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# SOLICITATION AMENDMENT
# MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

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|---|---|
| **Title - Sujet**<br>Office Bldg. Interior Renovations | |
| **Solicitation No. - N° de l'invitation**<br>EZ899-161815/A | **Amendment No. - N° modif.**<br>001 |
| **Client Reference No. - N° de référence du client** | **Date**<br>2015-12-15 |
| **GETS Reference No. - N° de référence de SEAG**<br>PW-$PWY-020-7687 | |
| **File No. - N° de dossier**<br>PWY-5-38305 (020) | **CCC No./N° CCC - FMS No./N° VME** |
| **Solicitation Closes - L'invitation prend fin**<br>**at - à 02:00 PM**<br>**on - le 2016-01-06** | **Time Zone**<br>**Fuseau horaire**<br>Pacific Standard Time PST |
| **F.O.B. - F.A.B.**<br>**Plant-Usine:** ☐ **Destination:** ☑ **Other-Autre:** ☐ | |
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| **Destination - of Goods, Services, and Construction:**<br>**Destination - des biens, services et construction:**<br>CBSA - Pacific Highway Port of Entry - Surrey, BC | |

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Canada

Please find Addendum #1 herein.

All other terms and conditions remain unchanged.

# ADDENDUM #1

Date: Dec. 14, 2015

PACIFIC HIGHWAY PORT OF ENTRY
TRAFFIC OFFICE BUILDING INTERIOR RENOVATIONS
SURREY, B.C.

The following revisions supersede the information contained in the original drawings and specification issued for the above named project, and shall become part thereof. No consideration will be allowed for extras due to the contractor or any subcontractor not being familiar with this Addendum.

## 1.0 Architectural Specifications

1.1 Replace section 00 00 10 (Table of Contents) with attached
1.2 Replace section 02 41 99 (Demolition Minor Works) with attached
1.3 Add new section 02 82 00.02 (Asbestos Abatement Intermediate Precautions)
1.4 Add new section 02 83 11 (Lead Basepaint Abatement Intermediate Precautions)
1.5 Add appendix C:

- **Sampling and analysis – suspected asbestos containing fire door insulation** report issued by DST Consulting Engineers Inc. dated July 05, 2013 (7 pages)
- **Hazardous Building materials Assessment** report issued by DST Consulting Engineers Inc. dated March 25, 2014 (18 pages)

## 2.0 ELECTRICAL ADDENDUM

2.1 Refer to **Electrical Addendum EAD01** dated Nov. 12, 2015 (37 pages) for revisions for specification section 260500 – Common Work Results, Appendix A - Forms and revised drawings E-100, E201 and E-202

END OF ADDENDUM #1

**DRAWING LIST**

**ARCHITECTURAL**

1.0 GENERAL

1.1 RELATED REQUIREMENTS
.1 Structure Demolition 02 41 16

1.2 REFERENCES
.1 CSA International
.1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

1.3 SITE CONDITIONS
.1 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous is encountered, stop work, take preventative measures, and notify Departmental Representative immediately.
.1 Proceed only after receipt of written instructions have been received from Consultant.

.2 Notify Departmental Representative before disrupting building access or services.

.3 Extent of Demolition - refer to drawings

**.4 Refer Appendix C for Hazmat Report**

3.0 EXECUTION

3.1 EXAMINATION
.1 Inspect building with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies before starting demolition.

.4 Disconnect, cap, plug or divert, as required, existing utilities within the building where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.
.1 Immediately notify Departmental Representative and the Owner concerned in case of damage to any utility or service designated to remain in place.
.2 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PREPARATION
.1 Protection of In-Place Conditions:
.1 Prevent movement, settlement, or damage to adjacent structures, and utilities.
.2 Keep noise, dust, and inconvenience to occupants to minimum.
.3 Protect building systems, services and equipment.
.4 Provide temporary dust screens, covers, railings, supports and other protection as required.

3.3 CLEANING
.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.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 74 11 - Cleaning.

END OF SECTION 02 41 99

## 1.0 GENERAL

### 1.1 SUMMARY

.1 Comply with requirements of this Section when performing following Work:

.1 Removal of asbestos containing material from building material within the project area at the existing welding shop, machine shop and pumphouse, as indicated in the Pre-Construction Hazardous Building Material and Survey in Appendix A.

### 1.2 RELATED REQUIREMENTS

.1 Structure Demolition Section 02 41 16

.2 Lead Basepaint abatement Intermediate Precautions Section 02 83 11

### 1.3 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.205- 94, 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 Underwriters' Laboratories of Canada (ULC)

.6 BC Occupational Health and Safety Act, WorkSafe BC.

### 1.4 DEFINITIONS

.1 Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.

.2 Asbestos Containing Materials (ACMs): materials that contain 0.1 provincial regulated amount per cent or more asbestos by dry weight and are identified under Existing Conditions including fallen materials and settled dust.

.3 Asbestos Work Area: area where work takes place which will, or may disturb ACMs.

.4 Authorized Visitors: Departmental Representative, Engineers, or designated representatives, and representatives of regulatory agencies.

.5 Competent worker person : 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 federal 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.

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

.7 Glove Bag: prefabricated glove bag as follows:

.1 Minimum thickness 0.25 mm (10 mil) polyvinyl-chloride bag.
.2 Integral 0.25 mm (10 mil) thick polyvinyl-chloride gloves and elastic ports.
.3 Equipped with reversible double pull double throw zipper on top and at approximately mid-section of the bag.
.4 Straps for sealing ends around pipe.

.8 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any dimension at 99.97% efficiency.

.9 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.

.10 Occupied Area: any area of building or work site that is outside Asbestos Work Area.

.11 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.

.12 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for scope of work.

1.5 ACTION & INFORMATIONAL SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of asbestos containing waste in accordance with requirements of authority having jurisdiction.

.3 Submit Provincial/Territorial and/or local requirements for Notice of Project Form.

.4 Submit proof of Contractor's Asbestos Liability Insurance.

.5 Submit to Departmental Representative necessary permits for transportation and disposal of asbestos containing waste and proof that asbestos containing waste has been received and properly disposed.

.6 Submit proof satisfactory to Departmental Representative that all asbestos workers have received appropriate training and education by a competent person in the hazards of asbestos exposure, good personal hygiene, entry and exit from Asbestos Work Area, aspects of work procedures and protective measures while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing.

.7 Submit proof that supervisory personnel have attended asbestos abatement course, of not less than two days duration, approved by Departmental Representative. Minimum of one supervisor for every ten workers.

.8 Submit Worker's Compensation Board status and transcription of insurance.

.9 Submit documentation including test results, fire and flammability data, and Material Safety Data Sheets (MSDS) for chemicals or materials including:
.1 Encapsulants;
.2 Amended water;

.3 Slow drying sealer.

.10 Submit proof satisfactory to Departmental Representative that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.

11. Submit Exposure Control Plan as per requirement in WorkSafe BC Part 6.

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 the time work is performed.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements and WorkSafe BC.

.2 Safety Requirements: worker and visitor protection.

.1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:

.1 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 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 to 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. It includes suitable footwear, and it to be repaired or replaced if torn.

.3 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.

.4 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.

.5 Ensure workers wash hands and face when leaving Asbestos Work Area. Facilities for washing are located as indicated on drawings.

.6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

.7 Visitor Protection:

.1 Provide protective clothing and approved respirators to Authorized Visitors to work areas.

.2 Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.

.3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

1.7 WASTE MANAGEMENT & DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

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

.3 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.

.4 Separate for reuse and recycling and place in designated containers steel metal plastic waste in accordance with Waste Management Plan.

.5 Place materials defined as hazardous or toxic in designated containers.

.6 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

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

.8 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 6 ml bags or leak proof drums. Label containers with appropriate warning labels.

.9 Provide manifests describing and listing waste created. Transport containers by approved means to licenced landfill for burial.

1.8 EXISTING CONDITIONS

.1 Reports and information pertaining to ACMS to be handled, removed, or otherwise disturbed and disposed of during this Project is appended in appendix A of this specifications.

.2 Notify Departmental Representative of friable material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative.

1.9 SCHEDULING

.1 Hours of Work: perform work in accordance with Section 01 11 55 General Instructions

1.10 QUALIFICATIONS

.1 Asbestos Abatement Contractor must have at least 10 years of experience in similar scope and nature of work. Qualifications and resume of personnel involved must be submitted and approved

by Departmental Representative.

## 2.0 PRODUCTS

### 2.1 MATERIALS

.1 Drop and Enclosure 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 concentration to provide thorough wetting of asbestos containing material.

.3 Waste Containers: contain waste in two separate containers.
- .1 Inner container: 0.15 mm thick sealable polyethylene bag or where glove bag method is used, glove bag itself.
- .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 Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site.

.4 Glove bag:
- .1 Acceptable materials: safe-T-Strip products in configuration suitable for Work, or Alternative material approved by addendum during tendering period in accordance with Instructions to Tenderers.
- .2 The glove bag to be equipped with:
  - .1 Sleeves and gloves that are permanently sealed to the body of the bag to allow the worker to access and deal with the insulation and maintain a sealed enclosure throughout the work period.
  - .2 Valves or openings to allow insertion of a vacuum hose and the nozzle of a water sprayer while maintaining the seal to the pipe, duct or similar structure.
  - .3 A tool pouch with a drain.
  - .4 A seamless bottom and a means of sealing off the lower portion of the bag.
  - .5 A high strength double throw zipper and removable straps, if the bag is to be moved during the removal operation.

.5 Tape: tape suitable for sealing polyethylene to surfaces under both dry and wet conditions using amended water.

.6 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.
- .1 Sealer: flame spread and smoke developed rating less than 50 and be compatible with new fireproofing.

.7 Encapsulant: surface film forming / penetrating type conforming to CAN/CGSB-1.205.

## 3.0 EXECUTION

### 3.1 SUPERVISION

.1 Minimum of one Supervisor for every ten workers is required.

.2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or

other handling of asbestos-containing materials.

3.2 PROCEDURES

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

.2 Before beginning Work, at each access to Asbestos Work Area, install warning signs in both official languages in upper case 'Helvetica Medium' letters reading as follows, where number in parentheses indicates font size to be used: 'CAUTION ASBESTOS HAZARD AREA (25 mm) / NO UNAUTHORIZED ENTRY (19 mm) / WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) / BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)'.

.3 Before beginning Work remove visible dust from surfaces in work area where dust is likely to be disturbed during course of work.
- .1 Use HEPA vacuum or damp cloths where damp cleaning does not create hazard and is otherwise appropriate.
- .2 Do not use compressed air to clean up or remove dust from any surface.

.4 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 work areas where dust or contamination cannot otherwise be safely contained.
- .2 When removing suspended ceilings and walls themselves do not enclose work area and when removing asbestos containing material from piping or equipment and "glove bag" method is not used erect enclosure of polyethylene sheeting around work area, shut off mechanical ventilation system serving work area and seal ventilation ducts to and from work area.

.5 Before removing suspended ceilings, remove friable material on upper surfaces using HEPA vacuum equipment.
- .1 Remove and clean surfaces of ceiling panels using HEPA vacuum, wrap clean panels in 0.10 mm thick polyethylene, and store in building as directed by Departmental Representative.
- .2 Clean "T" grid suspension system, disconnect, wrap in 0.10 mm thick polyethylene, and store in building as directed by Engineer.

.6 Remove loose material by HEPA vacuum; thoroughly wet friable material containing asbestos to be removed or disturbed before and during Work unless wetting creates hazard or causes damage.
- .1 Use garden reservoir type low - velocity sprayer or airless spray equipment capable of producing mist or fine spray.
- .2 Perform Work in a manner to reduce dust creation to lowest levels practicable.

.7 Pipe Insulation Removal Using Glove Bag:
- .1 A glove bag not to be used to remove insulation from a pipe, duct or similar structure if:
  - .1 It may not be possible to maintain a proper seal for any reason including, without limitation:
    - .1 The condition of the insulation.
    - .2 The temperature of the pipe, duct or similar structure.
  - .2 The bag could become damaged for any reason including, without limitation.
    - .1 The type of jacketing.
    - .2 The temperature of the pipe, duct or similar structure.

.2 Upon installation of the glove bag, inspect bag for any damage or defects. If any damage or defects are found, the glove bag is to be repaired or replaced. The glove bag to be inspected at regular intervals for damage and defects, and repair or replaced, as appropriately. The asbestos containing contents of the damaged or defective glove bag found during removal are to be wetted and the glove bag and its contents are to be removed and disposed of in an appropriate waste disposal container. Any damaged or defective glove bags are not be reused.

.3 Place tools necessary to remove insulation in tool pouch. Wrap bag around pipe and close zippers. Seal bag to pipe with cloth straps.

.4 Place hands in gloves and use necessary tools to remove insulation. Arrange insulation in bag to obtain full capacity of bag.

.5 Insert nozzle of garden reservoir type sprayer into bag through valve and wash down pipe and interior of bag thoroughly. Wet surface of insulation in lower section of bag.

.6 To remove bag after completion of stripping, wash top section and tools thoroughly. Remove air from top section through elasticized valve using a HEPA vacuum. Pull polyethylene waste container over glove bag before removing from pipe. Release one strap and remove freshly washed tools. Place tools in water. Remove second strap and zipper. Fold over into waste container and seal.

.7 After removal of bag ensure that pipe is free of residue. Remove residue using HEPA vacuum or wet cloths. Ensure that surfaces are free of sludge which after drying could release asbestos dust into atmosphere. Seal exposed surfaces of pipe and ends of insulation with slow drying sealer to seal in any residual fibres.

.8 Upon completion of Work shift, cover exposed ends of remaining pipe insulation with polyethylene taped in place.

.8 Work is subject to visual inspection and air monitoring. Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.

.9 Cleanup:

.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 and wet and fold to contain dust and then place in waste bags.

.3 Immediately before their removal from Asbestos Work Area and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.

.4 Seal and remove double bagged waste from site. Dispose of in accordance with requirements of Provincial/Territorial 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 Asbestos Work Areas and adjacent areas affected by Work using HEPA vacuum.

## 3.3 AIR MONITORING

.1 From beginning of Work until completion of cleaning operations, Departmental Representative to take air samples on daily basis outside of Asbestos Work Area enclosures in accordance with Provincial/Territorial Occupational Health and Safety Regulations PWGSC requirements.

.1 Contractor will be responsible for monitoring inside enclosure in accordance with applicable Provincial/Territorial Occupational Health and Safety Regulations.

.2 If air monitoring shows that areas outside Asbestos Work Area enclosures are contaminated,

enclose, maintain and clean these areas in same manner as that applicable to Asbestos Work Area.

.3 Ensure that respiratory safety factors are not exceeded.

.4 During the course of Work, Departmental Representative to measure fibre content of air outside Work areas by means of air samples analyzed by Phase Contrast Microscopy (PCM).
.1 Stop Work when PCM measurements exceed 0.05 f/cc and correct procedures.

END OF SECTION 02 82 00.02

## 1.0 GENERAL

### 1.1 SUMMARY

.1 Comply with requirements of this Section when performing following Work:
- .1 Removal of lead based paint from walls and ceilings within the project area.
- .2 Manual demolition of lead-painted plaster walls or building components.

### 1.2 RELATED REQUIREMENTS

.1 Structure Demolition Section 02 41 16

### 1.3 REFERENCES

.1 Department of Justice Canada
- .1 Canadian Environmental Protection Act, 1999 (CEPA).

.2 Health Canada
- .1 Workplace Hazardous Materials Information System (WHMIS), Material Safety Data Sheets (MSDS).

.3 Human Resources and Social Development Canada (HRSDC)
- .1 Canada Labour Code Part II, - SOR 86-304 - Occupational Health and Safety Regulations.

.4 Transport Canada (TC)
- .1 Transportation of Dangerous Goods Act, 1992 (TDGA).

.5 U.S. Environmental Protection Agency (EPA)
- .1 EPA 747-R-95-007- 1995, Sampling House Dust for Lead.

.6 U.S. Department of Health and Human Services/Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (NIOSH)
- .1 NIOSH 94-113 - NIOSH Manual of Analytical Methods (NMAM), 4th Edition (1994).

.7 U.S. Department of Labour - Occupational Safety and Health Administration (OSHA) - Toxic and Hazardous Substances
- .1 Lead in Construction Regulation - 29 CFR 1926.62- 1993.

.8 BC Occupational Health and Safety Act, WorkSafe BC.

### 1.4 DEFINITIONS

.1 HEPA vacuum: 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 Authorized Visitors: Owner Departmental Representative or designated representatives and representatives of regulatory agencies.

.3 Occupied Area: areas of building or work site that is outside Work Area.

.4 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine
spray. Must be appropriate capacity for scope of work.

.5 Airlock: ingress or egress system, without permitting air movement between contaminated area

and uncontaminated area. Consisting of two curtained doorways at least 2 m apart.

.6 Curtained doorway: arrangement of closures to allow ingress and egress from one room to another. Typically constructed as follows:
- .1 Place two overlapping polyethylene sheets over existing or temporarily framed doorway, securing each along top of doorway, securing vertical edge of one sheet along one vertical side of doorway, and secure other sheet along opposite vertical side of doorway.
- .2 Reinforce free edges of polyethylene with duct tape and add weight to bottom edge to ensure proper closing.
- .3 Overlap each polyethylene sheet at openings 1.5 m on each side.

.7 Action level: employee exposure, without regard to usage of respirators, to an airborne concentration of lead of 50 micrograms per cubic meter of air calculated as 8 hour time-weighted average (TWA). Intermediate precautions for lead abatement are based on airborne lead concentrations greater than 0.05 milligrams per cubic meter of air within Work Area.

.8 Competent person: Professionals capable of identifying existing lead hazards in workplace and taking corrective measures to eliminate them.

