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Note: For Electrical Specifications refer to Drawings E-100 to E-103

Appendices

- A) **Hazardous Building Materials Assessment** Building 10, CSC Springhill Institution Springhill Nova Scotia" Report by AMEC Foster Wheeler Environment & Infrastructure dated November 2016. (106 pages).
- B) **Equipment Detail List** (3 pages).
- C) **Equipment Removal List** (2 pages).
- D) **ES/SOW-0101** (REV3) - Procurement & Installation of Electronic Security Systems. (29 pages).
- E) **ES/SOW-0102** (REV6) - Quality Control for Procurements and Installations of Electronic Security Systems. (33 pages).
- F) **ES/SOW-0110** (REV1) - Structured Cabling Systems for Electronic Security Installations. (16 pages).
- G) **ES/SPEC-0006** (REV2) - Specification Conduit, Space and Power Requirements for Security Systems for Use in Federal Correctional Institutions. (32 pages).
- H) **ES/SPEC-0101** (REV2) - Public Address System for Use in Federal Correctional Institutions. (17 pages).

List of Drawings

A-000 Cover Sheet

Civil

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L-101 Site Plan

L-102 Site Plan Pre-Demolition

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A-101 Demolition Plan Building No. 10

Electrical

E-100 Electrical Details and Notes

E-101 Electrical Site Plan Existing / Demo

E-102 Electrical Site Plan New Construction

E-103 Electrical Details and Notes

PART 1 - GENERAL

1.1 Description Of Work

.1 In general, work under this contract consists of but not limited to:

- .1 Removal of Asbestos an Hazardous Material Abatement as specified and as described in Hazardous Building Material Assessment Building #10 CSC Springhill Institution compiled by AMEC Foster Wheeler Environmental & Infrastructure, Dated November 2016, AFW Project# TV161217 including Appendix A, B and C.
- .2 Removal of existing equipment.
- .3 Installation of all construction fencing, gates, and associated components, etc.
- .4 Installation of all new equipment poles, at locations indicated on drawing.
- .5 Removal of all (Building No. 10) existing cameras / lighting and relocation / installation at new locations indicated on drawings.
- .6 Installation of all new lighting, cameras and speakers at locations indicated on drawings.
- .7 Prior to commencement of Building 10 Demolition, drain, cap and seal all mechanical service piping so as to maintain the integrity, continuity and operation of the existing systems which serve the property and other buildings.

Affected systems shall include but not be limited to: domestic water, hydronic heating, sanitary sewer, storm sewer.

- .8 Existing low voltage (600/347V, 208/120V, 120/240V) electrical and lighting systems and services that terminate in or pass through Building 10 shall be rerouted, purged, capped, terminated, relocated and installed in accordance with the drawings and in coordination with other trades.
- .9 New low voltage (600/347V, 208/120V,

120/240V) electrical and lighting systems and services from Building 51 to Building 30 that terminate in or pass through Building 30 shall be relocated and installed in accordance with the drawings and in coordination with other trades.

- .10 Existing and new life safety, data, communications, access control, surveillance and services to/from Building 51 to/from Building 30, and to/from Building 30 to other areas of the site shall be relocated and installed in accordance with the drawings and in coordination with other trades.
- .11 Existing life safety, data, communications, access control, surveillance, and public address systems and services to/from Building 10 to/from other areas of the site shall be rerouted, purged, capped, terminated, relocated and installed in accordance with the drawings and in coordination with other trades.
- .12 Proof of satisfactory functionality of all power, lighting, life safety, data, communications, access control, surveillance, and public address systems and services.
- .13 Demolition of structure based on condition at time of Tender Closing.
- .14 Removal of concrete foundation and backfilling as specified.
- .15 Reinstatement of site and realignment of security fence.

- .2 Site of Work is at: Building No. 10
Springhill Institution, Springhill, Nova Scotia.

1.2 Familiarization
With Site

- .1 Before submitting a bid, it is recommended that bidders visit the site to review and verify the form, nature and extent of the work, materials needed, the means of access and the temporary facilities required to perform the Work. Refer to the solicitation documents for dates.

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|--|----|---|
| 1.3 <u>Codes And Standards</u> | .1 | Perform work in accordance with the 2015 National Building Code of Canada and any other code of provincial or local application, including all amendments up to bid closing date, provided that in any case of conflict or discrepancy, the more stringent requirement shall apply. |
| | .2 | Materials and workmanship must meet or exceed requirements of specified standards, codes and referenced documents. |
| 1.4 <u>Interpretation Of Documents</u> | .1 | Supplementary to the Order of Precedence article of the General Conditions of the Contract, the Division 01 sections take precedence over the technical specification sections in other Divisions of the Specification Manual. |
| 1.5 <u>Term Engineer</u> | .1 | Unless specifically stated otherwise, the term Engineer where used in the Specifications and on the Drawings shall mean the Departmental Representative as defined in the General Conditions of the Contract. |
| 1.6 <u>Setting Out Work</u> | .1 | Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated. |
| | .2 | Provide devices needed to lay out and construct work. |
| | .3 | Supply such devices as straight edges and templates required to facilitate Departmental Representative's inspection of work. |
| 1.7 <u>Cost Breakdown</u> | .1 | Before submitting first progress claim submit breakdown of Contract price in detail as directed by Departmental Representative |

and aggregating contract price. Required forms will be provided for application of progress payment.

- .2 List items of work numerically following the same division/section number system of the specification manual and thereafter sub-divide into major work components and building systems as directed by Departmental Representative.
- .3 Upon approval, cost breakdown will be used as basis for progress payment.

1.8 Permits

- .1 In accordance with the the General Conditions, obtain and pay for building permit, certificates, licenses and other permits as required by municipal, provincial and federal authorities.
- .2 Provide appropriate notifications of project to municipal and provincial inspection authorities.
- .3 Obtain compliance certificates as prescribed by legislative and regulatory provisions of municipal, provincial and federal authorities as applicable to the performance of work.
- .4 Submit to Departmental Representative, copy of application forms and approval documents received from above referenced authorities.

1.9 Alterations, Additions Or Repairs To Existing Building

- .1 Execute work with least possible interference or disturbance to Institution operations occupants, and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.
- .2 Where security has been reduced by work of Contract, provide temporary means to maintain security.
- .3 Provide temporary dust screens, barriers, warning signs in locations where renovation

and alteration work is adjacent to areas which will be operative during such work.

1.10 Roughing-In

- .1 Be responsible for obtaining manufacturer's literature and for correct roughing-in and hook-up of equipment, fixtures and appliances.

1.11 Cutting,
Fitting And
Patching

- .1 Ensure that cutting and patching required by all trades is included in total bid price submitted for the work.
- .2 Execute cutting including excavation, fitting and patching required to make work fit properly.
- .3 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work. This includes patching of openings in existing work resulting from removal of existing services.
- .4 Do not cut, bore, or sleeve load-bearing members, except where specifically approved by Departmental Representative.
- .5 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

1.12 Existing
Services

- .1 Where work involves breaking into or connecting to existing services, carry out work at times directed by governing authorities, with minimum of disturbance to tenant operations.
- .2 Before commencing work, establish location and extent of service lines in area of work and notify Departmental Representative of findings.
- .3 Submit request 48 hrs. in advance to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility. This includes

disconnection of electrical power and communication services to tenant's operational areas. Adhere to approved schedule and provide notice to affected parties.

- .4 Provide temporary services to maintain critical building and tenant systems.
- .5 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .6 Protect, relocate or maintain existing active services as required. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction over service. Record locations of maintained, re-routed and abandoned service lines.

1.13 Bilingual
Notations

- .1 Any items supplied and installed under this contract which have operating instructions on them and which can be expected to be used by the building tenants, must have such operating instructions in bilingual format - English and French.
- .2 Factory embossed or recessed symbols illustrating equipment operation is an acceptable alternate to lettering.
- .3 Items supplied with factory - embossed or recessed lettering in one official language with an applied sticker or decal representing the second official language is not acceptable unless the Departmental Representative gives prior approval before any such items are ordered.
- .4 Internationally recognized color coding such as red and blue center pieces for plumbing brass is acceptable.
- .5 No extra costs will be paid for re-stocking or re-ordering of materials and equipment due to Contractor's failure to fully meet

bilingual signage requirements specified herein.

- .6 Ensure that all trades are made aware of above requirements.

1.14 Building
Smoking Environment

- .1 Comply with smoking restrictions. No smoking.

1.15 Contractors Request
For Information

- .1 Contractor's Request for Information (RFI's) submitted by the Contractor is to be used for Clarification purposes only.
- .2 All RFI requests are a tool for the Contractor to clarify questions to be contract documents. As all items submitted under RFI's are to help the Contractor maintain schedule / direction, all RFI's are to be submitted a minimum of 2 weeks prior to required response.
- .3 Note that RFI's made by Contractor which are found to be clearly shown or specified in the Contract Documents shall be subject to financial penalties in the form of progress payment reductions and holdback assessment made against the Contractor.

END OF SECTION

PART 1 GENERAL

- | | | |
|---|----|---|
| 1.1 <u>Work Covered by Contract Documents</u> | .1 | Work of this Contract comprises of Demolition of Building No. 10 as indicated on the Drawings and in the Specifications. |
| 1.2 <u>Contract Method</u> | .1 | Construct Work under single, stipulated price contract. |
| 1.3 <u>Contractor Use Of Premise</u> | .1 | Use of site is restricted to area of contract. |
| 1.4 <u>Documents Required</u> | .1 | Maintain at job site, one copy each of the following: <ul style="list-style-type: none">.1 Contract drawings..2 Specifications..3 Addenda.4 Reviewed shop drawings..5 List of Outstanding Shop Drawings..6 Change orders..7 Other modifications to Contract..8 Field test reports..9 Copy of approved Work schedule..10 Manufacturers' installation and application instructions..11 Labour conditions and wage schedules..12 Health and Safety Plan and Other Safety Related Documents..13 Other documents as specified. |

PART 2 PRODUCTS

- | | | |
|--------------|----|-----------|
| 2.1 NOT USED | .1 | Not Used. |
|--------------|----|-----------|

PART 3 EXECUTION

- | | | |
|--|----|---|
| 3.1 <u>Existing Equipment Removal:</u> | .1 | Refer to Appendix B and Appendix C for list of existing equipment to be removed and instructions relating to the employment of inmate labour. |
|--|----|---|

3.2 Phasing

- .1 The following must be undertaken and reviewed / accepted by the Departmental Representative prior to actual demolition of Building No. 10:

.1 Architectural / Site:

- .1 Installation of all construction fencing, gates, and associated components, etc.
- .2 Installation of all new equipment poles, at locations indicated on drawings.
- .3 Removal of all (Building No. 10) existing cameras / lighting and relocation / installation at new locations indicated on drawings.
- .4 Installation of all new lighting, cameras and speakers at locations indicated on drawings.

.2 Mechanical:

- .1 Prior to commencement of Building 10 Demolition, drain, cap and seal all mechanical service piping so as to maintain the integrity, continuity and operation of the existing systems which serve the property and other buildings.

Affected systems shall include but not be limited to: domestic water, hydronic heating, sanitary sewer, storm sewer.

.3 Electrical:

- .1 Existing low voltage (600/347V, 208/120V, 120/240V) electrical and lighting systems and services that terminate in or pass through Building 10 shall be rerouted, purged, capped, terminated, relocated and installed in accordance with the drawings and in coordination with other trades.

- .2 New low voltage (600/347V, 208/120V, 120/240V) electrical and lighting systems and services from Building 51 to Building 30 that terminate in or pass through Building 30 shall be relocated and installed in accordance with the drawings and in coordination with other trades.
- .3 Existing and new life safety, data, communications, access control, surveillance, and public address systems and services to/from Building 51 to/from Building 30, and to/from Building 30 to other areas of the site shall be relocated and installed in accordance with the drawings and in coordination with other trades.
- .4 Existing life safety, data, communications, access control, surveillance, and public address systems and services to/from Building 10 to/from other areas of the site shall be rerouted, purged, capped, terminated, relocated and installed in accordance with the drawings and in coordination with other trades.
- .5 Proof of satisfactory functionality of all power, lighting, life safety, data, communications, access control, surveillance, and public address systems and services.

END OF SECTION

PART 1 - GENERAL

- 1.1 Submittals
- .1 Upon acceptance of bid and prior to commencement of work, submit to Departmental Representative the following work management documents:
 - .1 Work Schedule as specified herein.
 - .2 Shop Drawing Submittal Schedule specified in Section 01 33 00.
 - .3 Hot Work Procedures specified in Section 01 35 24.
 - .4 Lockout Procedures specified in Section 01 35 25.
 - .5 Health and Safety Plan specified in Section 01 35 29.06.
 - .6 List of workers requiring security clearance and those to be placed on Site Security Control list as specified in Section 01 35 55.
 - .7 Dust Control Plan specified in Section 01 50 00.
 - .8 Waste Management Plan specified in Section 01 74 21.
- 1.2 Work Schedule
- .1 Upon acceptance of bid submit:
 - .1 Preliminary work schedule within 7 calendar days of contract award.
 - .2 Detailed work schedule within 14 calendar days of contract award.
 - .2 Schedule to indicate all calendar dates from commencement to completion of all work within the time stated in the accepted bid.
 - .3 Provide sufficient details to clearly illustrate entire implementation plan, depicting efficient coordination of tasks and resources, to achieve completion of work on time and permit effective monitoring of work progress in relation to established milestones.
 - .4 Work schedule content to include as a minimum the following:
 - .1 Bar (GANTT) Charts, indicating all

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Demolition of	Management of Work	Page 2
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- work activities, tasks and other project elements, their anticipated durations, planned dates for achieving key activities and major project milestones supported with;
- .2 Written narrative on key elements of work illustrated in bar chart, providing sufficient details to demonstrate a reasonable implementation plan for completion of project within designated time.
- .3 Generally, Bar Charts derived from commercially available computerized project management system are preferred but not mandatory.
- .5 Schedule work in cooperation with the Departmental Representative. Incorporate within Detailed Work Schedule, items identified by Departmental Representative during review of preliminary schedule.
- .6 Completed schedule shall be reviewed by Departmental Representative. When reviewed, take necessary measures to complete work within scheduled time. Do not change schedule without Departmental Representative's approval.
- .7 Ensure that all subtrades and subcontractors are made aware of the work restraints and operational restrictions specified.
- .8 Schedule Updates:
 - .1 Submit a revised schedule (if applicable) with each progress billing submission.
 - .2 Provide information and pertinent details explaining reasons for necessary changes to implementation plan.
 - .3 Identify problem areas, anticipated delays, impact on schedule and proposed corrective measures to be taken.
- .9 Departmental Representative will make interim reviews and evaluate progress of work based on reviewed schedule. Frequency of such reviews will be as decided by Departmental Representative. Address and

take corrective measures on items identified by reviews and as directed by Departmental Representative. Update schedule accordingly.

- .10 In every instance, change or deviation from the Work Schedule, no matter how minimal the risk or impact on safety or inconvenience to tenant or public might appear, will be subject to prior review and approval by the Departmental Representative.

1.3 Operational Restrictions

- .1 Contractor to meet with the Departmental Representative on a weekly basis to identify intended work areas, activities and scheduling for the coming week.
- .2 See Section 01 35 55 in regards to:
 - .1 Special security requirements which must be observed in the course of work.
 - .2 Provision of security personnel by Contractor as part of the Work.
- .3 Limit Maneuvering Space on Site: To area indicated on drawings. Staging area for placement of construction trailer, goods storage and portable toilet in the location designated by the Institution.
- .4 Facility circulation maintained:
 - .1 Ensure that entrances, corridors, stairwells, fire exits and other circulation routes are maintained free and clear providing safe and uninterrupted passage for Facility users at all times during the entire work.
 - .2 Maintain those areas clean and free of construction materials and equipment. Provide temporary dust barriers and other suitable enclosures to ensure users are not exposed to construction activities and are protected from exposure to dust, noise and hazardous conditions.
 - .3 Maintain fire escape routes accessible and firefighting access open all times

- for the duration of the project.
 - .4 Do not under any circumstances block fire exit doors. Do not leave construction materials or debris in corridors, stairwells building entrances and exits.
- .5 Safety Signage:
 - .1 Provide on site, and erect as required during progress of work, proper bilingual signage. Mount where directed and as required on self-supporting stands, or on fixed walls warning the building occupants of construction activities in progress and alerting need to exercise caution in proceeding through disturbed areas of the facility, and directing building occupants through any detours which may be required.
 - .2 Signage to be professionally printed and mounted on wooden backing, coloured and to express messages as directed by the Departmental Representative.
 - .3 Generally maximum size of sign should be in the order of 1.0 square meters. Number of signs required will be decided in conjunction with Institution and as directed by Departmental Representative.
 - .4 Include costs for the supply and installation as well as removal of these signs and the related patching and making good of associated walls in the bid price.
- .6 Dust and Dirt Control:
 - .1 See Section 01 50 00 for dust control and cleaning requirements.
 - .2 Effectively plan and implement dust control measures and cleaning activities as an integral part of all construction activities. Review all measures with the Departmental Representative before undertaking work, especially for major dust generating activities.
 - .3 Do not allow demolition debris and

- construction waste to accumulate on site and contribute to the propagation of dust.
- .4 As work progresses, maintain construction areas in a tidy condition at all times. Remove dust accumulations by cleaning and vacuuming immediately following the completion of any major dust generating activity.
- .5 Immediately remove all debris and dust from within occupied areas as generated by work therein during a given workshift.
- .6 Disconnect and seal-off ductwork of HVAC servicing the construction area to stop spread of dust into other areas of Facility.
- .7 Avoid situations and practices which results in dust and dirt being brought from the construction areas or from the exterior and tracked inside the building into occupied areas.
- .8 Stop workers with soiled footwear from entering building.
- .9 Inform workers and make them sensitive to the need for dust and dirt control. Stringently enforce rules and regulations, immediately address non-compliance.
- .10 Keep access doors to work areas closed at all times. Use only designated doors for entry or egress.
- .7 Cleaning of occupied areas used by Contractor:
 - .1 Clean circulation routes used by workers to gain access to work.
 - .2 Meager attempts at controlling dust and ineffective unprofessional cleaning procedures will not be tolerated.
 - .3 Failure to provide effective dust control, allowing construction dust and dirt to escape beyond construction areas and contaminate occupied areas and building circulation areas will result in Contractor being ordered to immediately provide professional cleaning services without delay to

remedy the situation and conduct all cleaning to the extent as determined by Departmental Representative.

- .8 Ensure that all sub-trades are made aware of and abide by the contents of this section and in particular the work restrictions specified herein due to tenant operational requirements.

1.4 Project Meetings

- .1 Schedule and administer project meetings, held on a minimum bi-weekly basis, for entire duration of work and more often when directed by Departmental Representative as deemed necessary due to progress of work or particular situation.
- .2 Prepare agenda for meetings.
- .3 Notify participants in writing 4 days in advance of meeting date.
 - .1 Ensure attendance of all subcontractors.
 - .2 Departmental Representative will provide list of other attendees to be notified.
- .4 Hold meetings at project site or where approved by Departmental Representative.
- .5 Preside at meetings and record minutes.
 - .1 Indicate significant proceedings and decisions. Identify action items by parties.
 - .2 Distribute to participants by mail or by facsimile within 3 calendar days after each meeting.
 - .3 Make revisions as directed by Departmental Representative.
 - .4 Departmental Representative will advise whether submission of minutes by Email is acceptable. Decision will be based on compatibility of software among participants.

1.5 Work Coordination

- .1 The General Contractor is responsible for coordinating the work of the various trades and predetermining where the work of such

trades interfaces with each other.

- .1 Designate one person from own employ having overall responsibility to review contract documents and shop drawings, plan and manage such coordination.
- .2 The General Contractor shall convene meetings between trades whose work interfaces and ensure that they are fully aware of the areas and the extent of where interfacing is required.
- .3 Submission of shop drawings and ordering of prefabricated equipment or prebuilt components shall only occur once coordination meeting for such items has taken place between trades and all conditions affecting the work of the interfacing trades has been made known and accounted for.
- .4 Work Cooperation:
 - .1 Ensure cooperation between trades in order to facilitate the general progress of the work and avoid situations of spatial interference.
 - .2 Ensure that each trade provides all other trades reasonable opportunity for the completion of the work and in such a way as to prevent unnecessary delays, cutting, patching and the need to remove and replace completed work.
- .5 No extra costs to the Contract will be considered by the Departmental Representative as a result of Contractor's failure to effectively coordinate all portions of the Work. Disputes between the various trades as a result of their not being informed of the areas and extent of interface work shall be the sole responsibility of the General Contractor to be resolved at own cost.

END OF SECTION

PART 1 GENERAL

1.1 Administrative

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

- .10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
 - .11 Keep one reviewed copy of each submission on site.
- 1.2 Shop Drawings
And Product Data
- .1 Submit electronic copies of shop drawings for each requirement requested in specification Sections and as consultant may reasonably request.
 - .2 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
 - .3 Delete information not applicable to project.
 - .4 Supplement standard information to provide details applicable to project.
 - .5 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
 - .6 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept. This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of construction and Contract Documents. Without restricting generality of foregoing, Contractor is responsible for

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dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of all sub-trades.

- .7 For all sections of Work which require the Contractor or Sub Contractor to provide professional engineering services, the Contractor's or Sub Contractor's Registered Professional Engineer in the Province of Nova Scotia shall design and engineer components for the project which the Contractor's or Sub Contractor's Registered Professional Engineer is responsible for, and shall sign and seal all shop drawings and supporting documentation. The Contractor's or Sub Contractor's Registered Professional Engineer shall review all fabrication and installation of such components. At completion of the Work, each of the Contractor's and/or Sub Contractor's Registered Professional Engineers shall provide to the Consultant, a letter confirming that:
- .1 All structural, architectural, mechanical, electrical and other components are fabricated and erected in conformance with their design.
- .2 All components are capable of supporting all the loads or capable of performance specified or indicated on the reviewed shop drawings.
- .3 All changes to the contract documents have been reviewed and are acceptable.
- .4 All components have been designed, fabricated and installed to substantially comply with the applicable requirements of the National Building Code.
- .5 All components have been designed and installed to conform with the seismic restraint requirements of the National Building Code 2015.
- .6 The fabrication and installation of such components has been reviewed and accepted by the Contractor's and/or Sub Contractor's Registered Professional Engineers.
- .7 All components are fabricated and erected in accordance with the reviewed shop drawings.

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requested in respective specification Sections.
Label samples with origin and intended use.

- .2 Deliver samples prepaid to Departmental Representative's business address.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 Progress
Photographs

- .1 Employ a competent individual to take all photographs.
- .2 Upon commencement of Work and at monthly intervals thereafter, email to the Departmental Representative, digital electronic copies of photographs, of eight (8) different views to clearly indicate progress of all parts of the Work. Provide photos from locations as directed by the Departmental Representative. Electronic copies to indicate date when photos were taken.
- .3 Progress Photographs (Digital Format):
 - .1 Sizes: minimum 5 mega pixels image file size or 600 dpi print density.
 - .2 Type: digital colour with binding margin at one end.
 - .3 Format: jpeg.
 - .4 Number of copies: 1 set per month.
 - .5 Identification: Rich Text Format (*.rtf) reference to photo file with name, location, purpose, and number of project and date of exposure.

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Submittal Procedures

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- .6 Viewpoints: interior locations.
Viewpoints determined by Departmental Representative.
- .4 Distribution of Photographs:
 - .1 Submit one set of progress photographs to the Departmental Representative.
 - .2 Submit photographs with each Progress Claim, and continuing until Final Certificate.
 - .3 Submit progress photographs on CDROM, files compressed with file names referencing progress time when each photograph was prepared, e.g. 2010-10-15 Foundation 1, placement of reinforcing steel.
 - .4 Include all photographs in the final submission and submit on a CDROM files compressed with file names referencing progress time when each photograph was prepared e.g. 2010-10-15 Roof 10, Installation of roof vents.

PART 2 PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

- | | | |
|-------------------------------------|----|--|
| 1.1 <u>Section Includes</u> | .1 | Fire Safety Requirements |
| | .2 | Hot Work Permit |
| | .3 | Existing Fire Protection and Alarm Systems |
| 1.2 <u>Related Work</u> | .1 | Section 01 35 29.06 Health and Safety Requirements. |
| | .2 | Section 01 14 10 Scheduling and Management of Work. |
| 1.3 <u>Definitions</u> | .1 | Hot Work defined as: <ul style="list-style-type: none">.1 Welding work.2 Cutting of materials by use of torch or other open flame devices.3 Grinding with equipment which produces sparks..4 Use of open flame torches such as for roofing work. |
| 1.4 <u>Submittals</u> | .1 | Submit copy of Hot Work Procedures and sample of Hot Work permit to Departmental Representative for review, within 14 calendar days of acceptance of bid. |
| | .2 | Submit in accordance with section 01 33 00. |
| 1.5 <u>Fire Safety Requirements</u> | .1 | Implement and follow fire safety measures during Work. Comply with following: <ul style="list-style-type: none">.1 National Fire Code 2015..2 Fire Protection Standards FCC 301 and FCC 302..3 Federal and Provincial Occupational Health and Safety Acts and Regulations. |
| | .2 | In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental |

Representative will advise on the course of action to be followed.

1.6 Hot Work
Authorization

- .1 Obtain Departmental Representative's written "Authorization to Proceed" before conducting any form of Hot Work on site.
- .2 To obtain authorization submit to Departmental Representative:
 - .1 Contractor's typewritten Hot Work Procedures to be followed on site as specified below.
 - .2 Description of the type and frequency of Hot Work required.
 - .3 Sample Hot Work Permit to be used.
- .3 Upon review and confirmation that effective fire safety measures will be implemented and followed during performance of hot work, Departmental Representative will give authorization to proceed as follows:
 - .1 Issue one written "Authorization to Proceed" covering the entire project for duration of work or;
 - .2 Subdivide the work into pre-determined, individual activities, each activity requiring a separately written authorization to proceed.
- .4 Requirement for individual authorization will be based on:
 - .1 Nature or phasing of work;
 - .2 Risk to Facility operations;
 - .3 Quantity of various trades needing to perform hot work on project or;
 - .4 Other situation deemed necessary by Departmental Representative to ensure fire safety on premises.
- .5 Do not perform any Hot Work until receipt of Departmental Representative's written "Authorization to Proceed" for that portion of work.
- .6 In coordinate performance of Hot Work with Facility Manager through the Departmental Representative. When directed, perform Hot Work only during non-operative hours of the Facility. Follow Departmental Representative's directives in this regard.

1.7 Hot Work
Procedures

- .1 Develop and implement safety procedures and work practices to be followed during the performance of Hot Work.
- .2 Hot Work Procedures to include:
 - .1 Requirement to perform hazard assessment of site and immediate work area beforehand for each hot work event in accordance with Safety Plan specified in section 01 35 29.06.
 - .2 Use of a Hot Work Permit system with individually written permit issued by Contractor's Superintendent to specific worker or subcontractor granting permission to proceed with Hot Work.
 - .3 Permit required for each Hot Work event.
 - .4 Designation of a person on site as a Fire Safety Watcher responsible to conduct a fire safety watch for a minimum duration of 30 minutes immediately following the completion of the Hot Work.
 - .5 Compliance with fire safety codes, standards and occupational health and safety regulations specified.
 - .6 Site specific rules and procedures in force at the site as provided by the Facility Manager.
- .3 Generic procedures, if used, must be edited and supplemented with pertinent information tailored to reflect specific project conditions. Label document as being the Hot Work Procedures for this contract.
- .4 Procedures shall clearly establish responsibilities of:
 - .1 Worker performing hot work,
 - .2 Person issuing the Hot Work Permit,
 - .3 Fire Safety Watcher,
 - .4 Subcontractor(s) and Contractor.
- .5 Brief all workers and subcontractors on Hot Work Procedures and of Permit system. Stringently enforce compliance.
- .6 Failure to comply with fire safety procedures may result in the issue of a Non-Compliance

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notification as specified in Section 01 35 29.06.

1.8 Hot Work
Permit

- .1 Hot Work Permit to include the following:
 - .1 Project name and project number;
 - .2 Building name and specific room or area where hot work will be performed;
 - .3 Date of issue;
 - .4 Description of hot work type needed;
 - .5 Special precautions to be followed, including type of fire extinguisher needed;
 - .6 Name and signature of permit issuer.
 - .7 Name of worker to which the permit is issued.
 - .8 Permit validity period not to exceed 8 hours. Indicate start time/date and termination time/date.
 - .9 Worker's signature with time/date of hot work completion.
 - .10 Stipulated time period of safety watch.
 - .11 Fire Safety Watcher's signature with time/date.
- .2 Permit to be typewritten form. Industry Standard forms shall only be used if all data specified above is included on form.
- .3 Each Hot Work Permit to be completed in full, signed and returned to Contractor's Superintendent for safe keeping on site.

1.9 Fire
Protection And
Alarm Systems

- .1 Costs incurred, from the fire department, Facility owner and tenants, resulting from negligently setting off false alarms will be charged to the Contractor in the form of financial progress payment reductions and holdback assessments against the Contract.

1.10 Documents On
Site

- .1 Keep Hot Work Permits and Hazard assessment documentation on site for duration of Work.
- .2 Upon request, make available to Departmental Representative or to authorized safety Representative for inspection.

END OF SECTION

PART 1 - GENERAL

- | | | |
|-----------------------------|----|---|
| 1.1 <u>Section Includes</u> | .1 | Procedures to isolate and lockout electrical facility and other equipment from energy sources. |
| 1.2 <u>Related Work</u> | .1 | Section 01 35 29.06: Health and Safety |
| | .2 | Section 01 14 10 Scheduling and Management of the Work |
| | .3 | Section 01 50 00: Temporary Facilities. |
| 1.3 <u>References</u> | .1 | CSA C22.1-15 - Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations. |
| | .2 | CAN/CSA C22.3 No.1-15 - Overhead Systems. |
| | .3 | CSA C22.3 No.7-15 - Underground Systems. |
| | .4 | COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code. |
| 1.4 <u>Definitions</u> | .1 | Electrical Facility: means any system, equipment, device, apparatus, wiring, conductor, assembly or part thereof that is used for the generation, transformation, transmission, distribution, storage, control, measurement or utilization of electrical energy, and that has an amperage and voltage that is dangerous to persons. |
| | .2 | Guarantee of Isolation: means a guarantee by a competent person in control or in charge that a particular facility or equipment has been isolated. |
| | .3 | De-energize: in the electrical sense, that a piece of equipment is isolated and grounded, e.g. if the equipment is not grounded, it cannot be considered de-energized (DEAD). |

- .4 Guarded: means that an equipment or facility is covered, shielded, fenced, enclosed, inaccessible by location, or otherwise protected in a manner that, to the extent that is reasonably practicable, will prevent or reduce danger to any person who might touch or go near such item.
- .5 Isolate: means that an electrical facility, mechanical equipment or machinery is separated or disconnected from every source of electrical, mechanical, hydraulic, pneumatic or other kind of energy that is capable of making it dangerous.
- .6 Live/alive: means that an electrical facility produces, contains, stores or is electrically connected to a source of alternating or direct current of an amperage and voltage that is dangerous or contains any hydraulic, pneumatic or other kind of energy that is capable of making the facility dangerous to persons.

1.5 Compliance Requirements

- .1 Comply with the following in regards to isolation and lockout of electrical facilities and equipment:
 - .1 Canadian Electrical Code
 - .2 Federal and Provincial Occupational Health and Safety Acts and Regulations.
 - .3 Regulations and code of practice as applicable to mechanical equipment or other machinery being de-energized.
 - .4 Procedures specified herein.
- .2 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

1.6 Submittals

- .1 Submit copy of proposed lockout procedures and sample of lockout permit to Departmental Representative for review, within 14 calendar days of acceptance of bid.

1.7 Isolation Of
Existing Services

- .2 Submit in accordance with section 01 33 00.
- .1 Obtain Departmental Representative's written authorization prior to working on existing live or active electrical facilities and equipment and before proceeding with isolation of such item.
- .2 To obtain authorization, submit to Departmental Representative the following documentation:
 - .1 Written request to isolate the particular service or facility and;
 - .2 Copy of Contractor's Lockout Procedures.
- .3 Make a Request for Isolation for each event, unless directed otherwise by Departmental Representative, as follows:
 - .1 Fill-out standard form in current use at the Facility as provided by Departmental Representative or;
 - .2 Where no form exist, make written request indicating:
 - .1 The equipment, system or service to be isolated and its location;
 - .2 Duration of isolation period (ie: start time & date and completion time & date).
 - .3 Voltage of service feed to system or equipment being isolated.
 - .4 Name of person making the request.
- .4 Do not proceed with isolation until receipt of written notification from Departmental Representative granting the Isolation Request and authorizing to proceed with the work.
 - .1 Note that Departmental Representative may designate another person at the Facility being authorized to grant the Isolation Request.
- .5 Conduct safe, orderly shut down of equipment or facility. De-energize, isolate and lockout power and other sources of energy feeding the equipment or facility.
- .6 Determine in advance, as much as possible, in cooperation with the Departmental Representative, the type and frequency of

situations which will require isolation of existing services.

- .7 Plan and schedule shut down of existing services in consultation with the Departmental Representative and the Facility Manager. Minimize impact and downtime of Facility operations. Follow Departmental Representative's directives in this regard.
- .8 Conduct hazard assessment as part of the process in accordance with health and safety requirements specified Section 01 35 29.06.

1.8 Lockouts

- .1 De-energize, isolate and lockout electrical facility, mechanical equipment and machinery from all potential sources of energy prior to working on such items.
- .2 Develop and implement clear and specific lockout procedures to be followed as part of the Work.
- .3 Prepare typed written Lockout Procedures describing safe work practices, procedures, worker responsibilities and sequence of activities to be followed on site by workforce to safely isolate an active piece of equipment or electrical facility and effectively lockout and tagout it's sources of energy.
- .4 Include as part of the Lockout Procedures a system of lockout permits managed by Contractor's Superintendent or other qualified person designated by him/her as being "in-charge" at the site.
 - .1 A lockout permit shall be issued to specific worker providing a Guarantee of Isolation before each event when work must be performed on a live equipment or electrical facility.
 - .2 Duties of person managing the permit system to include:
 - .1 Issuance of permits and lockout tags to workers.
 - .2 Determining permit duration.
 - .3 Maintaining record of permits and tags issued.
 - .4 Making a Request for Isolation to Departmental Representative when

- required as specified above.
 - .5 Designating a Safety Watcher, when one is required based on type of work.
 - .6 Ensuring equipment or facility has been properly isolated.
 - .7 Collecting and safekeeping lockout tags returned by workers as a record of the event.
 - .5 Clearly establish, describe and allocate responsibilities of:
 - .1 Workers.
 - .2 Person managing the lockout permit system.
 - .3 Safety Watcher.
 - .4 Subcontractor(s) and General Contractor.
 - .6 Generic procedures, if used, must be edited and supplemented with pertinent information to reflect specific project requirements.
 - .1 Incorporate site specific rules and procedures in force at site as provided by Facility Manager through the Departmental Representative.
 - .2 Clearly label the document as being the Lockout procedures applicable to work of this contract.
 - .7 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.
 - .8 Use industry standard lockout tags.
 - .9 Provide appropriate safety grounding and guards as required.
- 1.9 Conformance
 - .1 Brief all workers and subcontractors on requirements of this section. Stringently enforce use and compliance.
 - .2 Failure to follow lockouts procedures specified herein may result in the issuance of a Non-Compliance notification as specified in Section 01 35 29.06.
- 1.10 Documents On Site
 - .1 Post Lockout Procedures on site in common location for viewing by workers.

