted and/or suspended.

Part 3 Execution

3.1 INSTALLATION

- .1 Secure equipment to masonry, tile and plaster surfaces with nylon shields.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .5 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.

- .2 Two-hole steel straps for conduits and cables larger than 50 mm.
- .3 Beam clamps to secure conduit to exposed steel work.
- .6 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.
- .7 For surface mounting of two or more conduits use channels at 1.5m on centre spacing
- .8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .10 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .11 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.
- .12 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer s installation recommendations.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 10 - General Instructions.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 28 31 00 Fire Alarm System

1.2 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-18, Canadian Electrical Code, Part 1, 24th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 00 10 - General Instructions.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Provide shop drawings: in accordance with Section 01 00 10 - General Instructions.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for recycling in accordance with Section 01 00 10 - General Instructions.

Part 2 Products

2.1 JUNCTION AND PULL BOXES

- .1 Construction: welded steel enclosure.
- .2 Covers Flush Mounted: 25 mm minimum extension all around.
- .3 Covers Surface Mounted: screw-on flat covers.

Part 3 Execution

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Mount cabinets with top not higher than 2.4 m, and visual displays and operating controls not lower than 600 mm and not higher than 1800 mm above finished floor except where indicated otherwise.
- .3 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.2 IDENTIFICATION

- .1 Equipment Identification: to Section 26 05 00- Common Work Results for Electrical.
- .2 Identification Labels: size 2 indicating system name, voltage and phase or as indicated.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 28 31 00 Fire Alarm System

1.2 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-18, Canadian Electrical Code, Part 1, 24th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 00 10 - General Instructions.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 00 10 - General Instructions.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for recycling in accordance with Section 01 00 10 - General Instructions.

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.
- .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 are grouped.

2.2 GALVANIZED STEEL OUTLET BOXES

- .1 One-piece electro-galvanized construction.
- .2 Single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- .3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.
- .4 Extension and plaster rings for flush mounting devices in finished walls.

2.3 MASONRY BOXES

- .1 Electro-galvanized steel masonry and multi and single gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

- .1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 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 35 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.
- .5 Vacuum clean interior of outlet boxes before installation of wiring devices.
- .6 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 28 31 00 Fire Alarm System

1.2 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings.
 - .2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.
 - .3 CSA C22.2 No. 56-17, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .4 CSA C22.2 No. 83-M1985(R2017), Electrical Metallic Tubing.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 00 10 - General Instructions.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

Part 2 Products

2.1 CONDUITS

- .1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings with expanded ends.
- .2 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal, or steel.

2.2 CONDUIT FASTENINGS

- .1 One hole steel straps to secure surface conduits 50 mm and smaller.
- .2 Two hole steel straps for conduits larger than 50 mm.
- .3 Beam clamps to secure conduits to exposed steel work.
- .4 Channel type supports for two or more conduits at 2 m on center.
- .5 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 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 25 mm and larger conduits.
- .3 Watertight connectors and couplings for EMT.

- .1 Set-screws are not acceptable.

2.4 FISH CORD

- .1 Polypropylene.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 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 electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury.
- .4 Use flexible metal conduit for drops from ceiling to suspended ceiling mounted boxes and flush mounted wall boxes.
- .5 Use liquid tight flexible metal conduit in damp, wet or corrosive locations.
- .6 Minimum conduit size: 19 mm.
- .7 Bend conduit cold:
 - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .8 Mechanically bend steel conduit over 19 mm diameter.
- .9 Install fish cord in empty conduits.
- .10 Run 25 mm spare conduits up to ceiling space and 25 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 surface type box.
- .11 Remove and replace blocked conduit sections.
 - .1 Do not use liquids to clean out conduits.
- .12 Dry conduits out before installing wire.
- .13 All conduits must be securely fastened with approved clips and screws.