.9 Lead in Dust: wipe sampling on vertical and/or horizontal surfaces, dust and debris is considered to be lead contaminated if it contains more than 40 micrograms of lead in dust per square foot.

## 1.5 ACTION & INFORMAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of lead based paint waste in accordance with requirements of authority having jurisdiction.

.3 Provide: Provincial Territorial and local requirements for Notice of Project Form.

.4 Provide proof of Contractor's General and Environmental Liability Insurance.

.5 Quality Control:
- .1 Provide Departmental Representative necessary permits for transportation and disposal of lead based paint waste and proof that it has been received and properly disposed.
- .2 Provide proof satisfactory to Departmental Representative that employees have had instruction on hazards of lead exposure, respirator use, dress, entry and exit from Work Area, and aspects of work procedures and protective measures.
- .3 Provide proof that supervisory personnel have attended lead abatement course, of not less than two days duration, approved by Departmental Representative. Minimum of one supervisor for every ten workers.

.6 Product data:
- .1 Provide documentation including test results, fire and flammability data, and Material Safety Data Sheets (MSDS) for chemicals or materials including:
  - .1 Encapsulants.
  - .2 Amended water.
  - .3 Slow drying sealer.

.7 Submit Exposure Control Plan as per requirement in Worksafe BC Part 6.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to lead paint, in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

.2 Safety Requirements: worker and visitor protection.

.1 Protective equipment and clothing to be worn by workers and visitors in Work Area includes:

.1 Respirator NIOSH approved and equipped with filter cartridges with assigned protection factor of 50, acceptable to Authority having jurisdiction. Suitable for type of lead and level of lead dust exposure in Lead Work Area. Provide sufficient filters so workers can install new filters following disposal of used filters and before re-entering contaminated areas.

.2 Disposable type protective clothing that does not readily retain or permit skin contamination, consisting of full body covering including head covering with snug fitting cuffs at wrists, ankles, and neck.

.2 Requirements for workers:

.1 Remove street clothes in clean change room and put on respirator with new filters or reusable filters, clean coveralls and head covers before entering Equipment and Access Rooms or Work Area. Store street clothes, uncontaminated footwear, towels, and similar uncontaminated articles in clean change room.

.2 Remove gross contamination from clothing before leaving work area. Place contaminated work suits in receptacles for disposal with other lead - contaminated materials. Leave reusable items except respirator in Equipment and Access Room. When not in use in Work Area, store work footwear in Equipment and Access Room. Upon completion of lead abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from Work Area or from Equipment and Access Room.

.3 Enter unloading room from outside dressed in clean coveralls to remove waste containers and equipment from Holding Room of Container and Equipment Decontamination Enclosure system. Workers not to use this system as means to leave or enter work area.

.3 Eating, drinking, chewing, and smoking are not permitted in Work Area.

.4 Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual lead abatement.

.5 Ensure workers wash hands and face when leaving Work Area. Facilities for washing are located as indicated on drawings.

.6 Provide and post in Clean Change Room and in Equipment and Access Room the procedures described in this Section, in both official languages.

.7 Ensure no person required to enter Work Area has facial hair that affects seal

between respirator and face.

.8 Visitor Protection:
- .1 Provide protective clothing and approved respirators to Authorized Visitors to Work Areas.
- .2 Instruct Authorized Visitors in use of protective clothing, respirators and procedures.
- .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Work Area.

1.7 WASTE MANAGEMENT & DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

.2 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.

.3 Disposal of lead waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of lead waste in sealed double thickness 6 ml bags or leak proof drums. Label containers with appropriate warning labels.

.4 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.8 EXISTING CONDITIONS

.1 Reports and information pertaining to lead based paint to be handled, removed, or otherwise disturbed and disposed of during this Project is appended in Appendix A of this specifications.

.2 Notify Departmental Representative of lead based paint discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative.

1.9 SCHEDULING

.1 Not later than two days before beginning Work on this Project notify the following in writing, where appropriate:
- .1 Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.
- .2 Provincial Ministry of Labour.
- .3 Disposal Authority.

.2 Inform sub trades of presence of lead-containing materials identified in Existing Conditions.

.3 Provide Departmental Representative copy of notifications prior to start of Work.

.4 Hours of Work: perform work in accordance with Section 01 11 55 General Instructions. Include in Contract Sum additional costs due to this requirement.

1.10 QUALIFICATIONS

.1 Abatement Contractor must have at least 10 years of experience in similar scope and nature of work. Qualifications and resume of personnel involved must be submitted to Departmental Representative for approval.

2.0 PRODUCTS

2.1 MATERIALS

.1 Polyethylene: 0.15 mm unless otherwise specified; in sheet size to minimize joints.

.2 FR polyethylene: 0.15 mm reinforced fabric bonded both sides with polyethylene.

.3 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under dry conditions and wet conditions using amended water.

.4 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for trapping residual lead paint residue.

.5 Lead waste containers: metal fibre type acceptable to dump operator with tightly fitting covers and 0.15 mm sealable polyethylene liners.

.1 Label containers with pre-printed bilingual cautionary Warning Lead clearly visible when ready for removal to disposal site.

3.0 EXECUTION

3.1 SUPERVISION

.1 Approved Supervisor must remain within Lead Work Area during disturbance, removal, or other handling of lead based paints.

3.2 PREPARATION

.1 Remove and wrap items to be salvaged or reused, and transport and store in area specified by Departmental Representative.

.2 Work Area:

.1 Shut off and isolate HVAC system to prevent dust dispersal into other building areas. Conduct smoke tests to ensure duct work is airtight.

.2 Pre-clean fixed casework, and equipment within work areas, using HEPA vacuum and cover with polyethylene sheeting sealed with tape.

.3 Clean work areas using HEPA vacuum. If not practicable, use wet cleaning method. Do not use methods that raise dust, such as dry sweeping, or vacuuming using other than HEPA vacuum.

.4 Seal off openings, corridors, doorways, windows, skylights, ducts, grilles, and diffusers, with polyethylene sheeting sealed with tape.

.5 Cover floor surfaces in work area from wall to wall with FR polyethylene drop sheets to protect existing floor during removal.

.6 Build airlocks at entrances and exits from work areas to ensure work areas are always closed off by one curtained doorway when workers enter or exit.

.7 At point of access to work areas install warning signs in both official languages in upper case "Helvetica Medium" letters reading as follows where number in parentheses indicates font size to be used:

.1 CAUTION LEAD HAZARD AREA (25 mm).

.2 NO UNAUTHORIZED ENTRY (19 mm).

.3 WEAR ASSIGNED PROTECTIVE EQUIPMENT AND RESPIRATOR (19 mm).

.4 BREATHING LEAD CONTAMINATED DUST CAUSES SERIOUS BODILY HARM (7 mm).

.8 Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Authority having jurisdiction.

.9 Where water application is required for wetting lead containing materials, provide temporary water supply by use of appropriately sized hoses for application of water as required.

.10 Provide electrical power and shut off for operation of powered tools and equipment. Provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical lines and equipment.

.3 Worker Decontamination Enclosure System:

.1 Worker Decontamination Enclosure System includes Equipment and Access Room and Clean Room, as follows:

.1 Equipment and Access Room: construct between exit and work areas, with two curtained doorways, one to the rest of suite, and one to work area. Install waste receptor and storage facilities for workers' shoes and protective clothing to be re-worn in work areas. Build large enough to accommodate specified facilities, equipment needed, and at least one worker allowing sufficient space to change comfortably.

.2 Clean Room: construct with curtained doorway to outside of enclosures. Provide lockers or hangers and hooks for workers' street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install mirror to permit workers to fit respiratory equipment properly.

.4 Construction of Decontamination Enclosures:

.1 Construct framing for enclosures or use existing rooms. Line enclosure with polyethylene sheeting and seal with tape, apply two layers of FR polyethylene on floor.

.2 Construct curtain doorways between enclosures so when people move through or waste containers and equipment are moved through doorway, one of two closures comprising doorway always remains closed.

.5 Separation of Work Areas from Occupied Areas

.1 Barriers between Work Area and occupied area to be constructed as follows:

.1 Construct floor to ceiling lumber metal stud framing, cover with polyethylene sheeting and seal with duct tape. Apply 9 plywood over polyethylene sheeting. Seal plywood joints and between adjacent materials with surface film forming sealer, to create airtight barrier.

.2 Cover plywood with polyethylene sheeting and sealed with duct tape.

.6 Maintenance of Enclosures:

.1 Maintain enclosures in clean condition.

.2 Ensure barriers and polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately.

.3 Visually inspect enclosures at beginning of each work day.

.4 Use smoke test method to test effectiveness of barriers as directed by Departmental Representative.

## 3.3 LEAD-BASE PAINT ABATEMENT

.1 Removal of lead based paint to be performed by scraping or sanding using non-powered hand tools, or manual demolition of lead-painted plaster walls or building components by striking a wall with sledgehammer or similar tool.

.2 Remove lead based paint in small sections and pack as it is being removed in sealable 0.15 mm plastic bags and place in labeled containers for transport.

.3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers to decontamination Washroom. Wash containers thoroughly

in decontamination Washroom, and store in Holding Room pending removal to Unloading Room and outside. Ensure containers are removed from Holding Room by workers who have entered from uncontaminated areas dressed in clean coveralls.

.4 After completion of stripping work, wire brush and wet sponge surface from which lead based paint has been removed to remove visible material. During this work keep surfaces wet.

.5 After wire brushing and wet sponging to remove visible lead based paint, and after encapsulating lead containing material impossible to remove, wet clean work area including equipment and access room, and equipment used in process. After inspection by Departmental Representative, apply continuous coat of slow drying sealer to surfaces. Do not disturb work for 8 hours with no entry, activity, ventilation or disturbance during this period.

.6 After enclosing lead painted surfaces, wet clean work area and equipment and access room. During settling period no entry, activity, or ventilation will be permitted.

3.4 INSPECTION

.1 Perform inspection to confirm compliance with specification and governing authority requirements. Deviations from these requirements not approved in writing by Departmental Representative will result in work stoppage, at no cost to Owner.

.2 Departmental Representative will inspect work 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 lead dust leakage from Work Area occurs Departmental Representative may order Work shutdown.
- .1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

3.5 LEAD SURFACE SAMPLING-WORK AREAS

.1 Final lead surface sampling to be conducted as follows:
- .1 After Work Area has passed a visual inspection for cleanliness approved by Departmental Representative and acceptable coat of lock-down agent has been applied to surfaces within enclosure, and appropriate setting period of 8 hours has passed. Departmental Representative will perform lead wipe sampling in Work Area.
  - .1 Final lead wipe sampling results from horizontal and vertical surfaces where lead based paints have been removed must show lead levels of less than 40 micrograms of lead in dust per square foot. Samples must be collected and analyzed in accordance with EPA 747-R-95-007.
  - .2 If wipe sampling results show levels of lead in excess of 40 micrograms per square foot, re-clean work area at contractor's expense and apply another acceptable coat of lock-down agent to surfaces.
  - .3 Repeat as necessary until fibre levels are less than 40 micrograms per square foot.

3.6 FINAL CLEAN-UP

.1 Following specified cleaning procedures, and when lead wipe sampling is below acceptable concentrations proceed with final cleanup.

.2 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum visible

lead containing particles observed during cleanup, immediately, using HEPA vacuum equipment.

.3 Place polyethylene seals, tape, cleaning material, clothing, and other contaminated waste in plastic bags and sealed labeled waste containers for transport.

.4 Clean-up Work Areas, Equipment and Access Room, and other contaminated enclosures.

.5 Clean-up sealed waste containers and equipment used in Work and remove from work areas, via Container and Equipment Decontamination Enclosure System, at appropriate time in cleaning sequence.

.6 Conduct final check to ensure no dust or debris remains on surfaces as result of dismantling operations.

3.7 RE-ESTABLISHMENT OF OBJECTS & SYSTEMS

.1 Repair or replace objects damaged in course of work to their original state or better, as directed by Departmental Representative.

END OF SECTION 02 83 11

**CANADA BORDER SERVICES AGENCY**
**PACIFIC HIGHWAY PORT OF ENTRY**
**TRAFFIC OFFICE BUILDING**
**INTERIOR RENOVATIONS**
**SURREY, BRITISH COLUMBIA**

# APPENDIX C

# SAMPLING AND ANALYSIS – SUSPECTED ASBESTOS CONTAINING FIRE DOOR INSULATION

# HAZARDOUS BUILDING MATERIALS ASSESSMENT

**DST Consulting Engineers Inc.**
Unit B – 4125 McConnell Drive
Burnaby, British Columbia
V5A 2H7
Office: 604.436.4588

Public Works and Government Services Canada
Suite 219 – 800 Burrard Street
Vancouver, British Columbia
V6Z 0B9

July 05, 2013

Attention: Amy Moizumi, B.Sc.
Environmental Specialist

**Subject: SAMPLING AND ANALYSIS – SUSPECTED ASBESTOS CONTAINING FIREDOOR INSULATION – 28 176th STREET, SURREY, BRITISH COLUMBIA**

DST File No.: BE-VC-017096

## 1.0 INTRODUCTION

DST Consulting Engineers Inc. (DST) was retained by Public Works and Government Services Canada (PWGSC) to sample and analyze suspected asbestos-containing insulation from a fire door currently stored in the Storage Building located at 28 176th Street, Surrey, British Columbia (referred to hereafter as the Subject Building).

The assessment was conducted by Asbestos Hazard Emergency Response Act (AHERA) certified building inspector, David Kernel of DST, on June 17, 2013.

This report outlines the scope of work, regulations, methodologies, findings of the assessment, and based on those findings states recommendations and conclusions.

## 2.0 SCOPE OF WORK

The assessment was limited to the sampling and analysis of insulation associated with the fire door in the storage building within the Subject Building.

## 3.0 REGULATIONS AND GUIDELINES

### 3.1 Federal Regulations

#### 3.1.1 Canada Labour Code

In federal jurisdictions, hazardous building materials are regulated under the *Canada Labour Code, Part II*, *Part X, Hazardous Substances*.

#### 3.1.2 Asbestos-Containing Materials (ACMs)

ACMs are regulated under the *Canada Occupational Health and Safety Regulations, (SOR/86-304)*.

In addition, PWGSC Departmental Policy 057 provides specific requirements for the management and abatement of ACMs for all Federal Buildings.

#### 3.1.3 Transportation of Dangerous Goods

The transportation of hazardous wastes is governed under the Transportation of Dangerous Goods (TDG) Act and Regulations which outline the requirements for storage, handling, and transportation of hazardous waste, amongst other products.

### 3.2 Provincial Regulations

In British Columbia, the management of hazardous building materials in the work place is regulated by WorkSafeBC under the Workers' Compensation Act (effective April 15, 1998), as amended by the Workers' Compensation (Occupational Health and Safety) Amendment Act (effective October 1, 1999). Specific requirements of the Occupational Health and Safety Amendment Act are prescribed in the British Columbia Occupational Health and Safety (BC OH&S) Regulation.

#### 3.2.1 Hazardous Materials & Demolition/Renovations

Section 20.112 of the BC OH&S Regulation details the requirements that employers and owners are responsible for before beginning work on the demolition, renovation or salvage of machinery, equipment, buildings, or structures. The employer or owner must:

- Inspect the site to identify any asbestos, lead and/or other potentially hazardous materials that may be handled, disturbed, or removed;
- Have the inspection results available at the worksite; and,
- Ensure that the hazardous materials are safely contained or removed.

### 3.2.2 Asbestos-Containing Materials (ACMs)

ACMs are regulated under Part 6 (sections 6.1 to 6.32) of the BC OH&S Regulation. General requirements prescribed in these sections are summarized below:

***Section 6.1 – Definitions***

According to this section of the OH&S Regulation, an ACM is defined as any manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos through analytical testing. Materials other than vermiculite must be tested in accordance with one of the following methods:

"*Asbestos, Chrysotile by XRD, Method 9000*" (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

"*Asbestos (bulk) by PLM, Method 9002*" (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control; or,

"*Test Method for the Determination of Asbestos in Bulk Building Materials*" (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency.

### 3.2.3 WorkSafeBC Manual - Safe Handling of Asbestos, A Manual of Standard Practices

This manual outlines basic information on asbestos and asbestos products, health hazards, and requirements for worker protection, safe work procedures and principles that should be followed in selecting the most suitable technique for the safe abatement of ACMs. This document provides a guide to current practices that are to be followed in the Province of British Columbia.

### 3.2.4 Hazardous Wastes

In British Columbia, environmental matters pertaining to waste generally fall under the jurisdiction of the British Columbia Ministry of Environment (MoE), pursuant to the Environmental Management Act. The key waste regulation under the Environmental Management Act relating to hazardous building materials is the Hazardous Waste Regulation (HWR), as amended from time to time. The HWR provides the requirements for the proper handling, storage, transportation, treatment, recycling and disposal of hazardous wastes in the province. The regulation also outlines the materials and criteria to be used to characterize waste as hazardous.

## 4.0 METHODOLOGY

Visual identification of materials suspected to contain asbestos were supported by the analysis of representative samples.

Suspect ACM samples were analyzed for asbestos content at Asbestos Analytical Services Ltd. (AASL) following the National Institute for Occupational Safety and Health (NIOSH) Method 9002.

## 5.0 FINDINGS

One (1) sample (two layers) of suspect ACMs was collected and analyzed for asbestos content. The sample descriptions, locations and analytical results are summarized in **Table 1**, below.

A copy of the analytical laboratory report is included in **Appendix I**.

**Table 1: Analysis Of Suspect ACMs**
**Pacific Highway Border Crossing, 28 176th Street, Surrey, BC**

| Sample I.D. | Sample Location | Sample Description | Asbestos Content |
|---|---|---|---|
| A-1 Layer 1 | Fire Door Stored in Storage Building | Red Brown Fibrous Rigid Wood Fire Door Insulation | None Detected |
| A-1 Layer 2 | Fire Door Stored in Storage Building | Off-White Lumpy Wood Fire Door Insulation | None Detected |

Note: **Bold** print indicates asbestos-containing materials.