- .2 Keep copies of Request for Isolation forms and lockout permits and tags issued to workers on site for full duration of Work.
- .3 Upon request, make available to Departmental Representative or to authorized safety Representative for inspection.

END OF SECTION

SPEC NOTE: This regional section must be included in the Specification manual of all PWGSC Atlantic Region construction projects to be tendered by Real Property Contracting.

SPEC NOTE: Consult this document for details on Occupational Health and Safety requirements on construction sites managed by PWGSC.

SPEC NOTE: PWGSC must avoid being seen in the role of the "Prime Contractor/Principal Contractor/ Constructor". An example when this might occur are two (or more) separately tendered construction contracts carried out concurrently at the site which cannot be separated from each other by either time, distance or physical barriers. Concurrent contracts include those tendered by PWGSC or combination of those tendered by PWGSC and the AFD Facility Manager. Departmental Policy requires that projects are structured and managed so that the Department's role is not that of the party executing the Work (i.e: the Builder). This section was written to complement this objective.

SPEC NOTE: Edit this section to reflect project requirements. Delete non-applicable articles.

1.1 RELATED SECTIONS

- .1 Section [01 35 24]: Special Procedures on Fire Safety Requirements.
- .2 Section [01 35 25]: Special Procedures on Lockout Requirements.

1.2 DEFINITIONS

- .1 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.
- .2 Competent Person: means a person who is:
 - .1 Qualified by virtue of personal knowledge, training and experience to perform assigned work in a manner that will ensure the health and safety of persons in the workplace, and;
 - .2 Knowledgeable about the provisions of occupational health and safety statutes and regulations that apply to the Work and;
 - .3 Knowledgeable about potential or actual danger to health or safety associated with the Work.
- .3 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.

- .4 PPE: personal protective equipment.
- .5 Work Site: where used in this section shall mean areas, located at the premises where Work is undertaken, used by Contractor to perform all of the activities associated with the performance of the Work.

1.3 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00.
- .2 Submit site-specific Health and Safety Plan prior to commencement of Work.
 - .1 Submit within 7 work days of notification of Bid Acceptance. Allow for 5-10 days for Department review and recommendations prior to the commencement of work. Provide [3] copies.
 - .2 Departmental Representative will review Health and Safety Plan and provide comments.
 - .3 Revise the Plan as appropriate and resubmit within [5][10] work days after receipt of comments.
 - .4 Departmental Representative's review and comments made of the Plan shall not be construed as an endorsement, approval or implied warranty of any kind by Canada and does not reduce Contractor's overall responsibility for Occupational Health and Safety of the Work.
 - .5 Submit revisions and updates made to the Plan during the course of Work.
- .3 Submit name of designated Health and Safety Site Representative and support documentation specified in the Safety Plan.
- .4 Submit building permit, compliance certificates and other permits obtained.
- .5 Submit copy of Letter in Good Standing from Provincial Workers Compensation or other Department of Labour organization.
 - .1 Submit update of Letter of Good Standing whenever expiration date occurs during the period of Work.
- .6 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .7 Submit copies of incident reports.
- .8 Submit WHMIS MSDS - Material Safety Data Sheets.

1.4 COMPLIANCE REQUIREMENTS

SPEC NOTE: **Select one** of the following 4 articles to specify the Province where the Work will take place.

- .1 Comply with Occupational Health and Safety Act for Province of Nova Scotia, and Regulations made pursuant to the Act.
- .2 Comply with Occupational Health and Safety Act for Province of New Brunswick, and General Regulations made pursuant to the Act.
- .3 Comply with Occupational Health and Safety Act for Province of Prince Edward Island, and Occupational Health and Safety Regulations made pursuant to the Act.
- .4 Comply with Occupational Health and Safety Act for Province of Newfoundland and Labrador, and Occupational Health & Safety Regulations made pursuant to the Act.
- .5 Comply with Canada Labour Code - Part II (entitled Occupational Health and Safety) and the Canada Occupational Health and Safety Regulations as well as any other regulations made pursuant to the Act.
 - .1 The Canada Labour Code can be viewed at:
[www.http://laws-lois.justice.gc.ca/eng/acts/L-2_fulltext.html](http://laws-lois.justice.gc.ca/eng/acts/L-2_fulltext.html).
 - .2 Canadian Occupational Health and Safety Regulations can be viewed at: http://laws-lois.justice.gc.ca/eng/regulations/SOR-86-304_index.html.
 - .3 A copy may be obtained at: Canadian Government Publishing Public Works & Government Services Canada Ottawa, Ontario, K1A 0S9 Tel: 819-956-4800 or 1-800-635-7943 Publication No. L31-85/2000 (E or F).
- .6 Treasury Board of Canada Secretariat (TBS):
 - .1 Treasury Board, Fire Protection Standard April 1, 2010
www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316§ion=text.
- .7 Canadian Standards Association (CSA):
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

SPEC NOTE: Specify other health and safety regulations as required when above regulations do not cover all aspects of the Work or are not pertinent to the scope of work. Example: H&S for remediation of contaminated sites, Mine Safety Act & Regulations, etc. Consult PWGSC Regional SSHEP Group (i.e.: Safety, Security, Health and Emergency Preparedness Group) for advice.

- .8 Observe construction safety measures of:
 - .1 NBC 2015, Division B, Part 8.
 - .2 Municipal by-laws and ordinances.
- .9 In case of conflict or discrepancy between above specified requirements, the more stringent shall apply.
- .10 Maintain Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter in Good Standing.
- .11 Medical Surveillance: Where prescribed by legislation or regulation, obtain and maintain worker medical surveillance documentation.

1.5 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons and environment adjacent to the site to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by all workers, sub-contractors and other persons granted access to Work Site with safety requirements of Contract Documents, applicable federal, provincial, and local by-laws, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.6 SITE CONTROL AND ACCESS

- .1 Control the Work and entry points to Work Site. Approve and grant access only to workers and authorized persons. Immediately stop and remove non-authorized persons.
 - .1 Departmental Representative will provide names of those persons authorized by Departmental Representative to enter onto Work Site and will ensure that such authorized persons have the required knowledge and training on Health and Safety pertinent to their reason for being at the site, however, Contractor remains responsible for the health and safety of authorized persons while at the Work Site.
- .2 Isolate Work Site from other areas of the premises by use of appropriate means.
 - .1 Erect fences, hoarding, barricades and temporary lighting as required to effectively delineate the Work Site, stop non-authorized

- entry, and to protect pedestrians and vehicular traffic around and adjacent to the Work and create a safe environment. [See Section [01 50 00] for minimum acceptable requirements].
- .2 Post signage at entry points and other strategic locations indicating restricted access and conditions for access.
 - .3 Use professionally made signs with bilingual message in the 2 official languages or international known graphic symbols.
- .3 Provide safety orientation session to persons granted access to Work Site. Advise of hazards and safety rules to be observed while on site.
 - .4 Ensure persons granted site access wear appropriate PPE. Supply PPE to inspection authorities who require access to conduct tests or perform inspections.
 - .5 Secure Work Site against entry when inactive or unoccupied and to protect persons against harm. [Provide security guard where adequate protection cannot be achieved by other means].

1.7 PROTECTION

- .1 Give precedence to safety and health of persons and protection of environment over cost and schedule considerations for Work.
- .2 Should unforeseen or peculiar safety related hazard or condition become evident during performance of Work, immediately take measures to rectify situation and prevent damage or harm. Advise Departmental Representative verbally and in writing.

1.8 FILING OF NOTICE

- .1 File Notice of Project with pertinent provincial health and safety authorities prior to beginning of Work.
 - .1 Departmental Representative will assist in locating address if needed.

1.9 PERMITS

- .1 Post permits, licenses and compliance certificates, specified in section [01 10 10], at Work Site.

- .2 Where a particular permit or compliance certificate cannot be obtained, notify Departmental Representative in writing and obtain approval to proceed before carrying out applicable portion of work.

1.10 HAZARD ASSESSMENTS

- .1 Perform site specific health and safety hazard assessment of the Work and its site.
- .2 Carryout initial assessment prior to commencement of Work with further assessments as needed during progress of work, [including when new trades and subcontractors arrive on site].
- .3 Record results and address in Health and Safety Plan.
- .4 Keep documentation on site for entire duration of the Work.

1.11 PROJECT/SITE CONDITIONS

SPEC NOTE: Obtain site information and pertinent hazard identification/environmental reports from PWGSC Project Mgr. in order to edit this article. List only those specific items having a likelihood of being encountered by Contractor during the Work.

SPEC NOTE: List in sub-article 1.1 below known hazardous liquids and controlled products used by tenants and stored on site within vicinity of work area(s).

SPEC NOTE: List in sub-article 1.2 below hazardous substances or contaminated materials found on site. Examples: contaminated soil, hazardous waste, asbestos, PCB's, lead paint etc.

SPEC NOTE: List in sub-article 1.3 below known latent and environmental conditions at the Work Site which could create a safety hazard to Contractor's work operations and workforce. Examples: structurally unsound component or condition, known confined space, adjacent wildlife activity, high tides, etc. Note: Apparent or obvious hazards at the Work Site as well as potential H&S hazards created by Contractor's work operations and activities should not be listed in this article but rather left for Contractor to address in Contractor's hazard assessment of the Work.

SPEC NOTE: List in sub-article 1.4 below on-going tenant operations at the Facility which could be impacted by Contractor's work operations and affect health and safety of Facility personnel and the public. Examples:

- .2 Above items shall not be construed as being complete and inclusive of potential health and safety hazards encountered during Work.
- .3 Include above items in the hazard assessment of the Work.
- .4 MSDS Data sheets of pertinent hazardous and controlled products stored on site can be obtained from Departmental Representative.

1.12 MEETINGS

- .1 Attend pre-construction health and safety meeting, convened and chaired by Departmental Representative, prior to commencement of Work, at time, date and location determined by Departmental Representative. Ensure attendance of:
 - .1 Superintendent of Work.
 - .2 Designated Health & Safety Site Representative.
 - .3 Subcontractors.
- .2 Conduct regularly scheduled tool box and safety meetings during the Work in conformance with Occupational Health and Safety regulations.
- .3 Keep documents on site.

1.13 HEALTH AND SAFETY PLAN

- .1 Prior to commencement of Work, develop written Health and Safety Plan specific to the Work. Implement, maintain, and enforce Plan for entire duration of Work and until final demobilization from site.
- .2 Health and Safety Plan shall include the following components:
 - .1 List of health risks and safety hazards identified by hazard assessment.
 - .2 Control measures used to mitigate risks and hazards identified.
 - .3 On-site Contingency and Emergency Response Plan as specified below.
 - .4 On-site Communication Plan as specified below.
 - .5 Name of Contractor's designated Health & Safety Site Representative and information showing proof of his/her competence and reporting relationship in Contractor's company.
 - .6 Names, competence and reporting relationship of other supervisory personnel used in the Work for occupational health and safety purposes.
- .3 On-site Contingency and Emergency Response Plan shall include:

- .1 Operational procedures, evacuation measures and communication process to be implemented in the event of an emergency.
- .2 Evacuation Plan: site and floor plan layouts showing escape routes, marshalling areas. Details on alarm notification methods, fire drills, location of firefighting equipment and other related data.
- .3 Name, duties and responsibilities of persons designated as Emergency Warden(s) and deputies.
- .4 Emergency Contacts: name and telephone number of officials from:
 - .1 General Contractor and subcontractors.
 - .2 Pertinent Federal and Provincial Departments and Authorities having jurisdiction.
 - .3 Local emergency resource organizations.
- .5 Harmonize Plan with Facility's Emergency Response and Evacuation Plan. Departmental Representative will provide pertinent data including name of PWGSC and Facility Management contacts.
- .4 On-site Communication Plan:
 - .1 Procedures for sharing of work related safety information to workers and subcontractors, including emergency and evacuation measures.
 - .2 List of critical work activities to be communicated with Facility Manager which have a risk of endangering health and safety of Facility users.
- .5 Address all activities of the Work including those of subcontractors.
- .6 Review Health and Safety Plan regularly during the Work. Update as conditions warrant to address emerging risks and hazards, such as whenever new trade or subcontractor arrive at Work Site.
- .7 Departmental Representative will respond in writing, where deficiencies or concerns are noted and may request re-submission of the Plan with correction of deficiencies or concerns.
- .8 Post copy of the Plan, and updates, prominently on Work Site.

1.14 SAFETY SUPERVISION

- .1 Employ Health & Safety Site Representative responsible for daily supervision of health and safety of the Work.
- .2 Health & Safety Site Representative may be the Superintendent of the Work or other person designated by Contractor and shall be assigned the responsibility and authority to:

- .1 Implement, monitor and enforce daily compliance with health and safety requirements of the Work
 - .2 Monitor and enforce Contractor's site-specific Health and Safety Plan.
 - .3 Conduct site safety orientation session to persons granted access to Work Site.
 - .4 Ensure that persons allowed site access are knowledgeable and trained in health and safety pertinent to their activities at the site or are escorted by a competent person while on the Work Site.
 - .5 Stop the Work as deemed necessary for reasons of health and safety.
- .3 Health & Safety Site Representative must:
- .1 Be qualified and competent person in occupational health and safety.
 - .2 Have site-related working experience specific to activities of the Work.
 - .3 Be on Work Site at all times during execution of the Work.
- .4 All supervisory personnel assigned to the Work shall also be competent persons.
- .5 Inspections:
- .1 Conduct regularly scheduled safety inspections of the Work on a minimum [bi-weekly] basis. Record deficiencies and remedial action taken.

SPEC NOTE: Add following sub-article on Formal Inspections for large project with multiple trades on site and having minimum 6 month duration. Delete for small projects with only a few sub-trades or which the construction duration is less than 6 months.

- .2 Conduct Formal Inspections on a minimum [monthly] basis. Use standardized safety inspection forms. Distribute to subcontractors.
 - .3 Follow-up and ensure corrective measures are taken.
- .6 Cooperate with Facility's Occupational Health and Safety representative should one be designated by Departmental Representative.
- .7 Keep inspection reports and supervision related documentation on site.

SPEC NOTE: Note that the term Health and Safety "Coordinator" typically refers to a person having a Professional accreditation in health and safety from an authoritative institution. Do not use this term unless it is specifically intended, such as for reference to a person managing or

monitoring the safety program of a large construction company.

1.15 TRAINING

- .1 Use only skilled workers on Work Site who are effectively trained in occupational health and safety procedures and practices pertinent to their assigned task.
- .2 Maintain employee records and evidence of training received. Make data available to Departmental Representative upon request.
- .3 When unforeseen or peculiar safety-related hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.16 MINIMUM SITE SAFETY RULES

- .1 Notwithstanding requirement to abide by federal and provincial health and safety regulations; ensure the following minimum safety rules are obeyed by persons granted access to Work Site:
 - .1 Wear appropriate PPE pertinent to the Work or assigned task; minimum being hard hat, safety footwear, safety glasses and hearing protection.
 - .2 Immediately report unsafe condition at site, near-miss accident, injury and damage.
 - .3 Maintain site and storage areas in a tidy condition free of hazards causing injury.
 - .4 Obey warning signs and safety tags.
- .2 Brief persons of disciplinary protocols to be taken for noncompliance. [Post rules on site].

1.17 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues

identified.

- .3 Departmental Representative will stop Work if non-compliance of health and safety regulations is not corrected in a timely manner.

1.18 INCIDENT REPORTING

- .1 Investigate and report the following incidents to Departmental Representative:
 - .1 Incidents requiring notification to Provincial Department of Occupational Safety and Health, Workers Compensation Board or to other regulatory Agency.
 - .2 Medical aid injuries.
 - .3 Property damage in excess of \$10,000.00,
 - .4 Interruptions to Facility operations resulting in an operational lost to a Federal department in excess of \$5,000.00.
- .2 Submit report in writing.

1.19 HAZARDOUS PRODUCTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS).
- .2 Keep MSDS data sheets for all products delivered to site.
 - .1 Post on site.
 - .2 Submit copy to Departmental Representative.

1.21 POWDER ACTUATED DEVICES

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

1.23 SITE RECORDS

- .1 Maintain on Work Site copy of safety related documentation and reports stipulated to be produced in compliance with Acts and Regulations of authorities having jurisdiction and of those documents specified herein.

- .2 Upon request, make available to Departmental Representative or authorized Safety Officer for inspection.

1.24 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on Work Site in accordance with Acts and Regulations of Province having jurisdiction.
- .2 Post other documents as specified herein, including:
 - .1 Site specific Health and Safety Plan.
 - .2 WHMIS data sheets.

END OF SECTION

PART 1 - GENERAL

- | | | |
|--|----|--|
| <u>1.1 Reporting Fires</u> | .1 | Know the location of nearest fire alarm box and telephone, including the emergency phone number. |
| | .2 | Report immediately all fire incidents to the Fire Department/Fire Authority as follows:
.1 activate nearest fire alarm box; or
.2 telephone. |
| | .3 | Person activating fire alarm box will remain at the box to direct Institutional Fire Authority/Fire Department to scene of fire. |
| | .4 | When reporting a fire by telephone, give location of fire, name or number of building and be prepared to verify the location. |
| <u>1.2 Interior and Exterior Fire Protection and Alarm Systems</u> | .1 | Fire protection and alarm system will not be:
.1 obstructed;
.2 shut-off; and
.3 left inactive at the end of a working day or shift without authorization from Fire Authority. |
| | .2 | Fire hydrants, standpipes and hose systems will not be used for other than fire-fighting purposes unless authorized by Fire Authority. |
| <u>1.3 Fire Extinguishers</u> | .1 | Supply "Dry Chemical" Fire extinguishers, as scaled by the fire authority, necessary to protect the work in progress. |
| <u>1.4 Blockage of Roadways</u> | .1 | Advise Fire Authority of any work that would impede fire apparatus response. This includes violation of minimum overhead clearance, as prescribed by fire chief, erecting of barricades and the digging of trenches. |
| <u>1.5 Smoking Precautions</u> | .1 | No smoking is permitted within the Institutions. |

1.6 Rubbish and
Waste Materials

- .1 Rubbish and waste materials are to be kept to a minimum.
- .2 The burning of rubbish on site is prohibited.
- .3 Removal:
 - .1 Remove all rubbish from the work site at the end of the work day or shift or as directed.
- .4 Storage:
 - .1 Store oily waste in approved receptacles to ensure maximum cleanliness and safety.
 - .2 Deposit greasy or oily rags and materials subject to spontaneous combustion in an approved receptacles and remove as required in 1.8
 - .3 All liquids to be stored in an approved "locked cabinet".

1.7 Flammable and
Combustible Liquids

- .1 The handling, storage and use of flammable and combustible liquids are to be governed by the current National Fire Code of Canada.
- .2 Flammable and combustible liquids such as gasoline, kerosene and naphtha will be kept for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing the Underwriter's Laboratory of Canada or Factory Mutual seal of approval. All liquids to be stored in a "locked". Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes, requires the permission of the Fire Authority.
- .3 Transfer of flammable and combustible liquids is prohibited within buildings or jetties.
- .4 Transfer of flammable and combustible liquids will not be carried out in the vicinity of open flames or any type of heat-producing devices.
- .5 Flammable liquids having a flash point below 38°C such as naphtha or gasoline will not be used as solvents or cleaning agents.

- .6 Flammable and combustible waste liquids, for disposal, will be stored in approved containers located in a safe ventilated area. Quantities are to be kept to a minimum and the Fire Department is to be notified when disposal is required.

1.8 Hazardous
Substances

- .1 Work entailing the use of toxic or hazardous materials, chemicals and/or explosives, otherwise creates a hazard to life, safety or health, will be in accordance with the National Fire Code of Canada.
- .2 Obtain from Fire Authority a "Hot Work" permit for work involving welding, burning or the use of blow torches and salamanders, in buildings or facilities.
- .3 When work is carried out in dangerous or hazardous areas involving use of heat, provide fire watchers, equipped with sufficient fire extinguishers. Determination of dangerous or hazardous areas along with the level of protection necessary for Fire Watch is at the discretion of the Fire Authority. Contractors are responsible for providing fire watch service for work on a scale established and in conjunction with the Fire Authority at the pre-work conference.
- .4 Where flammable liquids, such as lacquers or urethanes are to be used, proper ventilation will be assured and all sources of ignition are to be eliminated. The Fire Authority is to be informed prior to and at the cessation of such work.

1.9 Questions
and/or
Clarification

- .1 Direct any questions or clarification on Fire Safety in addition to above requirements to Fire Authority.

1.10 Fire
Inspection

- .1 Site inspections by Fire Authority will be coordinated through Departmental Representative.
- .2 Allow Fire Authority unrestricted access to the work site.

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- .3 Co-operate with the Fire Authority during routine fire safety inspection of the work site.
- .4 Immediately remedy all unsafe fire situations observed by the Fire Authority.

PART 2 - PRODUCTS Not
Used.

PART 3 - EXECUTION Not
Used.

PART 1 - GENERAL

- | | | |
|--|----|--|
| 1.1 <u>Related Work</u> | .1 | Section 01 74 21: Construction / Demolition Waste Management and Disposal. |
| | .2 | Section 01 14 10 Scheduling and Management of the Work |
| 1.2 <u>Definitions</u> | .1 | Hazardous Material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment. |
| 1.3 <u>Fires</u> | .1 | Fires and burning of rubbish on site not permitted. |
| 1.4 <u>Hazardous Material Handling</u> | .1 | Store and handle hazardous materials in accordance with applicable federal and provincial laws, regulations, codes and guidelines. Store in location that will prevent spillage into the environment |
| | .2 | Label containers to WHMIS requirements and keep MSDS data sheets on site for all hazardous materials. |
| | .3 | Maintain inventory of hazardous materials and hazardous waste stored on site. List items by product name, quantity and date when storage began. |
| | .4 | Store and handle flammable and combustible materials in accordance with National Fire Code. |
| | .5 | Transport hazardous materials in accordance with federal Transportation of Dangerous Goods Regulations and applicable Provincial regulations. |

- | | |
|-----------------------------------|---|
| <u>1.5 Disposal Of
Wastes</u> | <ul style="list-style-type: none">.1 Do not bury rubbish and waste materials on site..2 Do not dispose of hazardous waste or volatile materials, such as mineral spirits, paints, thinners, oil or fuel into waterways, storm or sanitary sewers or waste landfill sites..3 Dispose of hazardous waste in accordance with applicable federal and provincial laws, regulations, codes and guidelines. |
| <u>1.6 Pollution
Control</u> | <ul style="list-style-type: none">.1 Control emissions from equipment and plant to local authorities emission requirements..2 Report, spills of petroleum and other hazardous materials as well as accidents having potential of polluting the environment to Federal and Provincial Department of the Environment.<ul style="list-style-type: none">.1 Notify Departmental Representative and submit a written spill report to Departmental Representative within 24 hours of occurrence. |

END OF SECTION

SPEC NOTE: This section reflects the latest CSC security requirements for construction projects at Correctional Facilities issued by Correctional Service Canada as written in the Specifications Section 01 35 13 - "Special Project Procedures for Correctional Service Canada Security Requirements" issued on 2008-10-31. This Section contains the same content as found in the above noted document but includes some minor revisions and additions to reflect Atlantic Region requirements.

SPEC NOTE: Security requirements vary at each correctional facility of Atlantic Canada. When preparing a project specification, this section must be edited to reflect only the specific requirements applicable at the Institution of work based on size, scope and duration of work. The final version must be reviewed and approved by Correctional Services Canada.

1.1 PURPOSE

- .1 To ensure that both the construction project and the institutional operations may proceed without undue disruption or hindrance and that the security of the Institution is maintained at all times.
- .2 Perform the Work in such a way as to minimize disruptions to the daily operations of the Institution.
- .3 Abide by security rules and procedures specified herein and as stipulated at the security briefing conducted prior to commencement of the Work.

1.2 DEFINITIONS

- .1 "Contraband" means:
 - .1 An intoxicant, including alcoholic beverages, drugs and narcotics;
 - .2 Tobacco or associated tobacco products.
 - .3 An igniting device, lighter or matches.
 - .4 A weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization.
 - .5 An explosive or a bomb or a component thereof.

SPEC NOTE: Verify with Corrections and Conditional Release Regulations (SOR/92-620) for dollar amount in following clause. Typically the amount is \$50.00 for Minimum Security Institution and \$25.00 for a Medium and Maximum Security Penitentiaries and for Multiple Security Level Penitentiary.

- .6 Currency over the prescribed limit of [XX.00] dollars when possessed by an inmate without prior authorization.
- .7 Any other item, not described in paragraphs 1.2.1.1 to 1.2.1.6 as deemed by the Director, to pose a risk to the security of a Penitentiary or to the safety of persons, when that item is possessed without prior authorization from the Director.
- .2 "Unauthorized Smoking and Related Items" means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing or snuffing tobacco, cigarette making machines, matches and lighters.
- .3 "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required to the site for the construction project.
- .4 "CSC" means Correctional Service Canada.
- .5 CPIC Security Clearance: means a personal background check made through the RCMP Canadian Police Information Centre.
- .6 "Director" means Director, Warden or Superintendent of the Institution as applicable and means the person in charge of the Correctional Institution or Penitentiary where the Work will be carried out and includes any authorized person at the Facility, as designated by the Director, to provide directions on his/her behalf.
- .7 "Construction Employees" means persons working for the General Contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies.
- .8 "Departmental Representative" means the person as defined in the General Conditions of the Contract for projects managed by Public Works and Government Services Canada (PWGSC) or the Project Manager for projects managed by Correctional Service Canada (CSC).
- .9 "Perimeter" means the fenced or walled area of the Institution that restrains the movement of the inmates.
- .10 "Construction Limits" means the area as shown on the contract drawings that the Contractor will be allowed to work. This area may or may not be isolated from the security area of the Institution.
- .11 "Institution" means the Penitentiary or Correctional Facility where the Work will be carried out.

SPEC NOTE: Discuss with PWGSC project manager to determine whether a construction zone will be established and the need for this definition in the project specs. Delete if not required.

- .12 "Construction zone" means the area as indicated on the contract drawings [and as described below] where the Contractor will be allowed to work. This area may or may not be isolated from the security area of the Institution.
 - .1 In general, Contractor's work activities and movement is limited to areas outlined on drawing L-101.

1.3 PRELIMINARY PROCEEDINGS

- .1 Prior to commencement of work, the Contractor shall meet with the Director or his/her representative to:
 - .1 Discuss the nature and extent of all activities involved in the Project.
 - .2 Establish mutually acceptable security procedures in accordance with this instruction and the institution's particular requirements.
 - .1 Obtain security rules, regulations and procedures in force at the Institution and directives to be followed by Contractor and all Construction Employees during the entire course of the work.
- .2 Departmental Representative will coordinate a pre-construction meeting between Contractor, the Director and Facility security personnel who will provide details on site security requirements.
- .3 The Contractor shall:
 - .1 Ensure that all Construction Employees are aware of the CSC security requirements.
 - .2 Ensure that a copy of the CSC security requirements is always prominently on display at the job site.
 - .3 Co-operate with institutional personnel in ensuring that security requirements and procedures are observed and stringently followed by all Construction Employees.
- .4 Failure to follow site security requirements by the Contractor or by a construction employee could result in the immediate removal of the offending party or person from the site.

1.4 CONSTRUCTION EMPLOYEES

- .1 **CPIC security clearance ARE NOT REQUIRED for Construction Employees who need to circulate on the Institution's property during the course of a construction project.**

- .2 Each construction employees shall provide a recent picture identification, such as a provincial driver's license upon entering the Institution. No person will be admitted inside the Institution without a valid proof of identification.
- .3 For the duration of the contract, the names of each construction employee shall be registered in advance to the front desk. Upon entering the institution and during the sign-in process. If the name of an employee is not registered in the system, that employee may not be admitted inside the Institution for that working day. The general contractor is responsible to provide a list of names of all employees including sub-contractors to the Departmental Representative for coordination.
- .4 Entry to Institutional Property will be refused to any person which the Director has reason to believe may be a security risk to the facility's operation.
- .5 Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:
 - .1 Appear to be under the influence of alcohol, drugs or narcotics.
 - .2 Behave in an unusual or disorderly manner.
 - .3 Are in possession of contraband.

1.5 VEHICLES

- .1 All unattended vehicles on the Institution's property shall have their windows, doors and trunks closed and locked at all times. Keys must be removed and kept securely in the possession of the vehicle's owner or with an employee of the Contractor or subcontractor who owns the vehicle.

SPEC NOTE: Institution may require lockable gas caps on all vehicles and motorized equipment.

- .2 The Director may limit at any time the number and type of vehicles allowed within the Institution.

SPEC NOTE: Verify whether drivers of delivery vehicles require security clearance at the Institution of work. If required, edit following clause to suit.

- .3 Drivers of delivery vehicles for material required by the project will not require security clearances but must remain with their vehicle the entire time that the vehicle is in the Institution. This

is of absolute importance for vehicles who must enter the Secure Perimeter of the Institution. The Director may require that these vehicles be escorted by Institutional Staff or Commissionaires while in the Institution.

- .4 If the Director allows office or storage trailers to be left inside the secure perimeter of the Institution, these trailer doors will be locked at all times. All windows will be securely locked when left unoccupied. All trailer windows shall be covered with expanded metal mesh. All storage trailers inside and outside the perimeter shall be locked when not in use.

1.6 PARKING

- .1 Parking area(s) to be used by Construction Employees will be designated by the Director. Parking in other locations will be prohibited and vehicles may be subject to removal by the Institution with towing costs born by their owner.

1.7 SHIPMENTS

- .1 All shipments of project material, equipment and tools shall be addressed in the Contractor's name to avoid confusion with the Institution's own shipments. The Contractor must have his/her own employees on site to receive any deliveries or shipments. CSC staff will NOT accept receipt of deliveries or shipments of any material, equipment or tools.

1. TELEPHONES

- .1 There will be no installation of telephones, facsimile machines and computers with internet connections permitted within the secure perimeter of the Institution unless prior approval of the Director is received.
- .2 The Director will ensure that approved telephones, facsimile machine and computers with internet connections are located where they are not accessible to inmates. All computers will have an approved password protection that will stop an internet connection to unauthorized personnel.

SPEC NOTE: Some Institutions permit the use of cellular or digital

telephones, or two way radios but place restrictions on their use such as "not to be used in Inmate areas".

- .3 Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, BlackBerries, telephone used as 2-way radios, are not permitted within the Secure Perimeter of the Institution unless approved by the Director. If wireless cellular telephones are permitted, the owner/user will not permit their use by any inmate.
- .4 The Director may approve but limit the use of two way radios.

1.9 WORK HOURS

SPEC NOTE: Operational hours vary at each correctional facility. Confirm actual hours with the Institution and cross reference the following clause with pertinent scheduling clauses specified in the Work Scheduling Section located elsewhere in Division #01 of the Project Specifications.

- .1 Be aware that for security reasons the days and hours which Contractor will be permitted to perform work at the site are limited to:
 - .1 Week days only from Monday to Friday and between the hours of [08:00] and [16:00].
- .2 Work will not be permitted during evenings, night time, weekends and statutory holidays without the permission of the Director. A minimum of seven days advance notice will be required to obtain the required permission. In case of emergencies or other special circumstances, this advance notice may be waived by the Director.

SPEC NOTE: Check with the Institution which may have shorter permission request time for following clause.

- .3 The work day and hour restrictions specified above will only be waved for special situations and for certain aspects of the Work deemed necessary and where off-hour work is determined to be the least disruptive approach to the operations of the Institution as determined by the Director.
 - .1 A minimum of [7] days advance notice is required to obtain permission for off-hour work.
 - .2 In case of an emergency, the advanced notification may be waived by the Director.

1.10 OVERTIME WORK

- .1 No overtime work will be allowed without permission of the Director. Give a minimum [forty-eight (48)] hours advance notice when overtime work on the construction project is necessary and approved. If overtime work is required because of an emergency such as the completion of a concrete pour or work to make the construction safe and secure, the Contractor shall advise the Director as soon as this condition is known and follow the directions given by the Director. Costs to the Crown for such events may be attributed to the Contractor.

SPEC NOTE: Check with the Institution which may have a shorter permission request times for the following clause.

- .2 When overtime work or off-hour work, weekend, or statutory holiday work is required and approved by the Director, extra staff members may be posted by the Director or his/her designate, to maintain the security surveillance. The Departmental Representative may post extra staff for inspection of construction activities. The actual cost of this extra staff may be subject to reclamation by the Crown.

SPEC NOTE: Check with Project Manager before adding following article.

- .1 The costs for such service may be charged to the Contractor in the form of a financial assessment against the Contract.

1.11 TOOLS AND EQUIPMENT

- .1 Maintain a complete list of all tools and equipment to be used during the construction project. Make this inventory available for inspection when required. Provide copy of the list to the Director and to Departmental Representative.

SPEC NOTE: Verify with the Institution to obtain a list of non-authorized/restricted tools or equipment that are prohibited for this project. The list should be placed here.

- .2 Throughout the construction project maintain up-to-date the list of tools and equipment specified above.
- .3 Keep all tools and equipment under constant supervision, particularly power-driven and cartridge-driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders and any sort of jacking device.
- .4 Store all tools and equipment in approved secure locations in lockable tool boxes.
- .5 Lock all tool boxes when not in use. Keys to remain in the possession

of the employees of the Contractor. Scaffolding shall be secured and locked when not erected and when erected, will be secured in a manner agreed upon with the Institutional designate or Director.

- .6 All missing or lost tools or equipment shall be reported immediately to the Director.