3.3 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 Run conduits in flanged portion of structural steel.
- .4 Group conduits wherever possible on suspended channels.
- .5 Do not pass conduits through structural members except as indicated.
- .6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Do not install horizontal runs in masonry walls.
- .3 Do not install conduits in terrazzo or concrete toppings.

3.5 CLEANING

- .1 Proceed in accordance with Section 01 00 10 - General Instructions.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 26 05 00 – Common Work Results for Electrical.
- .3 Section 26 05 20 – Wire and Box Connectors (0-1000 V)
- .4 Section 26 05 21 – Wire and Cables (0-1000V)
- .5 Section 26 05 29 – Hangars and Supports for Electrical Systems
- .6 Section 26 05 31 – Splitters, Junction and Pull Boxes
- .7 Section 26 05 32 – Outlet Boxes and Conduit Boxes
- .8 Section 26 05 34 – Conduits and Fittings

1.2 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA)
 - .1 CSA C22.1-18, Canadian Electrical Code, Part I, Safety Standard for Electrical Installations (24th Edition).
- .2 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
 - .2 National Fire Code of Canada 2015 (NFC).
- .3 Treasury Board of Canada Secretariat (TBS), Occupational Safety and Health (OSH)
 - .1 Fire Protection Standard-10.
- .4 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524-14-AMD1(Including Amendment 1), Standard for the Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S525-16, Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories.
 - .3 CAN/ULC-S526-16, Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories.
 - .4 CAN/ULC-S527-11(Including Amendment 1), Standard for Control Units for Fire Alarm Systems.
 - .5 CAN/ULC-S529-16-(Revision 2016), Standard for Smoke Detectors for Fire Alarm Systems.
 - .6 CAN/ULC-S536-13, Standard for Inspection and Testing of Fire Alarm Systems.
 - .7 CAN/ULC-S537-13, Standard for the Verification of Fire Alarm Systems.
- .5 Manufacturer's instructions

- .6 The latest version of codes, standards, and regulations referenced by the above code and standards

1.3 SYSTEM DESCRIPTION

- .1 Booth Building
 - .1 Existing Chubb Edwards fire alarm control panel. Single stage, conventional zones, bells for audibles.
- .2 Dover Brouse Slater Building
 - .1 Existing Chubb Edwards fire alarm control panel. Single stage, conventional zones, bells for audibles.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
 - .2 Indicate on shop drawings:
 - .1 Detail assembly and internal wiring diagrams for control units.
 - .2 Overall system riser wiring diagram identifying signaling circuits, control equipment; identifying terminations, terminal numbers, conductors and raceways.
 - .3 Details for devices.
 - .4 Details and performance specifications for control, annunciation and peripherals with item by item cross reference to specification for compliance.
 - .5 Step-by-step operating sequence, cross referenced to logic flow diagram.
 - .6 Complete input/output correlation schedule.
 - .7 Battery and power calculation, showing compliance.
 - .8 Bill of material for equipment shipping.
 - .9 A list of all devices with addresses and user labels.
 - .3 Delete information not applicable to the project from the shop drawings.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00- Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for fire alarm system for incorporation into manual.
- .3 Include:

- .1 Instructions for complete fire alarm system to permit effective operation and maintenance.
- .2 Technical data - illustrated parts lists with parts catalogue numbers.
- .3 Copy of approved shop drawings with corrections completed and marks removed except review stamps.
- .4 List of recommended spare parts for system.
- .4 Furnish inspection certificates, prior to final payment, to show installed work conforms to specification and regulations.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- .1 Submit maintenance materials in accordance with Section 01 78 00- Closeout Submittals.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions and 01 00 10 - General Instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for recycling in accordance with Section 01 00 10 - General Instructions.