Based on the analytical sample results listed above, asbestos was not identified within the fire door insulation.

## 6.0 REPORT LIMITATIONS

This report is intended for client use only. Any use of this document by a third party, or any reliance on or decisions made based on the findings described in this report, are the sole responsibility of such third parties, and DST Consulting Engineers Inc. accepts no responsibility for damages, suffered by any third party as a result of decisions made or actions conducted based on this report. No other warranties are implied or expressed.

The data, conclusions and recommendations which are presented in this report, and the quality thereof, are based on a scope of work authorized by the client. The sampling program included asbestos bulk sampling in select representative areas for laboratory analysis. Note, however, that no scope of work, no matter how exhaustive, can guarantee to identify all contaminants. This report therefore cannot warranty that all building conditions are represented by those identified at specific locations.

Recommendations, when included, are made in good faith and are based on several successful experiences.

Note also that standards, guidelines and practices related to environmental investigations may change with time. Those which were applied at the time of this investigation may be obsolete or unacceptable at a later date.

Any comments given in this report on potential remediation problems and possible methods are intended only for the guidance of the designer. The scope of work may not be sufficient to determine all of the factors that may affect construction, clean-up methods and/or costs. Contractors bidding on this project or undertaking clean-ups should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the conditions may affect their work.

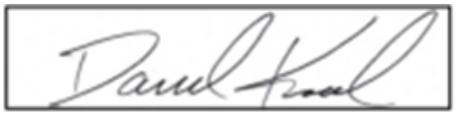
Any results from an analytical laboratory or other subcontractor reported herein have been carried out by others, and DST Consulting Engineers Inc. cannot warranty their accuracy. Similarly, DST cannot warranty the accuracy of information supplied by the client.

## 8.0 CLOSURE

We trust that the information contained herein meets your needs. Should you have any questions or comments, please do not hesitate to contact us.

***DST CONSULTING ENGINEERS INC.***

Report prepared by:



David Kernel, CLI, CLRA
*Environmental Technician*

Report reviewed by:

Christian J. Injates, CEC, CEM
*Sector Head, Building Environments*

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# APPENDIX I
# CERTIFICATES OF ANALYSIS

Asbestos Analytical Services Ltd.
7 - 2883 East Kent Avenue N., Vancouver, BC, V5S 3T9

# ASBESTOS ANALYSIS REPORT

AASL Report #: **B00305**
Project Location: Pacific Highway Border Crossing, 28 176th Street, Surrey, BC
Analyst: Gabrielle Sutton
Reference #s: BE-VC-017096
Report Date: 18JUN2013
Number of Samples: 1
Method: NIOSH Method 9002

| # B00305 | Sample | Sub-Sample | Sample Description / Location | Results | ASB |
|---|---|---|---|---|---|
| 1. 1 | **A-1** | Layer 1 - red-brown fibrous, rigid | Fire Door Insulation, Fire Door | Asbestos Fibres Not Detected<br>70 - 90 % Cellulose Fibres<br>> 10 % Non-Fibrous | --- |
| 1. 2 | A-1 | Layer 2 - off-white, lumpy | Fire Door Insulation, Fire Door | Asbestos Fibres Not Detected<br>1 - 5 % Fibrous Glass<br>> 95 % Non-Fibrous | --- |

**Comments**

Samples analyzed in accordance with NIOSH Laboratory Method 9002
American Industrial Hygiene Association (AIHA) BAPAT Program Laboratory Number 204301
Estimated Limit of Detection is <0.5 %
ASB = Asbestos present/absent in material
T = Asbestos Present
*AASL Asbestos Analytical Services Ltd.* will not accept any responsibility as to the manner of interpretation or application of these results.

Analyst: ***Original Signed By***
Gabrielle Sutton, B.A.
Date: June 18, 2013

***Original Signed By***
Reviewed By: Gabrielle Sutton, B.A.

**DST Consulting Engineers Inc.**
Unit B – 4125 McConnell Drive
Burnaby, British Columbia
V5A 2J7
Office: 604.436.4588

Public Works and Government Services Canada
Suite 219 – 800 Burrard Street
Vancouver, B.C.
V6Z 2V8

March 25, 2014

Attention: Viera Veidner, Leed AP
Senior Environmental Specialist, Environmental Services

**Subject: Hazardous Building Materials Assessment – Pacific Highway Border Crossing, 28 – 176th Street, Surrey, British Columbia**

DST File No.: BE-VC-017825

## 1.0 INTRODUCTION

DST Consulting Engineers Inc. (DST) is pleased to provide the results of our Hazardous Building Materials Assessment that was completed at the Pacific Highway Crossing located at 28 – 176th Street, Surrey, British Columbia (to be referred to hereafter as "the Subject Facility").

The assessment was completed to identify the presence or absence of Asbestos-Containing Materials (ACMs), Lead-Based Coatings (LBCs), Polychlorinated Biphenyls (PCBs), Ozone-Depleting Substances (ODS), Mould Amplification, Animal Waste and Elemental Mercury and to provide appropriate recommendations based on the findings of our assessment.

The assessment was completed on Thursday, March 6, 2013 by Asbestos Hazard Emergency Response Act (AHERA) certified building inspector, certified lead inspector and certified lead risk assessor, David Kernel of DST.

This report provides an outline our scope of work, applicable regulations and guidelines, our methodology, the results of the assessment, and conclusions with appropriate recommendations.

## 2.0 SCOPE OF WORK

The assessment was non-destructive in nature and focused on asbestos-containing materials (ACMs), including a detailed inspection, sampling, and analysis of samples.

The sampling was limited to include accessible areas of the Subject Facility and excluded an assessment of the Roofing systems.

## 3.0 REGULATIONS AND GUIDELINES

### 3.1 Provincial Regulations

In British Columbia, the management of hazardous building materials in the work place is regulated by WorkSafeBC under the Workers' Compensation Act (effective April 15, 1998), as amended by the Workers' Compensation (Occupational Health and Safety) Amendment Act (effective October 1, 1999). Specific requirements of the Occupational Health and Safety Amendment Act are prescribed in the British Columbia Occupational Health and Safety (BC OH&S) Regulation.

### 3.2 Federal Regulations

#### 3.2.1 Canada Labour Code

In federal jurisdictions, asbestos-containing materials and lead-based coatings are regulated under the *Canada Labour Code, Part II* under, *Part X, Hazardous Substances*.

#### 3.2.2 Hazardous Materials & Demolition/Renovations

Section 20.112 of the BC OH&S Regulation details the requirements that employers and owners are responsible for before beginning work on the demolition, renovation or salvage of machinery, equipment, buildings, or structures. The employer or owner must:

- Inspect the site to identify any asbestos, lead and/or other potentially hazardous materials that may be handled, disturbed, or removed;
- Have the inspection results available at the worksite; and,
- Ensure that the hazardous materials are safely contained or removed.

#### 3.2.3 Asbestos-Containing Materials (ACMs)

ACMs are regulated under Part 6 (sections 6.1 to 6.32) of the BC OH&S Regulation. General requirements prescribed in these sections are summarized below:

***Section 6.1 – Definitions***

According to this section of the OH&S Regulation, an ACM is defined as any manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos through analytical testing. Materials other than vermiculite must be tested in accordance with one of the following methods:

"*Asbestos, Chrysotile by XRD, Method 9000*" (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control;

"*Asbestos (bulk) by PLM, Method 9002*" (Issue 2, dated August 15, 1994) in the NIOSH Manual of Analytical Methods, published by the United States National Institute for Occupational Safety and Health, Centre for Disease Control; or,

"*Test Method for the Determination of Asbestos in Bulk Building Materials*" (EPA/600/R-93/116, dated July 1993) published by the United States Environmental Protection Agency.

### 3.2.4 Lead & Lead-Based Coatings

Section 6.59 – 6.69 of the BC OH&S Regulation describes specific requirements for workplace exposure to lead.

***WorkSafeBC Manual – Lead-Containing Paints and Coatings – Preventing Exposure in the Construction Industry***

This manual provides a guide to current practices that are to be followed in the Province of British Columbia, providing basic information on lead and lead products, health hazards and requirements for worker protection, safe work procedures and principles that should be followed in selecting the most suitable technique for the safe abatement of lead.

### 3.2.5 Hazardous Wastes

In British Columbia, environmental matters pertaining to waste generally fall under the jurisdiction of the British Columbia Ministry of Environment (MoE), pursuant to the Environmental Management Act. The key waste regulation under the Environmental Management Act relating to hazardous building materials is the Hazardous Waste Regulation (HWR), as amended from time to time. The HWR provides the requirements for the proper handling, storage, transportation, treatment, recycling and disposal of hazardous wastes in the province. The regulation also outlines the materials and criteria to be used to characterize waste as hazardous.

## 4.0 METHODOLOGY

Suspect hazardous building materials were visually identified based on the surveyor's knowledge of the historic composition of building products. Visual identification of materials suspected to contain hazardous materials were supported by the analysis of representative samples.

Suspect ACM samples were analyzed for asbestos content at Cardno ATC (ATC) following the National Institute for Occupational Safety and Health (NIOSH) Method 9002.

Suspect LBCs samples were tested for lead content using a Niton X-Ray Fluorescence (XRF) spectroscopy detector. The Niton XRF is designed to detect and quantify the amount of lead present in painted surfaces. Measurements were made following Niton XRF standard operating procedures for lead in surface coating measurements.

Suspect LBC samples that were determined to contain a concentration of lead equal to or > 0.05 mg/cm$^2$ were classified as LBCs, i.e., paints with hazardous levels of lead.

Suspected ozone-depleting substances (ODSs), elemental mercury, sources of polychlorinated biphenyls (PCBs), mould amplification and animal droppings were visually identified based on appearance, age, and knowledge of historic applications/locations.

## 5.0 FINDINGS

### 5.1 Asbestos-Containing Materials (ACMs)

Twenty-five (25) samples of suspect ACMs were collected and analyzed for asbestos content. The sample descriptions and analytical results are summarized in **Table 1**, below.

Asbestos analytical reports are included in **Appendix I**.

**Table 1: Analysis of Suspect ACMs**
**Pacific Highway Border Crossing**

| Sample I.D. | Sample Description | Sample Location | Asbestos Content & Type |
|---|---|---|---|
| AS-01 | Grey HVAC Duct Mastic | Mechanical Room (Traffic Operations) | None Detected |
| AS-02 | Brown HVAC Mastic on Air Handling Unit 1 | Mechanical Room (Traffic Operations) | None Detected |
| AS-03 | Drywall Joint Compound | Mechanical Room (Traffic Operations) | None Detected |
| AS-04 | White Flashing Mastic | Roof (Traffic Operations) | None Detected |
| AS-05 | Putty on Flood Lamp | Roof (Traffic Operations) | None Detected |
| AS-06 | Drywall Joint Compound | Phone Room (Traffic Operations) | None Detected |
| AS-07 | Grey Mastic Between Door Frame and Cinder Blocks | Mechanical Room (Traffic Operations) | None Detected |
| AS-08 | Drywall Joint Compound | Lunch Room, Main Floor (Traffic Operations) | None Detected |

**Table 1: Analysis of Suspect ACMs**
**Pacific Highway Border Crossing**

| Sample I.D. | Sample Description | Sample Location | Asbestos Content & Type |
|---|---|---|---|
| AS-09 | Drywall Joint Compound | Hallway, Ceiling 2nd Floor (Traffic Operations Building) | None Detected |
| **AS-10** | **Red HVAC Mastic** | **Hallway, 2nd Floor (Traffic Operations Building)** | **5% Chrysotile** |
| AS-11 | Ceiling Tiles | Hallway, 2nd Floor (Traffic Operations Building) | None Detected |
| AS-12 | Drywall Joint Compound | Electrical Room, Main Floor, Electrical Room (Traffic Operations Building) | None Detected |
| AS-13 | Drywall Joint Compound | Hallway, 2nd Floor (Traffic Operations Building) | None Detected |
| AS-14 | Drywall Joint Compound | Small Warehouse (Traffic Operations Building) | None Detected |
| AS-15 | White Caulking | Roof Exhaust (Traffic Operations Building) | None Detected |
| **AS-16** | **Red Duct Mastic** | **Mechanical Room, Main Floor (Traffic Operations Building)** | **5% Chrysotile** |
| AS-17 | Drywall Joint Compound | PWGSC Office Entrance | None Detected |
| AS-18 | Grey Mastic | Exterior (Commercial Building) | None Detected |
| AS-19 | Drywall Joint Compound | Large Warehouse Office (Commercial Building) | None Detected |
| AS-20 | Grey Mastic on Outlets | Large Warehouse (Commercial Building) | None Detected |
| AS-21 | 12” by 12” White Vinyl Tile | Large Warehouse Office (Commercial Building) | None Detected |
| AS-22 | Drywall Joint Compound | Large Warehouse Office, North Wall (Commercial Building) | None Detected |
| AS-23 | Pipe Insulation | Large Warehouse, City Water Valve (Commercial Building) | None Detected |
| AS-24 | Drywall Joint Compound | North Stairwell, (Large Warehouse) | None Detected |
| AS-25 | Ceiling Tiles | Large Warehouse (Commercial Building) | None Detected |

Note: **Bold** print indicates asbestos-containing materials.

Based on the analytical results, the red HVAC duct mastic located throughout the Subject Facility was found to be asbestos containing.

## 5.2 Lead-Based Coatings

Eighty-five (85) representative surface coatings were sampled and analyzed for lead content. The sample descriptions, locations and analytical results are summarized in **Table 2**, below.

**Table 2: Lead-Based Coating Sample Results**
**Pacific Highway Border Crossing**

| Sample Number | Location / Description | Color | Result (mg/cm2) | Lead-Based Coating |
|---|---|---|---|---|
| Mechanical Room, 2nd Floor (Traffic Operations Building) | | | | |
| L-01 | Concrete Pad | Red | 0.02 | No |
| L-02 | Concrete Slab | Grey | 0.03 | No |
| **L-03** | **Canvas Pipes** | **Green** | **0.09** | **Yes** |
| **L-04** | **Drain Pipes** | **Green** | **0.09** | **Yes** |
| L-05 | Boiler | Blue | 0.02 | No |
| **L-06** | **Pipes** | **Yellow** | **1.2** | **Yes** |
| **L-07** | **Air Compressor** | **Orange** | **1.7** | **Yes** |
| **L-08** | **HVAC Duct** | **Grey** | **0.8** | **Yes** |
| L-09 | Boiler Control | Teal | 0.03 | No |
| L-10 | Water Shut-off Valve | Aqua | 0.02 | No |
| **L-11** | **1" Pipe** | **White** | **0.08** | **Yes** |
| L-12 | Hot and Chilled Water Filtration | Blue | 0.03 | No |
| **L-13** | **Return Pump** | **Green** | **0.08** | **Yes** |
| L-14 | Cinder Block Walls | Beige | 0.02 | No |
| L-15 | Drywalls | Beige | 0.02 | No |
| **L-16** | **Column** | **Grey** | **0.8** | **Yes** |
| **L-17** | **Door Frame** | **Dark Grey** | **0.06** | **Yes** |
| **L-18** | **Double Door** | **Grey** | **0.17** | **Yes** |

**Table 2: Lead-Based Coating Sample Results**
**Pacific Highway Border Crossing**

| Sample Number | Location / Description | Color | Result (mg/cm2) | Lead-Based Coating |
|---|---|---|---|---|
| **L-19** | **Fire Sprinkler Pipes** | **Red** | **0.06** | **Yes** |
| L-20 | Column and Beams Outside Roof | Red | 0.02 | No |
| **L-21** | **Column and Beams Outside Roof** | **Orange** | **1.3** | **Yes** |
| L-22 | Railing Outside Roof | Grey | 0.02 | No |
| Hallway, 2nd Floor (Traffic Operations Building) | | | | |
| **L-23** | **Window Frame** | **Purple** | **0.05** | **Yes** |
| **L-24** | **Door** | **Purple** | **0.11** | **Yes** |
| L-25 | 6" by 6" Floor Tile | **Brown** | 0.03 | No |
| L-26 | 6" by 6" Floor Tile | **Speckled Brown** | 0.03 | No |
| L-27 | **Wall Paper** | **White** | 0.02 | No |
| L-28 | **Drywall Joint Compound** | **White** | 0.02 | No |
| L-29 | **Window Frame** | **White** | 0.02 | No |
| **L-30** | **Steel Slat Ceiling** | **Grey** | **0.1** | **Yes** |
| **L-31** | **Ceiling Tile** | **Grey** | 0.02 | No |
| L-32 | **Prime Steel Girders** | **Red** | **0.1** | **Yes** |
| **L-33** | **Wooden Door** | **Purple** | 0.02 | No |
| L-34 | **Door Frame** | **Grey** | **0.06** | **Yes** |
| **L-35** | **Texture Coat** | **Grey** | 0.02 | No |
| Janitor's Closet, 2nd Floor (Traffic Operations Building) | | | | |
| **L-36** | **Drywall Joint Compound** | **Beige** | **0.09** | **Yes** |
| **L-37** | **Ladder** | **Grey** | **0.10** | **Yes** |
| L-38 | **Concrete Slab** | **Grey** | 0.02 | No |
| Traffic Operation Office, 2nd Floor, (Traffic Operations Building) | | | | |