SPEC NOTE: Some Institutions require that tools and equipment be removed off the property on a daily basis, such as when working on an occupied range. Verify and edit following clauses accordingly.

- .7 The Director will ensure that the security staff members carry out checks of the Contractor's tools and equipment against the list provided by the Contractor. These checks may be carried out at the following intervals:
 - .1 At the beginning and conclusion of every construction project.
 - .2 Weekly, when the construction project extends longer than a one week period.
 - .3 The Contractor may be subject to random checks by security staff to ensure proper storage and security of tools throughout the project.

SPEC NOTE: Verify with the Institution for their specific procedures on controlled items. Edit following clause accordingly.

- .8 Controlled items: entry and use of certain tools and equipment, such as cartridges and hacksaw blades, are highly controlled at the Institution. The Director will determine and advise which items are to be controlled.
 - .1 Controlled items will be given to the Contractor at the beginning of each work day and only in sufficient quantity required for one day.
 - .2 Controlled items must be returned to CSC security personnel at the end of each work day including all worn component such as blades, cartridges etc.
- .9 If propane or natural gas is used for heating the construction, the Institution will require that an employee of the Contractor supervise the construction site during non-working hours.

SPEC NOTE: This is especially a concern if the construction site is close to inmate living units and a fire could endanger human life. Check with institution for their policy.

- .10 If torches or grinders are required tools to perform Work, Contractor must complete a Hot Work Permit as supplied by CSC. Completed original form(s) are copied and posted on the work site in a conspicuous location. Original documents are to remain with the Institutional Fire Chief.

1.12 KEYS

- .1 Security Hardware Keys:
 - .1 The Contractor shall arrange with the security hardware supplier/installer to have the keys for the security hardware to be delivered directly to Institution, specifically the Security Maintenance Officer (SMO).
 - .2 The Security Maintenance Officer (SMO) will provide a receipt to the Contractor for security hardware keys.
 - .3 The Contractor will provide a copy of the above-mentioned receipt to the Departmental Representative.
- .2 Other Keys:
 - .1 The Contractor will use standard construction cylinders for locks for his/her use during the construction period.
 - .2 The Contractor will issue instructions to his/her employees and sub-trades, as necessary, to ensure safe custody of the construction set of keys.
 - .3 Construction cylinders shall only be removed and be replaced with operational cylinders at such time as deemed appropriate by the Director.
 - .4 Upon completion of each phase of the construction, the CSC representative will, in conjunction with the SMO and lock manufacturer:
 - .1 Prepare an operational keying schedule.
 - .2 Accept the operational keys and cylinders directly from the lock manufacturer.
 - .3 Arrange for removal and return of the construction cores and install the operational core in all locks.
- .3 Upon putting operational security keys into use, the approved CSC construction security escort designated by the Director, shall obtain these keys as they are required from the Security Maintenance Officer (SMO) and open doors as required by the Contractor. The Contractor shall issue instructions to his/her employees advising them that all security keys shall always remain with the CSC construction escort.

1.13 SECURITY HARDWARE

- .1 Turn over all removed security hardware to the Director of the Institution for disposal or for safekeeping until required for re-installation.

1.14 PRESCRIPTION DRUGS

- .1 Employees of the Contractor who are required to take prescription drugs during the work day shall obtain approval of the Director to bring a one day supply only into the Institution.

1.15 SMOKING RESTRICTIONS

- .1 Contractors and Construction Employees are not permitted to smoke inside correctional facilities or outdoors within the secure perimeter of a correctional facility and must not possess unauthorized smoking items within the secure perimeter of a correctional facility.
- .2 Contractors and Construction Employees who are in violation of this policy will be requested to immediately cease smoking or dispose of any unauthorized smoking items and, if they persist, will be directed to leave the institution.
- .3 Smoking is only permitted outside the boundary of the secure perimeter of a correctional facility in an area to be designated by the Director.

1.16 CONTRABAND

- .1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are considered Contraband and are strictly prohibited on Institutional Property.
- .2 Discovery of Contraband on the construction site and the identification of the person(s) responsible for the Contraband shall be reported immediately to the Director.
- .3 Contractors shall be vigilant with both their staff and the staff of their sub-contractors and suppliers that the discovery of Contraband may result in cancellation of the security clearance of the affected employee. Serious infractions may result in the removal of the company from the Institution for the duration of the construction.
- .4 Presence of arms and ammunition in vehicles of Contractors, sub-contractors and suppliers or employees of these will result in

the immediate cancellation of security clearances for the driver of the vehicle.

1.17 SEARCHES

- .1 All vehicles and persons entering Institutional property may be subject to search.
- .2 When the Director suspects, on reasonable grounds, that an employee of the Contractor is in possession of Contraband or unauthorized items, he/she may order that person to be searched.
- .3 All employees entering the Institution may be subject to screening of personal effects for traces of Contraband drug residue.

1.18 ACCESS TO AND REMOVAL FROM INSTITUTION PROPERTY

- .1 Construction personnel and commercial vehicles will not be admitted to the Institution after normal working hours, unless approved by the Director.

1.19 MOVEMENT OF VEHICLES

- .1 Escorted commercial vehicles will be allowed to enter or leave the Secure Perimeter of the Institution through the designated vehicle security access gate during the following hours:
 - .1 From [07:45 am] to [11:00 am] and;
 - .2 From [13:00 pm] to [15:30 pm].
- .2 Construction vehicles shall not leave the Institution until an inmate count is completed.
- .3 Vehicles must be escorted by an approved CSC Staff or Commissionaire while inside the Secure Perimeter of the Institution.

SPEC NOTE: Hours vary with each institution. Confirm with the institution.

- .4 The Contractor shall advise the Director twenty four (24) hours in advance to the arrival on the site of heavy equipment such as concrete trucks, cranes, etc.
- .5 Vehicles being loaded with soil or other debris, or any vehicle considered impossible to search, must be under continuous supervision

by CSC Staff or Commissionaires working under the authority of the Director.

- .6 Commercial Vehicles will only be allowed access to Institutional Property when their contents are certified by the Contractor or his/her representative as being strictly necessary to the execution of the construction project.
- .7 Vehicles shall be refused access to Institutional Property if, in the opinion of the Director, they contain any article which may jeopardize the security of the Institution.

SPEC NOTE: Check with the Institution for policy concerning private vehicles.

- .8 Private vehicles of Construction Employees will not be allowed within the security wall or fence of medium or maximum security Institutions without the permission of the Director.

SPEC NOTE: Check with the Institution for policy concerning use of vehicles for transporting employees.

- .9 With prior approval of the Director, a vehicle may be used in the morning and evening to transport a group of employees to and from the Secure Perimeter of the Institution. This vehicle will not remain within the Institution the remainder of the day. However the vehicle shall not be allowed to remain parked inside the Security Perimeter.
- .10 With the approval of the Director, certain equipment may be permitted to remain on the construction site overnight or over the weekend. This equipment must be securely locked, with the battery removed. The Director may require that the equipment be secured with a chain and padlock to another solid object.

1.20 MOVEMENT OF CONSTRUCTION EMPLOYEES ON INSTITUTIONAL PROPERTY

- .1 Subject to the requirements of good security, the Director will permit the Contractor and his/her employees as much freedom of action and movement in the work areas of the site as is possible.
- .2 However, notwithstanding paragraph above, the Director may:
 - .1 Prohibit or restrict access to any part of the Institution.
 - .2 Require that in certain areas of the Institution, either during the entire construction project or at certain intervals, Construction Employees only be allowed access when accompanied by a member of the CSC security staff.

- .3 During the lunch and coffee/health breaks, all Construction Employees will remain within the construction site. Employees are not permitted to eat in the officer's lounge and dining room.

1.21 SURVEILLANCE AND INSPECTION

- .1 Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by CSC security staff members to ensure that established security requirements are met.
- .2 CSC staff members will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among Construction Employees and maintained throughout the construction project.

1.22 STOPPAGE OF WORK

- .1 The Director may request at any time that the Contractor, his/her employees, sub-contractors and their employees not enter or leave the work site immediately due to a security situation occurring within the Institution. The Contractor's site supervisor shall note the name of the CSC staff member making the request and the time of the request and obey the order as quickly as possible.
- .2 The Contractor shall advise the Departmental Representative within 24 hours of this delay to the progress of the work.

1.23 CONTACT WITH INMATES

- .1 Unless specifically authorized, it is forbidden to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any employee doing any of the above will be removed from the site and his/her security clearance revoked.

SPEC NOTE: If this project includes the use of Corcan and inmate labour, check with institution for their regulations concerning inmate contact.

- .2 It is forbidden to take pictures of inmates, of CSC staff members or of any part of the Institution other than those required as part of this Contract.

1.24 COMPLETION OF CONSTRUCTION PROJECT

- .1 Upon completion of the construction project or, when applicable, the takeover of a facility, the Contractor shall remove all remaining construction material, tools and equipment that are not specified to remain in the Institution as part of the construction contract.

END OF SECTION

PART 1 General

- | | | |
|---|----|---|
| 1.1 Construction
<u>Safety Measures</u> | .1 | Without restricting other provisions or requirements of the Contract, observe construction safety measures of National Building Code 2015, Part 8, Provincial Government, Workers'/Workmen's Compensation Board and municipal authority provided that in any case of conflict or discrepancy more stringent requirements shall apply. |
| | .2 | Comply with requirements of FCC No. 301. |
| | .3 | Provide fire extinguishers necessary to protect the work in progress and the Contractor's physical plant on site. Do not use specified permanent fire extinguishers for this purpose. |
| 1.2 References And
<u>Codes</u> | .1 | Perform Work in accordance with National Building Code of Canada (NBC) including all amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply. |
| | .2 | Meet or exceed requirements of: <ul style="list-style-type: none"> .1 Contract documents. .2 Specified standards, codes and referenced documents. |
| | .3 | Contractor responsible for obtaining all necessary building permits. |
| 1.3 <u>Falsework</u> | .1 | Design and construct falsework in accordance with CSA S269.1. |
| 1.4 Building
Smoking
<u>Environment</u> | .1 | Comply with smoking restrictions and municipal by-laws. |

PART 2 PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 General

1.1 Inspection

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests (minimum 48 hours), inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.2 Independent
Inspection Agencies

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to

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ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

1.3 Access To Work

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

1.4 Procedures

- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.5 Rejected Work

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner may deduct from Contract Price difference in value between Work performed and that called for by Contract

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Documents, amount of which shall be determined
by Departmental Representative.

- 1.6 Reports
- .1 Submit 4 copies of inspection and test reports to Departmental Representative.
 - .2 Provide copies to Subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

- 1.7 Tests And Mix Designs
- .1 Furnish test results and mix designs as may be requested.
 - .2 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Departmental Representative and may be authorized as recoverable.

PART 2 PRODUCTS

- 2.1 NOT USED
- .1 Not Used.

PART 3 EXECUTION

- 3.1 NOT USED
- .1 Not Used.

END OF SECTION

PART 1 General

- | | | |
|---|----|--|
| 1.1 <u>Site Access
And Parking</u> | .1 | Parking will be permitted on site in an area as directed by the Departmental Representative provided it does not disrupt performance of Work. |
| | .2 | The Contractor shall maintain access to project site. Follow all instructions from the Departmental Representative in regards to use of such facilities. |
| | .3 | Maintain roads and parking areas located within the construction compound and outside the institution. Provide snow removal and dust control during period of work. |
| | .4 | Make good damage resulting from Contractors' use of existing roads. |
| | .5 | Wash clean parking and access roads used by Contractor's equipment. |
| 1.2 <u>Building Access</u> | .1 | Use only access doors, and circulation routes within building as designated by Departmental Representative to access interior work. |
| 1.3 <u>Contractor's
Site Office</u> | .1 | Be responsible for and provide own site office, if required, including electricity, heat, lights and telephone. Locate site office as directed by Departmental Representative. |
| 1.4 <u>Material
Storage</u> | .1 | Locate site storage trailers where directed by Departmental Representative. Place in location of least interference with existing Facility operations. |
| | .2 | Material storage space on site does not exist. Coordinate delivery to minimize storage period on site before being needed for incorporation into work. |

1.5 Site Enclosures

- .1 Provide temporary fence where designated on by departmental and as agreed to by Site representative to enclose various construction areas of work site.
- .2 Make all gates lockable. Institution Security to provide keyed padlocks.
- .3 Obtain Departmental Representative's approval beforehand of location and layout of all temporary fence enclosures.
- .4 Provide warning signs affixed to all fenced areas, identifying those enclosed areas as "Construction Zones" with access restricted to only those persons so authorized by General Contractor.
- .5 Do not construe fencing as an acceptable replacement for pedestrian walkway and hoarding requirements specified below.

1.6 Pedestrian Walkways And Hoarding

- .1 Ensure maximum safety and security to facility users during the course of work.
- .2 Be responsible for and provide temporary 2.4 metre high plywood construction hoarding when work is adjacent to circulation routes used by facility employees and inmates.
- .3 Maintain access and egress to building entrances and fire exits designated by Departmental Representative to remain in use.
- .4 Adequately frame and brace hoarding and walkways to resist site conditions.
- .5 Erect such protective devices during Facility's non-operational off hour periods.
- .6 Obtain Departmental Representative's concurrence prior to removal of hoarding and walkways.

1.7 Interior Dust Control And Dust Barriers

- .1 Control creation and spread of dust and dirt to building interior and in particular to areas within premises still under use by occupants.
- .2 Develop and implement a dust control plan,

addressing effective measures to carry out work with least amount of dust being created and propagated.

- .1 Carefully evaluate the type of work to be undertaken and the physical layout of each work area on site.
 - .2 Provide specifically tailored strategy for each work area.
 - .3 Pre-determine location and placement of dust barriers to confine resulting dust to immediate work area.
 - .4 Inform Departmental Representative of the proposed dust control measures to be followed at each work area and for each major dust generating activities. Obtain Departmental Representative's approval before proceeding with work.
- .3 Dust control plan to incorporate as a minimum the following dust protection and cleaning requirements:
- .1 Erect dustproof partitions completely around work area to fully isolate construction from other parts of the building.
 - .2 Construct hoarding/dust partitions as follows:
 - .1 Use 10 mm polyethylene installed and sealed tightly to abutting walls, ceilings and floor with continuous duct tape along all edges and seams. Support in position with 38 x 89 wood framing at 400 mm o.c. Locate seams only at framing members and overlap sheathing by minimum of 150 mm.
 - .2 Use 19 mm thick plywood installed to wood stud framing spaced at 400 o.c.
 - .1 Erect from floor to underside of ceiling above, sheathing applied to occupied side of partition. Install polyethylene beneath plywood sheathing.
 - .2 Scribe, cut and fit sheathing tight to shape of structural steel, deck profile and to other obstructions in ceiling space and abutting walls.
 - .3 Use compressible neoprene gaskets around perimeter of partition and at all protrusions

to achieve airtight
construction.

- .3 Provide a "dust tight" and lockable access door(s) within dust partition or between rooms for worker entry into work area. This is of particular importance for situations where excessive dust will be generated.
- .4 Provide additional dust barriers, placed tightly to underside of the floor/roof deck above, in locations where existing walls are used as part of the dust barrier system but simply terminate at the finished ceiling level resulting in an open space above, or other similar condition, permitting dust to migrate beyond the construction areas.
- .5 Make all dust barriers airtight, effectively blocking and stopping all dust migration.
- .6 Inspect dust barriers at various intervals during each work shift. Immediately fix tears, unsealed edges and maintain barriers effectively sealed for the entire work duration.
- .7 Immediately clean areas in use by occupants contaminated by work.
 - .1 Remove accumulated dust from all surfaces.

- .4 Meager attempts at controlling dust will not be tolerated. Failure to provide effective dust control during work and to perform satisfactory cleaning thereafter will result in Departmental Representative to proceed and obtain a separate cleaning service agency to perform cleaning to tenant's satisfaction with cost for such services being charged against this Contract in the form of financial holdbacks.

1.8 Power

- .1 Power supply is available and will be provided for construction usage at no cost.
 - .1 Make arrangements for the use of such services through the Departmental Representative.
 - .2 Departmental Representative will designate and approve each location of existing power source to which connections can be made to obtain temporary power service.

- .3 Connect to existing power supply in accordance with Canadian Electrical Code.
 - .2 Provide and pay all costs to supply and install temporary cabling, panelboards, switching devices and other equipment as required to connect into power source, provide adequate ground fault protection and extend power supply from existing source to work areas. Perform work and make all connections in accordance with the Canadian Electrical Code, in compliance with the federal and provincial Occupational Health and Safety Regulations as specified in section 01 35 29.06 and to lockout requirements specified in section 01 35 25.
 - .3 Provide and maintain temporary lighting to conduct work. Ensure illumination level is not less than 162 lux in all locations.
 - .4 Electrical power and lighting systems installed under this Contract can be used for construction requirements provided that guarantees are not affected thereby. Make good damage.
- 1.9 Water Supply
 - .1 Water supply is available in existing building and will be provided for construction usage at no cost. Make arrangements for the use and transportation of such services to work area through the Departmental Representative.
- 1.10 Ventilating
 - .1 Provide temporary ventilation in enclosed areas as required to:
 - .1 Facilitate progress of work.
 - .2 Provide adequate ventilation to meet health regulations for safe working environment.
 - .2 Maintain strict supervision of operation of temporary ventilating equipment to:
 - .1 Conform to applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.

- | | | |
|---|----|---|
| 1.11 Construction
<u>Sign And Notices</u> | .1 | Contractor or subcontractor advertisement signboards are not permitted on site. |
| | .2 | Safety and Instruction Signs and Notices: |
| | .1 | Signs and notices for safety and instruction shall be in both official languages or commonly understood graphic symbols conforming to CAN3-Z321. |
| | .3 | Maintenance and Disposal of Site Signs: |
| | .1 | Maintain approved signs and notices in good condition for duration of project and dispose of off-site on completion of project or earlier if directed by Departmental Representative. |
| 1.12 Removal Of
Temporary
<u>Facilities</u> | .1 | Remove temporary facilities from site when directed by Departmental Representative. |

END OF SECTION

PART 1 General

- | | | |
|-------------------------------------|----|---|
| <u>1.1 Related Sections</u> | .1 | Section 01 35 55 - Security Requirements Outside the Perimeter. |
| | .2 | Section 01 35 56 - Security Requirements Inside the Perimeter. |
| <u>1.2 References</u> | .1 | Canadian General Standards Board (CGSB)
.1 CAN/CGSB 1.189-00, Exterior Alkyd for Primer Wood.
.2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel. |
| | .2 | Canadian Standards Association (CSA International)
.1 CSA-A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CSA-0121-08 (R2013), Douglas Fir Plywood. |
| | .3 | CAN/CSA-S269.2-M87 (R2003), Access Scaffolding for Construction Purposes. |
| | .4 | CAN/CSA-Z321-96 (R2006), Signs and Symbols for the Occupational Environment. |
| <u>1.3 Submittals</u> | .1 | Provide submittals in accordance with Section 01 33 00 - Submittal Procedures. |
| <u>1.4 Installation And Removal</u> | .1 | Provide construction facilities in order to execute work expeditiously. |
| | .2 | Remove from site all such work after use. |
| <u>1.5 Scaffolding</u> | .1 | Scaffolding in accordance with CAN/CSA-S269.2. |
| | .2 | Provide and maintain scaffolding, ramps, ladders, platforms. |

1.6 Site Storage/
Loading

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.7 Security

- .1 Refer to Section 01 35 13 - Security Requirements.

1.8 Offices

- .1 Provide office heated to 22° C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide a clearly marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors may provide their own offices as necessary.
- .4 Locate offices where directed by the Departmental Representative.

1.9 Equipment,
Tool And Material
Storage

- .1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

1.10 Sanitary
Facilities

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

- 1.11 Construction Signage
- .1 No signs or advertisements, other than warning signs, are permitted on site.
 - .2 Signs and notices for safety and instruction shall be in both official languages Graphic symbols shall conform to CAN3-Z321.
 - .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

- 1.12 Clean-Up
- .1 Remove construction debris, waste materials, packaging material from work site daily.
 - .2 Store materials resulting from demolition activities that are salvageable.
 - .3 Stack stored new or salvaged material not in construction facilities.

PART 2 PRODUCTS

- 2.1 NOT USED
- .1 Not Used.

PART 3 EXECUTION

- 3.1 NOT USED
- .1 Not Used.

END OF SECTION

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PART 1 - GENERAL

- 1.1 As-Built Drawings
- .1 Contractor responsible for As-Built Drawings.
 - .2 Departmental Representative will provide two sets of white prints for as-built drawing purposes.
 - .3 Maintain project as-built drawings and record accurately deviations from Contract documents.
 - .4 Record changes in red. Mark on one set of prints and at completion of project and prior to final inspection, neatly transfer notations to second set and submit both sets to Departmental Representative.
 - .5 Record following information:
 - .1 Depths of various elements of foundation.
 - .2 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.
 - .3 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by Change Order or Field Order.
 - .6 At completion of the project and prior to final inspection, submit to the Departmental Representative, the set of marked up white prints, for review by the Departmental Representative.

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PART 2 - PRODUCTS Not
Used.

PART 3 - EXECUTION Not
Used.

END OF SECTION

PART 1 - GENERAL

1.1 General

- .1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
- .2 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .3 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

1.2 Materials

- .1 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.3 Cleaning During Construction

- .1 Contractor is responsible to clean work daily and provide dumpsters as required to accomodate waste materials and debris from each days work. Keep work area neat, tidy and free from debris that would create a safety hazard. Broom clean work areas daily.
 - .1 If, in the opinion of the Safety Officer or the Departmental Representative, the cleaning of the site is not satisfactory, the Departmental Representative will give warning to the Contractor and it will be there responsibility to rectify the deficiency. After a period of 2 days, if the cleaning has not been completed by the Contractor, the Departmental Representative reserves the right to have areas cleaned, and cleaning invoice will be deducted from progress claim.
- .2 Dispose of waste materials, and debris off site.
- .3 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

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- .4 Clean site on daily bases to remove all dust, and debris generated within the operating building. Provide drop cloths, shields, barriers to minimize generation of contaminates.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

PART 1 General

- 1.1 Definitions
- .1 Materials Source Separation Program (MSSP): consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.
 - .2 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
 - .3 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
 - .4 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
 - .5 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.
 - .6 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
 - .7 Separate Condition: refers to waste sorted into individual types.
 - .8 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.
- 1.2 Documents
- .1 Maintain at job site, one copy of following documents:
 - .1 Material Source Separation Plan.

- 1.3 Submittals
- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Prepare and submit following prior to project start-up:
 - .1 Submit 2 copies of Materials Source Separation Program (MSSP) description.
- 1.4 Materials Source Separation Program (Mssp)
- .1 Prepare MSSP and have ready for use prior to project start-up.
 - .2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Departmental Representative.
 - .3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
 - .4 Provide containers to deposit reusable and recyclable materials.
 - .5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
 - .6 Locate separated materials in areas which minimize material damage.
 - .7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.
 - .1 Transport to approved and authorized recycling facility.
 - .8 Collect, handle, store on-site, and transport off-site, salvaged materials in combined condition.
 - .1 Ship materials to site operating under Certificate of Approval.
 - .2 Materials must be immediately separated into required categories for reuse or recycling.
- 1.5 Storage, Handling
- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental

Springhill Institution Demolition of Building No. 10 Project No. R.083508.001 And Protection	Construction / Demolition Waste Management and Disposal	Section 01 74 21 Page 3 2017-10-20
	Representative.	
	.2	Unless specified otherwise, materials for removal become Contractor's property.
	.3	Protect, stockpile, store and catalogue salvaged items.
	.4	Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
	.5	Protect surface drainage, mechanical and electrical from damage and blockage.
	.6	Separate and store materials produced during dismantling of structures in designated areas.
	.7	Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
	.1	On-site source separation is recommended.
	.2	Remove co-mingled materials to off-site processing facility for separation.
	.3	Provide waybills for separated materials.
1.6 Disposal Of Wastes	.1	Do not bury rubbish or waste materials.
	.2	Do not dispose of waste into waterways, storm, or sanitary sewers.
	.3	Remove materials from deconstruction as deconstruction/disassembly Work progresses.
	.4	Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.
1.7 Use Of Site And Facilities	.1	Execute work with least possible interference or disturbance to normal use of premises.
	.2	Provide temporary security measures approved by Departmental Representative.
1.8 Scheduling	.1	Co-ordinate Work with other activities at site

PART 2 PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 EXECUTION

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

3.2 Cleaning .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
.2 Clean-up work area as work progresses.
.3 Source separate materials to be reused/recycled into specified sort areas.

3.3 Diversion Of Materials .1 The diversion of waste materials from landfills is highly encouraged. Separate, recyclable and reusable materials where possible.
.2 On-site sale of salvaged, recovered, reusable, or recyclable materials is not permitted.

END OF SECTION

PART 1 General

1.1 Submittals

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .3 Copy will be returned after final inspection, with Departmental Representative's comments.
- .4 Revise content of documents as required prior to final submittal.
- .5 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, Electronic version of Operating and Maintenance Manuals and As-Built Drawings in English. Submit single PDF file for each Discipline.
- .6 Submit to Departmental Representative final one copy in print format (hard copy) Operating and Maintenance Manual in English for review.
- .7 If requested, furnish evidence as to type, source and quality of products provided.
- .8 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .9 Pay costs of transportation.

1.2 Format

- .1 Organize data in the form of an instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.
- .4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

1.3 Contents - Each
Volume

- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
 - .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
 - .7 Text: Manufacturer's printed data, or typewritten data.
 - .8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
 - .9 Provide 1:1 scaled CAD files in dxf format on CD.
-
- .1 Table of Contents: provide title of project;
 - .2 Date of submission; names,
 - .3 Addresses, and telephone numbers of Departmental Representative and Contractor with name of responsible parties;
 - .4 Schedule of products and systems, indexed to content of volume.
-
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
 - .3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
 - .4 Drawings: supplement product data to illustrate relations of component parts of equipment
 - .5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.4 As-Builts And
Samples

- .1 In addition to requirements in General Conditions, maintain at the site for Departmental Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to the Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

1.5 Recording
Actual Site
Conditions

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.
- .2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

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- .2 Field changes of dimension and detail.
 - .3 Changes made by change orders.
 - .4 Details not on original Contract Drawings.
 - .5 References to related shop drawings and modifications.
 - .5 Specifications: legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
 - .6 Other Documents: maintain manufacturer's certifications, inspection certifications, and field test records, required by individual specifications sections.
- 1.6 Storage, Handling And Protection
- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
 - .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
 - .3 Store components subject to damage from weather in weatherproof enclosures.
 - .4 Store paints and freezable materials in a heated and ventilated room.
 - .5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

PART 2 PRODUCTS

- 2.1 NOT USED .1 Not Used.

PART 3 EXECUTION

- 3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

- | | | |
|-----------------------------------|----|--|
| <u>1.1 Related Sections</u> | .1 | Section 31 23 33.01 - Excavating, Trenching and Backfilling. |
| | .2 | Section 02 41 16 - Structure Demolition |
| <u>1.2 References</u> | .1 | Canadian Federal Legislation |
| | .1 | Canadian Environmental Protection Act (CEPA), 1999. |
| | .2 | Canadian Environmental Assessment Act (CEAA), 2012. |
| | .3 | Transportation of Dangerous Goods Act (TDGA), 1992. |
| | .4 | Motor Vehicle Safety Act (MVSA), 1995. |
| <u>1.3 Storage and Protection</u> | .1 | Protect in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling. |
| | .2 | Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Owner. |
| | .3 | In all circumstances ensure that demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution. |
| | .4 | Do not dispose of waste of volatile materials such as, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers. Ensure proper disposal procedures are maintained throughout the project. |
| | .5 | Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties. |
| | .6 | Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local |

authorities.

- .7 Protect trees, plants and foliage on site and adjacent properties.

1.4 Existing
Conditions

- .1 Prior to the start of any demolition work remove contaminated or hazardous materials as defined by authorities having jurisdiction from site and dispose of at designated disposal facilities in safe manner in accordance with Transportation of Dangerous Goods Act (TDGA) and all other applicable regulatory requirements.

1.5 Regulatory
Requirements

- .1 Ensure all work is performed in compliance with all applicable federal regulations.

1.6 Submittals

- .1 Prior to commencement of work on site submit detailed report indicating anticipated percentages of reuse, recycling and landfill, schedule of selective demolition, material description and quantities of materials to be salvaged, number and location of dumpsters, anticipated frequency of tipping, and name and address of all waste receiving organizations.
- .2 Supply certified receipts from authorized disposal sites and reuse and recycling facilities for all material removed from site. Written authorization from the Departmental Representative is required to deviate from the receiving organizations listed in waste reduction workplan.

1.7 Scheduling

- .1 Ensure project time lines are met without compromising specified minimum rates of material diversion. Notify Departmental Representative in writing of delays.

PART 2 - PRODUCTS

2.1 Equipment

- .1 Equipment and heavy machinery used to meet or exceed all applicable emission requirements.

- .2 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

PART 3 - EXECUTION

3.1 Preparation

- .1 Inspect site 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.

3.2 Sequences of Operation

- .1 Removal
 - .1 Remove items as indicated.
 - .2 Do not disturb items designated to remain in place.
 - .3 In removal of pavements, curbs and gutters:
 - .1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Departmental Representative.
 - .2 Protect adjacent joints and load transfer devices.
 - .3 Protect underlying and adjacent granular materials .
 - .4 When removing pipes under existing or future pavement area, excavate at least 300 mm below pipe invert.
 - .5 Remove only as many trees as required during demolition. Obtain written approval of Departmental Representative prior to removal of any trees not designated.
- .2 Backfill
 - .1 Backfill in areas as indicated and in

accordance with Section 31 23 33.01 -
Excavating, Trenching and Backfilling.

- 3.3 Restoration
- .1 Restore areas and existing works outside areas of demolition to conditions that existed prior to commencement of work..
 - .2 Use only soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- 3.4 Cleanup
- .1 Upon completion of work, remove debris, trim surfaces and leave work site clean.
 - .2 Use only cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- 3.5 Coordination
- .1 Coordinate alternative disposal activities with Departmental Representative's on site waste diversion representative.
 - .2 Potential volumes of divertable materials, a list of verified alternate disposal options, and a collection outline upon award of contract will be provided by Departmental Representative on request.
 - .3 The Waste Management Coordinator as defined in Section 01 74 21 is responsible for ensuring all coordination requirements are fulfilled to the satisfaction of Departmental Representative.

PART 1 - GENERAL

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| <u>1.1 Standard</u> | .1 | Comply with National Building Code, Part 8, Construction Safety Measures at Construction and Demolition sites, and Provincial requirements. |
| <u>1.2 Asbestos</u> | .1 | Demolition of spray or trowel applied asbestos can be hazardous to health. Should material resembling spray or trowel-applied asbestos be encountered, stop work and notify Departmental Representative immediately. Do not proceed until written instructions have been received from Departmental Representative. Refer to Section 02 82 11 and Environmental Report for Asbestos & Hazardous Abatement for noted areas to be removed. |
| <u>1.3 Protection</u> | .1 | Prevent movement, settlement, or other damage to adjacent structures, utilities, and parts of building to remain in place. Provide bracing and shoring required. |
| | .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. |
| <u>1.4 Shop Drawings</u> | .1 | Before proceeding with demolition or breaking out of load bearing walls or of other walls requiring shoring, provide to Departmental Representative shoring and underpinning drawings prepared by qualified professional engineer registered or licensed in the province of Nova Scotia in Canada showing proposed method. |

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| <u>1.5 Notice</u> | .1 | Notify Departmental Representative 3 days prior to disrupting building access or services. |
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PART 2 - PRODUCTS
Not Used.

PART 3 - EXECUTION

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| <u>3.1 Demolition
Salvage and
Disposal</u> | .1 | Demolition of existing residence buildings No. 10. Sort materials into appropriate piles for recycling and or reuse. |
| | .2 | Remove items to be reused, store as directed by Departmental Representative. |
| | .3 | Dispose of removed materials, to appropriate recycling facilities except where specified otherwise, in accordance with authority having jurisdiction. |
| | .4 | Remove all underground Mechanical Services. |
| | .5 | Remove all concrete foundations and footings backfill to Section 31 23 33.01 Excavation, Trenching and Backfilling. |
| <u>3.2 Schedule of
Special Removal</u> | .1 | Building material requiring special consideration for removal and demolition are as follows: <ul style="list-style-type: none">.1 Asbestos removal per section 02 82 11.<ul style="list-style-type: none">.1 All mechanical piping, and elbows..2 Debris in mechanical duct chases. (typical location from mechanical room to top of cell blocks).3 Debris in service rooms under piping elbows..2 PCB light ballasts removals.<ul style="list-style-type: none">.1 All ballasts are to be removed in conformance with Section 02 85 14. |

END OF SECTION

PART 1 - GENERAL

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| <u>1.1 Related Sections</u> | .1 | Section 02 41 16 - Demolition of Structures. |
| | .2 | Section 02 41 13 - Selective Site Demolition. |
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| <u>1.2 References</u> | .1 | Canadian Standards Association (CSA) |
| | .1 | CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures. |
| | .2 | United States Environmental Protection Agency |
| | .1 | CFR 86.098-10, Emission Standards for 1998 and Later Model Year Otto-Cycle Heavy Duty Engines and Vehicles. |
| | .2 | CFR 86.098-11, Emission Standards for 1998 and Later Model Year Diesel Heavy Duty Engines and Vehicles. |
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| <u>1.3 Definitions</u> | .1 | Deconstruction: The systematic dismantling of a structure to salvage materials for reuse. What cannot be reused is considered subsequently for recycling. The ultimate objective is to recover potentially valuable resources while diverting from landfill what has traditionally been a significant portion of the waste system. |
| | .2 | Reuse: The use of a building material in its original form and function. |
| | .3 | Recycling: The use of a building material which has been processed in some way for use in a form and function which is different from its original form and function. |
| | .4 | Waste Management Coordinator (WMC): Contractor representative responsible for supervising all waste management activities as well as coordinating all related, required submittal and reporting requirements. |

- .5 Hazardous Materials: Dangerous substances, dangerous goods, hazardous commodities and hazardous products, such as poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or any other material that can endanger human health or well being or the environment if handled improperly.
- .6 Alternate Disposal: The reuse and recycling of materials by a designated facility, user or receiving organization which has a valid Certificate of Approval to operate. The alternative to landfill disposal.

1.4 Quality Assurance

- .1 Ensure work is performed in compliance with all applicable federal regulations.