Part 2 Products

2.1 MATERIAL

- .1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.
- .2 Power supply: to CAN/ULC-S524.
- .3 Audible signal devices: to CAN/ULC-S525.
- .4 Visual signal devices: to CAN/ULC-S526.
- .5 Control unit: to CAN/ULC-S527.
- .6 Smoke detectors: to CAN/ULC-S529.
- .7 Regulatory Requirements:
 - .1 To TBS Fire Protection Standard.
 - .2 System components: listed by ULC and comply with applicable provisions of NBC, and meet requirements of local authority having jurisdiction.

2.2 SYSTEM OPERATION

.1 Fire Alarm System

- .1 Actuation of any smoke or heat detector, flow switch, manual station, or actuation or operation of other alarm initiating device to:
 - .1 Cause electronic latch to lock-in alarm state at base building fire alarm control unit.
 - .2 Indicate zone of alarm at base building fire alarm control unit.
 - .3 Cause audible/visual signalling devices to activate at base building fire alarm control unit.
 - .4 Transmit signal to fire department.
- .2 Actuation of supervisory devices to:
 - .1 Cause electronic non-latch supervisory state for supervisory devices or conditions at base building fire alarm control unit.
 - .2 Indicate respective supervisory zone at base building fire alarm control unit.
 - .3 Activate common supervisory sequence.

2.3 CONTROL PANELS

.1 Fire Alarm Network

- .1 Fire alarm network is to be provided for monitoring purposes only between the 2 fire alarm panels.
- .2 Fire alarm network data communication link to be DCLB and cable to one-hour fire rated conductors.
- .3 Provide all necessary network cards, cables, racks etc. to achieve network communications between the two fire alarm panels.
- .4 The network will be for monitoring only and allow for each building to operate independently.

2.4 POWER SUPPLIES

- .1 120 V, 60 Hz as primary source of power for system.
- .2 Voltage regulated, current limited distributed system power.
- .3 Primary power failure or power loss (less than 102 V) will activate common trouble sequence.
- .4 Interface with battery charger and battery to provide uninterruptible transfer of power to standby source during primary power failure or loss.
- .5 During normal operating conditions a fault in battery charging circuit, short or open in battery leads to activate common trouble sequence and standby power trouble indicator.
- .6 Standby batteries: sealed, maintenance free.
- .7 Continuous supervision of wiring for external initiating and alarm circuits to be maintained during power failure.

- .8 Batteries provided with sufficient capacity to maintain 24 hours of supervision followed by 30 min full load operation.

2.5 POWER SUPPLY CIRCUITS

- .1 Dedicated 120 V circuits complete with breaker locks, painted red, from electrical room
 - .1 For booster panel if required.
- .2 15A/1P moulded-case circuit breakers at 600V – 25 kA and at 240 V - 22 kA to CSA 22.2-No. 5 standard, for each circuit with the following features:
 - .1 Provide automatic moulded case circuit breakers in panel board as indicated. Breaker sizes and trips as per panel schedule(s).
 - .2 Use bolt-on moulded case circuit breakers, quick-make, quick-break type for manual and automatic operation with temperature compensation for 40 C ambient.

2.6 INITIATING/INPUT CIRCUITS

- .1 Receiving circuits for alarm initiating devices such as manual pull stations, smoke detectors wired in Class A configuration to control unit.
- .2 Alarm receiving circuits (existing): compatible with smoke detectors and open contact devices.

2.7 ALARM OUTPUT CIRCUITS

- .1 Alarm output circuit: connected to signals, wired in Class B configuration to control unit.
 - .1 Signal circuits' operation to follow system programming; capable of operating horn/strobes. Rated at 2 A, 24 VDC; fuse-protected from overloading/overcurrent.

2.8 WIRING

- .1 Fire alarm device wiring: Twisted copper conductors: rated 300 V, FAS 90.
- .2 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.
- .3 To signal circuits: 16 AWG minimum, and in accordance with manufacturer's requirements.
- .4 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.
- .5 DCLB network wiring: 18 AWG minimum, 1 hour rated conductors, and in accordance with manufactures requirements.
- .6 Power distribution wiring: 600 V T90 rating copper conductors. #12 AWG minimum for 15 A, 120 V distribution circuit home runs. #10 AWG minimum for home runs over 20 m.