**Table 2: Lead-Based Coating Sample Results**
**Pacific Highway Border Crossing**

| Sample Number | Location / Description | Color | Result (mg/cm2) | Lead-Based Coating |
|---|---|---|---|---|
| **L-39** | **Steel Column** | **Grey** | **0.09** | **Yes** |
| **L-40** | **Steel Double Door** | **Teal** | **0.06** | **Yes** |
| **L-41** | **Steel** | **Teal** | **0.07** | **Yes** |
| L-42 | **Wood Door** | **Teal** | 0.02 | No |
| L-43 | **Door** | **Grey** | 0.02 | No |
| Lunch Room, Traffic Operations Office, 2nd Floor, (Traffic Operations Building) | | | | |
| L-44 | **Textured Wall Paper** | **Grey** | 0.02 | No |
| L-45 | **Ceiling Tile** | **Brown** | 0.02 | No |
| L-46 | 6" by 6" Floor Tile | **Brown** | 0.03 | No |
| **L-47** | **Radiator** | **Purple** | **0.10** | **Yes** |
| L-48 | **Outside Patio, Handrail** | **Grey** | 0.02 | No |
| L-49 | **Outside Patio, Window Frame** | **Orange** | 0.02 | No |
| Men's Washroom, Traffic Operations Office, 2nd Floor, (Traffic Operations Building) | | | | |
| **L-50** | **2" by 2" Tile** | **Teal** | **0.08** | **Yes** |
| **L-51** | **2" by 2" Tile** | **Grey** | **0.06** | **Yes** |
| **L-52** | **2" by 2" Tile** | **Navy Blue** | **0.06** | **Yes** |
| L-53 | **Ceiling** | **White** | 0.02 | No |
| L-54 | **Drywall Joint Compound** | **White** | 0.02 | No |
| Women's Washroom, Traffic Operations Office, 2nd Floor, (Traffic Operations Building) | | | | |
| L-55 | **2" by 2" Tile** | **Grey** | **0.06** | **Yes** |
| L-56 | **2" by 2" Tile** | **Pink** | **0.32** | **Yes** |
| L-57 | **2" by 2" Tile** | **Burgundy** | **0.07** | **Yes** |
| L-58 | **Ceiling** | **White** | 0.02 | No |

**Table 2: Lead-Based Coating Sample Results**
**Pacific Highway Border Crossing**

| Sample Number | Location / Description | Color | Result (mg/cm2) | Lead-Based Coating |
|---|---|---|---|---|
| Main Floor (Traffic Operations Building) | | | | |
| L-59 | Plastic Wainscoting | White | 0.02 | No |
| L-60 | Drywall Joint Compound | White | 0.02 | No |
| Electrical Room, Main Floor (Traffic Operations Building) | | | | |
| L-61 | Wall | Beige | 0.03 | No |
| L-62 | **Metal Door Frame** | **Off-white** | **0.07** | **Yes** |
| L-63 | **Concrete Slab** | **Grey** | 0.03 | No |
| Bus Entry, Main Floor ( Traffic Operations Building) | | | | |
| L-64 | 6” by 6” Floor Tile | **Brown** | 0.03 | No |
| L-65 | Drywall Joint Compound | **White** | 0.02 | No |
| Mechanical Room By Bus Entry (Traffic Operations Building) | | | | |
| L-66 | Cinder Block | **Beige** | 0.02 | No |
| L-67 | **Drywall Joint Compound** | **Beige** | 0.02 | No |
| L-68 | **Concrete Slab** | **Grey** | 0.03 | No |
| L-69 | **Metal Roof Hatch** | **Grey** | 0.03 | No |
| L-70 | **Roof Top Ladder** | **Grey** | 0.03 | No |
| Garage, Main Floor (Traffic Operations Building) | | | | |
| L-71 | **Q-deck Ceiling** | **Grey** | **0.8** | **Yes** |
| L-72 | **Steel Girders** | **Grey** | **1.0** | **Yes** |
| L-73 | **Door Frame** | **Grey** | **0.06** | **Yes** |
| Main Floor (Commercial Building, East) | | | | |
| L-74 | **Slate Floor** | **Grey** | **0.10** | **Yes** |
| L-75 | **Stripes on Floor** | **White** | **0.03** | **No** |

**Table 2: Lead-Based Coating Sample Results**
**Pacific Highway Border Crossing**

| Sample Number | Location / Description | Color | Result (mg/cm2) | Lead-Based Coating |
|---|---|---|---|---|
| Men's and Women's Bathroom, Same as on 2nd Floor of Traffic Operations Building (Commercial Building, East) | | | | |
| **See L-50 to L-58** | | | | |
| Dog Service Room, Main Floor (Commercial Building, East) | | | | |
| L-76 | **Drywall Joint Compound** | **White** | **0.04** | **Yes** |
| L-77 | **Auto Fire Sprinkler Pipe** | **Red** | **0.06** | **Yes** |
| Electrical Room (Commercial Building, East) | | | | |
| L-78 | **Concrete Floor** | **Grey** | 0.03 | No |
| L-79 | **Drywall Joint Compound** | **White** | 0.02 | No |
| Office Area, Same as on 2nd Floor of Traffic Operations Office in Traffic Operations Building (Commercial Building) | | | | |
| **See L-39 to L-43** | | | | |
| Warehouse (Commercial Building) | | | | |
| L-80 | **Office, Radiator** | **White** | **0.05** | **Yes** |
| L-81 | **Concrete Floor** | **Yellow** | **11.6** | **Yes** |
| L-82 | **Concrete Floor** | **Grey** | 0.02 | No |
| L-83 | **Drunk Tank, Concrete** | **Beige** | 0.02 | No |
| L-84 | **Wood on Drywall Joint Compound** | **Wood Finish** | 0.02 | No |
| L-85 | **Railing** | **Yellow** | **6.2** | **Yes** |

Note: **Bold** print indicates a lead-based coating.

Based on the analytical sample results listed above, the following LBCs were identified within the Subject Facility:

**Mechanical Room, 2nd Floor (Traffic Operations Building)**

- Green Paint on Canvas Pipes;
- Green Paint on Drain Pipes;
- Yellow Paint on Pipes;
- Orange Paint on Air Compressor;

- Grey Paint on HVAC Duct;
- White Paint on 1" Pipe;
- Green Paint on Return Pump;
- Grey Paint on Column;
- Dark Grey Paint on Door Frame;
- Grey Paint on Double Door;
- Red Paint on Fire Sprinkler Pipes; and,
- Orange Paint on Column and Beams.

**Hallway, 2nd Floor (Traffic Operations Building)**

- Purple Paint on Window Frame;
- Purple Paint on Door;
- Beige Paint on Steel Slat Ceiling;
- Interior Window Frame;
- Red Paint on Prime Steel Girders; and,
- Grey Paint on Door Frame.

**Janitor's Closet, 2nd Floor (Traffic Operations Building)**

- Beige Paint on Drywall Joint Compound; and,
- Grey Paint on Ladder.

**Traffic Operations Office, 2nd Floor (Traffic Operations Building)**

- Grey Paint on Column;
- Grey Paint on Steel Column;
- Teal Paint on Steel Double Door; and,
- Teal Paint on Steel Column.

**Lunch Room, Traffic Operations Office, 2nd Floor (Traffic Operations Building)**

- Purple Paint on Radiator.

**Men's Washroom, Traffic Operations Office, 2nd Floor (Traffic Operations Building)**

- Teal 2" by 2" Tile;
- Grey 2" by 2" Tile; and,
- Navy Blue 2" by 2" Tile.

**Women's Washroom, Traffic Operations Office, 2nd Floor (Traffic Operations Building)**

- Grey 2" by 2" Tile;
- Pink 2" by 2" Tile; and,
- Burgundy 2" by 2" Tile.

**Electrical Room, Main Floor (Traffic Operations Building)**

- Off-white Paint on Metal Door Frame.

**Garage, Main Floor (Traffic Operations Building)**

- Grey Paint on Q-deck Ceiling;
- Grey Paint on Steel Girders; and,
- Grey Paint on Door Frame.

**Main Floor (Commercial Building, East)**

- Grey 12" by 12" Slate Floor.

**Dog Service Room, Main Floor (Commercial Building, East)**

- White Paint on Drywall Joint Compound; and,
- Red Paint on Auto Fire Sprinkler Pipe.

**Warehouse (Commercial Building)**

- White Paint on Radiator Heater in Office;
- Yellow Paint on Concrete Floor; and,
- Yellow Paint on Railing.

### 5.3 Ozone Depleting Substances (ODSs)

Equipment suspected to contain ozone-depleting substances was observed on-site based on visible manufacturer labels, where accessible. Observed equipment containing ODSs include:

- Bar refrigerator located on the 2nd floor hallway outside the Mechanical Room of the Traffic Operations Building;
- Air Conditioning unit located on the 2nd floor in the IT Office of the Traffic Operations Building; and,
- Refrigerator located on the 2nd floor in the Lunch Room of the Traffic Operations Building

### 5.4 Elemental Mercury

Fluorescent light fixtures identified throughout the Subject Facility are presumed to contain mercury vapour.

Mercury containing thermostats were not identified within the Subject Facility.

### 5.5 Polychlorinated Biphenyls (PCBs)

PCB containing fluorescent light ballasts were not identified within the Subject Facility.

### 5.6 Mould Amplification

Areas of significant mould amplification were not identified within the Subject Facility.

### 5.7 Animal Waste

Animal droppings were identified within the Subject Facility in the ceiling spaces of the Traffic Operations Building located on the main floor.

## 6.0 CONCLUSIONS

Based on the site investigation, sampling and analysis, the following hazardous building materials were identified in the Subject Facility:

- ACMs;
- LBCs;
- ODSs;
- Elemental Mercury: and,
- Animal Droppings.

DST's recommendations for each material, which are based upon both regulatory compliance and best practice guidelines, are included in the following sections.

## 7.0 RECOMMENDATIONS

### 7.1 Asbestos-Containing Material (ACMs)

Prior to any renovation and/or demolition activities, identified ACMs should be removed in accordance with the requirements of WorkSafeBC, specifically but not limited to include those requirements prescribed through Parts 5.48-5.59 – Controlling Exposure, and Parts 6.1 - 6.32 – Asbestos.

DST recommends reference to WorkSafeBC publication "*Safe Handling of Asbestos, A Manual of Standard Practices"*. This document provides a guide to current practices that are to be followed in the Province of British Columbia, providing basic information on asbestos and asbestos products, health hazards and requirements for worker protection, safe work procedures and principles that should be followed in selecting the most suitable technique for the safe abatement of ACMs.

Asbestos-containing wastes should be managed in accordance with the British Columbia Ministry of Environment and should be transported in accordance with the requirements of the Federal Transportation of Dangerous Goods Act.

### 7.2 Lead-Based Coatings (LBCs)

Control the preparation of painted surfaces in accordance with the requirements of WorkSafeBC, specifically but not limited to include those requirements prescribed in Parts 5.48-5.59 – Controlling Exposure and Parts 6.59-6.69 – Lead of the BC OH&S Regulation.

DST recommends reference to WorkSafeBC publication "*Lead-Containing Paints and Coatings – Preventing Exposure in the Construction Industry*", 2011. This manual

provides a guide to current practices that are to be followed in the Province of British Columbia, providing basic information on lead and lead products, health hazards and requirements for worker protection, safe work procedures and principles that should be followed in selecting the most suitable technique for the safe abatement of LBCs.

Lead-containing wastes should be disposed of in accordance with the British Columbia Ministry of Environment and should be transported in accordance with the requirements of the Federal Transportation of Dangerous Goods Act.

### 7.3 Ozone Depleting Substances (ODSs)

When taken out of service, ODS-containing equipment should be managed in accordance with the requirements prescribed in British Columbia's Ozone-Depleting Substances and Other Halocarbons Regulation, including amendments up to B.C. Reg. 4/2010, January 14, 2010 and transport ODS-containing wastes in accordance with the requirements of the Federal Transportation of Dangerous Goods Act.

### 7.4 Elemental Mercury

When taken out of service, mercury-containing wastes should be managed in accordance with the requirements of the British Columbia Ministry of Environment and should be transported in accordance with the requirements of the Federal Transportation of Dangerous Goods Act.

### 7.5 Animal Droppings

DST recommends contracting pest control to further investigate rodent problem. If untreated, rodents can pose a risk to human health and could potentially damage building material and structure. Hantavirus Pulmonary Syndrome (HPS), a disease are associated with rodents through inhalation of dried droppings and urine. For more information please visit Health Link BC website, below at:

<http://www.healthlinkbc.ca/healthfiles/hfile36.stm>

## 8.0 LIMITATIONS

The conclusions and recommendations contained in this assessment report are based upon professional opinions with regard to the subject matter. These opinions are in accordance with currently accepted environmental assessment standards and practices applicable to these locations and are subject to the following inherent limitations:

1. The data and findings presented in this report are valid as of the dates of the investigations. The passage of time, manifestation of latent conditions or occurrence of future events may warrant further exploration at the property, analysis of the data, and re-evaluation of the findings, observations, and conclusions expressed in this report.

2. No warranty or guarantee, whether expressed or implied, is made with respect to the data or the reported findings, observations, and conclusions, which are based solely upon site conditions in existence through the period of assessment.

3. DST's assessment reports present professional opinions and findings of a scientific and technical nature. While attempts were made to relate the data and findings to

applicable environmental laws and regulations, the report shall not be construed to offer legal opinion or representations as to the requirements of, nor compliance with, environmental laws, rules, regulations or policies of federal, provincial, or local governmental agencies. Any use of the assessment report constitutes acceptance of the limits of DST's liability. DST's liability extends only to its client and not to other parties who may obtain this assessment report. Issues raised by the report should be reviewed by appropriate legal counsel.

## 9.0 CLOSING

We hope the information presented in this document meets your current requirements. If you have any questions, or require additional information please contact us at your convenience.

Yours truly,

***DST CONSULTING ENGINEERS INC.***

Report prepared by:

David Kernel, CLI, CLR
*Environmental Technologist*

Report reviewed by:

Christian J. Injates, CEC, CEM
*Sector Head, Building*

# APPENDIX I

# CERTIFICATES OF ANALYSIS (ASBESTOS)

# Laboratory Bulk Asbestos Test Report

Cardno ATC

Shaping the Future

**Client:** DST Consulting Engineers Inc

**Address:** Unit B - 4125 McConnell Drive, Burnaby, BC V5A 3J7

**Project Name:** Pacific Highway Border

**Project Number: / P.O. Number:** BE-VC-017825 / N/A

**Date Analyzed:** 03/11/14 **Page Number:** 1 of 1

Analytical method: Polarized light microscopy using dispersion staining ( EPA/600/R-93/116 )

| Sample I.D. Number | Laboratory I.D. Number | Sample Color | Type of Asbestos | Percentage of Asbestos | Other Fibers | Percentage of Other Fibers | Type of Material |
|---|---|---|---|---|---|---|---|
| AS-01 | 14B-02323 | Grey | ND | ND | SYNTH | <1.0 | Mastic |
| AS-02 | 14B-02324 | Brown | ND | ND | SYNTH | <1.0 | Mastic |
| AS-03 | 14B-02325 | White | ND | ND | CELL | <1.0 | Drywall Joint Comp. |
| AS-04 | 14B-02326 | White | ND | ND | ND | ND | Mastic |
| AS-05 | 14B-02327 | Brown | ND | ND | SYNTH | <1.0 | Putty |
| AS-06 | 14B-02328 | White | ND | ND | CELL | <1.0 | Drywall Joint Comp. |
| AS-07 | 14B-02329 | Grey | ND | ND | SYNTH | <1.0 | Mastic |
| AS-08 | 14B-02330 | White | ND | ND | CELL | <1.0 | Drywall Joint Comp. |
| AS-09 | 14B-02331 | White | ND | ND | CELL | <1.0 | Drywall Joint Comp. |
| AS-10 | 14B-02332 | Red | CHRY | 5.0 | ND | ND | Mastic |
| AS-11 | 14B-02333 | White/Grey | ND | ND | FBGL/CELL | 5.0/15.0 | Ceiling Tile |
| AS-12 | 14B-02334 | White | ND | ND | ND | ND | Drywall Joint Comp. |
| AS-13 | 14B-02335 | White | ND | ND | ND | ND | Drywall Joint Comp. |
| AS-14 | 14B-02336 | Brown/White | ND | ND | CELL | 20.0 | Paper/DWJC |
| AS-15 | 14B-02337 | White | ND | ND | ND | ND | Caulking |
| AS-16 | 14B-02338 | Red | CHRY | 5.0 | SYNTH | <1.0 | Mastic |
| AS-17 | 14B-02339 | White | ND | ND | CELL | <1.0 | Drywall Joint Comp. |
| AS-18 | 14B-02340 | Grey | ND | ND | SYNTH | <1.0 | Mastic |
| AS-19 | 14B-02341 | White | ND | ND | CELL | 10.0 | Paper/DWJC |
| AS-20 | 14B-02342 | Grey | ND | ND | FBGL/CELL | <1.0/<1.0 | Mastic |
| AS-21 | 14B-02343 | White | ND | ND | CELL | <1.0 | Floor Tile/Mastic |
| AS-22 | 14B-02344 | White | ND | ND | CELL | 5.0 | Paper/DWJC |
| AS-23 | 14B-02345 | Green/White | ND | ND | FBGL/CELL | <1.0/<1.0 | Insulation |
| AS-24 | 14B-02346 | White | ND | ND | CELL | <1.0 | Drywall Joint Comp. |
| AS-25 | 14B-02347 | White/Grey | ND | ND | FBGL/CELL | <1.0/10.0 | Ceiling Tile |

Abbreviations: ND-None Detected. Asbestos Type: ACTN-Actinolite, AMOS-Amosite, ANTH-Anthophyllite, CHRY-Chrysotile, CROC- Crocidolite, TREM-Tremolite. Other Fibers: CELL-Cellulose, FBGL-Fiberglass/Mineral wool, ANML-Animal, SYNTH-Synthetic, MNRL-Non-Asbestiform Mineral, OTHR-Other. Trace: <0.25%

NOTE: Materials containing heavy binders, small asbestos fibers, or heterogenous asbestos content should not be deemed absent of asbestos, or a non-asbestos containing material based soley on PLM analysis. Such materials include, but are not limited to: floor tiles, plasters, caulking, and joint compounds.