1.5 Site Conditions

- .1 Existing Conditions:
 - .1 If material resembling spray or trowel applied asbestos or any other designated substance listed as hazardous be encountered in course of deconstruction, other then areas indicated in specifications, Contractor is to stop work, take preventative measures, and notify Departmental Representative immediately. Do not proceed until written instructions have been received.
 - .2 Clearly label and package all component parts of mechanical and electrical material specified for salvage in accordance with Departmental Representative's instructions to prevent damage or loss.
- .2 Protection:
 - .1 Prevent movement, settlement or damage of adjacent structures, services, walks, paving, and landscaping. Provide bracing shoring underpinning as required. Repair damage caused by deconstruction as directed by Departmental Representative.

- .2 Support affected structures and, if safety of structure being deconstructed or adjacent structures services appears to be endangered, take preventative measures. Cease operations and immediately notify Departmental Representative.
- .3 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems.

PART 2 - PRODUCTS

2.1 Equipment

- .1 Equipment and heavy machinery used during course of demolition must meet or exceed all applicable emission requirements.
- .2 Leave equipment and machinery running only while in use, except where extreme temperatures prohibit shutting down.
- .3 Where possible use water efficient wetting equipment/trucks/attachments when minimizing dust.
- .4 Demonstrate that all tools are being used in a manner which allows for the salvage of materials in best condition possible.

PART 3 - EXECUTION

3.1 Preparation

- .1 Disconnect and re-route electrical, telephone and communication service lines entering buildings to be deconstructed. Post warning signs on electrical lines and equipment which must remain energized to serve other products during period of demolition.
- .2 Locate and protect utility lines. Do not disrupt active or energized utilities designated to remain undisturbed.

- .3 Disconnect and cap designated mechanical services.
 - .1 Sewer and water lines: remove in accordance with requirements of authority having jurisdiction.
 - .2 Other underground services: remove and dispose of as indicated.

3.2 Removal of Hazardous Wastes

- .1 Prior to start of deconstruction work remove contaminated or hazardous materials as defined by authorities having jurisdiction from site and dispose of in safe manner in accordance with Transportation of Dangerous Goods Act (TDGA) and all other applicable regulatory requirements. Refer to Section 02 41 16.

3.3 Disassembly

- .1 Materials removed from designated structures are property of Contractor unless noted otherwise.
- .2 Throughout course of deconstruction pay close attention to connections and material assemblies. Employ workmanship procedures which minimize damage to materials and equipment.
- .3 Project supervisor with previous deconstruction experience must be present on site at all times throughout projects deconstruction phase.
- .4 Deconstruct in accordance with CSA S350 and all other applicable safety standards.
- .5 Workers must utilize adequate fall protection where required by authorities having jurisdiction.
- .6 Maintain structural integrity of structure at all times.
- .7 Systematically remove all finishes, furnishings, and mechanical and electrical equipment of value.

- .8 Carefully remove all windows and doors from structure.
- .9 Disassemble all non-loadbearing interior partitions and remove materials from structure.
- .10 Disassemble in sequence: roof, interior loadbearing partitions, exterior walls, floors, foundation, and underground services.
- .11 Wherever possible, transfer material assemblies from heights to ground level for easier disassembly. Take all appropriate measures to ensure safety.
- .12 Separate from waste stream, all materials designated for alternate disposal as indicated, but not limited to the following:
 - .1 Remove all steel structure, door frames, steel piping, rebar from concrete, structural elements, piping, electrical panels, hardware, lintels, conduit, ductwork, fixtures, boilers, mortars, metal ceiling panels, toilet partitions, steel doors, handrails, outlet boxes, mechanical and electrical equipment and deliver to licensed recycling plant.
 - .2 Crush all brick, concrete block, concrete slabs, concrete walkways, concrete foundations, concrete footings, catch basins to sizes not larger than 200 mm and reuse for site fill (crushed site fill as indicated in section 31 23 33). All surplus material to be removed off site.
 - .3 Remove all aluminum frames, doors and and deliver to licensed recycling plant.
 - .4 Remove all glass and light tubes and deliver to a licensed recycling plant.
 - .5 Remove all copper piping, wiring, lab fixtures/trim, and flashing and deliver to licensed recycling plant.
 - .6 Remove all millwork, porcelain fixtures, plaster, cardboard, plastic; separate and dispose to landfill.
 - .7 Remove all wood doors, millwork, roofing, flooring, porcelain fixtures, speed tile, plaster, cardboard, plastic; separate and dispose to landfill.

- 3.4 Stockpiling
- .1 Clearly label all stockpiles, indicating material type and quantity.
 - .2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

- 3.5 Removal From Site
- .1 Transport material designated for alternate disposal to approved receiving organizations. Do not deviate from receiving organizations listed in waste reduction workplan without prior written authorization from Departmental Representative. Provide Departmental Representative with all way bills, and receipts.

- 3.6 Cleaning and Restoration
- .1 Keep site clean and organized throughout deconstruction.
 - .2 Upon completion of project, remove debris, trim surfaces and leave work site clean.
 - .3 Upon completion of project, reinstate all areas affected by Work to match condition of adjacent, undisturbed areas.

END OF SECTION

PART 1 - GENERAL

- 1.1 References
- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.205-2003, 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 Nova Scotia Environment:
 - .1 Asbestos in the Workplace: A Guide to Assessment & Management of Asbestos in the Workplace, 2013
 - .2 Asbestos in the Workplace: A Guide to Removal of Friable Asbestos Containing Material, 2013
 - .6 Nova Scotia Environmental Act, 1995, Asbestos Waste Management Regulations, N.S. Reg. 53/95.
- 1.2 Definitions
- .1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any dimension at 99.97% efficiency.
 - .2 Amended Water: Water with a non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.
 - .3 Asbestos-Containing Materials (ACMs): materials that contain 0.5% or more asbestos by dry weight. Materials identified under Existing Conditions (Section 1.5), including fallen materials and settled dust.

- .4 Minor Amounts of ACMs: Less than or equal to 0.1 m² of friable material containing chrysotile asbestos.
- .5 Asbestos Work Area: Area where work takes place which will, or may disturb ACMs.
- .6 Authorized Visitors: Departmental Representative, or designated representatives, and representatives of regulatory agencies.
- .7 Friable Material: Material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.
- .8 Occupied Area: Any area of the building or work site that is outside the Asbestos Work Area.
- .9 Polyethylene: Polyethylene sheeting or rip-resistant polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.
- .10 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 the mid-section of the bag.
 - .4 Straps for sealing ends around pipe.
 - .5 Must incorporate internal closure strip if it is to be moved or used in more than one specific location.
- .11 Sprayer: Garden reservoir type sprayer or airless spray equipment capable of producing a mist or fine spray. Must have appropriate capacity for scope of work.
- .12 Airlock: system for permitting ingress or

egress without permitting air movement between contaminated area and uncontaminated area, typically consisting of two curtained doorways at least 2 m apart.

- .13 Curtained doorway: arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed as follows:

.1 Place two overlapping sheets of polyethylene over existing or temporarily framed doorway, secure each along top of doorway, secure vertical edge of one sheet along one vertical side of doorway, and secure vertical edge of other sheet along opposite vertical side of doorway.

.2 Reinforce free edges of polyethylene with duct tape and weight bottom edge to achieve proper closing.

.3 Overlap each polyethylene sheet at openings not less than 1.5 m on each side.

- .14 Negative pressure: system that extracts air directly from work area, filters such extracted air through High Efficiency Particulate Air filtering system, and discharges this air directly outside work area to exterior of building.

.1 System to maintain minimum pressure differential of 5 Pa relative to adjacent areas outside of work areas, be equipped with alarm to warn of system breakdown, and be equipped with instrument to continuously monitor and automatically record pressure differences.

1.3 Regulatory Requirements

- .1 Comply with Federal, Provincial, and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications the more stringent requirement applies. Comply with regulations in effect at the time the work

is performed.

1.4 Submittals

- .1 Submit proof satisfactory to the Departmental Representative that suitable arrangements have been made to dispose of asbestos-containing waste in accordance with requirements of authority having jurisdiction.
- .2 Submit Provincial and/or local requirements for Notice of Project Form.
- .3 Submit proof of Contractor's Asbestos Liability Insurance.
- .4 Submit to Departmental Representative all necessary permits for transportation and disposal of asbestos-containing waste and proof that asbestos-containing waste has been received and properly disposed of.
- .5 Submit proof satisfactory to Departmental Representative that all employees have had instruction on hazards of asbestos exposure, respirator use, dress, entry and exit from Asbestos Work Area, and all aspects of work procedures and protective measures.
- .6 Submit proof that supervisory personnel have attended an asbestos abatement course, of not less than two days duration, approved by Departmental Representative. Minimum of one supervisor for every ten workers.
- .7 Submit Worker's Compensation Board status and transcription of insurance.
- .8 Submit documentation including test results, fire and flammability data, and Material Safety Data Sheets for chemicals or materials including:
 - .1 encapsulants;
 - .2 amended water;
 - .3 slow-drying sealer.
- .9 Submit layout of proposed enclosures and decontamination facilities to Department

Representative for review.

1.5 Existing
Conditions

- .1 Reports and information pertaining to material containing chrysotile asbestos to be handled, removed, or otherwise disturbed and disposed of during this project are available for inspection at PWGSC.
- .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.
- .3 Existing pipe insulation, pipe elbows, and duct chases contain asbestos.
- .4 The following asbestos-containing materials or presumed asbestos containing materials are associated with Building 10:
 - Insulation and residual insulation on Pipe fittings (elbows, tee joints and end of runs) associated with: heating supply and return lines; domestic hot and cold water lines; and roof or other drains. Previous work reports that some abatement has occurred but debris material is present in some areas and will require abatement. Some areas will require pre-demolition to access pipe chases and areas behind plumbing fixtures. Pipe fittings are considered to be friable asbestos-containing materials.
 - Gasket material around the 300 mm "water main" entrance to the building in the lower mechanical room is a friable asbestos containing material. This was reported to be an abandoned steam line entrance to the building.
 - 300mm "water main" is reported to be suspected asbestos-cement pipe which will require testing to confirm the presence/absence of asbestos. Pipe is to be assumed to be asbestos-containing until tested otherwise. A portion of this pipe may extend underground and

will require capping as part of the demolition project. It was reported that this "water main" is an abandoned steam line connection. The pipe insulation inside and outside the building is to be assumed to be asbestos containing unless tested otherwise. The cement pipe is non-friable asbestos while pipe insulation and parging materials are considered to be friable asbestos.

- Caulking associated with roof mounted duct work is a non-friable asbestos containing material.
- 12"x12" Brown vinyl floor tiles with white streaks are a non-friable asbestos-containing material. Reference sample was taken from Room A11. There is similar tile in various other cells or portions of cells, some of which is covered by paint.
- Textured ceiling in Rooms 201/202/203 and cell A17 are to be tested to confirm the presence / absence of asbestos in the materials. Contractor is to assume these materials contain friable asbestos until tested otherwise.

1.6 Instruction and Training

- .1 Before commencing work, provide to Departmental Representative satisfactory proof that every worker has had instruction and training in the hazards of asbestos exposure, in personal hygiene and work practices, in use of glove bag procedures, and in use, cleaning, and disposal of respirators and protective clothing.
- .2 Instruction and training related to respirators includes, at a minimum:
 - .1 Fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided

by a competent, qualified person.

1.7 Worker
Protection minimum

- .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area, while non-friable materials are disturbed or while a glove-bag is utilized, provided non-friable materials are not being removed by means other than hand powered tools, include:
 - .1 Non-powered reusable or replaceable filter-type respirator equipped with HEPA filter cartridges, personally issued to the worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to the Provincial Authority having jurisdiction.
 - .2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres, consisting of full-body covering including head covering with snug-fitting cuffs at wrists, ankles, and neck.
- .2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
- .3 Before leaving the Asbestos Work Area, dispose of protective clothing as contaminated waste as specified.
- .4 Ensure workers wash hands and face when leaving Asbestos Work Area. Facilities for washing are to be provided by the Contractor.
- .5 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects the seal between the respirator and the face.

1.8 Worker
Protection maximum

- .1 Protective equipment and clothing to be worn by workers while friable materials are disturbed, or non-friable materials are removed by means other than hand powered tools as part of maximum precaution enclosure 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. Fit respirator 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. Clean, disinfect and inspect respirator after use on each shift, or more often if necessary. A respirator that has been damaged or has deteriorated parts is to be replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. DCC Representative will 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, consisting of full-body covering including head covering with snug-fitting cuffs at wrists, ankles, and neck.

.2 Requirements for each worker:

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

.2 Remove gross contamination from clothing before leaving Asbestos Abatement Work Area. Place contaminated worksuits in receptacles for disposal with other

asbestos - contaminated materials. Leave reusable items except respirator in Equipment and Access Room. Still wearing the respirator proceed naked to showers. Using soap and water wash body and hair thoroughly. Clean outside of respirator with soap and water while showering; remove respirator; remove filters and wet them and dispose of filters in container provided for purpose; and wash and rinse inside of respirator. When not in use in work area, store work footwear in Equipment and Access Room. Upon completion of asbestos 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.

.1 After showering and drying off, proceed to clean change room and dress in street clothes at end of each day's work, or in clean coveralls before eating, smoking, or drinking. If re-entering work area, follow procedures outlined in paragraphs above.

.2 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 must not use this system as means to leave or enter work area.

- .3 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
- .4 Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual asbestos abatement.
- .5 Provide and post in Clean Change Room the procedures described in this Section, in both official languages.
- .6 Ensure that no person required to enter an Asbestos Abatement Work Area has facial hair that affects seal between respirator and face.
- .7 Ensure workers wash hair, hands and face when leaving asbestos work area.

1.8 Visitor
Protection

- .1 Visitor are to provide their own personal fitted respirators and be trained in the use and care of them. The contractor is to provide protective clothing / gear to Authorized Visitors to Asbestos Work Area.
- .2 Instruct Authorized Visitors in use of protective clothing, and procedures.
- .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

PART 2 - 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 a concentration to provide thorough wetting of asbestos-containing material.
- .3 Waste Containers: Contain waste in two separate containers. The inner container shall be a 0.15 mm thick sealable polyethylene bag. Outer container: sealable metal or fibre type where there are sharp objects included in the waste material; otherwise the outer container may be sealable metal or fibre type or a second 0.15 mm thick sealable polyethylene bag. Labelling requirements: Affix a preprinted cautionary asbestos warning, in both official languages, that is clearly 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 the tendering period in

accordance with the Instructions to Tenderers. Glove bags intended for use in more than one location must be equipped with a reversible, double-pull, double-throw zipper on the top and at approximately the mid-section of the bag.

- .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 the purpose of trapping residual asbestos fibers. Sealer shall have flame spread and smoke developed rating less than 50.

PART 3 - EXECUTION

3.1 Supervision

- .1 A minimum of one Supervisor for every ten workers is required.
- .2 An approved Supervisor must remain within the Asbestos Work Area at all times during the disturbance, removal, or other handling of asbestos-containing materials.

3.2 Procedures

- .1 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 the number in parentheses indicates the 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) '.
- .2 Based on the Contractor's abatement plan, erect enclosures for the planned work based on the materials to be removed and methods selected. In general, non-friable materials shall require minimum asbestos abatement precautions unless powered tools are used

to remove, grind, abrade or otherwise damage the material creating dust. Friable materials shall require maximum precautions unless removed by glovebag methods.

- .3 Before beginning work remove visible dust from surfaces in the work area where dust is likely to be disturbed during the course of the work. Use HEPA vacuum, or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate. Do not use compressed air to clean up or remove dust from any surface. Note settled dust/debris in chases is considered asbestos containing.
- .4 Prevent the spread of dust from the Asbestos Work Area using measures appropriate to the work to be done. As needed, use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over all flooring not otherwise being removed. Erect an enclosure of polyethylene sheeting around the work area, shut off the mechanical ventilation system serving the work area and seal ventilation ducts to and from the work area. As needed construct a three chamber decon with airlocks separating a clean room, a shower and an equipment room.
 - .1 Worker Decontamination Enclosure System includes Equipment and Access Room, Shower Room, and Clean Room, as follows:
 - .1 Equipment and Access Room: build Equipment and Access Room between Shower Room and Asbestos Abatement Work Area, with two curtained doorways, one to Shower Room and one to Asbestos Abatement Work Area. Install portable toilet, waste receptor, and storage facilities for workers' shoes and protective clothing to be re-worn in work areas. Build Equipment and Access Room large enough to accommodate specified facilities, other equipment needed, and at least one worker

- allowing him /her sufficient space to undress comfortably.
- .2 Shower Room: build Shower Room between Clean Room and Equipment and Access Room, with two curtained doorways, one to Clean Room and one to Equipment and Access Room. Provide one (1) shower for every five (5) workers. Provide soap, clean towels, and appropriate containers for disposal of used respirator filters. Wastewater shall be captured and disposed of off site.
- .3 Clean Room: build Clean Room between Shower Room and clean areas outside of enclosures, with two (2) curtained doorways, one (1) to outside of enclosures and one to Shower Room. 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.
- .2 Construction of Decontamination Enclosures:
 - .1 Build suitable framing for enclosures (or use existing rooms where convenient), and line with polyethylene sheeting sealed with tape.
 - .2 Build curtained doorways between enclosures so that when people move through or when waste containers and equipment are moved through doorway, one of two closures comprising doorway always remains closed.
- .3 Maintenance of Enclosures:
 - .1 Maintain enclosures in tidy condition.
 - .2 Confirm barriers and polyethylene linings are effectively sealed and taped. Repair damaged barriers and

- remedy defects immediately upon discovery.
- .3 Visually inspect enclosures at beginning of each working period.
- .4 Use smoke methods to test effectiveness of barriers when directed by Department Representative.
- .5 Do not begin Asbestos Abatement Work until:
 - .1 Arrangements have been made for disposal of waste.
 - .2 For wet stripping techniques, arrangements have been made for containing, filtering, and disposal of waste water.
 - .3 Work areas and decontamination enclosures are effectively segregated.
 - .4 Tools, equipment, and materials waste containers are on hand.
 - .5 Arrangements have been made for building security.
 - .6 Warning signs are displayed where access to contaminated areas is possible.
 - .7 Notifications have been completed and other preparatory steps have been taken.
 - .8 Enclosures, decontamination facilities and negative air systems are to be inspected by the DCC Representative.
- .6 Other than loose material which shall be removed by HEPA vacuum, friable material containing asbestos to be removed or disturbed shall be thoroughly wetted before and during work unless wetting creates a hazard or causes damage. Use garden reservoir type low - velocity sprayer or airless spray equipment capable of producing a mist or fine spray. Perform work in a manner to reduce dust creation to lowest levels practicable.
- .7 Vinyl floor tile or caulking removal, using minimum precautions:
 - .1 Using hand tools only lift and pry loose designated materials to be removed.
 - .2 As needed apply water to control dust generated during the removal process.
 - .3 Once materials are removed place in waste containers, do not overload bags.

- .4 For vinyl floor tiles check for material around corners, under radiators or other fixtures and remove if found.
- .5 HEPA vacuum area only when other work in asbestos work area has been completed.
- .8 Pipe Insulation and Duct Cleaning Removal Using Glove Bag:
 - .1 Place tools necessary to remove insulation in tool pouch. Wrap the bag around pipe and close zippers. Seal bag to pipe with cloth straps.
 - .2 Place hands in gloves and use necessary tools to remove insulation. Arrange insulation in bag to obtain full capacity of bag.
 - .3 Insert nozzle of a 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.
 - .4 When glove bags are intended for use at more than one location: After wash-down and application of sealer, seal off waste in lower section of bag using zipper at mid-section of bag. Remove air from top section of bag through the elasticized valve using a HEPA vacuum. Remove bag from pipe, reinstall in new location, and reseal to pipe prior to opening the lower section of the bag. Repeat stripping operation.
 - .5 If bag is to be moved along pipe, first remove air from top section through the elasticized valve using a HEPA vacuum. Next loosen straps, move bag, re-seal to pipe using double-pull zipper to pass hangers. Repeat stripping operation.
 - .6 To remove bag after completion of stripping, wash top section and tools thoroughly. Remove air from top section through the 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 all residue. Remove all 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 fibers.

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

.9 Texture coat removal as friable asbestos maximum precautions:

.1 Establish enclosure and decontamination as described above.

.2 Cover walls, floors and other surfaces not part of the abatement process with polyethylene sheeting.

.3 Remove suspended ceiling track and acoustic ceiling tiles if present. If these materials are not affected by dust / debris from texture coat, they may be removed as non-asbestos waste. If they are found to be impacted by debris from the texture coat, HEPA vacuum clean or dispose of these as asbestos waste.

.4 Wet the texture coat material to be removed at the start of the work and frequently during the removal of the material to suppress dust generated.

.5 Bag removed material as it is being generated to maintain suitable flooring surface.

.6 Use water and HEPA vacuums to remove fine debris from the poly floor and fine clean space.

.7 Upon completion of the removal and approval from the Departmental Representative that the work has been completed, proceed with the application of the sealer with an applicator long enough to reach the ceiling if a ladder is not utilized.

.10 All work is subject to visual inspection and air monitoring. Any contamination of surrounding areas indicated by visual inspection or air monitoring will require the complete enclosure and clean-up of affected areas.

- .11 Clean-up:
 - .1 Frequently during the work and immediately after completion of the work, clean up dust and asbestos-containing waste using a 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 the 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 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 the work using HEPA vacuum.

3.3 Air Monitoring

- .1 From commencement of work until completion of cleaning operations, the contractor shall retain the services of a consultant to take air samples from inside and outside of Asbestos Work Area enclosures. The consultant shall provide the certification for the laboratory used or the certification of their own lab by an acceptable third party. Results are to be provided to the Departmental Representative to demonstrate the respirator selection is appropriate and areas outside the abatement are not adversely affected.
- .2 If air monitoring shows that areas outside Asbestos Work Area enclosures are contaminated (fibre count NIOSH Method 7400 greater than 0.1 f/cc if negative air units are discharged outside or 0.01 f/cc if

negative air units discharge into the building), these areas shall be enclosed, maintained, and cleaned in the same manner as that applicable to Asbestos Work Area. When asbestos leakage from Asbestos Abatement Work Area has occurred or is likely to occur Department 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 Ensure that respiratory safety factors are not exceeded.

3.4 Final Cleanup

- .1 Following cleaning specified above, and when Departments Representative's air sampling shows that asbestos levels inside the enclosure do not exceed 0.01 fibres/cc as determined by membrane filter method at 400-500X magnification phase contrast illumination, as described in NIOSH 7400 or equivalent, proceed with final cleanup.
- .2 Workers involved in cleanup and onlookers shall use personnel protective equipment and respiratory protection.
- .3 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum visible asbestos-containing particles observed during cleanup, immediately, using HEPA vacuum equipment.
- .4 Place polyethylene seals, tape, cleaning material, clothing, and other contaminated waste in plastic bags and sealed labeled waste containers for transport.
- .5 Include clean-up in Asbestos Abatement Work Area, Equipment and Access Room, Washroom, and other contaminated enclosures.
- .6 Include in clean-up sealed waste containers

and equipment used in Work and remove from work areas, via Decontamination Enclosure System, at appropriate time in cleaning sequence.

- .7 Conduct final check to confirm that no dust or debris remains on surfaces as result of dismantling operations.
- .8 As Work progresses, and to prevent exceeding available storage capacity on site, remove sealed and labeled containers containing asbestos waste and dispose of at authorized disposal area in accordance with requirements of disposal authority. Confirm each shipment of containers transported to disposal facility is accompanied by Contractor's representative and that dumping is done in accordance with governing regulations.

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PART 1 - GENERAL

- | | |
|------------------------------------|--|
| <u>1.1 References</u> | <ul style="list-style-type: none"> .1 Handbook on PCBs in Electrical Equipment, EPS, 1982. .2 Manual for the Management of Wastes Containing Polychlorinated Biphenyl (PCBs), EPS 9 (HA) 1, February 1987. .3 Identification of Fluorescent Lamp Ballasts Containing PCBs, Environment Canada's Document (EPS/CC/2, August 1991). .4 Transportation of Dangerous Goods Act, 1992 (1992, c.34), Regulations respecting the handling, offering for transport and transporting of dangerous goods (Extract from the Canada Gazette Part II, dated January 6, 1985, and all amendments. .5 Occupational Health and Safety Act, 1996, and Amendments. .6 Environmental Contaminants Act, Environment Canada and Health and Welfare Canada. .7 Canadian Environmental Protection Act, 1999, and all Amendments. .8 Transportation of Dangerous Goods Regulations, 1986, distributed by the International Compliance Centre Ltd. .9 Guidelines for Disposal of Contaminated Solids in Landfills, March 22, 1994, Nova Scotia Department of Environment. .10 Solid Waste-Resource Management Regulations, Nova Scotia Department of Environment. .11 Ozone Layer Protection Regulations, N.S. Reg. 54/95, 1995. |
| <u>1.2 Regulatory Requirements</u> | <ul style="list-style-type: none"> .1 Comply with the Following: <ul style="list-style-type: none"> .1 Canadian Environmental Protection Act (Canada) and pursuant regulations. .2 Transportation of Dangerous Goods Act |

(Canada).

.3 All other legislation and regulations which apply to the performance of the Work of this section.

1.3 Submittals

- .1 Submit proof satisfactory to the Departmental Representative that suitable arrangements have been made to dispose of waste in accordance with requirements of authority having jurisdiction.
- .2 Submit Provincial and/or local requirements for Notice of Project Form.
- .3 Submit proof of Contractor's Liability Insurance.
- .4 Submit to Departmental Representative all necessary permits for transportation and disposal of waste and proof that waste has been received and properly disposed of.
- .5 Submit proof satisfactory to Departmental Representative that all employees have had instruction on hazards of exposure, spill response, and all aspects of work procedures and protective measures.
- .6 Submit Worker's Compensation Board status and transcription of insurance.

1.4 Existing Conditions

- .1 Reports and information pertaining to hazardous material to be handled, removed, or otherwise disturbed and disposed of during this project are available for inspection at PWGSC.
- .2 Previous work at the Site has identified the following actual or potential miscellaneous hazardous materials on-site:
 - .1 polychlorinated biphenyls (PCBs) present in remaining older lamp ballasts and capacitors associated with various motors on-site.
 - .2 lead containing batteries associated with emergency lighting systems
 - .3 mercury-containing equipment light tubes and switches
 - .4 potential radioactive sources in smoke detectors

- .5 hazardous chemicals and petroleum hydrocarbons including gear oil, paints, thinners, etc. were identified in the building
- .6 ozone depleting substances (ODS) were not identified on-site; if encountered these refrigerants must be properly recovered for disposal

1.5 Management of Wastes

- .1 Contractor will provide the containers for use in the transportation and disposal of PCB-containing ballasts, and PCB-containing equipment.
- .2 Contractor will provide the containers for use in the transportation and disposal of mercury-containing materials and equipment.
- .3 Contractor will provide the containers for use in the transportation and disposal of lead-containing materials and equipment.
- .4 Contractor shall be responsible for the pick-up and delivery of the containers from and to the proposed hazardous materials handling facility.
- .5 All other containers and the disposal of all other hazardous and non-hazardous materials are the responsibility of the Contractor unless indicated otherwise in this and other sections of the specifications.

1.6 Instruction and Training

- .1 Use qualified electricians for removal of light ballasts unless the building has been de-energized by an electrician prior to the work.
- .2 Where contact with hazardous materials is expected, instruct personnel in handling procedures, safety precautions, use of safety equipment and applicable Provincial Federal legislation and regulations.
- .3 Use qualified staff for removals when required by applicable Provincial Federal legislation and regulations.

1.7 Worker

- .1 Follow Provincial and Federal regulations

Protection

relating to proper personal protective equipment and Work procedures for removal, handling, and disposal of hazardous materials; provided that in case of conflict among these requirements or with these specifications the more stringent requirements applies. Comply with regulations in effect at the time the Work is performed.

- .2 Provide workers with additional protective clothing and equipment where contact with hazardous materials may occur. Provide clothing and equipment appropriate for the potential level of exposure.
- .3 Inform personnel removing hazardous materials of the hazards associated with exposure to the materials and the procedures that are to be followed if they come in contact with the hazardous material.

1.8 Visitor Protection

- .1 Visitor are to provide their own personal fitted respirators and be trained in the use and care of them if needed. The contractor is to provide protective clothing / gear to Authorized Visitors to Work Area.
- .2 Instruct Authorized Visitors in use of protective clothing, and procedures.
- .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Work Area.

PART 2 - PRODUCTS

2.1 Materials

- .1 Absorptive Material: PCB absorptive material that creates a quasi-solid product which can be swept or shoveled. Acceptable materials include:
 - .1 Sawdust.
 - .2 Vermiculite.
 - .3 Activated Charcoal.

- .4 Oclansorb.
 - .5 Imbiber Beads.
 - .6 Hi-Dry.
 - .7 Desorb.
 - .8 Stay-Dry.
 - .9 Oil-Dry.
 - .10 Conwed.
 - .11 3M Matting.
 - .12 Graboil.
- .2 Disposal containers for PCB- containing ballasts:
.1 200 litre capacity metal drums will be supplied by the Contractor.
- .3 Polyethylene Sheeting: 0.15 mm minimum thickness unless otherwise specified.
- .4 Hazardous waste bags: minimum 0.15 mm thick polyethylene bags complete with wire ties. All hazardous waste, as well as materials contaminated with Hazardous Materials, must be double bagged. Each bag must be wire-tie closed.

PART 3 - EXECUTION

3.1 Preparation

- .1 The Work area will be isolated during the removal of hazardous materials.
- .2 Maintain emergency and fire exits from Work area.

3.2 Removal of PCB-Containing Ballasts

- .1 Examine fluorescent light fixtures in the buildings upon removal. Verify the total number of PCBs-containing ballasts. Identify ballasts containing PCBs with reference to Identification of Fluorescent Lamp Ballasts Containing PCBs EPS/CC/2, August 1991 or through contact with manufacturer. Examine capacitors associated with motors in the building for PCBs.
- .2 For materials containing PCBs, follow provincial and federal regulations regarding removals with respects to

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respiratory gear, proper clothing, handling of materials, ventilation, etc. The procedure for handling these materials must be submitted to the Department Representative prior to removal.

- .3 All ballasts or capacitors which cannot be identified as non PCB-containing, with reference to above, will be treated as containing PCBs.
- .4 Submit a list to the Department Representative showing the total number of light ballasts and capacitors containing PCBs.
- .5 Remove all PCB-containing ballasts as follows:
 - .1 Remove entire ballast, including capacitor, for fluorescent lights.
 - .2 Cut off excess wire and dispose of as construction waste.
 - .3 Place ballast into plastic lined disposal drums.
- .6 Remove all PCB-containing capacitors from motors or other electrical equipment in building and place in lined drums.
- .7 Pack drum with sufficient absorbent material to absorb any PCBs which may leak from ballasts or motor capacitors.
- .7 Dispose of PCB-contaminated gloves and work clothes in drums as PCB waste. Contaminated gloves and other personal protective equipment (PPE) will be stored in separate drums to facilitate disposal.
- .8 Label drums containing waste PCBs in accordance with Section 9 of the Interim Order respecting the Storage of Wastes containing Chlorobiphenyls (PCBs), as issued under the Canadian Environmental Protection Act in September 1990 or most recent amendments.
- .9 Seal drum and store in a designated storage area pending transportation.

- .10 Transport and deliver PCB-containing materials to the waste hauler for final disposal of ballasts Provide copy of manifest to Department Representative.
- .11 All non PCB-containing ballasts will be disposed of by the Contractor.

3.3 Removal of Mercury - .1 Containing Materials

- .1 Identify all mercury-containing materials and submit to the Department Representative, a list of the mercury contaminated materials identified at the Work area.
- .2 For materials containing mercury, follow Provincial and Federal regulations regarding removals with respects to respiratory gear, proper clothing, handling of materials, ventilation, etc. The procedure for handling these materials must be submitted to the Department Representative prior to removals.
- .3 All workers are to be given an orientation to the project including a discussion of exposure routes, the toxicity of mercury, and the protective equipment to be used during removals. These procedures will also include the hazards associated with mercury spills and the proper method of clean up if a spill occurs and the medical procedures used by the worker if the spilled mercury comes in contact with the worker's skin.
- .4 Carefully remove all materials containing mercury (fluorescent light tubes, mercury filled vials in thermostats) from their operating position with special attention not to damage the container holding the mercury material and to avoid having mercury come in contact with the worker. Carefully place items containing mercury in a 0.15 mm thick plastic bag, double bagged and sealed tightly with a wire tie or alternately may be wrapped in polyethylene sheeting and sealed with tape.
- .5 Be responsible for the proper disposal of mercury-containing materials.

3.4 Removal of Lead-containing materials

- .1 Identify all lead-containing materials and submit to the Department Representative, a list of the identified materials at the Work area.
- .2 Remove materials and dispose in a manner approved by Department Representative, and in accordance with regulations of Authorities having jurisdiction.

3.5 REMOVAL OF OTHER HAZARDOUS MATERIALS

- .1 Be responsible for the removal, handling and disposal of all other hazardous materials present in the structure, in accordance with requirements of Authorities having jurisdiction, unless specified. Stockpiling of hazardous waste on site is prohibited unless authorized by Department Representative, or Provincial and Federal Environmental Departments.

Part 1 General

- | | | |
|---------------------------|----|--|
| <u>1.1 REFERENCES</u> | .1 | American Society for Testing and Materials International (ASTM) |
| | .1 | ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing. |
| | .2 | ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates. |
| | .3 | ASTM D422-632002, Standard Test Method for Particle-Size Analysis of Soils. |
| | .4 | ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m ³). |
| | .5 | ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m ³). |
| | .6 | ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils. |
| | .2 | Canadian General Standards Board (CGSB) |
| | .1 | CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric. |
| | .3 | Nova Scotia Transportation and Infrastructure Renewal (NSTIR) Standard Specification for Highway Construction and Maintenance. |
| <u>1.2 DEFINITIONS</u> | .1 | Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation. |
| | .1 | Rock: solid material in excess of 1.0 m ³ and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m ³ bucket. Frozen material not classified as rock. |
| | .2 | Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation. |
| | .2 | Unclassified excavation: excavation of |

deposits of whatever character encountered in Work.

.3 Topsoil:

- .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
- .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

.4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.5 Imported fill material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.7 Unsuitable materials:

- .1 Weak, chemically unstable, and compressible materials.
- .2 Frost susceptible materials:
 - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.2.

.2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

- .3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

.8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that

resists settlement when placed in utility trenches, and capable of being readily excavated.