2.9 AUTOMATIC ALARM INITIATING DEVICES

- .1 Addressable variable-sensitivity smoke detectors.

- .1 Photo-electric type.
- .2 Drift compensation and smoothing algorithms.
- .3 Plug in detector type with base.
- .4 Red and green LED indicators for: normal standby and alarm.

2.10 AUDIBLE/VISUAL SIGNAL DEVICES

- .1 Bell: wall mounting, 24 V dc, matching existing devices where possible.
 - .1 ULC listed, minimum 89 db sound pressure level.
 - .2 All bells including existing bells shall be synchronized.
 - .3 Factory surface boxes if required.
- .2 Strobes: wall mounting, 24 V dc, matching existing devices where possible.
 - .1 ULC listed, selectable, set at 30 cd with minimum.
 - .2 All strobes including existing strobes shall be synchronized.
 - .3 Factory boxes if required.

2.11 END-OF-LINE DEVICES

- .1 End-of-line devices to control supervisory current in signalling circuits and alarm circuits, sized to ensure correct supervisory current for each circuit. Open, short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at control panel and remotely as indicated.

2.12 BOXES

- .1 Manufacturers painted box with factory finish, no knockouts, and red where device is surface mount.

Part 3 Execution

3.1 VERIFICATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for fire alarm installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION OF FIRE ALARM DEVICES

- .1 Install systems in accordance with CAN/ULC-S524 and TB Fire Protection Standard.
- .2 Locate and install smoke detectors. Mount detectors more than 1 m from air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors.

- .3 Install bells and strobes with the top of the device at least 2300 mm above the finished floor level and at least 150 mm below the ceiling, and with the entire lens not more than 2400 mm above the finished floor, and connect to signalling circuits of existing fire alarm system.
- .4 Install end-of-line devices.
- .5 Identify complete address or zone information on all new devices with black printed lettering on white labelling tabs (p-tabs).
- .6 Reprogram base building fire alarm system. Provide all necessary system programming to meet requirements. Allow for one additional programming change at the Departmental Representative's request.
- .7 Splices are not permitted. All terminations to be made on terminal strips in terminal cabinets or on field devices.
- .8 Provide necessary raceways, cable and wiring to make interconnections to terminal boxes, annunciator equipment and control panels, as required by equipment manufacturer.
- .9 Provide an insulated green grounding conductor (No. 12 AWG) in all conduits. Run with circuit conductors and to all enclosures.
- .10 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.
- .11 Identify circuits and other related wiring at control units and terminal boxes.

3.3 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical, CAN/ULC-S537. Provide verification report.
- .2 Fire alarm system:
 - .1 Test such device and alarm circuit to ensure detectors transmit alarm to control panel and actuate devices.
 - .2 Check annunciator panels to ensure zones are shown correctly.
 - .3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of systems.
- .3 Demonstrate operation of the fire alarm system in the presence of authority having jurisdiction and Department Representative after Department Representative has reviewed the verification report.
- .4 Provide final PROM program re-burn for system incorporating program changes made during construction.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 10 - General Instructions.

- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 00 10 - General Instructions.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
 - .2 Place materials defined as hazardous or toxic waste in designated containers.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by fire alarm system installation.

3.6 CLOSEOUT ACTIVITIES

- .1 Provide on-site lectures and demonstration by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

3.7 MAINTENANCE

- .1 Provide a written guarantee, signed and issued in the name of the Department Representative for a period of twelve (12) months from the date of the Final Certificate of Completion.
- .2 Provide one year's free maintenance by the manufacturer during warranty period.
- .3 Coordinate services with existing building service provider. Provide all inspection tests required to conform to ULC 536. Submit inspection report to Departmental Representative.

END OF SECTION