Reported percentage of asbestos is based upon a calibrated visual estimate of area. *Denotes that the asbestos content was verified with point counting. **Denotes that the asbestos content was verified by gravimetric reduction.(EPA/600/R-93/116) Samples that contain discreetly identifiable layers will be analyzed and reported separately, if any layer is found to contain asbestos. When no asbestos is detected in any layer of a sample, or separation of layers is impossible, the sample will be reported as a composite sample. All samples will be held for 60 days before disposal, unless otherwise requested.



| | |
|---|---|
| Date Received: | 3/11/2014 |
| Turnaround Time: | Rush |
| Report Issue Date: | 3/11/2014 |
| Sample Set Number: | 72.43356.0185 |

NVLAP® **LAB CODE: 200471-0**

**Analyst Signature:**

James R Jones, Laboratory Director

***Unsigned reports have not yet been proofread, and should not be considered complete.***

*Cardno ATC* *11121 Canal Road* *Cincinnati, OH 45241* *Tel: 513.771.2112* *Fax: 513.782.6908*

ATC ASSOCIATES INC.
Environmental, Geotechnical and Materials Professionals

11121 Canal Road
Cincinnati, OH 45241
Tel: 513.771.2112
Fax: 513.782.6908

# Sample Submittal Form for Analytical Services

## Client Information

**Company Name:** DST Consulting Engineers Inc.
**Address:** # 200-4125 McConnell Drive
Burnaby, British Columbia V5A 3J7
**Phone Number:** 604.436.4588

**Project Name: Pacific Highway Border**
**Client: Public Works GSC**
**Project Number:** BE-VC-017825
**P.O. Number:**

**Project Manager: Christian Injates**
**Email Address: dkernel@dstgroup.com / cinjates@dstgroup.com**

## Turnaround Time (Circle One)

| Normal | Rush | Emergency Rush |
|---|---|---|
| 3 to 5 days | 24 to 48 hours | less than 24 hours |

## Type of Analysis Requested (Circle One)

Bulk Asbestos (PLM) | Air Asbestos (NIOSH 7400) | Lead Analysis | Biological | TEM

## Sample Log

| Sample Number | Sample Location and Description | Laboratory Number |
|---|---|---|
| AS-01 | Grey HVAC Duct Mastic - Mechanical Room (Traffic Operations) | 14B-02323 |
| AS-02 | Brown HVAC Mastic on AHU 1 - Mechanical Room (Traffic Operations) | |
| AS-03 | DWJC - Mechanical Room (Traffic Operations) | |
| AS-04 | White Flashing Mastic - Roof (Traffic Operations) | |
| AS-05 | Putty on Flood Lamp - Roof (Traffic Operations) | |
| AS-06 | DWJC - Phone Room (Traffic Operations) | |
| AS-07 | Grey Mastic between door frame and cinder blocks - Mech Rm (Traffic Ops) | |
| AS-08 | DWJC - Lunch Room 1st floor (Traffic Ops) | |
| AS-09 | DWJC - Hallway Ceiling (Traffic Operatiosn 2nd Floor) | |
| AS-10 | Red HVAC Mastic - Hallway (Traffic Ops 2nd floor) | |
| AS-11 | Ceiling Tiles - Hallway (Traffic Ops 2nd Floor) | |
| AS-12 | DWJC - Main Floor - Electrical Room (Traffic Ops) | |
| AS-13 | DWJC - Hallway (Traffic Ops 2nd floor) | |
| AS-14 | DWJC - Small Warehouse (Traffic Operations) | |
| AS-15 | White Caulking - Roof Exhaust (Traffic Operations) | |
| AS-16 | Red Duct Mastic - Main Floor Mech Rm (Traffic Ops) | |
| AS-17 | DWJC - PWGSC Office Entrance | |
| AS-18 | Grey Mastic - Exterior (Commercial Bldg) | |
| AS-19 | DWJC - Large Warehouse Office (Commercial Bldg) | |
| AS-20 | Grey Mastic on Outlets - Large Warehouse (Commercial Bldg) | |
| AS-21 | 12x12 White VT - Large Warehouse office (Commercial Bldg) | |
| AS-22 | DWJC - Large Warehouse Office North Wall (Commercial Bldg) | |
| AS-23 | Pipe Insulation - City Water Valve Large Warehouse (Comm Bldg) | |
| AS-24 | DWJC - North Stariwell (Large Warehouse) | |
| AS-25 | Ceiling Tiles - Large Warehouse (Commercial Bldg) | 14B-02347 |
| | | |
| | | |
| | | |
| | | |
| | | |

Special Instructions:

## Chain of Custody

| Relinquished By: | Date/Time | Received By: |
|---|---|---|
| DJS | 3-11-14 / 9:00 | DJS |
| | 3-11-14 / 9:00 | |
| | / | |
| | / | |

**Stantec Consulting Ltd.**
1100 – 111 Dunsmuir Street
Vancouver BC V6B 6A3
Tel: (604) 696-8000 Fax: (604) 696-8100

# Electrical Addendum

| | | | |
|---|---|---|---|
| Project No: | 115615325 | Addendum No. | EAD01 |
| Project Name: | CBSA Traffic Office Building<br>468 Terminal Ave., Vancouver | Date: | November 12, 2015 |
| To: | Chernoff Thompson Architects | | |
| Attention: | James Bligh | | James.B@cta.bc.ca |
| Copy: | Tony Yip | | Tony.Y@cta.bc.ca |

This Addendum varies the Contract Documents for above-stated Project Name and will form part of the Contract Documents and is to be read, interpreted and coordinated with all other parts, including General and Supplementary General Conditions of the Contract and all Sections in Division 1. The cost of all work contained herein is to be included in the Contract Sum. The following revisions supersede the information contained in the original drawings and specifications issued for the above named project to the extent referenced and shall become a part thereof.

## 1. Specifications

1.1. Section 260500 - Common Work Results

1.1.1. References to "Engineer" and/or "Consultant" as they relate to Stantec Consulting Ltd. shall be revised to "Departmental Representative".

1.1.2. Subsections which do not relate to the project have been deleted.

1.2. Appendix A - Forms

1.2.1. Same as 1.1.1 above.

1.2.2. Form entries which do not relate to the project have been deleted.

1.3. Refer to attached revised Section 260500 and Appendix A for details.

## 2. Drawings

2.1. Drawing E-100: Delete General Note no. 4.

2.2. Drawing E-201: Delete detail 2/E-201.

2.3. Drawing E-202: Revise Typical Key Notes nos. 1, 3 and 5.

2.4. Refer to attached revised drawings E-100, E-201 and E-202 for details.

End of Addendum EAD01

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## 1.0 GENERAL

### 1.1 RELATED SECTIONS & SUMMARY

.1 The General Conditions, Supplements and Amendments shall govern this Section (read in conjunction with Instructions to Tenderers / Bidders). This section covers items common to all Electrical sections and is intended only to supplement the requirements of Division 01.

.2 Reference to “Electrical Divisions” shall mean all sections of Divisions 26, 27, 28, 33, 34 & 48 in the Master Format or the Canadian Master Specifications.

.3 The word "Provide" shall mean "Supply and Install" the products and services specified. "As Indicated" means that the item(s) specified are shown on the drawings.

.4 Provide materials, equipment and plant, of specified design, performance and quality; and, current models with published certified ratings for which replacement parts are readily available. Provide project management and on-site supervision to undertake administration, meet schedules, ensure timely performance, ensure coordination, and establish orderly completion and the delivery of a fully commissioned installation.

.5 The most stringent requirements of this and other electrical sections shall govern.

.6 All work shall be in accordance with the PROJECT Drawings and Specifications and their intent, complete with all necessary components, including those not normally shown or specified, but required for a complete installation.

.7 Provide seismic restraints for all required equipment and wiring systems.

.8 Connect to equipment specified in other Sections and to equipment supplied and installed by other Contractors or by the Owner. Uncrate equipment, move in place and install complete; start-up and test. Include all field assembly of loosely/separately packaged accessories

.9 (Deleted)

### 1.2 REFERENCES

.1 Install in accordance with CSA C22.1 (current adopted edition) - except where specified otherwise.

.2 Refer to CSA C22.1 Appendix A “Safety Standards for Electrical Equipment” for applicable codes and the related revisions

.3 Refer to CSA C22.1 Pages xxix - xxxii for related ‘Reference Publications’

.4 Refer to NBCC Table 1.3.1.2 for applicable codes and the related revisions.

.5 Comply with local electrical bulletins and by-laws relating to the Authority Having Jurisdiction (AHJ).

.6 Install overhead and underground systems in accordance with CSA C22.3 No.1 (current adopted edition) - except where specified otherwise.

.7 Preferred Voltage Levels for AC Systems, 0-50,000V in accordance with CAN3-C235 (current adopted 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 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235, current edition

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

## 1.5 SUBMITTALS

.1 Submittals to be in accordance with Division 01.

.2 Product Data: submit WHMIS MSDS in accordance with Division 01 - Sustainable Requirements and Division 02- Hazardous Materials

.3 Shop Drawings:

.1 Submit shop drawings, product data and samples in accordance with Division 01. The submission shall be reviewed, signed and processed as described in Division 01.

.2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.3 Where applicable, include wiring, line and schematic diagrams. Include wiring drawings or diagrams showing interconnection with work of other Sections.

.4 Content

.1 Shop drawings submitted title sheet.

.2 Data shall be specific and technical.

.3 Identify each piece of equipment.

.4 Information shall include all scheduled data.

.5 Advertising literature will be rejected.

.6 The project and equipment designations shall be identified on each document.

.7 Information shall be given in S.I. [Imperial] units.

.8 The shop drawings/product data shall include:

.1 Dimensioned construction drawings with plans and sections showing size, arrangement and necessary clearances, with all equipment weights and mounting point loads.

.2 Mounting arrangements.

.3 Detailed drawings of bases, supports and anchor bolts.

.4 Control explanation and internal wiring diagrams for packaged equipment.

.5 A written description of control sequences relating to the schematic diagrams.

.4 Format

.1 Black line prints 216 mm x 280 mm [8-1/2" x 11"] or 280 mm x 430 mm [11" x 17"].

.2 Larger drawings may be submitted on reproducible single sheet media (ie not bound) with space for stamps and signatures - master set plus one working copy.

.3 Bill of Quantities for related components, identified by model number, listed on the front cover with item identification numbers.

.5 Number of copies:

.1 Provide number of copies indicated in Section Division 01 with a minimum of 2 copies to be retained by the Departmental Representative.

.6 Coordination

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

.7 Keep one copy of shop drawings and product data, on site, available for reference.

.8 Quality Control: in accordance with Division 01 - Quality Control

.1 Provide CSA certified equipment and material. Where CSA certified equipment and/or material is not available, submit such equipment and/or material to the authority having jurisdiction for special approval before delivery to site.

.2 Submit test results of installed electrical systems and instrumentation.

.3 Submit, upon completion of Work, the electrical “load balance” report.

.9 Permits and Fees:

.1 Submit to Electrical Inspection Department, local fire authorities and supply authority the necessary number of drawings and specifications for examination and approval prior to commencement of work. Obtain all required permits and pay all fees.

.2 Arrange for inspection of all Work by the AHJ. On completion of the Work, furnish final unconditional certificates of approval by the inspecting authorities.

## 1.6 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Division 01 - Quality Control

.2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial and/or Territorial Act respecting manpower vocational training and qualification.

.1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.

.2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.3 Site Meetings: in accordance with Division 01 - Construction Progress Schedule

.1 Site Meetings: as part of Manufacturer's Field Services: schedule site visits, to review Work, at stages listed below:

.1 At time of initial shop drawing submission to confirm any existing conditions and to coordinate with the project schedule and any cross discipline requirements.

.2 After delivery and storage of products, and when preparatory Work is complete but before installation begins.

.3 During progress of Work at key schedule points as determined.

.4 At commissioning.

.5 Upon completion of Work, after cleaning is carried out.

.4 Health and Safety Requirements: do construction occupational health and safety in accordance with Division 01 - Health and Safety Requirements.

## 1.7 DELIVERY, STORAGE AND HANDLING

.1 Material Delivery Schedule: provide Departmental Representative with schedule within 4 weeks after award of Contract.

.2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and/or recycling in accordance with Division 01 Construction/Demolition Waste Management and Disposal.

## 1.8 SYSTEM START-UP

.1 Refer to Division 01, and as follows.

.2 Instruct Departmental Representative and operating personnel in the operation, care and maintenance of equipment.

.3 Arrange and pay for services of manufacturer's factory service Engineer to supervise start-up of installation, check, adjust, balance and calibrate components, where required in these specifications.

.4 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.

## 1.9 OPERATING INSTRUCTIONS

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

- .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
- .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
- .3 Safety precautions.
- .4 Procedures to be followed in event of equipment failure.
- .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

## 1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01 - Construction/Demolition Waste Management and Disposal and with the Waste Reduction Work plan.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

.3 Place materials defined as hazardous or toxic waste in designated containers.

## 1.11 ASBESTOS REMOVAL

.1 Refer to specification Division 01 for procedures, removal and disposal of asbestos.

.2 If during renovations / demolition, asbestos is discovered (or material suspected to be asbestos), all work in that area shall immediately cease and the General Contractor advised. The General Contractor shall take immediate appropriate action to verify presence of friable asbestos and be responsible for the removal of all friable asbestos.

.3 This division will not be entitled to a claim for any delays resulting from the investigation of or removal of asbestos.

## 1.12 DRAWINGS AND MEASUREMENTS

.1 Drawings are generally diagrammatic and are intended to indicate the scope and general arrangement of work and are not detailed installation drawings. Do not scale the drawings. Obtain accurate dimensions from the Architectural and Structural drawings.

.2 Consult the architectural drawings and details for exact locations of fixtures and equipment. Obtain this information from the Departmental Representative where definite locations are not indicated.

.3 Take field measurements, where equipment and material dimensions are dependent upon building dimensions.

.4 Where imperial units have been indicated in brackets [ ] following the requirements in SI units, the conversion is approximate and provided for convenience. The SI units shall govern.

## 1.13 PROJECT COORDINATION

.1 Check drawings of all trades to verify space and headroom limitations for work to be installed. Coordinate work with all trades and make changes to facilitate a satisfactory installation. Make no deviations to the design intent involving extra cost to the Owner, without the Departmental Representative's written approval.

.2 The drawings indicate the general location and route to be followed by the electrical services. Where details are not shown on the drawings or only shown diagrammatically, the services shall be installed in such a way as to conserve head room and interfere as little as possible with the free use of space through which they pass. Service lines shall run parallel to building lines. All services in the ceiling shall be kept as tight as possible to beams or other limiting members at high level. All electrical services shall be coordinated in elevation to ensure that they are concealed in the ceiling or structural space provided unless detailed otherwise on drawings.

.3 Work out jointly all interference problems on the site and coordinate all work before fabricating, or installing any material or equipment. Where necessary, produce interference/coordination drawings showing exact locations of electrical systems or equipment within service areas, shafts and the ceiling space. Distribute copies of the final interference/coordination drawings to the Architect and Departmental Representative and all affected parties.

.4 Ensure that all materials and equipment fit into the allotted spaces and that all equipment can be properly serviced and replaced, if and when required. Advise the Departmental Representative of space problems before installing any material or equipment. Demonstrate to the Departmental Representative on completion of the work that all equipment installed can be properly, safely serviced and replaced, if and when required.

## 1.14 (DELETED)

## 1.15 EQUIPMENT RESTRAINT

.1 Related Section: 26 05 05 Seismic Restraint.

.2 It is the entire responsibility of equipment manufacturers to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.

## 1.16 REUSED EQUIPMENT

.1 Where existing equipment is being relocated and re-used, check and report on the condition to the Departmental Representative before reinstallation. Protect and carefully store equipment designated for reuse.

## 1.17 (DELETED)

## 1.18 SEQUENCE OF WORK

.1 Before interrupting major services notify the Departmental Representative well in advance and arrange an acceptable schedule for the interruptions.

.2 Before interrupting any services complete all preparatory work as far as reasonably possible and have all necessary materials on site and prefabricated (where practical) and work continuously to keep the length of interruption to a minimum.

.3 Include for the cost of all work that may be required out of regular hours to minimize the period of service interruption when modifying the existing systems.

.4 All trades in this Division shall make allowance for the implications of having to totally complete all work in the new addition before proceeding with work in the existing building.

## 1.19 BUILDING OPERATION DURING CONSTRUCTION

.1 In order to minimize operational difficulties for the existing building staff, the various trades must cooperate with the owner throughout the entire construction period and particularly ensure that noise is minimized.

.2 Convenient access for the staff and public to the building must be maintained at all times. Minor inconvenience and interruption of services will be tolerated, provided advance notice is given, but the Contractor will be expected to coordinate his work, in consultation with the Departmental Representative, so the operation of the facility can be maintained as nearly normal as possible.

## 1.20 EXISTING SERVICES

.1 Protect all existing services encountered. Every effort has been made to show the known existing services. However, the removal of concealing surfaces may reveal other existing services. Work with the Owner's staff to trace the originating source and points served. Obtain instructions from the Departmental Representative when existing services require relocation or modifications, other than those already indicated in the Contract Documents.

.2 Arrange work to avoid shutdowns of existing services. Where shutdowns are unavoidable, obtain the Departmental Representative's approval of the timing, and work to minimize any interruptions.

.3 Shutdowns, to permit connections, to be coordinated with the maintenance staff.

.4 In order to maintain existing services in operation, temporary relocations and wiring may be required.

.5 Be responsible for any damages to existing systems by this work.