1.3 EXISTING CONDITIONS

- .1 Examine Geotechnical Investigation report.
- .2 Buried services:
 - .1 Before commencing work, verify or establish location of buried services on and adjacent to site by careful test excavations. Location of services shown on utilities plan is approximate only and not deemed accurate.
 - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
 - .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
 - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .5 Prior to beginning excavation Work, notify Departmental Representative and establish location and state of use of buried utilities and structures.
 - .6 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
 - .7 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing. Costs for such Work to be paid by Owner.
 - .8 Record location of maintained, re-routed and abandoned underground lines.
 - .9 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
 - .1 Conduct, with Departmental Representative, a condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, pavement, survey bench marks and

- monuments which may be affected by Work.
- .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Structural Fill: Gravel borrow in accordance with NSTIR specifications with the following requirements:
- .1 Gradation Chart
- | Sieve Size | Percent Passing |
|------------|-----------------|
| 112 000 µm | 100 |
| 14 000 µm | 15 - 65 |
| 80 µm | 3 - 10 |
- .2 Physical Properties Chart
- | Property | Test Method | Gravel Borrow |
|--------------------|-------------|---------------|
| Absorption % Max. | ASTM C 127 | 1.75 |
| Plasticity Index | ASTM D 4318 | 0 |
| Micro-Deval % Max. | DOT&PW TM-1 | 35 |
- .2 Common Fill: Common material from site which is free of stumps, trees, roots, organics, boulders and masonry larger than 100 mm in any dimension and other deleterious materials as approved by the Departmental Representative.
- .3 Imported Fill: Common material from other (Contractor's own) sources which is free of stumps, trees, roots, organics, boulders and masonry larger than 100 mm in any dimension and other deleterious materials as approved by the Departmental Representative.
- .4 Utility/Pipe Bedding and Surround: Type 1 granular in accordance with NSTIR specifications.
- .5 28mm Clear Stone: Crushed and screened, hard, durable stone, free from clay and organic matter and graded as follows:
- | Sieve Size (mm) | Percent Passing |
|-----------------|-----------------|
| 28 | 100 |
| 20 | 90-100 |

- | | | |
|--|----|------|
| | 10 | 0-40 |
| | 5 | 0-10 |
- .6 Marking Tape: Color coded heavy gauge polyethylene, 150 mm wide indicating the service type buried below.
 - .7 Geotextile: Non-woven synthetic fibre fabric, supplied in rolls. Properties as follows for foundation drainage and landscaping fabrics:
 - .1 Weight: Minimum 136 g/m² to ASTM D5261.
 - .2 Grab Tensile Strength: Minimum 445 N to ASTM D4632.
 - .3 Grab Elongation: 50 % to ASTM D4632.
 - .4 Tear Resistance: Minimum 222 N to ASTM D4533.
 - .5 Puncture Resistance: Minimum 289 N to ASTM D4833.
 - .6 Mullen Burst: Minimum 1481 N to ASTM D3786.
 - .7 Permittivity: Maximum 2.0 Sec⁻¹ to ASTM D4491.
 - .8 Water Flow Rate: 5689 l/min/m² to ASTM D4491.
 - .9 Apparent Opening Size (AOS): 0.212 mm to ASTM D4751.
 - .10 UV Stability: Minimum 70 % @ 500 hours to ASTM D4355.

Part 3 Execution

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| 3.1 SITE PREPARATION | .1 | Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated. |
| | .2 | Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly. |
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- | | | |
|-----------------------------|----|--|
| 3.2 PREPARATION/ PROTECTION | .1 | Keep excavations clean, free of standing water, and loose soil. |
| | .2 | Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval. |

- .3 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .4 Protect buried services that are required to remain undisturbed.

3.3 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with the Provincial Health and Safety Act.
- .2 Obtain permit from authority having jurisdiction for temporary diversion of water course if required.
- .3 Construct temporary Works to depths, heights and locations as approved by Departmental Representative.
- .4 During backfill operation:
 - .1 Unless otherwise indicated or directed Departmental Representative, remove sheeting and shoring from excavations.
 - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
 - .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.
- .5 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .6 Upon completion of substructure construction:
 - .1 Remove cofferdams, shoring and bracing.
 - .2 Remove excess materials from site.

3.4 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Departmental Representative's approval the details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .3 Avoid excavation below groundwater table if

quick condition or heave is likely to occur.

- .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in manner not detrimental to public and private property, or portion of Work completed or under construction.
 - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- .6 Provide flocculation tanks, settling basins, geotubes or other treatment methods and facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas in accordance with the approved Erosion and Sediment Control Plan.

3.5 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as indicated.
- .2 Excavation must not interfere with bearing capacity of adjacent foundations.
- .3 Do not disturb soil within branch spread of trees or shrubs that are to remain.
 - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .4 For trench excavation, do not excavate more than 30 m of trench in advance of installation operations. All excavations shall be filled at end of work day prior to leaving site.
- .5 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .6 Restrict vehicle operations directly adjacent to open trenches.
- .7 Dispose of surplus and unsuitable excavated material in approved location.
- .8 Do not obstruct flow of surface drainage or

natural watercourses.

- .9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .10 Notify Departmental Representative when bottom of excavation is reached.
- .11 Obtain Departmental Representative approval of completed excavation.
- .12 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .13 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with Type 2 granular fill, common or structural fill compacted to not less than 100% of SPMDD.
 - .2 Fill under other areas with Type 2 granular, common or structural fill compacted to not less than 95% of SPMDD.
- .14 Hand trim, make firm and remove loose material and debris from excavations.
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
 - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

3.6 FILL TYPES AND COMPACTION

- .1 Use types of fill as indicated or specified below.
 - .1 Exterior side of structure walls: Type 2 granular to subgrade level. Compact to 95% SMPDD to ASTM D698.

3.7 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Hand place material in uniform layers not exceeding 150 mm compacted thickness as indicated.
- .2 Place bedding and surround material in unfrozen condition.

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- 3.8 BACKFILLING .1 Do not proceed with backfilling operations until completion of following:
- .1 Departmental Representative has inspected and approved installations.
 - .2 Departmental Representative has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.
 - .4 Removal of concrete formwork.
 - .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
- .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 300 mm.
- .6 Place unshrinkable fill in areas as indicated.
- .7 Consolidate and level unshrinkable fill with internal vibrators.
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- 3.9 TESTING .1 Contractor shall conduct quality control testing and provide results to Departmental Representative upon request. Testing shall be conducted on sub-grade, bedding, surround and backfill materials.

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- .2 Submit testing procedure and frequency of tests to Departmental Representative for approval.

3.10 RESTORATION

- .1 Clean and reinstate areas affected by Work as directed by Departmental Representative.
- .2 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

Part 1 General

<u>1.1 RELATED REQUIREMENTS</u>	.1	Nova Scotia Transportation & Infrastructure Renewal (NSTIR) Standard Specification for Highway Construction and Maintenance.
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<u>1.2 WASTE MANAGEMENT AND DISPOSAL</u>	.1	Divert unused granular material to local facility as approved by Departmental Representative.
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Part 2 Products

<u>2.1 MATERIALS</u>	.1	Type 2 granular in accordance with NSTIR Specifications.
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Part 3 Execution

<u>3.1 PLACING</u>	.1	Place granular sub-base after subgrade is inspected and approved by Departmental Representative.
	.2	Construct granular sub-base to depth and grade in areas indicated.
	.3	Ensure no frozen material is placed.
	.4	Place material only on clean unfrozen surface, free from snow or ice.
	.5	Place granular sub-base materials using methods which do not lead to segregation or degradation.
	.6	Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
	.7	Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
	.8	Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from Departmental Representative before use.
- .3 Equipped with device that records hours of actual work, not motor running hours.
- .4 Compact to density of not less than 100% SPMDD.
- .5 Shape and roll alternately to obtain smooth, even and uniformly compacted sub base.
- .6 Apply water as necessary during compaction to obtain specified density.
- .7 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .8 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 PROOF
ROLLING

- .1 For proof rolling, use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm maximum.
- .2 Obtain approval from Departmental Representative to use non-standard proof rolling equipment.
- .3 Proof roll at level in sub-base as indicated.
- .4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
- .5 Where proof rolling reveals areas of defective subgrade:
 - .1 Remove sub-base and subgrade material to depth and extent as directed by Departmental Representative.
 - .2 Backfill excavated subgrade with Type 2 granular and compact as per this

section.

.3 Replace sub base material and compact.

.6 Where proof rolling reveals areas of defective sub-base, remove and replace in accordance with this section at no extra cost.

3.4 TESTING

.1 Contractor shall conduct quality control testing and provide results to Departmental Representative upon request.

.2 Submit testing procedure and frequency of tests to Departmental Representative for approval.

3.5 SITE TOLERANCES

.1 Finished sub-base surface to be within 5 mm of elevation as indicated but not uniformly high or low.

3.6 PROTECTION

.1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub base is accepted by Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS	.1	Nova Scotia Transportation & Infrastructure Renewal (NSTIR) Standard Specification for Highway Construction and Maintenance.
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1.2 WASTE MANAGEMENT AND DISPOSAL	.1	Divert unused granular material to local facility as approved by Departmental Representative.
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Part 2 Products

2.1 MATERIALS	.1	Type 1 granular in accordance with NSTIR Specifications.
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Part 3 Execution

3.1 SEQUENCE OF OPERATION	.1	Place granular base after sub-base surface is inspected and approved by the Departmental Representative.
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| | .2 | Placing |
| | .1 | Construct granular base to depth and
grade in areas indicated. |
| | .2 | Ensure no frozen material is placed. |
| | .3 | Place material only on clean unfrozen
surface, free from snow and ice. |
| | .4 | Place material using methods which do
not lead to segregation or degradation
of aggregate. |
| | .5 | Place material to full width in uniform
layers not exceeding 150 mm compacted
thickness. |
| | .6 | Shape each layer to smooth contour and
compact to specified density before
succeeding layer is placed. |
| | .7 | Remove and replace that portion of layer
in which material becomes segregated
during spreading. |
| | .3 | Compaction Equipment |

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from the Departmental Representative before use.
- .3 Equipped with device that records hours of actual work, not motor running hours.
- .4 Compacting
 - .1 Compact to density not less than 100% SPMDD.
 - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
 - .3 Apply water as necessary during compacting to obtain specified density.
 - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the Departmental Representative.
 - .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- .5 Proof rolling
 - .1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm
 - .2 Proof roll at level in granular base as indicated.
 - .3 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
 - .4 Where proof rolling reveals areas of defective subgrade:
 - .1 Remove base, sub-base and subgrade material to depth and extent as directed by Departmental Representative.
 - .2 Backfill excavated subgrade with

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- Type 2 gravel and compact in accordance with Section 32 11 16.01 Granular Sub-base.
- .3 Replace sub-base material and compact in accordance with Section 32 11 16.01 Granular Sub-base.
- .4 Replace base material and compact in accordance with this Section.
- .5 Where proof rolling reveals defective base or sub base, remove defective materials to depth and extent as directed by Departmental Representative and replace with new materials in accordance with Section 32 11 16.01 Granular Sub-base and this section at no extra cost.
- 3.2 TESTING .1 Contractor shall conduct quality control testing and provide results to Departmental Representative upon request.
- .2 Submit testing procedure and frequency of tests to Departmental Representative for approval.
- 3.3 SITE TOLERANCES .1 Finished base surface to be within plus or minus 5 mm of established grade and cross section but not uniformly high or low.
- 3.4 PROTECTION .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Departmental Representative.

END OF SECTION

Part 1 General

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| 1.1 RELATED | .1 | Section 01 33 00 - Submittal Procedures. |
| <u>REQUIREMENTS</u> | .2 | Section 01 74 21 - Construction/Demolition
Waste Management and Disposal. |
| 1.2 <u>REFERENCES</u> | .1 | American Association of State Highway and
Transportation Officials (AASHTO) |
| | .1 | AASHTO M320-02, Standard Specification
for Performance Graded Asphalt Binder. |
| | .2 | AASHTO R29-02, Standard Specification
for Grading or Verifying the Performance
Graded of an Asphalt Binder. |
| | .3 | AASHTO T245-97, Resistance to Plastic
flow of Bituminous Mixtures Using
Marshall Apparatus. |
| | .4 | AASHTO T-283, Standard Method of Testing
for Resistance of Compacted Hot Mix
Asphalt (HMA) to Moisture-Induced
Damage. |
| | .5 | AASHTO T11-05, Materials Finer Than No.
200 Sieve in Mineral Aggregates Washing. |
| | .6 | AASHTO T30-06, Mechanical Analysis of
Extracted Aggregates. |
| | .7 | AASHTO T96-02 Resistance to Degradation
of Small Size Coarse Aggregate by
abrasion and Impact in the Los Angeles
Machine. |
| | .8 | AASHTO T283-07 Resistance of Compacted
Hot Mix Asphalt (HMA) to Moisture-
Induced Damage. |
| | .9 | AASHTO T245-97 Resistance to Plastic
Flow of Bituminous Mixtures Using
Marshall Apparatus. |
| | .10 | AASHTO T308-10 Determining the Asphalt
Binder Content of Hot Mix Asphalt (HMA)
by Ignition Method. |
| | .11 | AASHTO T304-11 Uncompacted Void Content
of Fine Aggregate. |
| | .12 | AASHTO T269-11 Percent Air Voids in
Compacted Dense and Open Asphalt
Mixtures. |

- .13 AASHTO T209-11 Theoretical Maximum Specific Gravity and Density of Hot Mix Asphalt (HMA)
- .14 AASHTO T-166-11 Bulk Specific Gravity of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface-Dry Specimens.
- .15 AASHTO T176-08 Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.
- .16 AASHTO T84-10 Specific Gravity and Absorption of Fine Aggregate.
- .17 AASHTO T85-10 Specific Gravity and Absorption of Coarse Aggregate.
- .2 Asphalt Institute (AI)
 - .1 AI MS2 1994 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.
- .3 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C88 99a, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
 - .2 ASTM C127 01, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
 - .3 ASTM D995 95b (2002), Standard Specification for Mixing Plants for Hot Mixed, Hot Laid Bituminous Paving Mixtures.
 - .4 ASTM D4791 99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 8.2 M88, Sieves Testing, Woven Wire, Metric.
 - .2 CAN/CGSB 16.3 M90, Asphalt Cements for Road Purposes.
- .5 Nova Scotia Transportation & Infrastructure Renewal (NSTIR) Standard Specification or highway Construction and Maintenance.

- 1.3 MATERIAL
 - .1 At least 2 weeks prior to commencing work,

CERTIFICATION

submit viscosity-temperature charts for asphalt cement to be supplied showing kinematic viscosity in mm²/s versus temperature range from 105°C to 175°C.

- .2 At least 2 weeks prior to commencing work, submit refinery's test data and certification that asphalt cement meets requirements of this section which also includes specific gravity of asphalt cement.

1.4 SUBMISSION OF MIX DESIGN

- .1 The Contractor shall submit, in writing, asphalt concrete mix design and trail mix test results to Departmental Representative for review at least 2 weeks prior to commencing work. Hot mix asphalt to conform to NSTIR Specifications, Division 4, Section 4.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.
- .4 Divert unused aggregate materials to facility for reuse as approved by Departmental Representative.
- .5 Divert unused asphalt from landfill to facility capable of recycling materials.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 MATERIALS

- .1 Asphalt concrete: shall meet the properties of NSTIR Specifications for Type B-HF or Type C-HF where indicated.

- 2.2 MIX DESIGN .1 Job mix formula: shall meet the requirements of NSTIR Specifications, Division 4, Section 4. Submit mix design to Departmental Representative for review.
- 2.3 EQUIPMENT .1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.
- .2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers:
- .1 Minimum drum diameter: 1200 mm.
- .2 Maximum amplitude of vibration (machine setting): 0.5 mm for lifts less than 40 mm thick.
- .4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
- .1 Boxes with tight metal bottoms.
- .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
- .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
- .4 Use only trucks which can be weighed in single operation on scales supplied.
- .5 Truck tailgate assemblies must be such that they do not strike paver hoppers when emptying into the hopper.
- .5 Hand tools:
- .1 Lutes or rakes with covered teeth for spreading and finishing operations.
- .2 Tamping irons having mass not less than 12 kg and bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative, may be used

instead of tamping irons.

- .3 Straight edges, 3 m in length, to test finished surface.

Part 3 Execution

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| <u>3.1 PREPARATION</u> | .1 | Apply tack coat. |
| | .2 | Prior to laying mix, clean surfaces of loose and foreign material. |
| <u>3.2 TRANSPORTATION OF MIX</u> | .1 | Transport mix to job site in vehicles cleaned of foreign material. |
| | .2 | Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum based commercial product, at least daily or as required. Elevate truck bed and thoroughly drain. No excess solution to remain in truck bed. |
| | .3 | Schedule delivery of material for placing in daylight, unless Departmental Representative approves artificial light. |
| | .4 | Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment. |
| | .5 | Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as directed by Departmental Representative. |
| | .6 | Tarpaulins or other coverings for trucks must be of sufficient mass to prevent rapid cooling of asphalt concrete surface. |
| <u>3.3 PLACING</u> | .1 | Obtain Departmental Representative approval of base, existing surface and tack coat prior to placing asphalt. |
| | .2 | Place asphalt concrete to thicknesses, grades and lines as indicated. |
| | .3 | Placing conditions: <ul style="list-style-type: none">.1 Place asphalt mixtures only when air temperature is above 5 degrees C. |

- .2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.
- .3 Do not place hot mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .4 Place asphalt concrete in compacted lifts of thickness as indicated.
 - .1 Base course asphalt shall have a spread rate of 160 kg/m² (65 mm compacted) or as directed by Departmental Representative.
 - .2 Surface course asphalt shall have a spread rate of 90 kg/m² (35 mm compacted) or as directed by Departmental Representative.
- .5 Spread and strike off mixture with self-propelled mechanical finisher.
 - .1 Construct longitudinal joints and edges true to line markings. pavement. Position and operate paver to follow established line closely.
 - .2 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .3 Correct irregularities in alignment left by paver by trimming directly behind machine.
 - .4 Correct irregularities in surface of pavement course directly behind paver.
- .6 Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.
- .7 Do not throw surplus material on freshly screened surfaces.
- .8 The forward speed of the paver shall be regulated by capacity of the plant and the rollers but shall not exceed a forward speed of 10m/min.
- .9 When hand spreading is used:

- .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section. Use measuring blocks and intermediate strips to aid in obtaining required cross section.
- .2 Distribute material uniformly. Do not broadcast material.
- .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.
- .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
- .5 Provide heating equipment to keep hand tools free from asphalt. Control temperature to avoid burning material. Do not use tools at higher temperature than temperature of mix being placed.

3.4 COMPACTING

- .1 Roll asphalt continuously using established rolling pattern.
 - .1 Do not change rolling pattern unless mix changes or lift thickness changes. Change rolling pattern only as directed by Departmental Representative.
- .2 General:
 - .1 Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be pneumatic tired type.
 - .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
 - .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel wheeled and pneumatic tired rollers. Do not exceed 8 km/h for finish rolling.
 - .4 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of

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- 20 impacts per meter of travel.
 - .5 Overlap successive passes of roller by at least one half width of roller and vary pass lengths.
 - .6 Keep wheels of roller slightly moistened with water to prevent pick up of material but do not over water.
 - .1 Do not use diesel fuel to moisten roller.
 - .7 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
 - .8 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
 - .9 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side. Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.
 - .10 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re rolling.
 - .3 Breakdown rolling:
 - .1 Begin breakdown rolling with static steel wheeled roller or vibratory roller immediately following rolling of transverse and longitudinal joint and edges.
 - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
 - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super elevated sections use operation approved by Departmental Representative.
 - .4 Use only experienced roller operators.
 - .4 Intermediate rolling:
 - .1 Use pneumatic tired, steel wheel or

vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.

- .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.
- .5 Dust entire area of sheet asphalt pavements immediately after rolling to eliminate tendency to pick up under traffic.
- .6 All asphalt concrete shall be compacted to 92.5% Theoretical Maximum Relative Specific Gravity (TMSG) to AASHTO T209-11.
- .7 The Contractor shall supply additional compaction equipment if the required density is not achieved.

3.5 JOINTS

- .1 General:
 - .1 Trim vertical face to provide true surface and cross section against which new pavement may be laid. Remove loose particles.
 - .2 Paint joint face with coat of emulsified asphalt cement or preheat joint face with approved heater, prior to placing of fresh asphalt concrete.
 - .3 Overlap previously laid strip with spreader by 300 mm.
 - .4 Rake fresh asphalt concrete against joint and thoroughly tamp and roll.
 - .5 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
 - .6 Do not throw surplus material on freshly screened asphalt.
 - .7 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
- .2 Transverse joints:
 - .1 Offset transverse joint in succeeding lifts by at least 600 mm.
 - .2 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at

joints.

.3 Hold transverse joints to a minimum. When paving single width and maintaining traffic, construct one lane no farther than one-half total paving day.

.4 Stagger transverse joint locations 1.5 to 3.0 m minimum, in either lane. Schedule each days paving operation to terminate adjacent lanes in any one area to within above specified joint location.

.3 Longitudinal joints:

.1 Offset longitudinal joints in succeeding lifts by at least 300 mm.

.2 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.

.3 Roll longitudinal joints directly behind paving operation.

.4 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.

.5 When abutting lane is not placed on same day, or when joint is distorted during days work by traffic or other means, carefully trim edge of lane to line and paint with a thin coating of asphalt before abutting lane is placed.

3.6 FINISH TOLERANCES

.1 Finished asphalt surface to be within +/- 5 mm of design elevation but not uniformly high or low.

.2 Finished asphalt surface not to have irregularities exceeding 6 mm when checked with 3 m straight edge placed in any direction.

3.7 DEFECTIVE WORK

.1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true

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and even surface and compact immediately to specified density.

- .2 Repair areas showing checking, rippling, or segregation.
- .3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

END OF SECTION

PART 1 - GENERAL

1.1 References

- .1 ASTM A 53/A 53M-12, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A 90/A 90M-13 Standard Test Method for Weight of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
- .3 ASTM A 121-13, Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
- .4 ASTM A 653/A 653M-15e1, Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process.
- .5 CAN/CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete, includes update no. 1 (2015).
- .6 CAN/CSA-G164-M92 (2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .7 CAN/CGSB-138.1-96, Fence, Chain Link, Fabric.
- .8 CAN/CGSB-138.2-96, Fence, Chain Link, Framework, Zinc-Coated, Steel.
- .9 CAN/CGSB-138.3-96, Fence, Chain Link - Installation.
- .10 CAN/CGSB-138.4-96, Fence, Chain Link, Gates.

1.2 Shop Drawings

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

PART 2 - PRODUCTS

2.1 Materials

- .1 Fencing: as indicated manufactured by New Brunswick Wire Fence Co., Expert Fence Co. Ltd, or an approved alternate.
- .2 Chain-link fence fabric: to CAN/CGSB-138.1.
 - .1 Type 1, Class B, 6 Gauge.
 - .2 Mesh size: 50 x 50mm.
 - .3 Height of fabric: 3600mm.
 - .4 Salvage: bottom knuckled, top twisted.
- .3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe.
 - .1 Line posts: 73mm, schedule 40 tubular steel pipe, scale free, hot dipped galvanized.
 - .2 Terminal posts: 143.3mm schedule 40 tubular steel pipe, scale free, hot dipped galvanized.
 - .3 Top rail: 43mm, schedule 40 tubular steel pipe, scale free, hot dipped galvanized.
 - .4 Braces at corner, straining and end posts: 114.3mm, schedule 40 tubular steel pipe, scale free, hot dipped galvanized.
- .4 Bottom rail: 43mm, schedule 40 tubular steel pipe, scale free, hot dipped galvanized.
- .5 Tie wire fasteners: single strand, galvanized steel wire conforming to requirements of fence fabric, 3.7mm diameter. (Wire to conform to Institution requirements 'Military Tie')
- .6 Tension bar: 5 x 20mm minimum x 3600 mm galvanized steel.
- .7 Tension bar bands: 3 x 20mm minimum galvanized steel, spaced vertically @ 300mm o.c.
- .8 Gate frame; to ASTM A 53-90b, galvanized steel pipe, standard weight, 73mm outside diameter pipe for outside frame.
 - .1 Fabricate gates as indicated with electrically welded joints, and hot dipped galvanized after welding.
 - .2 Fasten fence fabric to gate with twisted salvage at top.
 - .3 Furnish gates with galvanized malleable

iron ball bearing roller wheels, minimum 1 per gate, 200 mm in diameter, gate hinges, and lock and latch catch with provision for padlock. Padlocks to be provided by Institutional Security.

- .9 Fittings and hardware: cast aluminum alloy, galvanized steel or malleable or ductile cast iron. Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail. Turnbuckles to be drop forged.
- .10 Organic zinc rich coating: to CAN/CGSB-1.181-92.

2.2 Finishes

- .1 Galvanizing:
 - .1 For chain link fabric: to CAN/CGSB-138.1-96 Grade 2.
 - .2 For pipe: 550 g/m² minimum to ASTM A90/A90M-01.
 - .3 For other fittings: to CAN/CSA-G164.

PART 3 - EXECUTION

3.1 Grading

- .1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts. Maintain clearance between bottom of fence and ground surface to a maximum of 30 mm.

3.2 Erection of Fence

- .1 Erect fence along lines as indicated and in accordance with CAN/CGSB-138.3.
- .2 Excavate posts at fence locations for holes, install 1650 mm deep holes by methods approved by the Departmental Representative. 450 mm diameter base for strain and gate posts, 350 mm base for all others.
- .3 Space line post 3.1m apart maximum, measured

parallel to the ground surface.

- .4 Space straining posts at equal intervals not exceeding 60 m.
- .5 Install end posts at end of fence and at building. Install gate posts on both sides of gate opening and at each side of gate holding position.
- .6 Place concrete in post holes then embed posts into concrete to minimum 1650 mm deep. Posts to be set plumb and within 6mm centre of footing. Extend concrete 50 mm above ground level and slope to drain away from posts. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set. Concrete to be 25 mpa, depth as specified.
- .7 Do not install fence fabric until concrete has cured a minimum of 3 days.
- .8 Install top and bottom rails between posts and fasten securely to posts.
- .9 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, and corner with tension bar secured to post with tension bar bands spaced at 300mm intervals. Knuckled self at bottom. Twisted self at top.
- .10 Secure fabric to top rails, line posts and bottom rails with tie wires at 300mm intervals. Conform to institution standards.
- .11 Install angled bracket at top of fence post complete with 710 mm barbed concertina wire.
- .12 Provide anti-tunnel sand/cement mix between posts, till 50/50 mixture into current soil a minimum of 300 mm deep x 600 mm wide.

3.3 Installation of Gates

- .1 Install gates in locations as indicated.
- .2 Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.
- .3 Determine position of centre gate rest for arrest posts. Dome concrete above ground level to shed

water.

- .4 Install 450 mm steel concertina wire along top of fence c/w 2 strands of barbed wire, and fasten to purpose made bracket fastened to each upright.
- .5 Remove existing compound fencing, electronics, cameras, concrete sono tubes and anti-tunneling mixture, and turn fencing, electronics and cameras over to Institution. Contractor can use removed fence for new locations if installation conforms to General Contractor schedule.

3.4 Touch up

- .1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas as per manufacturers recommendation. Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint.

3.5 Cleaning

- .1 Clean and trim areas disturbed by operations to original condition.

END OF SECTION

Part 1 General

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| 1.1 RELATED REQUIREMENTS | .1 | Section 01 33 00 - Submittal Procedures. |
| | .2 | Section 01 74 11 - Progress Cleaning. |
| 1.2 REFERENCES | .1 | Agriculture and Agri-Food Canada |
| | .1 | The Canadian System of Soil Classification, Third Edition, 1998. |
| | .2 | Canadian Council of Ministers of the Environment |
| | .1 | PN1340-2005, Guidelines for Compost Quality. |
| 1.3 DEFINITIONS | .1 | Compost: |
| | .1 | Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner. |
| | .2 | Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test. |
| | .3 | Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 50), and contain no toxic or growth inhibiting contaminants. |
| | .4 | Composed bio-solids to: CCME Guidelines for Compost Quality, Category A. |
| 1.4 ACTION AND INFORMATIONAL SUBMITTALS | .1 | Provide submittals in accordance with Section 01 33 00 - Submittal Procedures. |
| | .2 | Submittals: |
| | .1 | Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL. |
| | .2 | Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics |

and criteria and physical requirements.

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| 1.5 WASTE
MANAGEMENT AND
DISPOSAL | .1 | Divert unused soil amendments from landfill to official hazardous material collections site approved by Departmental Representative. |
| | .2 | Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard. |

Part 2 Products

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| 2.1 TOPSOIL | .1 | Mixture of particulates, microorganisms and organic matter which provides suitable medium for supporting intended plant growth. |
| | .1 | Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight. |
| | .2 | Contain no toxic elements or growth inhibiting materials. |
| | .3 | Finished surface free from: <ul style="list-style-type: none"> .1 Debris and stones over 50 mm diameter. .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume. |
| 2.2 SOIL
AMENDMENTS | .4 | Consistence: friable when moist. |
| | .1 | Fertilizer: <ul style="list-style-type: none"> .1 Complete non-toxic, non-burning, slow release fertilizer. .2 Fertilizer analysis for hydroseeding areas, sodding areas and planting areas as determined from soil sample test. |
| | .2 | Peatmoss: <ul style="list-style-type: none"> .1 Derived from partially decomposed species of Sphagnum Mosses. .2 Elastic and homogeneous, brown in colour. |

- .3 Free of wood and deleterious material which could prohibit growth.
- .4 Shredded particle minimum size: 5 mm.
- .3 Sand: washed coarse silica sand, medium to course textured.
- .4 Organic matter: compost Category A in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.
- .5 Limestone:
 - .1 Ground agricultural limestone.
 - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

Part 3 Execution

3.1 PREPARATION OF EXISTING GRADE

- .1 Verify that grades are correct.
 - .1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
 - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
 - .2 Remove debris which protrudes more than 75 mm above surface.
 - .3 Dispose of removed material off site.
- .4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
 - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

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| <u>3.2 PLACING AND
SPREADING OF
TOPSOIL/PLANTING
SOIL</u> | .1 | Place topsoil after Departmental Representative accepted subgrade. |
| | .2 | Spread topsoil in uniform layers not exceeding 150 mm. |
| | .3 | For sodded areas keep topsoil 15 mm below finished grade. |
| | .4 | Spread topsoil to following minimum depths after settlement.
.1 100 mm for sodded areas. |
| | .5 | Manually spread topsoil/planting soil around trees, shrubs and obstacles. |
| <u>3.3 FINISH
GRADING</u> | .1 | Grade to eliminate rough spots and low areas and ensure positive drainage.
.1 Prepare loose friable bed by means of cultivation and subsequent raking. |
| | .2 | Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.
.1 Leave surfaces smooth, uniform and firm against deep foot printing. |
| <u>3.4 ACCEPTANCE</u> | .1 | Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading. |
| <u>3.5 SURPLUS
MATERIAL</u> | .1 | Dispose of materials except topsoil not required where directed by Departmental Representative. |
| <u>3.6 CLEANING</u> | .1 | Proceed in accordance with Section 01 74 11 - Progress Cleaning. |
| | .2 | Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers. |

END OF SECTION

Part 1 General

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| 1.1 RELATED
REQUIREMENTS | .1 | Section 32 91 19.13 - Topsoil Placement and Grading. |
| 1.2 ACTION AND
INFORMATIONAL
SUBMITTALS | .1 | Submit in accordance with Section 01 33 00 - Submittal Procedures. |
| | .2 | Product Data: |
| | .1 | Submit manufacturer's instructions, printed product literature and data sheets for seed, mulch, tackifier, fertilizer, liquid soil amendments and micronutrients. |
| | .3 | Submit in writing 7 days prior to commencing work: |
| | .1 | Volume capacity of hydraulic seeder in litres. |
| | .2 | Amount of material to be used per tank based on volume. |
| | .3 | Number of tank loads required per hectare to apply specified slurry mixture per hectare. |
| | .4 | Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements. |
| | .5 | Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties. |
| 1.3 QUALITY
ASSURANCE | .1 | Qualifications: |
| | .1 | Landscape Contractor: to be a Member in Good Standing of Landscape Nova Scotia. |
| 1.4 DELIVERY,
STORAGE AND
HANDLING | .1 | Deliver, store and handle materials in accordance with manufacturer's written instructions. |
| | .2 | Delivery and Acceptance Requirements: |
| | .1 | Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's |

name and lot number.

.2 Inoculant containers to be tagged with expiry date.

.3 Storage and Handling Requirements:

.1 Store fertilizer in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

1.5 WARRANTY

.1 For seeding, 12 months warranty period is extended to 1 full growing season.

.2 End-of-warranty inspection will be conducted by Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.

.1 Grass mixture: "Certified", "Canada No. 1 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".

.1 Mixture composition:

.1 40 % Kentucky Blue Grass.

.2 40 % Creeping Red Fescue.

.3 20% Annual Rye Grass.

.2 Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with following properties:

.1 Type I mulch:

.1 Made from wood cellulose fibre.

.2 Organic matter content: 95% plus or minus 0.5%.

.3 Value of pH: 6.0.

.4 Potential water absorption: 900%.

.3 Tackifier: water dilutable, liquid dispersion.

- .4 Water: free of impurities that would inhibit germination and growth.
- .5 Fertilizer:
 - .1 To Canada "Fertilizers Act" and Regulations.
 - .2 Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.
- .6 Inoculants: inoculant containers to be tagged with expiry date.

Part 3 Execution

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| <u>3.1 EXAMINATION</u> | .1 | Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for hydraulic seeding. <ul style="list-style-type: none"> .1 Visually inspect substrate in presence of Departmental Representative. .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery. .3 Proceed with installation only after unacceptable conditions have been remedied. |
| <u>3.2 INSTALLERS</u> | .1 | Use installers with a membership in Good Standing with Landscape Nova Scotia. |
| <u>3.3 PROTECTION OF EXISTING CONDITIONS</u> | .1 | Protect structures, signs, guide rails, fences, plant material, utilities and other surfaces not intended for spray. |
| | .2 | Immediately remove any material sprayed where not intended. |
| <u>3.4 PREPARATION OF SURFACES</u> | .1 | Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water. |
| | .2 | Fine grade areas to be seeded free of humps and hollows. |

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| | .1 | Ensure areas are free of deleterious and refuse materials. |
| | .3 | Cultivated areas identified as requiring cultivation to depth of 25 mm. |
| | .4 | Ensure areas to be seeded are moist to depth of 150 mm before seeding. |
| | .5 | Obtain Departmental Representative's approval of grade and topsoil depth before starting to seed. |
| <u>3.5 FERTILIZING PROGRAM</u> | .1 | Fertilize prior to fine grading, during establishment and warranty period in accordance with manufacturer's recommendations. |
| <u>3.6 PREPARATION OF SLURRY</u> | .1 | Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Departmental Representative. |
| | .2 | Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder. |
| | .3 | After materials are in seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry. |
| <u>3.7 SLURRY APPLICATION</u> | .1 | Hydraulic seeding equipment: |
| | .1 | Slurry tank. |
| | .2 | Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method. |
| | .3 | Capable of seeding by 50 m hand operated hoses and appropriate nozzles. |
| | .4 | Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate". |
| | .2 | Slurry mixture shall be applied to surface in accordance with manufacturer's instructions and as approved by Departmental |

Representative.