## 1.21 SALVAGE

.1 All conduit, wiring and equipment which becomes redundant and is no longer required due to the work in this Contract shall be completely removed.

.2 All existing items which need to be removed, and which have a reasonable salvage value, shall be carefully removed and handed over to the Owner. Handing over to the Owner includes moving to Owner's designated storage place on site. These items shall not become the property of the Contractor. Obtain a written receipt from the Owner detailing each of the items handed over.

.3 Remove all redundant material not required by the Owner from the site.

## 1.22 WARRANTY

.1 Use of installed equipment during construction shall not shorten or alter the warranty period as specified in the Division 01.

.2 Take note of any extended warranties specified.

.3 Furnish a written warranty stating that all work executed under this Division will be free from defects of material and workmanship for a period of one (1) year from the date of substantial performance.

.4 Promptly investigate any electrical or control malfunction, and repair or replace all such defective work and all other damages thereby which becomes defective during the time of the warranty.

## 1.23 TENDER INQUIRIES

.1 All contractor queries during the tender period shall be made in writing to the Departmental Representative. Contractor queries will be collected and suitable addenda will be issued for clarification. No verbal information will be considered valid or issued by the Departmental Representative's office during tender. All tender queries may be faxed, mailed or couriered to the Departmental Representative's office. No telephone questions will be answered.

## 1.24 EXAMINATION

.1 Visit the site before preparing the tender and examine all existing conditions. No extra cost will be considered for any misunderstanding of work to be done resulting from failure to visit the site.

.2 Examine the documents for details of work included. Obtain a written clarification in the event of conflict within the specification, between the specification and the drawing, or in the drawing. Obtain written clarification from the Departmental Representative if work affecting the installation is not clear. Where this is not done in advance, allow in the tender sum for providing the more costly alternative.

## 1.25 RESPONSIBILITIES

.1 (Deleted)

.2 Where the Contract Documents do not contain sufficient information for the proper selection of equipment for bidding, notify the Departmental Representative during the tendering period. If clarification is not obtainable, allow for the most expensive arrangement. Failure to do this shall not relieve the Contractor of responsibility to provide the intended equipment.

.3 Protect equipment and material from the weather, moisture, dust and physical damage.

.4 Cover equipment openings and open ends of conduit, piping and pullboxes as work progresses. Failure to do so will result in the Trade being required to adequately clean or replace materials and equipment at no extra cost to the Owner.

.5 Protect all existing services encountered. Obtain instructions from the Departmental Representative when existing services require relocation or modification.

.6 Refinish damaged or marred factory finish to factory finish.

.7 The specifications and drawings form an integral part of the Contract Documents. Neither the drawings nor the specifications shall be used alone. Work omitted from the drawings but mentioned or reasonably implied in the specifications, vice versa, shall be considered as properly and sufficiently specified and shall be provided. Misinterpretation of any requirement of either plans or specifications shall not relieve this Contractor of the responsibility of properly completing his trade to the approval of the Departmental Representative.

## 1.26 STANDARD OF ACCEPTANCE

.1 Standard of Acceptance means that the item named and specified by manufacturer and/or catalogue number forms part of specification and sets standard regarding performance, quality of material and workmanship and when used in conjunction with a referenced standard, shall be deemed to supplement the standard.

.2 Where two or more manufacturers are listed, the manufacturer's name shown first or underlined or shown with a model name and/or number was used in preparing the base design. Tenders may be based on any one of those named, provided that they meet every aspect of the base design and every aspect of the drawings and specifications.

.3 Where other than the first named or the underlined manufacturer or scheduled/specified manufacturer is selected or approved, include for the cost of any resulting work (both under this Division and other Divisions) and any necessary redesign of installation or structure. Submit redesign drawings for review with Shop Drawings. Maintain installation, access and servicing clearances. Equipment/materials shall not exceed the available space limitations. Redesign drawings shall be to scale and of a standard equal to the Project Drawings.

.4 A visible manufacturer's nameplate shall indicate manufacturer's name, model number, serial number, capacity data, electrical characteristics and approval stamps.

## 1.27 ADDITION OF ACCEPTABLE MANUFACTURERS

.1 Material/products considered to satisfy the specification, but of a manufacturer other than those named may be submitted to the Departmental Representative for consideration not later than five (5) working days prior to closing of tender or of bid depository subtrade tender whichever is earlier.

.2 Alternate approvals will be given by written addendum only. No other substitution will be permitted after closing of tenders.

.3 Alternate approvals granted before the closing of tenders will be limited to a manufacturer's system and/or series only. This limited approval will not preclude substitute equipment/material from complying with specific features included with equipment/material specified. Determine that the alternate product meets the specification intent before basing a tender on the product

.4 Where alternate equipment/materials are selected, allow for effects on other parts of the work of this Trade and other Trades. Where substantial changes in arrangement are required, submit shop drawings of the proposed changes with Plan and Section views and show effects on work of other Trades. Alternate equipment/materials shall not exceed the available space limitations. Maintain installation, access and servicing clearances. No extra will be allowed due to the use of alternate equipment/materials.

.5 Where two or more items of equipment and/or material, of the same type, are required, provide products of a single manufacturer.

.6 Install and test all equipment and material, in accordance with the detailed recommendations of the manufacturer.

## 1.28 EQUIPMENT LIST

.1 Submit a completed Equipment List, showing the make of equipment and material included in the Tender, including the names of the subtrades, 10 days after the award of the Contract**. Form EF110** in Appendix A shall be used for this purpose.

.2 The equipment list shall be a full list of materials or systems intended for installation.

## 1.29 PROGRESS CLAIM AND CHANGEORDER BREAKDOWNS

.1 Ten (10) days after the award of contract, submit price breakdowns on photocopies of the Price Breakdown **Form EF112** included in Appendix A.

.2 In particular cases more detail may be necessary to properly assess a change order or progress claims. This additional information could include all suppliers and all sub-contractors when requested by the Departmental Representative. Provide details for each section of the electrical work listed for each separate electrical change order item exceeding $10,000.00.

.3 Mark-up information is required for change orders but is optional on the original tender price.

.4 Progress claims will not be certified nor payment made beyond 90% of the overall Electrical contract until commissioning and verification of the systems are complete. This procedure is to allow for any necessary deficiency holdbacks on items which do not become apparent until the systems are commissioned.

## 1.30 PROJECT CLOSE-OUT REQUIREMENTS

.1 Refer to detailed specifications in each section for detailed requirements. Also refer to Specification **Form EF-142** included in Appendix A for list of required substantial completion submissions. Record drawings to be submitted to Departmental Representative and all life safety systems must be operational, verified and tested and demonstrated to Departmental Representative prior to issuance of Schedule C-B.

## 1.31 SUBSTANTIAL PERFORMANCE REQUIREMENTS

.1 Before the Departmental Representative is requested to make an inspection for substantial performance of the work:

.1 Commission all systems and prove out all components, interlocks and safety devices.

.2 Submit a letter certifying that all work is complete for the intended use, operational, clean and all required submissions have been completed. **Form EF143** in Appendix A should be used for this purpose.

.3 A complete list of incomplete or deficient items shall be provided. If, in the opinion of the Departmental Representative, this list indicates the project is excessively incomplete, a substantial completion inspection will not be performed.

.2 The work will not be considered to be ready for use or substantially complete until the following requirements have been met:

.1 All reported deficiencies have been corrected.

.2 Operating and Maintenance Manuals completed.

.3 "As Built" Record Drawing ready for review.

.4 Systems Commissioning has been completed and has been verified by Departmental Representative.

.5 All demonstrations to the owner have been completed.

.6 All documents required on **Form EF142** in Appendix A have been submitted.

.3 Engineer's Letters of Assurance will not be issued until the following requirements have been met:

.1 All items listed in .1 above have been completed or addressed.

.2 Certificate of Penetrations through separations (**Form EF130**).

.3 Provincial or City Electrical Inspection - Certificate of inspection.

.4 Seismic Engineers letter of Assurance and final inspection report.

.5 Certificate of Substantial Performance (**Form EF143**).

.6 Signed off copy of Departmental Representative's final inspection report.

.7 Fire alarm verification.

## 1.32 DEFICIENCY HOLDBACKS AND DEFICIENCY INSPECTIONS

.1 Work under this Division which is still outstanding when substantial performance is certified will be considered deficient and a sum equal to at least twice the estimated cost of completing that work will be held back.

.2 It is expected that outstanding work will be completed in an expeditious manner and the entire holdback sum will be retained until the requirements for Total Performance of Division 26, 27, 28, 33 (electrical) work have been met and verified.

## 2.0 PRODUCTS

## 2.1 SUSTAINABLE REQUIREMENTS

.1 Materials and products in accordance with Division 01 - Sustainable Requirements: Construction

.2 Do verification requirements in accordance with Division 01 Sustainable Requirements: Contractor's Verification.

## 2.2 MATERIALS AND EQUIPMENT

.1 Provide materials and equipment in accordance with Division 01 and as follows.

.2 Material and equipment to be CSA certified. Where CSA certified material or equipment is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval.

.3 Where equipment or materials are specified by technical description only, they are to be of the best commercial quality available for the intended purpose.

.4 Factory assemble control panels and component assemblies.

## 2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Provide all power and control wiring, conduit, wire, fittings, disconnect switches, motor starters, for all mechanical equipment unless otherwise specified.

.2 Ground all motors to conduit system with separate grounding conductor in flexible conduit or bonding conductor in the flexible conduit.

.3 Connections shall be made with watertight flexible conduit with watertight connectors.

.4 Control wiring and conduit standards are specified in the Electrical Divisions. Refer to Mechanical Divisions for scope of work and particular details.

## 2.4 WARNING SIGNS

.1 Provide warning signs, as specified or to meet the requirements of Inspection Department, Authority having Jurisdiction and Departmental Representative.

.2 Use decal signs, minimum 175 x 250 mm [7" x 10"] size

## 2.5 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

## 2.6 EQUIPMENT IDENTIFICATION

.1 Identify all electrical equipment including but not limited to starters, disconnects, remote ballasts and controls with nameplates and labels as follows:

.2 Nameplates:

.1 Lamicoid 3 mm [0.125"] thick plastic engraving sheet, white face, black core, self adhesive unless specified otherwise. Provide white face, red core for all essential distribution equipment.

.2 Nameplate Sizes:

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

.3 Typical Labelling:

.1 Panelboard & CDP – 5 lines

.1 Line 1 – eg Conditional/Vital – Size 4 lettering

.2 Line 2 – Panel/CDP designation – Size 4 lettering

.3 Line 3 – eg 225A, 120/208V, 3 phase 4W – Size 2 lettering

.4 Line 4 – Feeder: eg 4#3 – 35mm C – Size 2 lettering

.5 Line 5 – Origin eg: Main Elect. Room – Size 2 lettering

.2 (Deleted)

.3 Label colours unless otherwise indicated:

.1 120/208V labels: white letters on black base.

.2 347/600V labels: Black letters on white base.

.3 Standby/Emergency Power: white letters on red base.

.4 Wording on nameplates to be approved prior to manufacture.

.5 Allow for average of twenty-five (25) letters per nameplate.

.6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.7 Terminal cabinets and pull boxes: indicate system and voltage.

.8 (Deleted)

.3 Labels:

.1 Identify each outlet, starter, disconnect and all items of fixed equipment with the appropriate panel and circuit number origin by means of a small but good quality vinyl, self-laminating label such as T & B E-Z Code WSL, Dymo Letratag or Brother P-Touch equivalent printable markers. Embossed Dymo or any labels with edges and corners that are prone to lift will be rejected. Confirm location of labels with Departmental Representative before installing. Circuit number to agree with Record Drawings.

.4 Provide plastic covered panel directory with circuits and areas served typed in, and mounted on inside of door. Directory to conform to Record Drawings.

## 2.7 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

## 2.8 CONDUIT, CABLE AND PULLBOX IDENTIFICATION

.1 Colour code conduits, metallic sheathed cables, pullboxes and junction boxes.

.2 Code with 25 mm plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor and at 15 m intervals.

.3 Colour coding to be as follows unless otherwise specified:

| SYSTEM | MAJOR BAND | MINOR BAND | CHARACTERS |
|---|---|---|---|
| 347/600V Normal | Dark Blue | | |
| 347/600V Emergency | Dark Blue | Red | |
| 120/208V Normal | Light Blue | | |
| 120/208V Emergency | Light Blue | Red | |
| Ground | Dark Green | | GR |
| Fire Alarm | Red | | FA |
| Door Lock Release | Purple | Black | ED |

.4 Refer to Specification Appendix A Electrical **Form EF120**. Obtain the Building Owner's representative sign off for the colour coding prior to the identification process. Use **Form EF 120** for this purpose.

## 2.9 (DELETED)

## 2.10 ACCESS PANELS (DOORS)

.1 Unless otherwise noted, access doors shall be minimum: 450mmx450mm [18"x18"] for body entry; 300mmx300mm [12"x 12"] for hand entry.

.2 Access doors in fire separations of 3/4 hour rating, and higher, and firewalls shall have a compatible fire rating and a ULC label with tamper-proof latch, self closing.

.3 Minimum Requirements:

.1 180 degree door swing, mitred rounded safety corners flush welded, concealed hinges, screwdriver latches, and anchor straps or lugs to suit construction, all steel prime coated.

.2 Plaster or wet wall construction: 14 gauge bonderized steel flush with wall or ceiling type with concealed flange.

.1 Acceptable Product: Acudor PS-5030.

.3 Masonry or drywall construction: 16 gauge for 400 mm [16"] x 400 mm [16"] and smaller, 14 gauge for 450 mm [18"] x 450 mm [18"] and larger bonderized steel face of wall type with exposed flange.

.1 Acceptable Product: Acudor UF-5000.

.4 Tile, ceramic tile, marble, terrazzo, plaster or wet wall construction in washrooms and other special areas: 14 gauge stainless steel flush with wall or ceiling type with concealed flange.

.1 Acceptable Product: Acudor PS-5030 stainless.

.5 Acoustical tile ceiling and similar block materials: 14 gauge bonderized steel recessed ceiling type.

.1 Acceptable Product: Acudor AP-5010 or AT-5020.

.6 (Deleted)

.7 Access panels in fire separations and fire walls shall have a compatible fire rating and ULC label. (ie. Acudor Fire Rated FW-5050 or FB-5060).

.4 Standard of Acceptance: Zurn, Wade, Acudor, Can-Aqua, Milcor, Maxam, Van-Met.

## 2.11 ANCHOR BOLTS AND TEMPLATES

.1 Supply anchor bolts and templates for installation by other Divisions.

## 2.12 FASTENING TO BUILDING STRUCTURE

.1 General:

.1 Do not use inserts in base material with a compressive strength less than 13.79 MPa [2000 psi] [refer to structural drawings].

.2 All inserts supporting conduit racks shall have a factor of safety of 5. All other inserts shall have a factor of safety of 4.

.2 Types:

.1 (Deleted)

.2 Drilled, mechanical expansion type:

.1 Hilti HSL or UCAN LHL heavy duty anchor for use in concrete with compressive strength not less than 19.6 MPa [2840 psi].

.2 Hilti Kwik-Bolt or UCAN WED stud anchor for concrete. (Do not use in seismic restraint applications).

.3 Hilti HDI or UCAN IPA drop-in anchor for concrete.

.4 Hilti or UCAN Sleeve Anchor (medium and light duty) for concrete and masonry.

.5 Hilti ZBP or UCAN Zamac pin bolt (light duty) for concrete and masonry.

.3 (Deleted)

.3 Note:

.1 All drilling for inserts shall be performed using the appropriate tool specifically designed for the particular insert. The diameter and depth of each drilled hole shall be to the exact dimensions as specified by the insert manufacturer.

.2 Refer to manufacturer's recommendations for tightening torques to be applied to inserts.

.3 (Deleted)

**2.13 EQUIPMENT SUPPORTS**

.1 Provide stands and supports for equipment and materials supplied.

.2 (Deleted)

.3 (Deleted)

.4 (Deleted)

.5 (Deleted)

.6 Support ceiling hung equipment with rod hangers and/or structural steel.

**2.14 MISCELLANEOUS METAL**

.1 Be responsible for all miscellaneous steel work relative to Electrical Divisions of the Specifications, including but not limited to:

.1 Support of equipment.

.2 Hanging, support, anchoring, guiding and relative work as it applies to wiring raceways and electrical equipment.

.3 Earthquake restraint devices - refer also to “Seismic Restraint” sections.

.4 Bridle rings - secure to structure or steel supports.

.2 All steel work shall be prime and undercoat painted ready for finish under the related Division.

**2.15 (DELETED)**

**2.16 (DELETED)**

**3.0 Execution**

**3.1 INSTALLATION**

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

**3.2 NAMEPLATES AND LABELS**

.1 Ensure manufacturers nameplates and CSA labels to be visible and legible after equipment is installed.

**3.3 CONDUIT AND CABLE INSTALLATION**

.1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit and protruding 50 mm [2”].

.2 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

.3 Install roof jacks where conduit and cables penetrate roofs. Apply sealant after installation.

.4 All cables and conduits to be installed concealed in finished areas.

**3.4 (DELETED)**

**3.5 (DELETED)**

**3.6 (DELETED)**

**3.7 CLEANING**

.1 Do final cleaning in accordance with Division 01.

.2 At time of final cleaning, clean lighting reflectors, lenses and other lighting surfaces that have been exposed to construction dust and dirt.

.3 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.4 Clean and prime paint exposed non-galvanised hangers, racks, fastenings to prevent rusting. Coordinate finish painting with Division 09.

**3.8 WORKMANSHIP**

.1 Workmanship shall be in accordance with well established practice and standards accepted and recognized by the Departmental Representative and the Trade.

.2 The Departmental Representative shall have the right to reject any item of work that does not conform to the Contract Documents and accepted standards of performance, quietness of operation, finish and appearance.

.3 Employ only tradesmen holding valid Provincial Trade Qualification Certificates. Tradesmen shall perform only work that their certificate permits. Certificates shall be available for inspection by the Departmental Representative.

**3.9 PROTECTION OF WORK**

.1 Protect equipment and materials, stored or in place, from the weather, moisture, dust and physical damage.

.2 Mask machined surfaces. Secure covers over equipment openings and open ends of equipment and conduit, as the installation work progresses.

.3 Equipment having operating parts, bearings or machined surfaces, showing signs of rusting, pitting or physical damage will be rejected.

.4 Refinish damaged or marred factory finish.

**3.10 PROTECTION OF ELECTRICAL EQUIPMENT**

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live parts, e.g. "LIVE 120 VOLTS".

.3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

**3.11 CONCEALMENT**

.1 Conceal wiring and conduit in partitions, walls, crawlspaces and ceiling spaces, unless otherwise noted.

.2 Do not install wiring and conduit on outside walls or on roofs unless specifically directed.

**3.12 SERVICE PENETRATIONS IN RATED FIRE SEPARATIONS**

.1 All cabling, wiring, conduits, cable trays, etc. passing through rated fire separations shall be smoke and fire stopped to a ULC or cUL tested assembly system, in accordance with CAN4-S115-95, that meets the requirements of the Building code in effect.

.2 The scope includes new services which pass through existing rated separations and also all existing services which pass through a new rated separation or existing separations whose rating has been upgraded.

.3 Fire resistance rating of installed firestopping assembly shall not be less than fire resistance rating of surrounding assembly indicated on Architectural drawings. Where this is not indicated assume a minimum of one hour for walls and two hours for floors.

.4 Install firestopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions. The Applicator shall be approved, licensed and supervised by the manufacturer in the installation of firestopping and are to follow the requirements of a rated system as detailed above.

.5 Contractors are expected to submit system information detailing firestopping product, backing, penetrant, penetrated assembly, Fire (F) and Temperature (T) rating, and ULC or cUL system number.

.6 Provide fire stopping material and system information in the maintenance manuals and via labels at major penetrations that are likely to be repenetrated.

.7 Allow openings for 100% capacity of raceway or 200% capacity of J-hooks.

.8 Provide split systems where existing cables are involved.

.9 Provide Firestopping approval certificate in including a Building Code / By-Law Schedule B and C-B signed by a BC registered Professional Engineer. Submit a letter certifying that all work is complete and in accordance with this specification. Electrical Form EF130 in Section 26 06 02 should be used for this purpose.

## 3.13 SERVICE PENETRATIONS IN NON-RATED SEPARATIONS

.1 All cabling, wiring, conduits, cable trays, etc. passing through non-rated fire separations and non-rated walls and floors shall be tightly fitted and sealed on both sides of the separation with caulking or silicon sealant to prevent the passage of smoke and/or transmission of sound.

## 3.14 CONDUIT SLEEVES

.1 Provide conduit sleeves for all conduit and wiring passing through rated walls and floors. Sleeves to be concentric with conduit or wiring.

.2 Except as otherwise noted conduit sleeves are not required for holes formed or cored in interior concrete walls or floors.

.3 Conduit sleeves shall extend 50 mm [2"] above floors in unfinished areas and wet areas and 6 mm [1/4"] above floors in finished areas.

.4 Conduit sleeves shall extend 25 mm [1"] on each side of walls in unfinished areas and 6 mm [1/4"] in finished areas.

.5 Conduit sleeves shall extend 25mm [1"] beyond exterior face of building. Caulk with flexible caulking compound.

.6 Sleeve Size: 12 mm [1/2"] clearance all around, between sleeve and conduit or wiring.

.7 Paint exterior surfaces of ferrous sleeves with heavy application of rust inhibiting primer.

.8 Packing of Sleeves:

.1 Where sleeves pass through foundation walls and perimeter walls the space between sleeve and conduit shall be caulked with waterproof fire retardant non-hardening mastic.

.2 Pack future-use sleeves with mineral wool insulation and then seal with ULC approved fire stop sealant for rated fire separations.

## 3.15 ACCESSIBILITY AND ACCESS PANELS

.1 Install all equipment, controls and junction boxes so as to be readily accessible for future modification, adjustment, operation and maintenance as appropriate.

.2 Provide access panels where required in building surfaces. Do not locate access panels in panelled or special finish walls, without prior approval of the Departmental Representative.

.3 Access panels in U.L.C. fire separations and fire walls shall have a compatible fire rating and U.L.C. label. Acquire approval in writing from the local fire authority if required.

.4 Access panels shall be painted with a primer coat if applicable and then with a finish coat, colour and type to the Departmental Representative's approval.

.5 Locate equipment and junction boxes in service areas wherever possible.

## 3.16 EQUIPMENT INSTALLATION

.1 Provide means of access for servicing equipment.

.2 CSA identification and equipment labels to be clearly visible after installation.

## 3.17 CUTTING, PATCHING, DIGGING, CANNING, CORING & CONCRETE

.1 Lay out all cutting, patching, digging, canning and coring required to accommodate the electrical services. Coordinate with other Divisions. The performance of actual cutting, patching, digging, canning and coring is specified under other Divisions.

.2 Be responsible for all cutting, patching, digging, canning and coring required to accommodate the electrical services.

.3 Be responsible for correct location and sizing of all openings required under Electrical Divisions, including piped sleeves.

.4 Verify the location of existing and planned service runs and structural components within concrete floor and walls prior to core drilling and/or cutting. Repairs to existing services and structural components damaged as a result of core drilling and cutting is included in this section of the work.

.5 Openings through structural members of the building shall not be made without the approval of the Departmental Representative.

.6 Openings in Concrete:

- .1 Be responsible for the layout of all openings in concrete, where openings are not left ready under previous contract.
- .2 All openings shall be core drilled or diamond saw cut.
- .3 Refer to structural drawings for permissible locations of openings and permissible opening sizes in concrete floors and walls.
- .4 Refer to structural drawings for locations of steel reinforcing.
- .5 Be responsible for repairing any damage to steel reinforcing.

.7 Openings in building surfaces other than concrete:

- .1 Lay out all openings required.

## 3.18 PAINTING

.1 Clean exposed bare metal surfaces supplied under the Electrical Divisions removing all dirt, dust, grease and millscale. Apply at least one coat of corrosion resistant primer paint to all supports and equipment fabricated from ferrous metal.

.2 Paint all hangers and exposed sleeves, in exposed areas, with a rust inhibiting primer, as they are installed.

.3 Repaint all marred factory finished equipment supplied under the Electrical Divisions, to match the original factory finish.

.4 Coordinate with Division 09.

END OF SECTION 26 05 00

**TABLE OF CONTENTS**

**EF 100 Check List – Submissions to Departmental Representative**

| **ITEM** | **CHECKED BY** | **DATE** |
|---|---|---|
| 5 WORKING DAYS BEFORE CLOSE OF SUBTRADE TENDER<br>– Request for addition of acceptable manufacturers | | |
| 10 DAYS AFTER AWARD OF THE CONTRACT<br>– List of equipment suppliers and subtrades (EF 110)<br>– Detailed price breakdown (EF 112) | | |
| AS SOON AS POSSIBLE<br>– Shop drawings and Product Samples (EF 111) | | |
| WITH EACH APPLICATION FOR PROGRESS PAYMENT<br>– Price breakdown (EF 112) | | |
| PRIOR TO DEMONSTRATION OF SYSTEMS<br>– Demonstration agenda | | |
| DEMONSTRATION OF SYSTEMS<br>– Checklists for sign off of demonstrations (EF 141) | | |
| 10 DAYS PRIOR TO SUBSTANTIAL PERFORMANCE<br>– Submission of items listed on Form EF-142 | | |
| WHEN REQUESTING REVIEW OF OUTSTANDING WORK<br>– Checklist of work remaining (EF 144)<br>– Certificate of total completion (EF 145) | | |

**EF 110 Equipment/Sub-Trade List**

| **ITEM** | **COMPANY/SUPPLIER** |
|---|---|
| Motor Control | |
| Wiring Devices | |
| Luminaires | |
| Fire Alarm System | |
| Fire Alarm Verification Agency | |
| Seismic Engineer | |
| Testing and Commission Agency | |
| | |
| | |

**EF 111 Check List –Shop drawings and Product and Samples**

| | | REVIEW | |
|---|---|---|---|
| **ITEM** | **DATE SUBMITTED** | **ACTION** | **DATE** |
| Motor Control | | | |
| Wiring Devices | | | |
| Luminaires (list groups) | | | |
| | | | |
| | | | |

NOTES:

.1 Modify list to suit project.

.2 Submit samples where indicated to the Departmental Representative for review prior to installation.

**EF 112 Progress Claim Summary – Division 26**

**PROJECT:** **CLAIM NO:** _____

**FOR MONTH OF:** _____

| **ITEM** | | **PRICE** | **WORK TO DATE** | | **PREVIOUS WORK** | | **THIS MONTH** | |
|---|---|---|---|---|---|---|---|---|
| | | **$** | **%** | **$** | **%** | **$** | **%** | **$** |
| **Base Contract**: | | | | | | | | |
| General Conditions | | | | | | | | |
| Mobilization (not to exceed 2%) | | | | | | | | |
| Demolition | | | | | | | | |
| Conduit, Boxes & Wire | Mat Lab. | | | | | | | |
| Motor Control | Mat Lab. | | | | | | | |
| Wiring Devices & Plates | Mat Lab. | | | | | | | |
| Lighting | Mat Lab. | | | | | | | |
| Fire Alarm System | Mat Lab. | | | | | | | |
| O & M | | | | | | | | |
| Testing and Commissioning | | | | | | | | |
| Other | | | | | | | | |
| Cash Allowances | | | | | | | | |
| Total Base Contract | | | | | | | | |
| Change Order | | | | | | | | |
| Total Change Orders | | | | | | | | |
| **Total Contract**: | | | | | | | | |
| Amount due less 10% lien holdback | | | | | | | | |

Submit this form as called for on **EF 100** for tender price breakdown and for each progress claim

**EF 120 Check List – Colour Coding**

Obtain sign off from Building Owner's representative prior to colour coding systems.

Project Identification: _____

| | SYSTEM | MAJOR BAND | MINOR BAND | CHARACTERS |
|---|---|---|---|---|
| 1 | 120/208 volt Normal | *Light Blue* | | |
| 2 | 347/600 volt Normal | *Dark Blue* | | |
| 3 | 120/208 volt Emergency | *Light Blue* | *Black* | |
| 4 | 347/600 volt Emergency | *Dark Blue* | *White* | |
| 8 | Fire Alarm | *Red* | | *FA* |
| 16 | Other | | | |

Prepared By _____

Departmental Representative's Sign Off _____ Date _____

**EF 130 Certificate of Penetrations Through Separations**

Project Identification: _____

I hereby certify that I _____

am an employee / a principal / an agent of _____

have personally witnessed that all electrical service penetrations through fire separations (rated & non-rated) and sound separations in the following areas have been properly sealed in accordance with the specified requirements.

SIGNED _____ DATE _____

| AREA | SIGNED | DATE |
|---|---|---|
| Level: | | |
| Level: | | |
| Level: | | |

NOTES:

.3 This certificate shall be submitted to the Departmental Representative prior to Substantial Performance.

**EF 131 Certificate of Seismic Restraint Installation**

Project Identification: _____

I hereby certify that I _____

am an employee / a principal / an agent of _____

Certify that the seismic restraint of all electrical equipment and wiring system installation meets the requirements of the B.C. Building Code as it relates to seismic restraint and the Schedules B and CB have been signed, stamped and submitted to the Departmental Representative.

SIGNED _____ DATE _____

NOTES:

.1 This certificate shall be submitted to the Departmental Representative prior to Substantial Performance.

**EF 140 Check List & Record – Items to be Handed to Departmental Representative**

| ITEM | QUANTITY | RECEIVED | DATE |
|---|---|---|---|
| Fluorescent Lighting Ballasts – | 1 of ea type | | |
| Fluorescent lamps - no less than 10% of each size & type | 1 minimum | | |
| Rated Access Door Keys | 1 | | |
| Salvaged Materials (Attach List) | | | |

NOTES:

.4 Copies of this form shall be submitted to the Departmental Representative with all items signed off prior to substantial performance.

Prepared By _____

Departmental Representative's Sign Off _____ Date _____

**EF 141 Check List – Departmental Representative's Demonstration**

| | CONTRACTOR | | OWNER | |
|---|---|---|---|---|
| **SYSTEM/ITEM** | **SIGNED** | **DATE** | **SIGNED** | **DATE** |
| Lighting System Controls | | | | |
| Fire Alarm Systems | | | | |
| Location of Control Devices | | | | |
| Access to Equipment | | | | |
| Points of required maintenance | | | | |

NOTES:

.5 Contractor shall submit copies of this form with each appropriate item signed and dated by the person having overall charge of commissioning prior to substantial performance. (See **EF 143**.)

.6 Departmental Representative shall sign off each item during or after the demonstration.

.7 Contractor to strike out items where they do not apply to the systems being demonstrated.

.8 Interlocks and controls to be demonstrated by following the descriptions and diagrams in the contract documents and proving that all controls function as required.

.9 Where multiple identical controls are installed, the Departmental Representative may elect to only witness sample items, but the person having charge of commissioning is expected to have checked them all.

**EF 142 Check List – Substantial Performance Submissions - Electrical**

| SECTION | ITEM | DATE | STATUS |
|---|---|---|---|
| | | | |
| 260500 | Final Electrical Inspector Certificate | | |
| 260500 | Fire Stop Penetration Certificate. (**EF-130**) | | |
| 260500 | Items handed to Departmental Representative Checklist (**EF 140**) | | |
| 260500 | Identification | | |
| 260505 | Seismic Engineer Report and Schedules (**EF131**) | | |
| 260924 | Lighting Controls Commissioning | | |
| 280000 | Access Control Commissioning | | |
| 283100 | Fire Alarm Verification Report and Appendix C (FA) | | |
| | | | |
| | Contractors Letter of Guarantee | | |
| | Demonstration to Departmental Representative agenda | | |
| | Demonstrations Checklists (**EF 141**) | | |
| | Substantial Performance Certificate (**EF143**) | | |
| | Checklist of work remaining after Substantial (**EF 144**). | | |
| | | | |
| | | | |
| | | | |

NOTES:

.10 This list is provided as a checklist and may not include all Substantial Performance requirements.

**EF 143 Certificate of Substantial Performance - Electrical**

I hereby certify that I _____

am an employee / a principal / an agent of _____

and have personally witnessed the following with regard to the electrical systems work specified for the above project and that to the best of my knowledge except as noted on **EF 144** (attached);

- The installation is complete and as specified.
- The systems have been commissioned and operate satisfactorily.
- Every control sequence and every control performs as specified.
- The systems are clean.
- All of the required submissions have been made to the Departmental Representative.

SIGNED _____ DATE _____

NOTES:

.11 This certificate must be completed and submitted to the Departmental Representative prior to substantial performance.

.12 If it is apparent that the systems or their operation are seriously deficient then all reasonable costs and Departmental Representative time charges relating to any subsequent site reviews shall be deducted from the contract sum.

**EF 144 Check List – Work Remaining After Substantial Performance**

| | | COMPLETION | | |
|---|---|---|---|---|
| **ITEM NO.** | **DESCRIPTION** | **CLAIMED BY** | **DATE** | **VERIFIED DATE** |
| | | | | |
| | | | | |
| | | | | |
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| | | | | |

NOTES:

.13 This form must be filled in and submitted to the Departmental Representative prior to substantial performance.

.14 Any discovered outstanding items will be added to the list by the Departmental Representative. Copies of the complete list will be circulated to the Departmental Representative and the Contractor.

.15 The Contractor may include estimated values against the outstanding work but determination of the actual amounts to be held will be made by the Departmental Representative.

.16 The Contractor shall sign off each item as it is completed and submit the list monthly to the Departmental Representative. When all items are signed off the completed list shall be submitted with the certificate of total performance **EF 145**.

**EF 145 Certificate of Total Performance – Electrical**

I hereby certify that I _____

am an employee / a principal / an agent of _____

and have personally witnessed that each item of outstanding work on the checklist and record of work remaining after substantial completion EF 144 (attached) has been satisfactorily completed and I hereby certify that the Electrical systems work specified on the above project is complete.

SIGNED _____ DATE _____

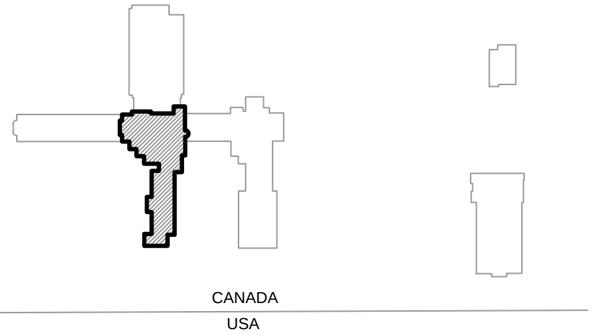
NOTES:

.17 This certificate must be completed and submitted to the Departmental Representative when requesting total performance.

.18 If it is apparent during the final review that the systems or their operation are seriously deficient then all reasonable costs and Departmental Representative time charges relating to any subsequent site reviews shall be deducted from the contract sum.

# CANADA BORDER SERVICES AGENCY

## PACIFIC BORDER CROSSING TRAFFIC OFFICE BUILDING INTERIOR RENOVATIONS




1 / E-100 KEY PLAN
SCALE N.T.S.