- .3 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.

- .1 Using correct nozzle for application.

- .2 Using hoses for surfaces difficult to reach and to control application.

- .4 Blend application 300 mm into adjacent grass areas or sodded areas or previous applications to form uniform surfaces.

- .5 Re-apply where application is not uniform.

- .6 Remove slurry from items and areas not designated to be sprayed.

3.8 CLEANING

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

- .1 Leave Work area clean at end of each day.

- .2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

- .1 Clean and reinstate areas affected by Work.

3.9 PROTECTION

- .1 Protect seeded areas from trespass until plants are established.

- .2 Remove protection devices as directed by Departmental Representative.

3.10 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform following operations from time of seed application until acceptance by Departmental Representative.

- .2 Grass Mixture:

- .1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.

- .2 Mow grass to 50 mm whenever it reaches

- height of 70 mm. Remove clippings which will smother grass.
- .3 Fertilize seeded areas after 10 weeks after germination provided plants have mature true leafs in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles.
- .4 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.
- .5 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.
- .3 Legume Mixture:
 - .1 Repair minor dead and bare spots as determined by Departmental Representative to allow establishment of seed prior to acceptance.
 - .2 Repair major dead and bare spots as determined by Departmental Representative in accordance with site climatic averages and recommendations of local agricultural governmental representative.
 - .3 Mow legume mixtures to 100mm whenever height reaches 200mm and as follows:
 - .1 Do not mow within period commencing 3 weeks before and ending 3 weeks after first severe, average fall frost date and 3 weeks after actual severe fall frost.
 - .2 When mowing after first severe fall frost, mow at a height of not less than 300mm.
 - .4 Remove clippings that will smother plants as directed by Departmental Representative.
 - .5 Water seeded areas to maintain optimum soil moisture level for germination and continued growth. Control watering to prevent washouts.

3.11 ACCEPTANCE

- .1 Seeded areas will be accepted by Departmental

Representative provided that:

- .1 Plants are uniformly established and seeded areas are free of rutted, eroded, bare or dead spots.
- .2 Areas have been mown at least twice.
- .3 Areas have been fertilized.
- .2 Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

3.12 MAINTENANCE
DURING WARRANTY
PERIOD

- .1 Perform following operations from time of acceptance until end of warranty period:
 - .1 Repair and reseed dead or bare spots to satisfaction of Departmental Representative.
 - .2 Mow areas seeded and remove clippings that will smother grassed areas as directed by Departmental Representative.

END OF SECTION

Part 1 General

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| 1.1 RELATED | .1 | Section 01 33 00 - Submittal Procedures. |
| <u>REQUIREMENTS</u> | .2 | Section 01 74 11 - Cleaning. |
| | .3 | Section 31 23 33.01 - Excavating, Trenching and Backfilling. |
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| 1.2 <u>REFERENCES</u> | .1 | American National Standards Institute/American Water Works Association (ANSI/AWWA) |
| | .1 | ANSI/AWWA B301-10, Standard for Liquid Chlorine. |
| | .2 | ANSI/AWWA C651-05, Standard for Disinfecting Water Mains. |
| | .3 | ANSI/AWWA C900-07, Standard for Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 Inch through 12 Inch (100 mm - 300 mm), for Water Transmission and Distribution. |
| | .2 | American Water Works Association (AWWA)/Manual of Practice |
| | .1 | AWWA M17-2006, Installation, Field Testing, and Maintenance of Fire Hydrants. |
| | .3 | CSA International |
| | .1 | CAN/CSA-B137 Series-09, Thermoplastic Pressure Piping Compendium. (Consists of B137.0, B137.1, B137.2, B137.3, B137.4, B137.4.1, B137.5, B137.6, B137.8, B137.9, B137.10, B137.11 and B137.12). |
| | .1 | CAN/CSA-B137.3-09, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications. |
| | .4 | Underwriters' Laboratories of Canada (ULC) |
| | .1 | CAN/ULC-S520-07, Standard for Fire Hydrants. |
| | .2 | CAN/ULC-S543-09, Standard for Internal-Lug, Quick Connect Couplings for Fire Hose. |

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| 1.3 ACTION AND
INFORMATIONAL
SUBMITTALS | .1 | Submit in accordance with Section 01 33 00 -
Submittal Procedures. |
| | .2 | Product Data: |
| | .1 | Submit manufacturer's instructions,
printed product literature and data
sheets for pipes and include product
characteristics, performance criteria,
physical size, finish and limitations. |
| | .3 | Certification: to be marked on pipe. |
| 1.4 DELIVERY,
STORAGE AND
HANDLING | .1 | Deliver, store and handle materials in
accordance with manufacturer's written
instructions. |
| | .2 | Delivery and Acceptance Requirements: deliver
materials to site in original factory
packaging, labelled with manufacturer's name
and address. |
| | .3 | Storage and Handling Requirements: |
| | .1 | Store materials in accordance with
manufacturer's recommendations. |
| | .2 | Store and protect pipes from damage. |
| | .3 | Replace defective or damaged materials
with new. |
| 1.5 SCHEDULING
OF WORK | .1 | Schedule Work to minimize interruptions to
existing services. |
| | .2 | Notify Departmental Representative minimum of
24 hours in advance of interruption in
service. |
| | .3 | Do not interrupt water service for more than
3 hours and confine this period between 10:00
and 16:00 hours local time unless otherwise
authorized. |
| | .4 | Notify fire department of planned or
accidental interruption of water supply to
hydrants. |
| | .5 | Provide and post "Out of Service" sign on
hydrant not in use. |

<u>2.1 PIPE, JOINTS AND FITTINGS</u>	.1	<p>Polyvinyl chloride pressure pipe: to ANSI/AWWA C900, pressure class 150, DR 18, 1 MPa gasket bell end, cast iron outside diameter.</p> <p>.1 CAN/CSA-B137.3, PVC series 160, 1.1 MPa elastomeric gasket.</p> <p>.2 Cast iron fittings: to ANSI/AWWA C110/A21.10, and for pipe diameters larger than NPS 4, cement mortar lined to ANSI/AWWA C104/A21.4.</p>
<u>2.2 PIPE PROTECTION</u>	.1	<p>Provide means of protection for iron pipe in corrosive soils in accordance with local practices and to ANSI/AWWA C105/A21.5.</p>
<u>2.3 VALVES AND VALVE BOXES</u>	.1	<p>Valves to open counter-clockwise.</p>
	.2	<p>Gate valves: to AWWA C509 up to 300mm, standard iron body, bronze mounted wedge valves with non-rising stems, suitable for 1 Pa with mechanical joints.</p>
	.3	<p>Cast iron valve boxes: piece sliding type, adjustable over minimum of 450 mm complete with valve operating extension rod.</p>
	.1	<p>Base to be large round type with minimum diameter of 300 mm.</p>
	.2	<p>Top of box to be marked "WATER".</p>
<u>2.4 TRACE WIRE</u>	.1	<p>RWU90, number 10 gauge (AWG), single stranded, insulated copper wire with 60 mil of black cross-linked polyethylene (XCPE) insulation specifically manufactured for direct burial application.</p>
	.2	<p>Make all spliced or repaired wire connections in the tracer wire system waterproof using approved buried service wire closure as per manufacture instructions.</p>
<u>2.5 THRUST RESTRAINTS</u>	.1	<p>Thrust blocks and anchors: 20 MPa concrete and 15M, Grade 400 reinforcing steel as indicated on drawings.</p>
	.2	<p>Mechanical joint restraint: ductile iron follower gland to AWWA C153 and C11 with multiple wedge restraining mechanism, minimum</p>

pressure working rating 2410 kPa and minimum safety factor of 2:1. Lugs to have twist-off torque nuts.

2.6 ANODE PACKS .1 Zinc anodes, to ASTM B418.

2.7 GRANULAR BEDDING AND BACKFILL .1 As indicated on drawings and to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

2.8 PIPE DISINFECTION .1 Liquid chlorine to ANSI/AWWA B301 to disinfect water mains.
.2 Disinfect water mains in accordance with ANSI/AWWA C651.

Part 3 Execution

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

3.2 PREPARATION .1 Clean pipes, fittings, valves and appurtenances of accumulated debris and water before installation.
.1 Inspect materials for defects to approval of Departmental Representative.
.2 Remove defective materials from site as directed by Departmental Representative.

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| <u>3.3 TRENCHING</u> | .1 | Do trenching work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling. |
| | .2 | Ensure trench depth allows coverage over pipe of 1.2 m minimum from finished grade unless indicated otherwise |
| | .3 | Trench alignment and depth require Departmental Representative's approval prior to placing bedding material and pipe. |
| <u>3.4 GRANULAR BEDDING</u> | .1 | Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness. |
| | .2 | Do not place material in frozen condition. |
| | .3 | Shape bed true to grade to provide continuous uniform bearing surface for pipe. |
| | .4 | Shape transverse depressions in bedding as required to suit joints. |
| | .5 | Compact each layer full width of bed to 98% SPMDD to ASTM D698. |
| | .6 | Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling with compacted bedding material. |
| <u>3.5 PIPE INSTALLATION</u> | .1 | Lay pipes to manufacturer's standard instructions and specifications. |
| | .1 | Do not use blocks except as specified. |
| | .2 | Join pipes in accordance with manufacturer's recommendations. |
| | .3 | Bevel or taper ends of PVC pipe to match fittings. |
| | .4 | Handle pipe by methods recommended by pipe manufacturer and approved by Departmental Representative. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends. |
| | .5 | Lay pipes on prepared bed, true to line and grade. |
| | .1 | Ensure barrel of each pipe is in contact |

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- with shaped bed throughout its full length.
 - .2 Take up and replace defective pipe.
 - .3 Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.
 - .6 Face socket ends of pipe in direction of laying. For mains on grade of 2% or greater, face socket ends up-grade.
 - .7 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.
 - .8 Keep jointing materials and installed pipe free of dirt and water and other foreign materials.
 - .1 Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
 - .9 Position and join pipes with equipment and methods approved by Departmental Representative.
 - .10 Cut pipes in approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
 - .11 Align pipes before jointing.
 - .12 Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
 - .13 Avoid displacing gasket or contaminating with dirt or other foreign material.
 - .1 Remove disturbed or contaminated gaskets.
 - .2 Clean, lubricate and replace before jointing is attempted again.
 - .14 Complete each joint before laying next length of pipe.
 - .15 Minimize deflection after joint has been

made.

- .16 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.
- .17 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes.
- .18 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.
- .19 Recheck plastic pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.
- .20 Do not lay pipe on frozen bedding.
- .21 Backfill remainder of trench.

3.6 VALVE INSTALLATION

- .1 Install valves to manufacturer's recommendations at locations as indicated.
- .2 Support valves located in valve boxes by means of concrete located between valve and solid ground. Maximum length of pipe on each end of valve shall be 1 m. Valves not to be supported by pipe.

3.7 THRUST BLOCKS AND RESTRAINED JOINTS

- .1 For thrust blocks: do concrete Work in accordance with CAN3-A23.1.
- .2 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers and fittings and undisturbed ground as indicated.
- .3 Keep joints and couplings free of concrete.
- .4 Do not backfill over concrete within 24 hours after placing.
- .5 For restrained joints: only use restrained joints approved by Departmental Representative.
- .6 All valves, tees, plugs, caps, bends, reducers, and fittings to be installed with thrust blocks and mechanical restraints.

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| 3.8 HYDROSTATIC
AND LEAKAGE
TESTING | .1 | Do tests in accordance with ANSI/AWWA C600. |
| | .2 | Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described. |
| | .3 | Notify Departmental Representative at least 24 hours in advance of proposed tests. |
| | .1 | Perform tests in presence of Departmental Representative. |
| | .4 | Where section of system is provided with concrete thrust blocks, conduct tests at least 5 days after placing concrete or 2 days if high early strength concrete is used. |
| | .5 | Test pipeline in sections not exceeding 365 m in length. |
| | .6 | Upon completion of pipe laying and after Departmental Representative has inspected Work in place, surround and cover pipes between joints with approved granular material placed to dimensions indicated. |
| | .7 | Leave valves, joints and fittings exposed. |
| | .8 | When testing is done during freezing weather, protect valves, joints and fittings from freezing. |
| | .9 | Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied. |
| | .10 | Open valves. |
| | .11 | Expel air from main by slowly filling main with potable water. |
| | .1 | Install corporation stops at high points in main where no air-vacuum release valves are installed. |
| | .2 | Remove stops after satisfactory completion of test and seal holes with plugs. |
| | .12 | Thoroughly examine exposed parts and correct for leakage as necessary. |
| | .13 | Apply leakage test pressure of 1035 kPa minimum after complete backfilling of trench, based on elevation of lowest point in main and corrected to elevation of gauge, for |

period of 2 hours.

- .14 No leakage is permitted by the test.
- .15 Locate and repair defects if leakage is observed.
- .16 Repeat test until defects have been corrected.

3.9 PIPE SURROUND

- .1 Upon completion of pipe laying and after Departmental Representative has inspected Work in place, surround and cover pipes as indicated on drawings.
- .2 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.
- .3 Place layers uniformly and simultaneously on each side of pipe.
- .4 Do not place material in frozen condition.
- .5 Compact each layer from pipe invert to mid height of pipe to at least 98 % SPMDD to ASTM D698.
- .6 Compact each layer from mid height of pipe to underside of backfill to at least 98 % SPMDD to ASTM D698.

3.10 BACKFILL

- .1 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated on drawings.
- .2 Do not place backfill in frozen condition.
- .3 Under roadways and walkways, compact backfill to at least 98 % SPMDD.
 - .1 In other areas, compact to at least 95 % SPMDD to ASTM D698.

3.11 FLUSHING AND DISINFECTING

- .1 Flushing and disinfecting operations: witnessed by Departmental Representative.
 - .1 Notify Departmental Representative at least 4 days in advance of proposed date when disinfecting operations will begin.
- .2 Flush water mains through available outlets with a sufficient flow of potable water to

produce velocity of 1.5 m/s, within pipe for minimum 10 minutes, or until foreign materials have been removed and flushed water is clear.

.3 Flushing flows as follows:

Pipe Size NPS	Flow (L/s) Minimum
6 and below	38
8	75
10	115
12	150

.4 Provide connections and pumps for flushing as required.

.5 Open and close valves and service connections to ensure thorough flushing.

.6 When flushing has been completed to Departmental Representative approval, introduce strong solution of chlorine as approved by Departmental Representative into water main and ensure that it is distributed throughout entire system.

.7 Disinfect water mains.

.8 Rate of chlorine application to be proportional to rate of water entering pipe.

.9 Chlorine application to be close to point of filling water main and to occur at same time.

.10 Operate valves and appurtenances while main contains chlorine solution.

.11 Flush line to remove chlorine solution after 24 hours.

.12 Measure chlorine residuals at extreme end of pipe-line being tested.

.13 Perform bacteriological tests on water main, after chlorine solution has been flushed out.

.1 Take samples daily for minimum of 2 days.

.2 Should contamination remain or recur during this period, repeat disinfecting procedure.

.14 Take water samples at service connections, in suitable sequence, to test for chlorine residual.

.15 After adequate chlorine residual not less

than 50 ppm has been obtained, leave system charged with chlorine solution for 24 hours.

- .1 After 24 hours, take further samples to ensure that there is still not less than 10 ppm of chlorine residual remaining throughout system. Flush disinfectant solution from line.

3.12 SURFACE RESTORATION

- .1 After installing and backfilling over water mains, restore surface as indicated.

3.13 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

APPENDIX A

Hazardous Building Materials Assessment



**HAZARDOUS BUILDING MATERIALS ASSESSMENT
BUILDING 10, CSC SPRINGHILL INSTITUTION
SPRINGHILL, NOVA SCOTIA**

FINAL REPORT

Submitted to:

**Public Works and Government Services Canada
Environmental Services**
189 Prince William Street
Saint John, New Brunswick
E2L 2B9

Submitted by:

**Amec Foster Wheeler Environment & Infrastructure
A Division of Amec Foster Wheeler Americas Limited**
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March 2017

Amec Foster Wheeler Project No. TV161217

EXECUTIVE SUMMARY

Amec Foster Wheeler Environment & Infrastructure, a division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler), was retained by Public Works and Government Services Canada (PWGSC), on behalf of Correctional Service Canada (CSC), to conduct a Hazardous Building Materials Assessment (HBMA) of Building 10 located at CSC's Springhill Institution, Springhill, Nova Scotia, herein referred to as the "Site Building". The HBMA was requested to provide PWGSC and CSC with an evaluation of known and potential hazardous building materials prior to demolition.

Building 10 is a two-storey building formerly used for inmate housing and administrative purposes. The building was reportedly constructed in approximately 1967 and was vacated in 2014. The building is primarily constructed of concrete block and concrete (pre-fabricated) panels. Building 10 has a footprint of approximately 2,360 m² (25,400 ft²).

The building is comprised of four wings; three containing inmate cells (Wings A to F), and the fourth containing administrative offices. The central portion of the building contains the guard post, as well as offices, television room, inmate kitchenette, day room, interview room, and storage rooms. Upper and lower mechanical rooms are also located within the central portion of the building. Heating and cooling of the building was controlled by a remote central heating plant.

The objective of the HBMA was to identify the type and location of potential and confirmed hazardous building materials at the Site Building in anticipation of demolition. The scope of work for the assessment was completed in accordance with PWGSC's Terms of Reference dated 30 November 2015 and Amec Foster Wheeler's Proposal dated 05 July 2016.

Hazardous building materials identified at Building 10 during the HBMA, along with associated recommendations, are summarized in Table ES-1.

Table ES-1

Hazardous Material	Disposal
Asbestos-Containing Materials (ACMs)	<p>Building materials containing greater than 0.5% asbestos by dry weight, which are considered to be ACMs, are present in the form of friable thermal insulating pipe cement/parging on fittings (elbows, tee joints and end of runs) and a gasket around the water main entering through the basement floor. Nine ACM cement fittings were observed in the Upper and Lower Mechanical Rooms as well as a pipe chase off Room 109/111, however it is likely that others exist in inaccessible areas of the building.</p> <p>Thermal insulation on mechanical pipe fittings will require Level 2 (Glove Bag) abatement techniques by a licensed asbestos abatement contractor prior to building demolition. It is noted that some of the insulating pipe cement/parging within the pipe chases appears to have been previously abated, to an extent, however due to limited accessibility, the likelihood that residual material remains in these areas is considered to be high.</p> <p>An asbestos-containing gasket around the water main entering through the basement floor is also considered friable and will require removal in advance of building demolition.</p> <p>Non-friable asbestos material including floor tiles (ten inmate cells totaling 73 m²) and caulking on roof mounted duct work (estimated to be 0.2 m³) are also</p>

	<p>present. These non-friable asbestos material will require removal in advance of building demolition by licensed asbestos abatement contractor.</p> <p>The 300 mm dia. water main entering the building in the Lower Mechanical Room is suspected (not sampled) to be non-friable asbestos (transite). Prior to demolition, the water to this line should be shut off and a sample of the pipe material tested to confirm it is asbestos containing. The water line will require cutting and capping prior to building demolition. If confirmed to be ACM, proper abatement techniques will be required by a licensed abatement contractor to cut and cap the pipe. The removed section, as well as the gasket material, should be properly disposed of at approved asbestos disposal facility.</p> <p>All other materials sampled in the building and analyzed for asbestos content were found to be non-asbestos containing.</p>
Lead- and Mercury-Based Paint	<p>Results of the paint sampling and analytical program revealed that all painted surfaces from Building 10 removed during future demolition are suitable for disposal at a C&D landfill.</p> <p>However, as some paints exceed the HPA criteria of 90 mg/kg and 10 mg/kg for lead and mercury, respectively, there are potential adverse human health effects associated with disturbing lead and mercury containing paint finishes. As a precautionary measure, Amec Foster Wheeler recommends handling these paint finishes, as follows:</p> <ul style="list-style-type: none"> • The peeling or flaking paint should be removed using wet scraping techniques by an experienced decommissioning/demolition contractor. • Steps should be taken to ensure that workers and anyone present in and around areas being dismantled or demolished are protected. The contractor should also ensure that dust generation and migration is minimized. • Precautions should be taken to prevent/reduce exposure to paint dust during any disturbance of lead and mercury containing paint finishes, such as wetting the surface of the materials to prevent dust emissions, donning respiratory protection, and cleaning tools and clothing prior to exiting work areas.
Lead-containing Equipment	<p>Lead acid batteries, contained in emergency lighting units in the building, should be removed before demolition and disposed of accordingly.</p>
Mercury-containing Equipment	<p>Mercury vapour is present in all fluorescent light tubes. Prior to building demolition, lighting tubes should be handled carefully to ensure that they are not broken, and then carefully packaged for appropriate reuse or disposal. Workers should avoid direct skin contact with mercury. Should fluorescent light tubes be designated for disposal, a bulb crusher or "eater" should be used to break up the lights and allow the mercury to be recovered in a filter and properly disposed at a licensed facility. The facility used to process and recycle the mercury shall be approved by the Nova Scotia Department of Environment, or local jurisdictional authority, and shall have valid approval/licenses to carry out the work.</p>
PCBs	<p>Paint and caulking were either non-detect for PCBs, or where detected, had a Total PCB concentration well below the applicable criteria.</p> <p>Although PCB-containing fluorescent light ballasts were reported to be removed from the building, the demolition contractor will be responsible for evaluating the light ballasts to confirm if they are free of PCBs. Ballasts confirmed or suspected of containing PCBs will require appropriate management during demolition and disposal.</p> <p>The building electrician was unaware of the presence of PCB-containing electrical capacitors, however indicated that some capacitors associated with motors are present in the building. These should be removed and checked for PCBs in advance of demolition.</p>

	Four small transformers were observed inside the building; three in the lower mechanical room and one in the upper mechanical room. The building electrician indicated that all transformers were “dry type”, therefore do not contain PCBs.
Radioactive materials / Smoke Detectors	Prior to demolition, smoke detectors should be checked for the presence of radioactive elements. If present, these units should be removed before demolition and disposed of accordingly.
Hazardous Chemicals and Petroleum Hydrocarbons	Hazardous chemicals and petroleum located in the building, including gear oil, paints, thinners and epoxy should be removed before demolition and properly disposed.
ODSs and Halocarbons	Although no refrigeration units or fire suppression systems containing ODS or halocarbons were observed during the HBMA, if encountered prior to demolition, refrigerant gases should be drained and recovered by a licenced contractor prior to removal or demolition.
UFFI	Although no suspected UFFI was noted during the HBMA, if encountered during demolition, UFFI should be managed appropriately by workers and disposed of accordingly.
Mold	Visible mould growth was not observed during the site visit, however the interior of the building exhibited stale and musty odours due to limited ventilation. During demolition, if any areas are observed to contain visible mould growth, workers should don personal protective equipment and comply with the regulations in the Nova Scotia Occupational Health and Safety Act.
Silica	Appropriate worker protection shall be implemented if dust is generated from the demolition of poured concrete or concrete blocks. Precautions should be taken to prevent/reduce exposure to silica dust during any disturbance /demolition of silica-containing products, such as wetting the surface of the materials to prevent dust emissions, donning respiratory protection, and cleaning tools and clothing prior to exiting work areas.

Further details with respect to the types, locations and estimated quantities (where possible) of the hazardous building materials identified are provided in Section 3.0 of this report.

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1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, a division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler), was retained by Public Works and Government Services Canada (PWGSC), on behalf of Correctional Service Canada (CSC), to conduct a Hazardous Building Materials Assessment (HBMA) of Building 10 at the Springhill Institution, Springhill, Nova Scotia., herein referred to as the "Site Building". A General Site Location is provided as Figure A-1 (Appendix A). The HBMA was requested by PWGSC and CSC as a requirement prior to building demolition.

1.1 BUILDING DESCRIPTION

Building 10 is a two-storey building formerly used for inmate housing and administrative purposes. The building was reportedly constructed in approximately 1967 and was vacated in 2014. The building is primarily constructed of concrete block and concrete (pre-fabricated) panels. Building 10 has a footprint of approximately 2,360 m² (25,400 ft²).

The building is comprised of four wings; three containing inmate cells (Wings A to F), and the fourth containing administrative offices. The central portion of the building contains the guard post, as well as offices, television room, inmate kitchenette, day room, interview room, and storage rooms. Upper and lower mechanical rooms are also located within the central portion of the building. Heating and cooling of the building was controlled by a remote central heating plant.

Floors in the building are a mix of vinyl floor tile and ceramic tile, primarily in the inmate cell wings, and terrazzo flooring, in the administration portions. Ceilings are comprised of concrete panels and suspended tiles (in the administration portion). Interior walls were observed to be a mix of concrete, concrete block, ceramic tile (showers) gypsum board and fibrous wall board. It is noted that walls separating the inmate cell wings from the administration portion of the building were all covered with metal sheeting (on the inmate cell side).

Building Floor Plans are provided as Figures A-2 to A-4 (Appendix A).

1.2 REPORT STRUCTURE

This HBMA report is structured in the following manner:

- Section 1.0: Introduction and Regulatory Framework
- Section 2.0: Methodology
- Section 3.0: Findings and QA/QC Discussion
- Section 4.0: Conclusions and Recommendations
- Section 5.0: Closure
- Section 6.0: References

1.3 OBJECTIVES

The objective of the HBMA was to identify the type and location of potential and confirmed hazardous building materials at Building 10 in anticipation of demolition.

1.4 SCOPE OF WORK

The scope of work for the HBMA, as per the PWGSC's Terms of Reference (TOR) dated 30 November 2015 and Amec Foster Wheeler Proposal dated 05 July 2016, included:

- Conduct a Hazardous Building Materials Assessment (HBMA) of Building 10;
- Provide extent of the hazardous materials found so that proper abatement can be completed prior to demolition;
- Provide a report outlining the methodology used in obtaining samples, sample Quality Assurance/Quality Control (QA/QC), findings and recommendations;
- Provide specification development support based on the findings; and
- Complete the work and report within the required timeframe.

Specifically, the HBMA will consist of the following activities:

- Obtaining access to Building 10.
- Inspecting potentially hazardous building materials at Building 10:
 - Asbestos-containing materials (ACMs);
 - Lead-based paints (LBPs) and other lead-containing materials or equipment;
 - Mercury-based paints (MBPs) and other mercury-containing materials or equipment;
 - Polychlorinated biphenyl (PCB)-based paints and other PCB-containing materials or equipment;
 - Urea formaldehyde foam insulation (UFFI);
 - Sources of ozone depleting substances (ODSs) and global warming halocarbons;
 - Chemical storage;
 - Petroleum hydrocarbon containing equipment/contamination;
 - Mould; and
 - Other potentially hazardous building materials.
- Documenting the location of any ODSs, Federal Halocarbons and petroleum storage tanks identified during the assessment.
- Performing intrusive cavity inspections to attempt to identify any hidden and potentially hazardous building materials that may be concealed by walls and/or ceiling systems.
- Sampling and laboratory testing of suspected ACMs to confirm the presence or absence of asbestos fibres.
- Sampling and laboratory testing of paint to determine the concentrations of lead, mercury and PCBs.
- Sampling and laboratory testing of caulking (or other bulk materials) to determine the concentrations of PCBs.
- Inspecting all thermostats to assess the presence/absence of mercury-containing switches.
- Inspecting fluorescent lights (if present) for PCB-containing light ballasts.
- Documenting chemicals and/or petroleum hydrocarbons stored in the building.
- Prior to leaving the Site, ensuring that the Site contact is notified so that Building 10 can be appropriately secured.

- Preparing a written report documenting the methodologies and findings of the demolition HBMA.

The work was carried out using commercially reasonable best efforts consistent with the level and skill ordinarily exercised by members of the profession currently practicing under similar conditions. Amec Foster Wheeler completed the HBMA on a “room-by-room” basis to provide an estimate of the quantities and locations of hazardous building materials. It is noted that Amec Foster Wheeler did not gain access to the pipe chases located throughout the building or the roof-mounted ductwork due to lack of space and safety concerns. Please note that the findings of the HBMA are based on the interpretation of data from the areas investigated and analytical results pertaining to specific samples collected and tested. The findings are limited by the availability of information at the time of the assessment and inaccessibility to some confined areas within the Site building. It is possible that hazardous materials may exist that cannot be reasonably identified within the scope of the work or which are not apparent or accessible during the Site visit.

1.5 REGULATORY FRAMEWORK

The federal and provincial governments in Canada have prepared and/or adopted numerous acts (and amendments), regulations (and amendments), guidelines, policies, and procedures related to the protection of the environment and the investigation of sites containing hazardous building materials including the following:

- Canadian Environmental Protection Act (1999, C. 33)
 - PCB Waste Export Regulations (SOR/97-109)
 - Ozone-depleting Substances Regulations (SOR/99-7)
 - PCB Regulations (SOR/2008-273)
 - Regulations Amending the PCB Regulations (SOR/2010-57)
 - Interprovincial Movement of Hazardous Waste Regulations (SOR/2002-301)
 - Federal Halocarbon Regulations (SOR/2003-289)
 - Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149)
- Federal Hazardous Products Act (R.S., 1985, c. H-3)
 - Surface Coating Materials Regulations (SOR/2005-109)
 - Regulations Amending the Surface Coating Materials Regulations (SOR/2010-224)
- Federal Transportation of Dangerous Goods Act (1992, c. 34)
 - Transportation of Dangerous Goods Regulations (SOR/2012-245)
- National Plumbing Code of Canada (National Research Council Canada)
- NS Occupational Health and Safety Act
 - Occupational Safety General Regulations (53/2013)
 - Workplace Health and Safety Regulations (143/2014)
- NS Environment Act
 - Asbestos Waste Management Regulations (53/45)
 - Dangerous Goods Management Regulations (57/2016)
- NS A Guide to Removal of Friable Asbestos Containing Materials, Nov. 2013.
- NS Guidelines for Disposal of Contaminated Solids in Landfills, 2005.
- NS Information Package on Working with Inorganic Lead in Nova Scotia (NSE, 2001).

- NS Code of Practice: Working with Inorganic Lead in Nova Scotia (NSE, 2010).

Amec Foster Wheeler has considered the above documents in conducting this HBMA.

The following sections present the guidelines and standards that were used to evaluate analytical results for samples of suspected hazardous materials collected during this assessment.

1.5.1 Asbestos-Containing Materials (ACMs)

Asbestos-Containing Materials (ACMs) are fibrous hydrated silicates that were frequently used in building materials from the 1920s to the late 1970s/early 1980s for their insulating and fire retardant properties. Although discontinued from use in Canada, asbestos can still be found in many more recent buildings. ACMs can be found in building materials as either “friable” or “non-friable” asbestos products. Friable asbestos refers to materials that can be readily crumbled using hand pressure, separating asbestos fibres from the binding materials with which they are associated. Non-friable material refers to asbestos that is associated with a binding agent (such as tar or cement), preventing ready release of airborne fibres. Friable asbestos is commonly found in boiler and pipe insulation. Non-friable or bound asbestos is typically found in roofing tars, floor and ceiling tiles, and precast asbestos cement products commonly referred to as “transite”.

ACMs in the workplace are regulated under the following federal and provincial policies and regulations:

Federal:

- *Treasury Board of Canada Secretariat Hazardous Substances Directive - II, Section 2.9 as it relates to asbestos management; and*
- *Public Works and Government Services Canada Departmental Policy (DM: 057) - Asbestos Management, dated March 12, 1997.*

Provincial:

- *Nova Scotia Asbestos Waste Regulations.*

Under these regulations, materials containing greater than 0.5% asbestos fibers are considered asbestos-containing and should be managed in accordance with the applicable regulations.

Building 10 is located on a federal site, the building and employees are under federal, not provincial, jurisdiction. Typically, federal buildings and employees come under the Canada Labour Code, however, contractors would be under provincial jurisdiction.

1.5.2 Lead in Paint

Paint manufacturers historically added heavy metals, including lead, to paint because of their desirable properties such as rust and fungus prevention.

In order to determine disposal options for painted surfaces, concentrations of total lead in paint (flaking) and paint including substrate (adhered) were compared to the *Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills* criteria of 1,000 parts per million (ppm), or

milligrams per kilogram (mg/kg). Samples with lead concentrations in excess of 1,000 mg/kg were subjected to leachability testing during this program. The lead leachability limit for Construction and Demolition landfills in Nova Scotia and the federal regulation for the Transportation of Dangerous Goods (TDG) is 5 milligrams per litre (mg/L). This criteria was used to assess the results of the leachability testing in order to determine disposal options for any lead-containing painted surfaces to be removed during demolition. Any paints or materials that require disposal and exceed the lead leachate guideline are considered to be leachable toxic waste and must be disposed of at an approved hazardous waste disposal site and not a landfill disposal site.

Additionally, to address potential health effects to Site workers pre-demolition (should salvaging of materials occur) or during demolition to peeling or flaking paint or possible generated dust, lead concentrations in paint were also compared to Federal Hazardous Products Act (HPA) criteria of 90 mg/kg. Under the HPA, the lead content limit was reduced from 5,000 mg/kg to 600 mg/kg in 2005 for surface coating materials where persons may become exposed. In 2010, the lead content limit was further reduced from 600 mg/kg to 90 mg/kg.

1.5.3 Mercury in Paint

Paint manufacturers historically added mercury to paint, because of its desirable properties such as rust and fungus prevention.

In order to determine disposal options, concentrations of mercury in paint were compared to the provincial landfill disposal guideline of 10 mg/kg. Samples that contained a mercury concentration in excess of 10 mg/kg were subjected to leachability testing. The mercury leachability limit for Construction and Demolition landfills in Nova Scotia and the federal regulation for the TDG for mercury is 0.10 mg/L. This criteria was used to assess the results of the leachability testing to determine disposal options for any mercury-containing painted surface removed during demolition. Any paints or materials that require disposal and exceed the mercury leachate guideline are considered to be leachable toxic waste and must be disposed of at an approved hazardous waste disposal site and not a landfill disposal site.

1.5.4 PCBs in Paint and Caulking

Analytical results for PCBs in paint and caulking were compared to the CCME CSQG of 50 mg/kg for PCBs in soil at an industrial site. The Federal HPA does not include any assessment criteria for PCBs in paint.

In order to determine disposal options, concentrations of PCBs in paint were compared to the criterion of 50 mg/kg for PCBs provided in the Federal Transportation of Dangerous Goods (TDG) Regulation. Any paints that require disposal and exceed the PCB solid criterion must be disposed of at an approved hazardous waste disposal site and not a landfill disposal site.

2.0 METHODOLOGY

The HBMA site visit of Building 10 was conducted by Amec Foster Wheeler on 07 and 08 September 2016. The visual inspection and intrusive bulk sampling program was performed by Amec Foster Wheeler personnel Mr. Bill Chew, B.Sc., CET, Mr. John Krilow, CET, and Mr. Jason Marsh, B.Tech. The following subsections provide descriptions of the methodology employed to carry out the HBMA.

2.1 BULK MATERIAL SAMPLING FOR ASBESTOS AND PCBS

During the HBMA, all accessible areas of the Site Building were examined for the presence of suspected friable and non-friable ACMs.

Amec Foster Wheeler personnel collected eighty-one (81) bulk material samples, including nine field duplicates, from the building. Materials sampled included troweled-on insulating pipe cement, insulating pipe wrap, caulking, concrete, drywall joint compound, spackle, vinyl floor tile and mastics. Building materials suspected of containing asbestos were sampled by removing a 2.0 cm by 2.0 cm piece of material (where possible) and placing the sample into Ziploc® plastic bags. Bulk samples were collected from materials that appeared visually distinct and therefore repetitive testing was generally not performed.

The presence, location, condition and approximate quantities of each suspect ACM were recorded. Each material sampled was assigned a sample number and location recorded on building floor plans. Sampling locations are identified on Building floor plans, provided on Figures A-2 to A-4 (Appendix A). Photographs of select sampling locations are provided in Appendix B. A summary of suspected ACM samples is provided in Table C-1 (Appendix C).

Bulk samples were submitted to the EMSL Canada Inc. (EMSL) laboratory located in Mississauga, Ontario (ON) for the analysis of asbestos using Polarized Light Microscopy (PLM) with dispersion staining. The analysis was conducted in accordance with the United States Environmental Protection Agency (USEPA) Method EPA 600/R-93/116 (Method for the Determination of Asbestos in Bulk Building Materials). EMSL is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Industrial Hygiene Association (AIHA) for bulk asbestos fibre analysis by PLM.

Amec Foster Wheeler also collected three caulking samples from the building for PCB analysis. Sampling locations are identified on Building floor plans, provided on Figures A-2 and A-3 (Appendix A). Approximately five grams of caulking was obtained from each sampling location and placed into Ziploc® plastic bags. The analysis was conducted by Maxxam Analytics Inc. (Maxxam) using GC-ECD methodology. The analysis was conducted in accordance with an in-house lab method, as there is currently no recognized reference method for PCBs in caulking.

2.2 PAINT SAMPLING FOR LEAD, MERCURY AND PCBS

During the HBMA, all accessible areas of the Building were examined for the presence of suspected LBP/MBP.

Amec Foster Wheeler collected twenty-one (21) paint samples from the building interior and exterior, including two field duplicates. The interior samples were collected in order to ensure a

representative number of samples were collected from the different areas of the building and different paint colours. These samples were considered representative of painted surfaces throughout the building. Samples included only paint, where observed to be flaking, as well as paint and substrate (i.e. concrete) where paint was observed to be readily adhered. Paint samples were collected from surfaces by cutting and scraping areas of paint, both flaking and adhered, using clean knives, scrapers or chisels, or by removing a small section of the painted substrate (e.g., concrete). If a portion of the substrate was unable to be removed, paint samples were collected down to the bare substrate (e.g., metal). A minimum of five grams (where possible) of paint was obtained from each sampling location and placed into Ziploc® plastic bags. Paint samples were collected from surfaces that appeared visually distinct and therefore repetitive testing was generally not performed. It is noted that the majority of wall surfaces in the inmate cell wings contained light blue paint underlain by green and beige.

The presence, location, condition and approximate quantities of each suspect LBP/MBP were recorded. Each paint sample was assigned a sample number and location recorded on Building floor plans. Observations made by Amec Foster Wheeler at the time of the Site visit revealed that most painted surfaces were in good condition, with only a few small areas exhibiting peeling and/or flaking paint. Each paint sampled was assigned a sample number and location recorded on building floor plans. Sampling locations are identified on Building floor plans, provided on Figures A-2 and A-3 (Appendix A). Photographs of select sampling locations are provided in Appendix B. A summary of paint sampling information is provided in Table C-2 (Appendix C).

Paint samples were submitted to the Maxxam Analytics Inc. (Maxxam) laboratory located in Bedford, NS for the analysis of lead and mercury. Maxxam is accredited under the Standards Council of Canada (SCC) to perform analysis of lead and mercury in paint samples. The lead and mercury analysis was conducted in accordance with the EPA 6020A, method analysis for metals using inductively coupled plasma – mass spectrometry (ICP-MS). It is noted that based on the total lead and/or total mercury concentration results of paint only, further testing of paint including substrate was performed to determine disposal options. Also, further testing for leachable lead and/or leachable mercury was performed for the same reason. Note that the further testing was only performed if the total lead and/or total mercury values in paint exceeded disposal guidelines (Attachment B parameters). Based on the total lead and/or total mercury values, paint samples were analyzed for leachable lead and/or mercury using the TCLP method, as required.

Amec Foster Wheeler also collected four paint samples from the building for PCB analysis. Sampling locations are identified on Building floor plans, provided on Figures A-2 and A-3 (Appendix A). The analysis was conducted by Maxxam using GC-ECD. The analysis was conducted in accordance with an in-house method, as there is currently no recognized reference method for PCBs in paint.

2.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROGRAM

A Quality Assurance and Quality Control (QA/QC) program was implemented as part of the HBMA and included the following components.

Field QA Program

Standardize procedures were implemented in the field to ensure quality of data and minimize cross contamination. These included the following measures:

- Latex or nitrile gloves were worn during all sampling (new pair of gloves for each sample);
- All sampling equipment was thoroughly cleaned prior to sampling to ensure that samples were unaffected by cross-contamination from previous samples; and
- Each sample was photographed, given a unique sample ID and logged onto a chain of custody form before shipment to the laboratory.

Field QC Program

To assess the reliability of analytical data, Amec Foster Wheeler collected field duplicate samples of bulk materials and paints at a frequency of ten percent and submitted to the laboratory as blind field duplicates. In total, eight bulk material duplicates and two paint duplicates were collected to ensure consistency of field data and quality of laboratory methods. A discussion of the reliability of data as it relates to the field duplicate results is discussed on Section 2.4.

Laboratory QA/QC program

The laboratories utilized have extensive QA/QC programs in place to ensure that reliable results are consistently obtained. Specific laboratory QA/QC measures include:

- Chain of Custody and sample integrity inspection;
- Strict documentation control and files;
- Trained personnel prepare and analyze samples according to Standard Operating Procedures (SOPs);
- All analytical methods are based on accepted procedures and are fully validated prior to use;
- Precision is monitored by performing replicate analysis of samples;
- Accuracy is verified by analyzing spiked samples and reference materials;
- Instrument calibration integrity is ensured by analyzing calibration check standards within each run sequence;
- Extensive use is made of reference material for routine procedure evaluation;
- Highest available purity analytical standards;
- Predefined analytical sequences ensure all results are traceable to calibration and QC data;
- Hard copy reports displaying all of the required data are generated for each instrument;
- Analytical results are determined only from instrument responses that fall within the calibration range;
- Acceptable QC performance must be demonstrated prior to data authorization;
- On-going method and instrument performance records are maintained for all analysis; and,
- A full-time QA Scientist evaluates the QA program on an on-going basis.

2.4 INSPECTION FOR OTHER POTENTIALLY HAZARDOUS BUILDING MATERIALS

In addition to the bulk material and paint sampling program discussed above, Amec Foster Wheeler also inspected Building 10 for the presence of other potentially hazardous building materials that would require removal in advance of building demolition, including:

- Lead-containing equipment, such as lead-acid batteries and pipe solder;
- Mercury-containing equipment, such as thermostats and fluorescent light tubes;
- PCB-containing equipment, such as fluorescent light ballasts, capacitors and transformers;
- ODSs and halocarbons, such as refrigeration units, fire suppression systems or rigid foam insulation;
- Radioactive materials, such as smoke detectors;
- Hazardous chemicals or petroleum hydrocarbons;
- UFFI;
- Mould; and
- Silica.

Documentation of the presence of these materials is provided in Section 3.5.

3.0 FINDINGS

The findings documented in this section are based on the observations made by Amec Foster Wheeler personnel at the time of the site visit and laboratory analyses of samples collected from Building 10.

3.1 ASBESTOS-CONTAINING MATERIALS (ACMs)

Eighty-one (81) bulk material samples, including nine field duplicates, were collected from Building 10 and submitted for asbestos analysis. The samples included pipe insulation and parging (trowelled cement on elbows and joints), duct insulation, floor tiles, ceiling tiles, vinyl baseboards, wallboard, caulking, mastics, grout, mortar and roofing materials. It is noted that in many cases, where the sample consisted of multiple layers, the laboratory separated and analyzed each layer individually. Considering this, the actual number of materials tested for asbestos content was one hundred and nineteen (119). Sample locations are illustrated on Figures A-2 to A-4, Appendix A. Select sample photographs are contained in Appendix B. Sample descriptions and analytical results are summarized in Table C-1, Appendix C. Laboratory certificates are included in Appendix D.

A description of suspected ACMs observed and sampled in the building is provided in the following sub-sections.

3.1.1 Friable Materials

Friable ACMs are defined as materials that can be crumbled, pulverized and reduced to powder when dry using hand pressure. Typical friable materials include acoustical or decorative spray applications, fireproofing and thermal insulation.

3.1.1.1 Spray-Applied Fireproofing or Surfacing Materials

There were no spray-applied fireproofing, insulation or texture finishes observed within the building during the site visit; therefore, no samples of these materials were collected for analysis.

3.1.1.2 Thermal Insulation

A considerable amount of mechanical thermal insulation (i.e. insulated hot and cold water piping, ductwork, and ventilation units) is present in the Upper and Lower Mechanical Rooms of the building as well as pipe chases throughout the building. These pipe chases, containing insulated hot and cold water piping and electrical wiring, run between the Lower and Upper Mechanical Rooms through portions of each inmate cell and some other rooms within the building. These pipe chases are somewhat accessible via steel doors located in the hallways and a few other rooms within the building. The pipe chases could not be entered due to a lack of space and safety concerns, therefore visual inspection and sampling of the insulating materials in these confined areas was limited to what could be seen or reached at arm's length from the steel doors.

Several samples of pipe wrap (lagging), parging (trowel or hand applied pipe cement) and duct insulation were collected throughout the building during the Site visit.

Of these, seven (7) samples exceeded the *Nova Scotia Asbestos Waste Regulations Guideline* of 0.5% by weight. The location and asbestos concentration of these samples are presented in Table 3.1, below.

Table 3.1

Sample ID	Material Analyzed	Detailed Material Description	Location / Photo No.	Analytical Result
A27	Pipe Insulation	Pipe Insulating Cement/Parging (elbow), 75 mm dia., painted yellow.	Upper Mech. Room / Photo 7	15% Chrysotile
A28	Pipe Insulation	Pipe Insulating Cement/Parging (tee), 250 mm dia.	Lower Mech. Room / Photo 1	20% Chrysotile
A30	Pipe Insulation	Pipe Insulating Cement/Parging (joint), 25 mm dia.	Room 109/111 pipe chase via steel door / Photo 3	15% Chrysotile
A78	Pipe Insulation	Pipe Insulating Cement/Parging, End of Run, 25 mm dia.	Lower Mech. Room / Photo 4	30% Chrysotile
A80	Pipe Insulation	Pipe Insulating Cement/Parging, End of Run, 25 mm dia.	Lower Mech. Room / Photo 5	30% Chrysotile
A81	Pipe Insulation	Pipe Insulating Cement/Parging, End of Run, 25 mm dia.	Lower Mech. Room / Photo 6	20% Chrysotile

Nine ACM cement fittings were observed in the Upper and Lower Mechanical Rooms as well as a pipe chase off Room 109/111, however it is likely that others exist in inaccessible areas of the building. These fittings should be removed according to the *Nova Scotia Guide to Removal of Friable Asbestos Containing Materials*. Type 2 (Glove Bag) abatement techniques should be employed by a licensed asbestos abatement contractor prior to building demolition. It is noted that some of the insulating pipe cement/parging within the pipe chases appear to have been previously abated, to an extent, however due to limited accessibility, the likelihood that residual material remains in these areas is considered to be high.

Asbestos was not detected in any other mechanical thermal insulation found in the building.

3.1.1.3 Other Potential Friable ACMs

A pipe gasket (Sample No. A29: Annulus of 300 mm dia. water main entering through wall) was found to contain 7% amosite asbestos (Photo 2, Attachment B). This material is considered to be friable and will require removal in advance of building demolition by licensed asbestos abatement contractor.

Vermiculite was not observed during the HBMA in assessable portions of the building. Should vermiculite be encountered during building demolition, the work in the area should be halted and the suspect material sampled and tested to determine the presence or absence of vermiculite.

3.1.2 Non-Friable and Potentially Friable Materials

Non-friable ACMs are hard or manufactured products such as floor tiles, pre-formed manufactured cementitious insulation and wallboards, pipes, and siding, wherein the asbestos fibres are bound to the substrate. Note that although a product may be considered non-friable when new, the product may release fine dust when disturbed (e.g., deterioration, removal, renovations) and the free dust is considered friable.

3.1.2.1 Ceiling Tile

Suspended ceiling tiles (600 mm x 1200 mm) were observed in some of the rooms in the administration portion of the building. Two samples of ceiling tile were collected from the Building and analyzed for asbestos content. Asbestos was not detected in either sample.

3.1.2.2 Drywall Joint Compound

Drywall was observed in a small portion of the building; in particular, on the office walls near the main entrance. Two samples of drywall joint compound (DJC) were collected and analyzed for asbestos content. Asbestos was not detected in either DJC sample.

3.1.2.3 Vinyl Flooring Products and Mastics

Vinyl floor tile (300 mm x 300 mm) was observed throughout the majority of the building, in particular, within the inmate cell wings. Eight different colors/patterns of floor tile and associated mastics were sampled and analyzed for asbestos content. Of these, only one color/pattern of floor tile (Sample No. A-6: brown with white streaks) was found to be asbestos containing (2 % chrysotile asbestos). This particular color/pattern of floor tile was observed in ten cells of the building (identified on Figures A-2 and A-3). The total area covered by this floor tile was calculated to be 73 m². This floor tile will require removal in advance of building demolition by licensed asbestos abatement contractor. None of the mastic and none of the other floor tile colors/patterns were asbestos containing.

3.1.2.4 Baseboard Mastics

Vinyl baseboards and associated mastics were observed throughout the building. A sample of this material was analyzed for asbestos content. Asbestos was not detected in the baseboard or mastic.

3.1.2.5 Roofing Products

During the HBMA, two samples of roofing material (containing multiple layers including poly membrane, tar, fiberglass and rigid foam insulation) were collected from the Building and analyzed for asbestos content. Asbestos was not detected in either sample collected from the Building roof.

3.1.2.6 Caulking

During the HBMA, eight samples of caulking were collected from the Building and analyzed for asbestos content. The caulking was collected from the interior and exterior of windows as well as on ductwork. Chrysotile asbestos (2%) was detected in the caulking sample collected from the exterior ductwork located on the roof of the Building (Sample No. A70, refer to Photo 12, Appendix B). The estimated quantity of caulking on the roof ductwork is estimated to be 0.2 m³. This caulking will require removal in advance of building demolition by licensed asbestos abatement contractor. Asbestos was not detected in any of the other caulking samples collected from the Building.

3.1.2.7 Mortar, Grout and Other Cementitious Materials

During the HBMA, several samples of concrete, mortar, and ceramic tile grout, were collected from the Building and analyzed for asbestos content. Asbestos was not detected in any of these materials.

The 300 mm dia. water main entering the building in the Lower Mechanical Room is suspected (not sampled) to be non-friable asbestos (transite). Note that the white gasket material between the pipe and the wall has been confirmed to be 7% amosite asbestos (friable). Prior to demolition, the water to this line should be shut off and a sample of the pipe material tested to confirm it is asbestos containing. The water line will require cutting and capping prior to building demolition. If confirmed to be ACM, proper abatement techniques will be required by a licenced abatement contractor to cut and cap the pipe. The removed section, as well as the gasket material, should be properly disposed of at approved asbestos disposal facility.

3.1.2.8 Other Potential Non-Friable ACMs

During the HBMA, other potential ACMs such as tar paper, terrazzo flooring, ceramic tile and wall board were observed, sampled and analyzed for asbestos content. Asbestos was not detected in any of these materials.

Other possible hidden and inaccessible ACMs have the potential to be present in the building but were not identified during the HBMA site visit. These possible ACMs could include fire rated structures or building materials, gaskets associated with cast iron pipe joints (if present), and infrastructure or piping (i.e. 300 mm dia. water main in Lower Mechanical Room suspected to be asbestos (transite) pipe).

If other potential ACMs that were not sampled as part of this assessment are encountered in the future, these materials should be treated as ACMs or samples should be collected and tested to verify asbestos content. This should be done as soon as these materials are encountered and before these materials are disturbed. This includes materials that are currently concealed by walls and ceiling systems.

3.2 PCBs IN CAULKING

According to the USEPA, PCB may be present in caulking used in windows, door frames, masonry columns and other building materials in buildings built or renovated between 1950 and 1979. The Site Building was constructed in 1967, therefore, it is possible that PCB may be present in caulking used in the construction of these buildings.

The PCBs results in caulking are presented in Table C-2, Appendix C. The caulking samples analyzed were either non-detect for PCBs (i.e., <0.50 mg/kg), or where detected, had a Total PCB concentrations of 0.75 mg/kg, well below the applicable criteria (i.e., 50 mg/kg).

3.3 PAINT ADDITIVES

Lead compounds have been used in paint as pigment and durability additives since the early 1800s. Mercury compounds have been used in paint as anti-microbial additives up until the

1990s. PCBs have been used in paint as plasticizers and corrosion resistance additives from the 1950s to the 1970s.

During Amec Foster Wheeler's site visit on 07 and 08 September 2016, twenty-one (21) paint samples, including two field duplicates, were collected from the Site Building and submitted for analyses of total lead and total mercury. Four paint samples were also analyzed for PCB content.

3.3.1 Lead in Paint

Total lead results in paint are provided in Table C-3, Appendix C. Of the twenty-one (21) paint samples tested, five (5), including one field duplicate, exhibited total lead concentrations in exceedance of the provincial landfill disposal guideline of 1,000 mg/kg. The location and lead concentration of the five samples are presented in Table 3.2, below.

Table 3.2

Sample ID	Colour Description	Substrate	Location (Photo No.)	Total Lead (mg/kg)
P2	White on Shower Ceiling (flaking)	Concrete	Shower ceiling (Rm. A19). (Photo 14)	<u>6600</u>
PDUP2	White on Shower Ceiling (flaking)	Concrete	Shower ceiling (Rm. A19). (Photo 14)	<u>3900</u>
P8	Light Blue over green/beige	Concrete and metal	Wall in Rm. F14. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13)	<u>1500</u>
P41	Beige	Concrete	Wall in TV Room (Rm. 201).	<u>3100</u>
P60	Red over grey/green (flaking)	Metal	Exterior steel stairs, three sets. (Photos 17 & 18)	<u>6700</u>

Notes:

Underlined results indicate that lead concentration is above the Federal HPA criterion of 90 mg/kg.

Based on these exceedances, three samples (P2 (the higher concentration of the duplicates), P8 and P60) were further tested for lead leachate using the TCLP to determine whether or not the paint would be considered hazardous waste upon removal from the site (leachate results are discussed in Section 3.3.2).

The remaining sample (P41) was further tested including substrate, as the paint was readily adhered, to characterize the lead concentration of the total volume of the material. The total lead result of this sample (P40) was 64 mg/kg, well below the landfill disposal criteria.

Additionally, to address potential health effects to Site workers pre-demolition (should salvaging of materials occur) or during demolition to peeling or flaking paint or possible generated dust, lead concentrations in paint were also compared to (HPA) criteria of 90 mg/kg. Seventeen (17) paint samples, including two field duplicates, contained lead at concentrations above the Federal HPA criterion of 90 mg/kg. Based on this, Site workers should don personal protective equipment (respiratory and dermal protection) during any salvaging (if performed) or demolition activities, to reduce exposures to peeling or flaking paint or paint dust in the areas where these samples were collected. It is important to note that the condition of paint in three areas of the building, (Room

C8, Room A19 and the exterior steel stairways) was observed to be in poor condition (i.e., peeling and flaking) at the time of the site visit.

3.3.2 Leachable Lead in Paint

Three paint samples that exceeded the provincial landfill disposal guideline for total lead were further tested for lead leachability analysis (TCLP). The leachable lead results are provided in Table C-6, Appendix C. The concentrations of leachable lead in all samples were below the lead leachability guideline for Construction and Demolition (C&D) landfills in Nova Scotia (5 mg/L). As such, with respect to lead, painted surfaces from Building 10 removed during demolition are suitable for disposal at a C&D landfill.

3.3.3 Mercury in Paint

Total mercury results in paint are provided in Table C-4, Appendix C. Of the twenty-one (21) paint samples tested, eight (8), including one field duplicate, exhibited total mercury concentrations in exceedance of the provincial landfill disposal guideline of 10 mg/kg. The location and mercury concentration of the eight samples are presented in Table 3.3, below.

Table 3.3

Sample ID	Colour Description	Substrate	Location (Photo No.)	Total Mercury (mg/kg)
P1	Light Blue over green/beige (flaking)	Concrete and metal	Wall in Rm. C8. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	<u>36</u>
PDUP1	Light Blue over green/beige (flaking)	Concrete and metal	Wall in Rm. C8. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	<u>24</u>
P3	Light Blue over green/beige.	Concrete and metal	Wall in Rm. A1. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	<u>12</u>
P4	Light Blue over green/beige.	Concrete and metal	Wall in Rm. B8. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	<u>25</u>
P5	Light Blue over green/beige.	Concrete and metal	Wall in Rm. C10. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	<u>11</u>
P7	Light Blue over green/beige.	Concrete and metal	Wall in Rm. E4. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	<u>13</u>
P8	Light Blue over green/beige.	Concrete and metal	Wall in Rm. F14. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	<u>17</u>
P41	Beige	Concrete	Wall in TV Room (Rm. 201)	<u>26</u>

Notes:

Underlined results indicate that lead concentration is above the Federal HPA criterion of 10 mg/kg.

It is noted that seven of the eight exceedances are considered to be the same paint. Based on this, one sample exhibiting the highest mercury concentration (Sample No. P1), was further tested for mercury leachate using the TCLP to determine whether or not the paint would be considered hazardous waste upon removal from the site (leachate results are discussed in Section 3.3.4).

The remaining sample (P41) was further tested including substrate, as the paint was readily adhered, to characterize the mercury concentration of the total volume of the material. The total mercury result of this sample (P40) was 2 mg/kg, which is below the landfill disposal criteria. Additionally, to address potential health effects to Site workers pre-demolition (should salvaging of materials occur) or during demolition to peeling or flaking paint or possible generated dust, mercury concentrations in paint were also compared to (HPA) criteria of 10 mg/kg. Site workers should don personal protective equipment (respiratory and dermal protection) during any salvaging (if performed) or demolition activities, to reduce exposures to peeling or flaking paint or paint dust in the areas where the above-noted samples were collected.

3.3.4 Leachable Mercury in Paint

One paint sample that exceeded the provincial landfill disposal guideline for total mercury was further tested for mercury leachability analysis (TCLP). The leachable mercury result is provided in Table C-7, Appendix C. The concentration of leachable mercury was below the guideline for C&D landfills in Nova Scotia (0.1 mg/L). As such, with respect to mercury, painted surfaces from Building 10 removed during demolition are suitable for disposal at a C&D landfill.

3.3.5 PCBs in Paint

The PCBs results in paint are presented in Table C-5, Appendix C. All four paint samples analyzed were non-detect for PCBs (i.e., <5.0 mg/kg), well below the applicable criteria (i.e., 50 mg/kg).

3.4 QA/QC DISCUSSION

A discussion of field duplicates and laboratory surrogate recoveries, laboratory blanks and duplicates is presented in this section.

Laboratory QA/QC standard samples were analyzed with the samples and their duplicates to assess the reliability of the analysis. The laboratory QC results are provided in the Quality Assurance Reports appended to the Certificates of Analysis in Appendix D.

3.4.1 Field Duplicates

Two field duplicate samples of paint and nine field duplicates of bulk material for asbestos testing were collected and submitted blind to the laboratory for analysis. Relative Percent Differences (RPDs) for the paint analyses ranged from 12% to 51% (see Table C-8, Appendix C), well within the 100% RPD, which are considered typical for these materials. It is noted that precision criteria were not considered for results within a factor of five of the reporting limit.

Bulk material duplicate samples analyzed for asbestos content showed that asbestos was not detected in all nine duplicate sample pairs.

3.4.2 Laboratory Surrogate Recoveries

The PCB surrogate recoveries (Maxxam) showed that two paint samples (P1 and P41) were not within (below) acceptable limits. Based on this, the results for these samples are considered "estimated, bias low". Also, the PCB surrogate recoveries showed that one caulking sample (A-

18 PCB) was not within (above) acceptable limits. Based on this, the result for this sample is considered “estimated, bias high”. Neither case is expected to change the outcome of the HBMA, as the PCB results were either non-detectable or well below the acceptable guideline.

3.4.3 Laboratory Blanks

Laboratory method blank samples were analyzed for total and leachable lead and mercury as well as PCBs (Maxxam). The purpose of the laboratory blank samples was to assess the quality of the laboratory results with respect to the presence/absence of instrument cross contamination at the laboratory.

A review of laboratory method blanks showed non-detectable concentrations for all parameters tested. Based on this, no evidence of cross contamination occurred during the laboratory analytical program.

3.4.4 Laboratory Duplicates, Matrix Spikes and Spiked Blanks

The analytical data for the laboratory duplicate samples and the corresponding original paint samples analyzed for total and leachable lead and mercury as well as PCBs (Maxxam) were compared as relative percent differences (RPDs). A review of the laboratory duplicate data showed that duplicate RPDs were less than the laboratory’s acceptable QC limits.

A review of the matrix spike and spiked blank data showed that all values were within the laboratory’s acceptable QC limits.

3.4.5 Summary of QA/QC Program

Based on the above QC reviews, the analytical results are considered representative of site conditions in the immediate vicinity of the sample locations, with the exception of the PCB surrogate recovery data for three samples.

Overall, based on the QC review and above noted qualifiers, the analytical data is considered to be reliable and may be used with confidence for decision making purposes.

3.5 OTHER POTENTIALLY HAZARDOUS BUILDING MATERIALS

Other potentially hazardous building materials or substances identified during the HBMA are presented in the following sections.

3.5.1 Lead-containing Equipment

Lead is typically associated with plumbing solder and older pipe materials (e.g., cast iron pipe joints), as well as products such as radiation protective shielding and lead-acid batteries.

Two emergency lighting units, one observed to contain a lead battery, was observed in the building near the main entrance outside Room 104.

Based on the age of the building, copper piping in the building is suspected to contain lead solder.

3.5.2 Mercury-containing Equipment

No thermostats or mercury-containing switches were observed in the Site Building. The building electrician indicated that heating in the building was controlled via a remote computer system and heating plant. Some electric heaters were observed in offices in the administration portion of the building, however no thermostats were associated with these heaters (dial located directly on heater).

Fluorescent light tubes often contain limited quantities of mercury in a powder or vapour form. The majority of lighting in the building was observed to be fluorescent. Lighting tubes should be removed in advance of building demolition and handled carefully by workers to ensure they are not broken. Inhalation or direct skin contact with mercury should be avoided. Fluorescent light tubes should either be carefully packaged for appropriate reuse or disposed. Should fluorescent light tubes be designated for disposal, a bulb crusher or “eater” should be used to break up the lights and allow the mercury to be recovered in a filter and properly disposed at a licensed facility. The facility used to process and recycle the mercury shall be approved by the Nova Scotia Department of Environment, or local jurisdictional authority, and shall have valid approval/licenses to carry out the work.

3.5.3 PCBs

PCBs are commonly associated with dielectric fluids within electrical equipment such as transformers, fluorescent light ballast, and capacitors manufactured in Canada prior to approximately 1980.

Fluorescent Light Ballasts

Fluorescent light ballasts were observed throughout the majority of the building. According to the building electrician (Mr. Barry Brayley), all fluorescent light ballasts in the building were replaced in approximately 2011. Amec Foster Wheeler observed that most fluorescent light fixtures in the building were inaccessible due to the nature of the building. Inspection of one light ballast indicated that it was labelled “No PCBs”. Based on the aforementioned, it is unlikely that any light ballasts in the building contain PCBs. However, during demolition, the contractor will be responsible for evaluating the light ballasts to confirm if they are free of PCBs. Ballasts confirmed or suspected of containing PCBs will require appropriate management during demolition and disposal.

Capacitors

The building electrician was unaware of the presence of PCB-containing electrical capacitors, however indicated that some capacitors associated with motors are present in the building. These should be removed and checked for PCBs in advance of demolition.

Transformers

Four small transformers were observed inside the building; three in the lower mechanical room and one in the upper mechanical room. The building electrician indicated that all transformers were “dry type”, therefore do not contain PCBs.

3.5.4 ODSs and Halocarbons

Ozone depleting substances (ODS) include any substances containing chlorofluorocarbon (CFC), hydrochlorofluorocarbon (HCFC), halon or any other material capable of destroying ozone in the atmosphere. ODS have been used in rigid polyurethane foam and insulation, laminates, aerosols, air conditioners, freezers, chillers, fire extinguishers, cleaning solvents and for the sterilization of medical equipment. Federal regulations introduced in 1995 required the elimination of production and import of CFCs by January 1, 1996 (subject to certain essential uses) and a freeze on the production and import of HCFC-22 by January 1, 1996. These regulations also require the complete elimination of HCFC-22 by the year 2020. The NL Halocarbon Regulations (dated May 2005) required the elimination of halon in portable fire extinguishers effective June 1, 2005 and the elimination of halon in fire extinguishing systems by January 1, 2010.

Refrigerators, freezers, ice machines, cold rooms, roof-top HVAC units, air conditioning units or fire suppression systems could contain ODSs or global warming halocarbons. None of these units were encountered during the site visit.

Portable, hand-held fire extinguishers observed in the building were found to be dry chemical-type which would not likely contain halon or other ODS ingredients.

3.5.5 Radioactive Materials

Smoke detectors often contain the radioactive element Americium 241. The building electrician indicated that smoke detectors in the building were manufactured by *Tyco-Simplex Integrated Solutions*, and he suspected that they did not contain radioactive components. The electrician was going to check with another individual at the Site to verify this, however Amec Foster Wheeler did not receive any new information during the timeframe of this draft report. Smoke detectors in the building should be removed and checked for the presence of radioactive components in advance of demolition.

3.5.6 Hazardous Chemicals and Petroleum Hydrocarbons

Minor quantities of maintenance products were observed in two areas of the building during the site visit; Room 107 (inmate kitchenette) and the hallway in F-wing. The product types and quantities are provided in Table 3.4, below.

Table 3.4

Room 107	1 x 20 L Acrylic paint 5 x 3.8 L Acrylic paint 2 x 3.8 L Epoxy coating 1 x 3.8 L Alkyd metal primer 1 x 473 mL Urathane catalyst 1 x 340 g Alkyd spray paint 1 x 283 g Alkyd spray paint
F-Wing Hallway	1 x 4 L Amercoat thinner (contains xylene) 2 x 3.8 L Epoxy joint filler

Photos of these products (Photos 19 and 20) are provided in Appendix B. These chemicals and products should be removed from the building in advance of demolition and either reused or disposed at an approved facility.

In terms of petroleum hydrocarbons, electric motors, each containing approximately 1 litre of gear oil, are located in wall cavities behind steel doors off the laundry room of each wing (and each floor). The motors are used to operate chain-driven riot doors at the entrance to each inmate cell wing. A photo (Photo 21) of one of these motors is provided in Appendix B. It is possible that other electric motors containing gear oil associated with ventilation systems may also be present in the building. Oil should be emptied from each of these six motors and properly disposed at a licensed facility in advance of building demolition.

3.5.7 UFFI

UFFI is a thermal insulation material that is pumped into interstitial spaces between the walls of buildings where it hardens to form a solid layer of insulation. UFFI is comprised of a cured mixture of urea-formaldehyde resin and compressed air. The sale and installation of UFFI was banned for health-related reasons in 1980 because of the formation of formaldehyde gas which is released from the UFFI to the building interior.

Visual indicators suggesting the potential presence of UFFI were not observed in the Site building during the site visit.

Rigid foam insulation was observed in a roof layer during the Site visit and also reported by the Site escorts as being present within the walls of the two similar buildings that were previously demolished.

3.5.8 Mould

During the HBMA site visit on August 12, 2016, Amec Foster Wheeler personnel inspected the interior areas of the Building for visual or olfactory evidence of suspected mould. No evidence of suspected visible mould growth was observed in the Building at the time of the site visit, however the building exhibited stale and musty odours due to limited ventilation.

During demolition, if any areas are observed to contain mould, workers should comply with the regulations in the *Nova Scotia Occupational Health and Safety Act*. Workers on-site should don proper personal protective equipment (PPE) to prevent/reduce exposure to mould while working within the Site Building or during any disturbance/demolition of building materials that may be impacted by mould growth.

3.5.9 Silica

Many common construction materials contain silica including, asphalt, brick, cement, concrete, drywall, grout, mortar, stone, sand and tile. The dust created by cutting, grinding, drilling or otherwise disturbing these materials can contain crystalline silica particles.

Poured concrete, concrete block, concrete panels, mortar and grout were observed on the Site building. These materials may pose a risk to Site workers during demolition if dust is generated.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on observations made, information gathered, and sample analyses results, Table 4.1 presents the conclusions and recommendations with respect to the potential and actual presence of hazardous building materials at the Site Building.