NORTH

## GENERAL NOTES

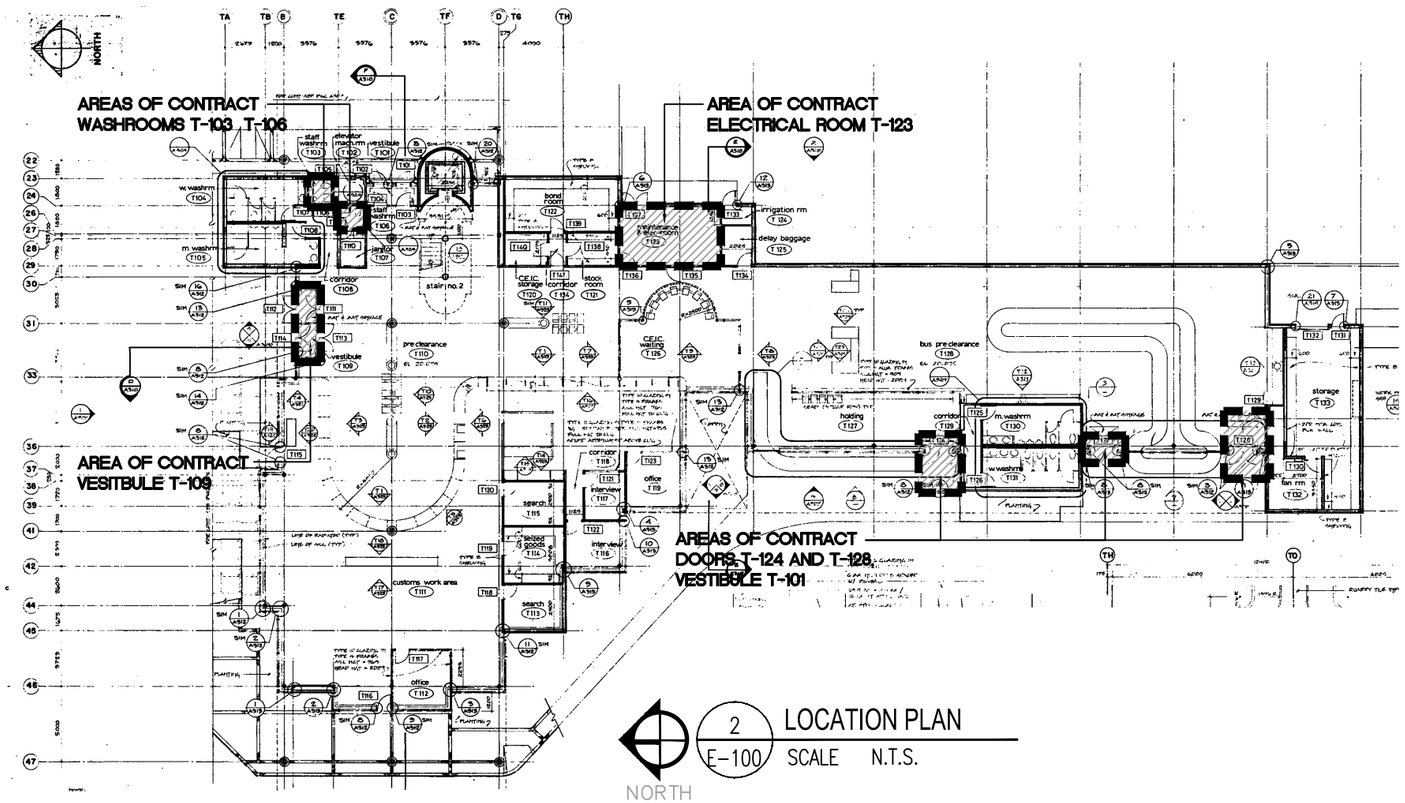
1. ELECTRICAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH ARCHITECTURAL, INTERIOR DESIGN AND MECHANICAL DRAWINGS.
2. ALL WORKS SHALL COMPLY WITH THE REQUIREMENTS OF THE AUTHORITIES HAVING JURISDICTION, THE LATEST EDITIONS OF THE BRITISH COLUMBIA BUILDING CODE AND THE CANADIAN ELECTRICAL CODE.
3. ELECTRICAL CONTRACTOR SHALL PAY FOR AND SECURE ALL NECESSARY PERMITS.

## DRAWING LIST

| DWG # | DRAWING TITLE | SCALE |
|---|---|---|
| E-100 | SITE PLAN, LEGEND AND DRAWING LIST | AS NOTED |
| E-200 | ELECTRICAL – VESTIBULE T-109 PLAN | AS NOTED |
| E-201 | ELECTRICAL – VESTIBULE T-101, DOORS T-128 AND T-124 DEMOLITION PLAN | AS NOTED |
| E-202 | ELECTRICAL – WASHROOMS T-103 AND T-106 DEMOLITION AND NEW PLANS | AS NOTED |

## ELECTRICAL LEGEND:

- OCCUPANCY SENSOR, 2-POLE — OS
- LUMINAIRE
- MOTOR WITH DISCONNECT SWITCH
- FIRE ALARM MANUAL STATION — F
- H/C PUSHBUTTON SWITCH
- EQUIPMENT TAG — EF-1
- DETAIL NO. ON SHEET NO. — 1 / E-0




2 / E-100 LOCATION PLAN
SCALE N.T.S.

NORTH

2015-11-10

A0 – PWGSC – ANSI B–L1 – 11X17

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Pacific Region
SERVICES IMMOBILIERS
Région de Pacifique


Consultants:
Stantec
1100 – 111 Dunsmuir Street
Vancouver BC Canada
V6B 6A3
Tel. 604.696.8000
Fax. 604.696.8100
www.stantec.com


Stantec Project Number: 115615325



Dimensions
The Contractor shall verify all dimensions, and immediately report any errors and/or omissions to Stantec. DO NOT SCALE DRAWINGS.

| Revision/ Revision | Description/Description | Date/Date |
|---|---|---|
| 3 | ISSUED FOR ADDENDUM E01 | 2015/11/10 |
| 2 | ISSUED FOR TENDER | 2015/11/03 |
| 1 | ISSUED FOR 99% CD REVIEW | 2015/10/16 |
| 0 | ISSUED FOR 50% CD REVIEW | 2015/09/23 |

Client/client

**CANADA BORDER SERVICES AGENCY**

**OTTAWA, ON CANADA K1A 0L8**

Project title/Titre du projet

**SURREY, BC**
**28 176TH STREET, V3Z 9R9**
**TRAFFIC OFFICE BUILDING**

**PACIFIC HIGHWAY PORT OF ENTRY TRAFFIC OFFICE BUILDING INTERIOR RENOVATIONS**

Consultant Signature Only

Designed by/Concept par: **MA**

Drawn by/Dessine par: **MA**

PWGSC Project Manager/Administrateur de Projets TPSGC: **JULIAN HO**

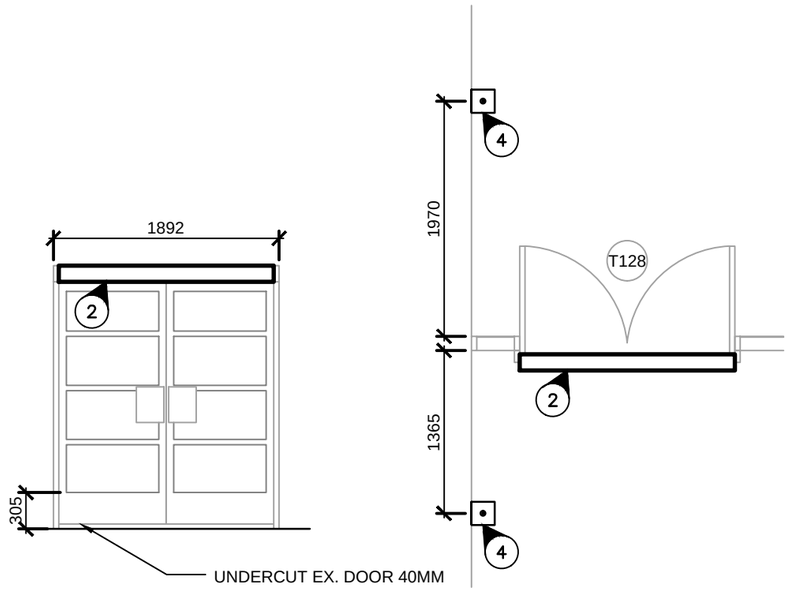
PWGSC, Regional Manager, Architectural and Engineering Services/ Gestionnaire régionale, Services d'architectural et de génie, TPSGC: **PREETIPAL PAUL**

Drawing title/Titre du dessin

**COVER SHEET**
**SITE PLAN, LEGEND & DRAWING LIST**

| Project No./No. du projet | Sheet/ Feuille | Revision no./ La Révision no. |
|---|---|---|
| R.078169.001 | E-100 1 OF 4 | 3 |

DM5_No

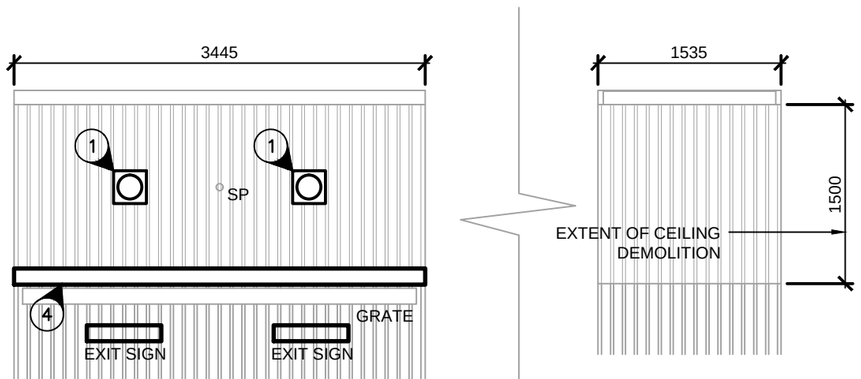



1 E-201 **DOOR T-128 DEMOLITION PLAN**
1:50

2 E-201 (DELETED)
N.T.S.

## TYPICAL KEY NOTES:

1. DISCONNECT WIRING TO LUMINAIRES AND MAKE SAFE. REMOVE, CLEAN AND SAFEKEEP EXISTING LUMINAIRES. REINSTALL LUMINAIRES AFTER WORK ON CEILING IS COMPLETED.
2. DISCONNECT WIRING TO MOTORIZED DOOR OPERATORS AND SWITCHES AND MAKE SAFE. REMOVE, CLEAN AND SAFEKEEP EXISTING OPERATORS AND SWITCHES. REINSTALL DEVICES AFTER WORK ON DOOR COMPONENTS ARE COMPLETED.
3. (NOT USED)
4. EXISTING ELECTRICAL COMPONENTS TO REMAIN.




3 E-201 **VESTIBULE T-101 DEMOLITION ELEVATION**
1:50

1:50 0 500 1500 2500mm

2015-11-10

A0 – PWGSC – ANSI B–L1 – 11X17

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Pacific Region
SERVICES IMMOBILIERS
Région de Pacifique

Consultants:

Stantec
1100 – 111 Dunsmuir Street
Vancouver BC Canada
V6B 6A3
Tel. 604.696.8000
Fax. 604.696.8100
www.stantec.com

Stantec Project Number: 115615325



Dimensions
The Contractor shall verify all dimensions, and immediately report any errors and/or omissions to Stantec. DO NOT SCALE DRAWINGS.

| Revision/ Revision | Description/Description | Date/Date |
|---|---|---|
| 3 | ISSUED FOR ADDENDUM E01 | 2015/11/10 |
| 2 | ISSUED FOR TENDER | 2015/11/03 |
| 1 | ISSUED FOR 99% CD REVIEW | 2015/10/16 |
| 0 | ISSUED FOR 50% CD REVIEW | 2015/09/23 |

Client/client

**CANADA BORDER SERVICES AGENCY**

**OTTAWA, ON CANADA K1A 0L8**

Project title/Titre du projet

**SURREY, BC**
**28 176TH STREET, V3Z 9R9**
**TRAFFIC OFFICE BUILDING**

# PACIFIC HIGHWAY PORT OF ENTRY TRAFFIC OFFICE BUILDING INTERIOR RENOVATIONS

Consultant Signature Only

Designed by/Concept par: **MA**

Drawn by/Dessine par: **MA**

PWGSC Project Manager/Administrateur de Projets TPSGC: **JULIAN HO**

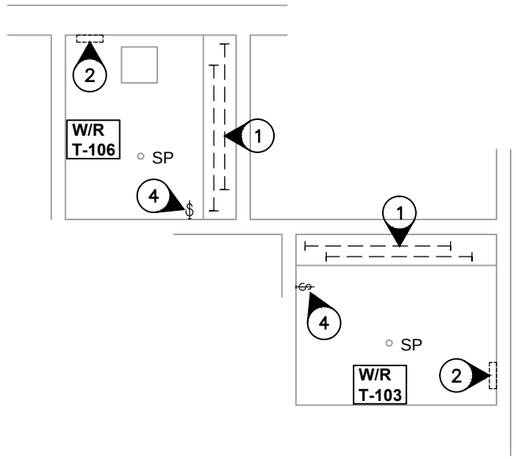
PWGSC, Regional Manager, Architectural and Engineering Services/ Gestionnaire régionale, Services d'architectural et de génie, TPSGC: **PREETIPAL PAUL**

Drawing title/Titre du dessin

**ELECTRICAL - VESTIBULE T-101, DOORS T-128 AND T-124 DEMOLITION WORKS**

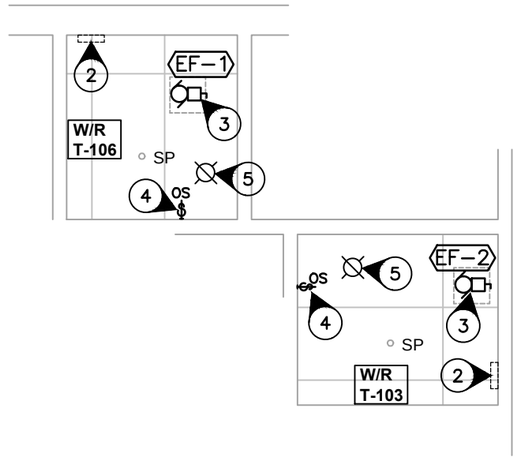
| Project No./No. du projet | Sheet/Feuille | Revision no./ La Révision no. |
|---|---|---|
| R.078169.001 | E-201 3 OF 4 | 3 |

DM5_No




1 E-202 **WASHROOMS T-106 AND T-103: DEMOLITION PLAN**

1:50




2 E-202 **WASHROOMS T-106 AND T-103: NEW PLAN**

1:50

## TYPICAL KEY NOTES:

1. REMOVE EXISTING LUMINAIRES AND TURN OVER TO DEPARTMENTAL REPRESENTATIVE. DISCONNECT WIRING TO EXISTING LUMINAIRES AND MAKE SAFE.
2. DISCONNECT WIRING TO FORCE FLOW FANS AND MAKE SAFE. REMOVE, CLEAN AND SAFEKEEP FORCE FLOW FANS FOR RE-INSTALLATION AFTER WORK ON WALLS ARE COMPLETED.
3. PROVIDE 2#12+BOND RW90, 16mmø EMT FROM NEW 15A,1P CIRCUIT BREAKER IN AVAILABLE CCT 24 SPACE IN EXISTING 120/208V PANEL T-2D IN ELECTRICAL ROOM T-123 TO SERVE EF-1, EF-2 AND NEW LUMINAIRES IN WASHROOMS. DETERMINE AT SITE EXACT ROUTING OF WIRING.
4. REPLACE EXISTING WALL SWITCH WITH COMBINATION PASSIVE INFRARED TECHNOLOGY OCCUPANCY SENSOR AND SWITCH SIMILAR IN PERFORMANCE WITH "SENSOR SWITCH WSD 2P". OCCUPANCY SENSOR SHALL BE WITH 2 INTGEGRAL ISOLATED RELAYS TO CONTROL LIGHT AND FAN SEPARATELY. RELAY TO BE RATED FOR 1/4HP OR 800W AT 120V, MINIMUM.
5. PROVIDE NEW 200mm (8") APERTURE DOWNLIGHT SIMILAR IN PERFORMANCE TO GOTHAM LIGHTING AFLP-232DTT-8WR-120 C/W 2X32W PL COMPACT FLUORESCENT LAMPS, 3500K COLOR TEMPERATURE.

0 500 1500 2500mm
1:50

2015-11-10

A0 – PWGSC – ANSI B-L1 – 11X17

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Pacific Region
SERVICES IMMOBILIERS
Région de Pacifique

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| Revision/ Revision | Description/Description | Date/Date |
|---|---|---|
| 3 | ISSUED FOR ADDENDUM E01 | 2015/11/10 |
| 2 | ISSUED FOR TENDER | 2015/11/03 |
| 1 | ISSUED FOR 99% CD REVIEW | 2015/10/16 |
| 0 | ISSUED FOR 50% CD REVIEW | 2015/09/23 |

Client/client

**CANADA BORDER SERVICES AGENCY**

**OTTAWA, ON CANADA**
**K1A 0L8**

Project title/Titre du projet

**SURREY, BC**
**28 176TH STREET, V3Z 9R9**
**TRAFFIC OFFICE BUILDING**

# PACIFIC HIGHWAY PORT OF ENTRY TRAFFIC OFFICE BUILDING INTERIOR RENOVATIONS

Consultant Signature Only

Designed by/Concept par: **MA**

Drawn by/Dessine par: **MA**

PWGSC Project Manager/Administrateur de Projets TPSGC: **JULIAN HO**

PWGSC, Regional Manager, Architectural and Engineering Services/ Gestionnaire régionale, Services d'architectural et de génie, TPSGC: **PREETIPAL PAUL**

Drawing title/Titre du dessin

**ELECTRICAL - WASHROOMS T-103 AND T-106 DEMOLITION AND NEW PLANS**

| Project No./No. du projet | Sheet/ Feuille | Revision no./ La Révision no. |
|---|---|---|
| R.078169.001 | E-202 4 OF 4 | 3 |

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