Table 4.1

Hazardous Material	Disposal
Asbestos-Containing Materials (ACMs)	<p>Building materials containing greater than 0.5% asbestos by dry weight, which are considered to be ACMs, are present in the form of friable thermal insulating pipe cement/parging on fittings (elbows, tee joints and end of runs) and a gasket around the water main entering through the basement floor. Nine ACM cement fittings were observed in the Upper and Lower Mechanical Rooms as well as a pipe chase off Room 109/111, however it is likely that others exist in inaccessible areas of the building.</p> <p>Thermal insulation on mechanical pipe fittings will require Level 2 (Glove Bag) abatement techniques by a licensed asbestos abatement contractor prior to building demolition. It is noted that some of the insulating pipe cement/parging within the pipe chases appear to have been previously abated, to an extent, however due to limited accessibility, the likelihood that residual material remains in these areas is considered to be high.</p> <p>An asbestos-containing gasket around the water main entering through the basement floor is also considered friable and will require removal in advance of building demolition.</p> <p>Non-friable asbestos material including floor tiles (ten inmate cells totaling 73 m²) and caulking on roof mounted duct work (estimated to be 0.2 m³) are also present. These non-friable asbestos material will require removal in advance of building demolition by licensed asbestos abatement contractor.</p> <p>The 300 mm dia. water main entering the building in the Lower Mechanical Room is suspected (not sampled) to be non-friable asbestos (transite). Prior to demolition, the water to this line should be shut off and a sample of the pipe material tested to confirm it is asbestos containing. The water line will require cutting and capping prior to building demolition. If confirmed to be ACM, proper abatement techniques will be required by a licensed abatement contractor to cut and cap the pipe. The removed section, as well as the gasket material, should be properly disposed of at approved asbestos disposal facility.</p> <p>All other materials sampled in the building and analyzed for asbestos content were found to be non-asbestos containing.</p>
Lead- and Mercury-Based Paint	<p>Results of the paint sampling and analytical program revealed that all painted surfaces from Building 10 removed during future demolition are suitable for disposal at a C&D landfill.</p> <p>However, as some paints exceed the HPA criteria of 90 mg/kg and 10 mg/kg for lead and mercury, respectively, there are potential adverse human health effects associated with disturbing lead and mercury containing paint finishes. As a precautionary measure, Amec Foster Wheeler recommends handling these paint finishes, as follows:</p> <ul style="list-style-type: none"> • Peeling or flaking paint should be removed using wet scraping techniques by an experienced decommissioning/demolition contractor. • Steps should be taken to ensure that workers and anyone present in and around areas being dismantled or demolished are protected. The contractor should also ensure that dust generation and migration is minimized.

	<ul style="list-style-type: none"> Precautions should be taken to prevent/reduce exposure to paint dust during any disturbance of lead and mercury containing paint finishes, such as wetting the surface of the materials to prevent dust emissions, donning respiratory protection, and cleaning tools and clothing prior to exiting work areas.
Lead-containing Equipment	Lead acid batteries, contained in emergency lighting units in the building, should be removed before demolition and disposed of accordingly.
Mercury-containing Equipment	Mercury vapour is present in all fluorescent light tubes. Prior to building demolition, lighting tubes should be handled carefully to ensure that they are not broken, and then carefully packaged for appropriate reuse or disposal. Workers should avoid direct skin contact with mercury. Should fluorescent light tubes be designated for disposal, a bulb crusher or "eater" should be used to break up the lights and allow the mercury to be recovered in a filter and properly disposed at a licensed facility. The facility used to process and recycle the mercury shall be approved by the Nova Scotia Department of Environment, or local jurisdictional authority, and shall have valid approval/licenses to carry out the work.
PCBs	<p>Paint and caulking were either non-detect for PCBs, or where detected, had a Total PCB concentration well below the applicable criteria.</p> <p>Although PCB-containing fluorescent light ballasts were reported to be removed from the building, the demolition contractor will be responsible for evaluating the light ballasts to confirm if they are free of PCBs. Ballasts confirmed or suspected of containing PCBs will require appropriate management during demolition and disposal.</p> <p>The building electrician was unaware of the presence of PCB-containing electrical capacitors, however indicated that some capacitors associated with motors are present in the building. These should be removed and checked for PCBs in advance of demolition.</p> <p>Four small transformers were observed inside the building; three in the lower mechanical room and one in the upper mechanical room. The building electrician indicated that all transformers were "dry type", therefore do not contain PCBs.</p>
Radioactive materials / Smoke Detectors	Prior to demolition, smoke detectors should be checked for the presence of radioactive elements. If present, these units should be removed before demolition and disposed of accordingly.
Hazardous Chemicals and Petroleum Hydrocarbons	Hazardous chemicals located in the building, including gear oil, paints, thinners and epoxy should be removed before demolition and properly disposed.
ODSs and Halocarbons	Although no refrigeration units or fire suppression systems containing ODS or halocarbons were observed during the HBMA, if encountered prior to demolition, refrigerant gases should be drained and recovered by a licenced contractor prior to removal or demolition.
UFFI	Although no suspected UFFI was noted during the HBMA, if encountered during demolition, UFFI should be managed appropriately by workers and disposed of accordingly.
Mold	Visible mould growth was not observed during the site visit, however the interior of the building exhibited stale and musty odours due to limited ventilation. During demolition, if any areas are observed to contain visible mould growth, workers should don personal protective equipment and comply with the regulations in the Nova Scotia Occupational Health and Safety Act.
Silica	Appropriate worker protection shall be implemented if dust is generated from the demolition of poured concrete or concrete blocks. Precautions should be taken to prevent/reduce exposure to silica dust during any disturbance /demolition of silica-containing products, such as wetting the surface of the materials to prevent dust emissions, donning respiratory protection, and cleaning tools and clothing prior to exiting work areas.

5.0 CLOSURE

This report was prepared for the exclusive use of PWGSC and CSC. The findings of this report are based solely on the conditions of the site buildings encountered at the time of the site visit, and are limited by the availability of information at the time of the HBMA, lack of accessibility to areas within the buildings, project scope and budget. The findings of this assessment are based on the interpretation of data from a limited number of areas investigated and analytical results pertaining to specific samples. It is possible that materials exist which could not be reasonably identified within the scope of the HBMA or which were not apparent or accessible during the site visit.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third party. Should additional parties require reliance on this report, written authorization from Amec Foster Wheeler is required. With respect to third parties, Amec Foster Wheeler has no liability or responsibility for losses of any kind whatsoever, including direct or consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. This assessment has been carried out using commercially reasonable best efforts consistent with the level and skill ordinarily exercised by members of the profession currently practicing under similar conditions.

Except when otherwise specified, Amec Foster Wheeler disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to Amec Foster Wheeler after the time during which Amec Foster Wheeler conducted the hazardous building materials assessment.

In evaluating the property, Amec Foster Wheeler has relied in good faith on information provided by other individuals noted in this report. Amec Foster Wheeler has assumed that the information provided is factual and accurate. In addition, some of the findings in this report are based upon information provided by the current owner/occupant. Amec Foster Wheeler accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Amec Foster Wheeler makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

We trust that the information presented in this report meets your current requirements. Should you have any questions, or concerns, please do not hesitate to contact the undersigned.

Yours truly,

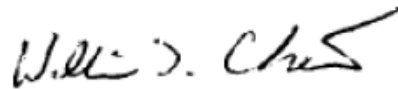
**Amec Foster Wheeler Environment & Infrastructure,
A Division of Amec Foster Wheeler Americas Limited**

Prepared by:



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Reviewed by:



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Environmental Scientist

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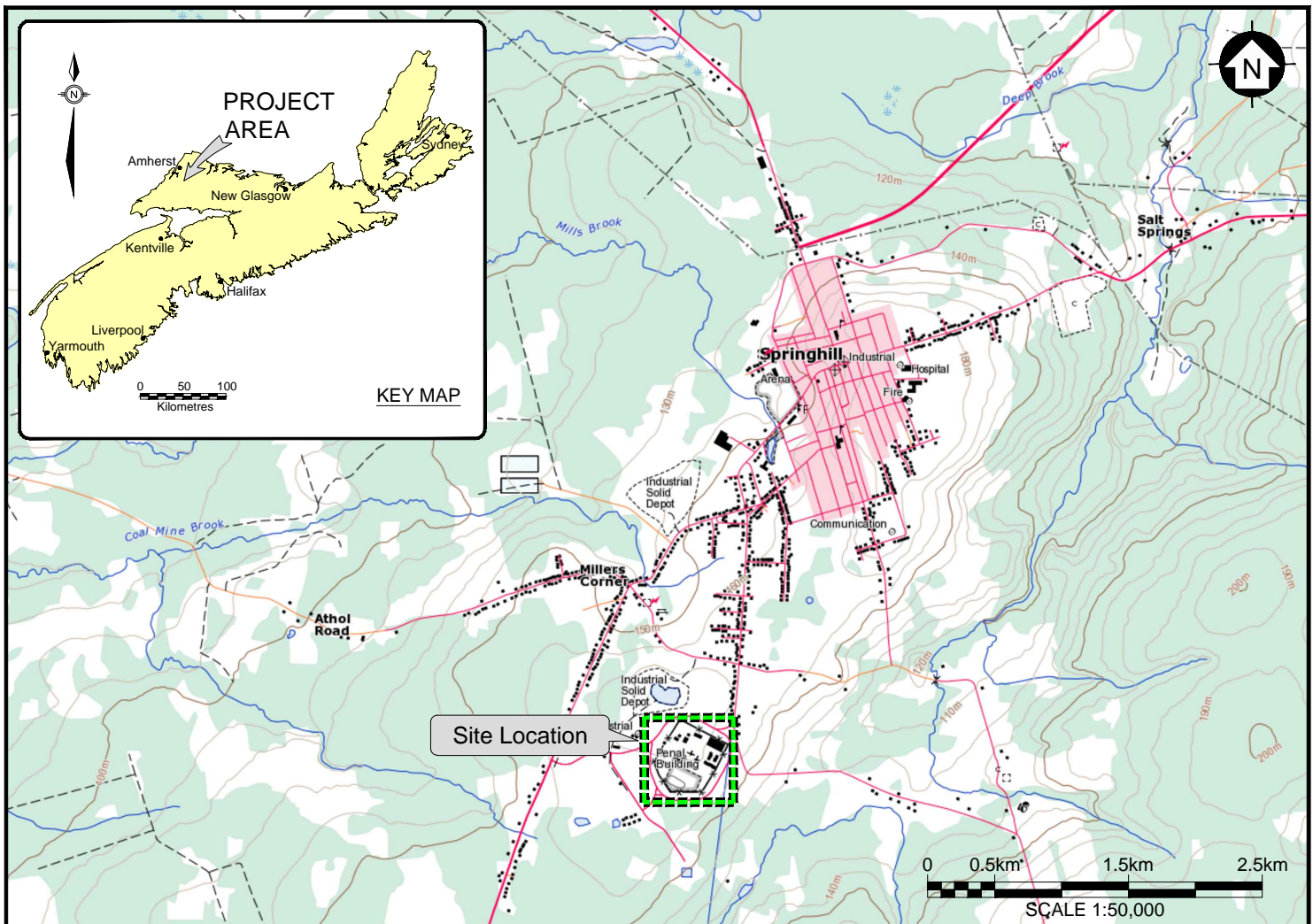
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APPENDIX A

FIGURES



Source: NTS Map# 21H09 Provided by Government of Canada, Natural Resources Canada, Earth Sciences Sector, Mapping Information Branch, Centre for Topographic Information.



Source: Orthophoto provided by Service Nova Scotia Municipal Relations, Nova Scotia Geomatics Centre., Photo No.1045600064000, 2014

CLIENT Public Works and Government Services Canada Real Property Branch Professional and Technical Services 1045 Main Street, Moncton, NB, E1C 1H1	DWN BY: DS	PROJECT: Hazardous Building Materials Assessment Springhill Institution Springhill, Nova Scotia	DATE: March 2017
	CHK'D BY: BA		PROJECT NO: TV161217
Amec Foster Wheeler Environment & Infrastructure 50 Troop Avenue, Unit 300 Dartmouth, N.S., B3B 1Z1 (P) 902-468-2848 (F) 902-468-1314	REV. NO: 	TITLE: General Site Location	SCALE: As Shown
	DATUM: NAD 83		FIGURE NO: 1
	PROJECTION: UTM Zone 20		

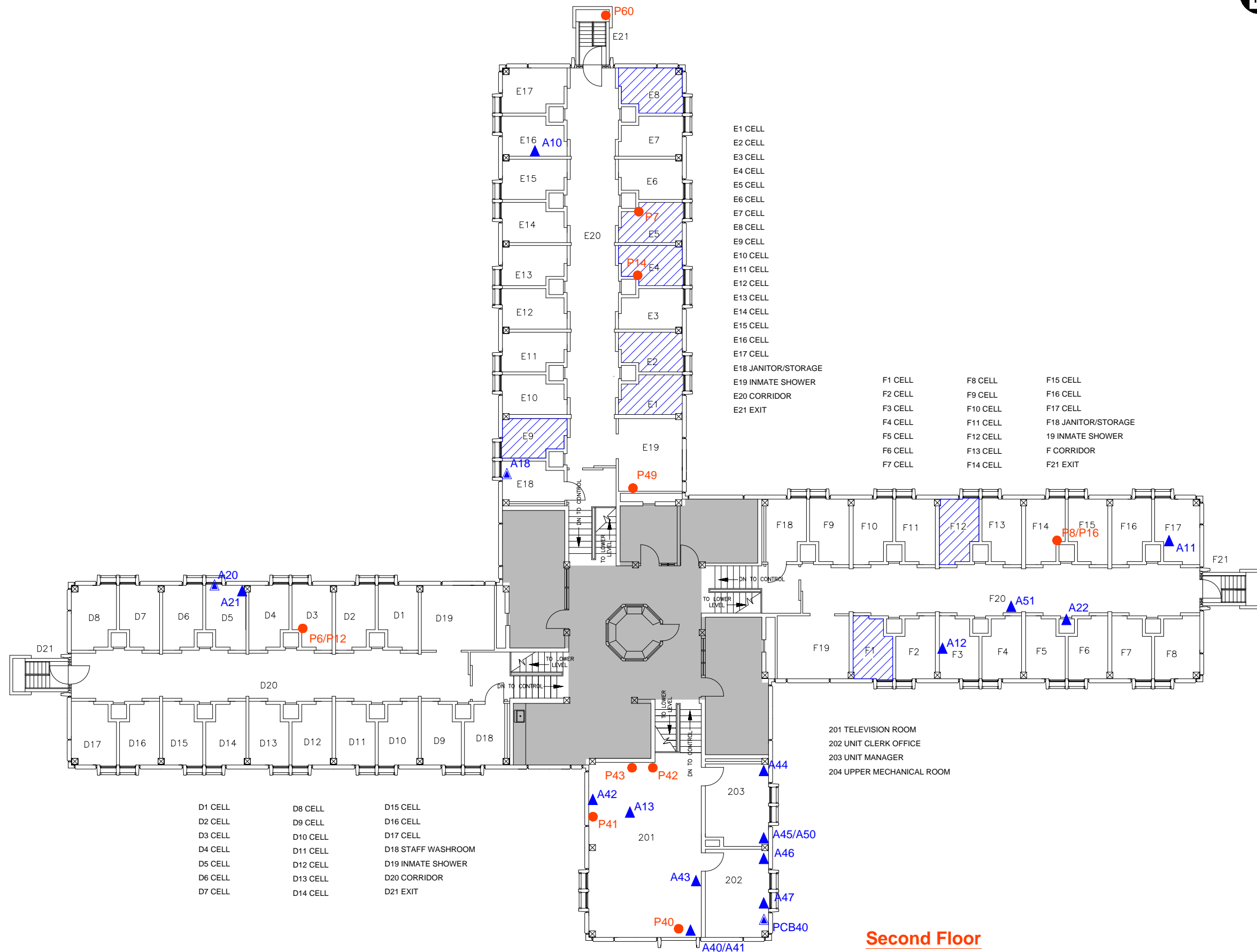
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First Floor



TITLE: Bulk Sample Locations First Floor		
PROJECT: Hazardous Building Materials Assessment Springhill Institution Springhill, Nova Scotia		
CLIENT Public Works and Government Services Canada Real Property Branch Professional and Technical Services 1045 Main Street, Moncton, NB, E1C 1H1		
LOCATION Springhill Institution Springhill, NS		
DATE: March 2017		
DATUM & PROJECTION: NAD83 UTM Zone 20		
PROJECT NO: TV161217		
DWN BY: DS	CHK'D BY: BA	FIGURE NO: 2
LEGEND: ▲ Denotes bulk sample for asbestos content ● Denotes paint sample for Lead & Mercury analysis ● Denotes paint sample for PCB analysis ▨ Denotes asbestos containing floor tile		
0 2 4 6 8 10m SCALE 1:200		
Amec Foster Wheeler Environment & Infrastructure 50 Troop Avenue, Unit 300, Dartmouth, N.S., B3B 1Z1 (P) 902-468-2848 (F) 902-468-1314		
amec foster wheeler		



TITLE:

Bulk Sample Locations
Second Floor

PROJECT:

Hazardous Building Materials Assessment
Springhill Institution
Springhill, Nova Scotia

CLIENT

Public Works and Government
Services Canada
Real Property Branch Professional and
Technical Services
1045 Main Street, Moncton, NB, E1C 1H1

LOCATION

Springhill Institution
Springhill, NS

DATE:

March 2017

DATUM & PROJECTION:

NAD83 UTM Zone 20

PROJECT NO:

TV161217

DWN BY:

DS

CHK'D BY:

BA

FIGURE NO:

3

LEGEND:

▲ Denotes bulk sample for asbestos
content

▲ Denotes bulk sample caulking for
PCB analysis

● Denotes paint sample for Lead
& Mercury analysis

● Denotes paint sample for PCB
analysis

■ Denotes asbestos containing
floor tile

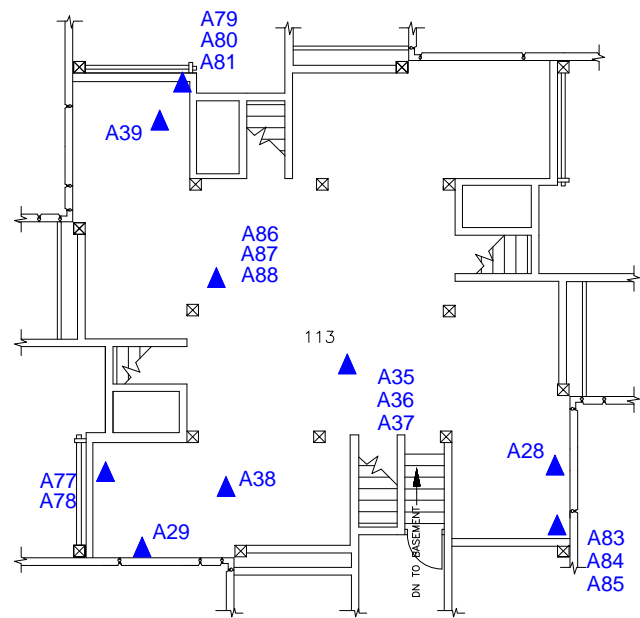
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SCALE 1:200

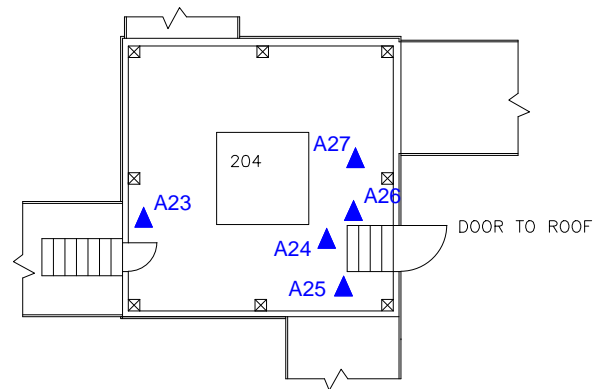
Amec Foster Wheeler
Environment & Infrastructure
50 Troop Avenue, Unit 300, Dartmouth, N.S., B3B 1Z1
(P) 902-468-2848 (F) 902-468-1314

Second Floor

\\nk1451\projects\5200 PROJECTS\2016\TV161217 PNGSC CSC Springhill Bldg 10.dwg, 3/17/2017, Schulte, Derrick M



Lower Mechanical Room

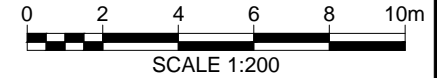


Upper Mechanical Room

TITLE: Bulk Sample Locations Basement Floor & Roof Access		
PROJECT: Hazardous Building Materials Assessment Springhill Institution Springhill, Nova Scotia		
CLIENT Public Works and Government Services Canada Real Property Branch Professional and Technical Services 1045 Main Street, Moncton, NB, E1C 1H1		
LOCATION Springhill Institution Springhill, NS		
DATE: March 2017		
DATUM & PROJECTION: NAD83 UTM Zone 20		
PROJECT NO: TV161217		
DWN BY: DS	CHK'D BY: BA	FIGURE NO: 4

LEGEND:

▲ Denotes bulk sample for asbestos
content



Amec Foster Wheeler
Environment & Infrastructure
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APPENDIX B
SITE PHOTOGRAPHS

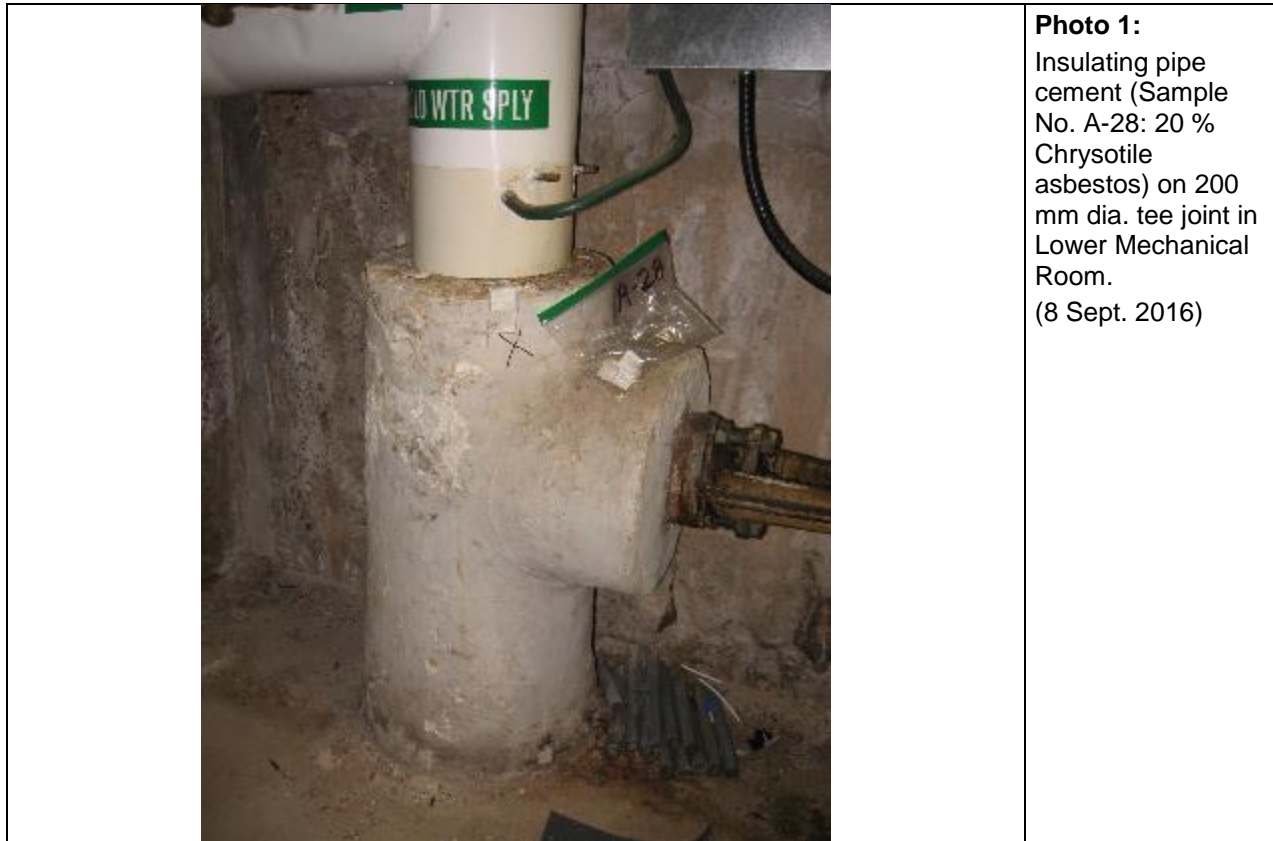




Photo 3:
Insulating pipe cement (Sample No. A-30: 15 % Chrysotile asbestos) over fibreglass on 25 mm dia. pipe joint in utility corridor off Rm. 109/111. (8 Sept. 2016)



Photo 4:
Insulating pipe cement (Sample No. A-78: 30 % Chrysotile asbestos) over fibreglass at end of 12 mm dia. pipe in Lower Mechanical Room. (8 Sept. 2016)

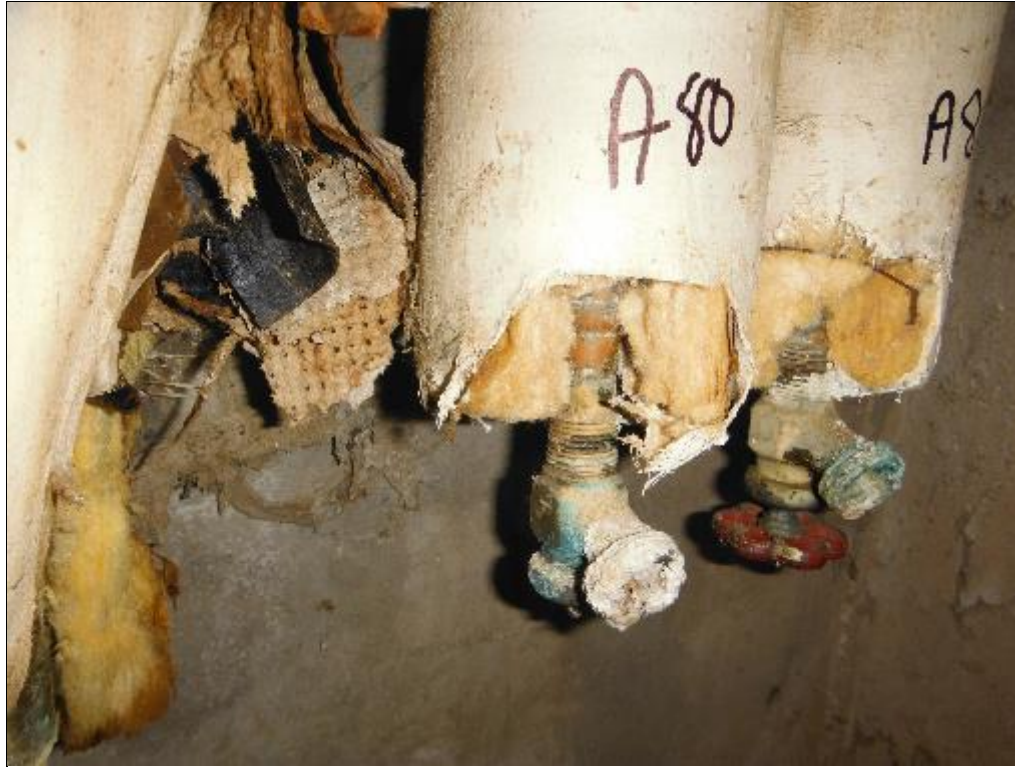


Photo 5:
Insulating pipe cement (Sample No. A-80: 30 % Chrysotile asbestos) over fiberglass at end of 12 mm dia. pipe in Lower Mechanical Room.
(8 Sept. 2016)



Photo 6:
Insulating pipe cement (Sample No. A-81: 20 % Chrysotile asbestos) over fiberglass at end of 12 mm dia. pipe in Lower Mechanical Room.
(8 Sept. 2016)



Photo 7:
Insulating pipe
cement (Sample
No. A-27: 15 %
Chrysotile
asbestos) over
fibreglass on 90
mm dia. elbow in
Upper Mechanical
Room.
(8 Sept. 2016)



Photo 8:
Roof layers.
Including rigid
foam insulation (all
layers non-ACM)
(8 Sept. 2016)



Photo 9:
Typical inmate cell wing. Note steel access doors (open) to utility corridors (8 Sept. 2016)



Photo 10:
Typical interior of utility corridor via steel door access. Insulating pipe lagging was found to be non-ACM, however traces of insulating cement (parging) suspected on some joints and elbows. (8 Sept. 2016)



Photo 11:
Asbestos-containing (Sample No. A-6: 2% Chrysotile) vinyl floor tile (300 mm x 300 mm, brown with white streaks) in Room A11. (7 Sept. 2016)
Same tile observed in nine other cells.

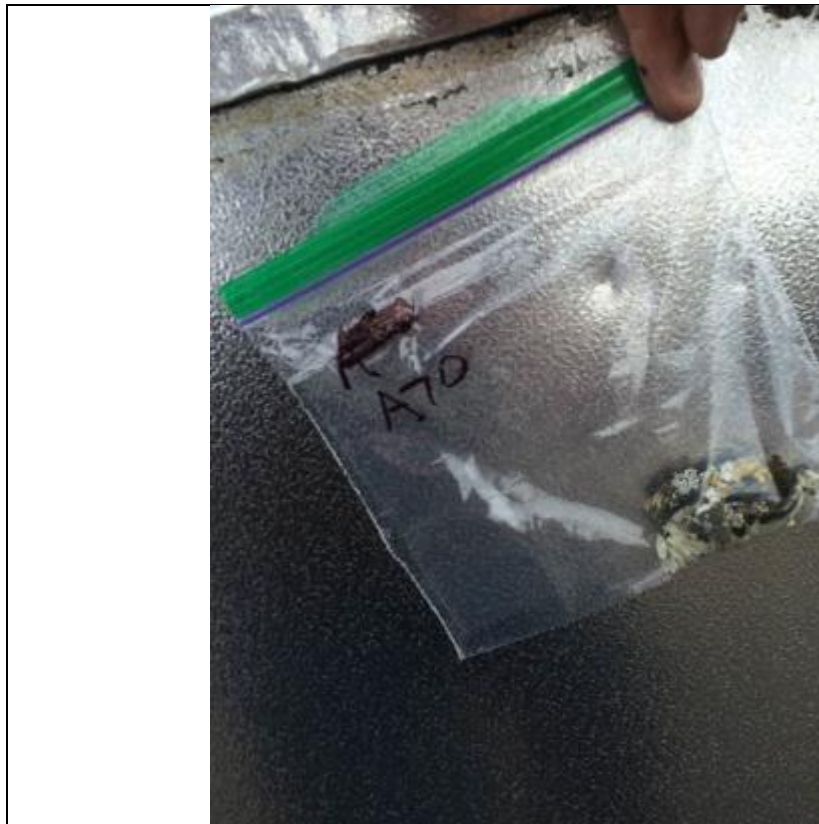


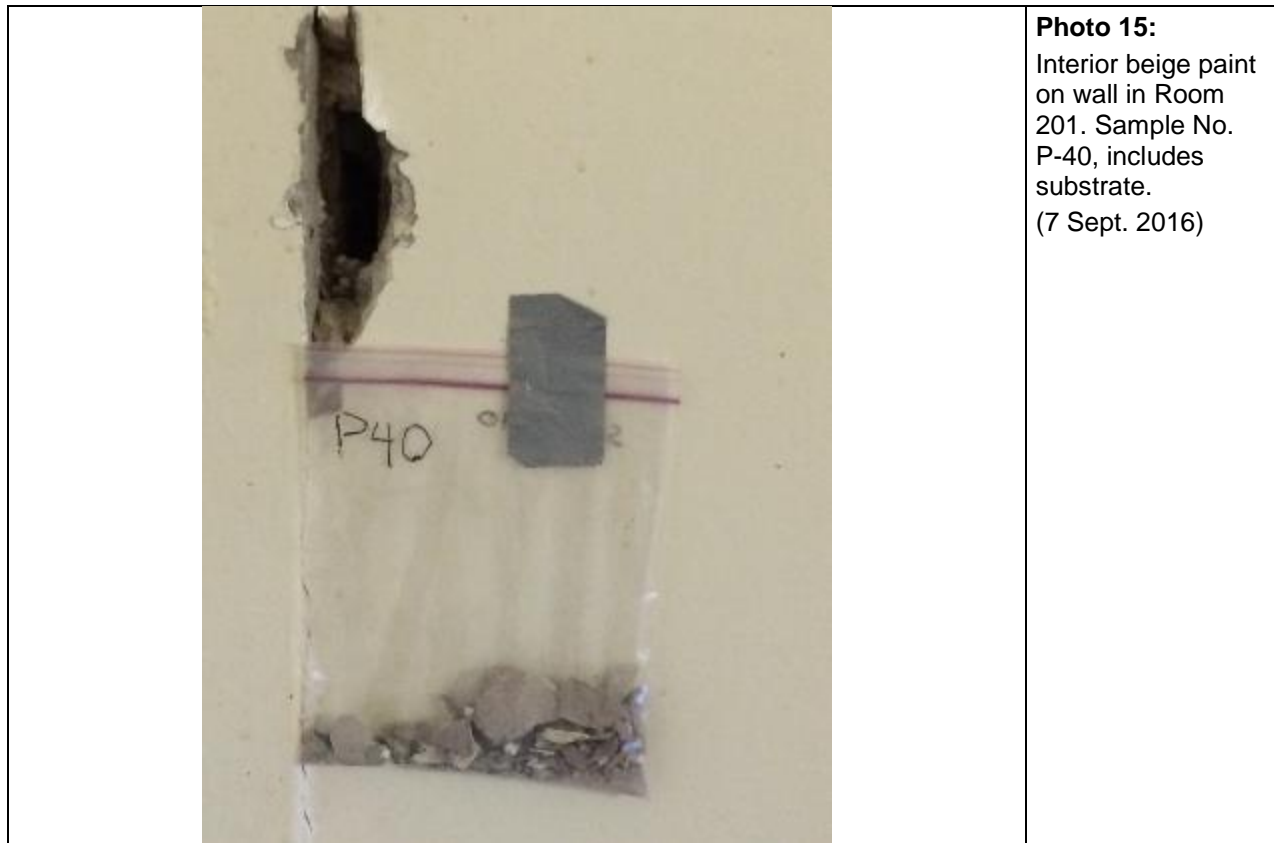
Photo 12:
Caulking (Sample No. A-70: 2 % Chrysotile asbestos) on exterior duct work on roof. (8 Sept. 2016)



Photo 13:
Interior light
blue/green/beige
flaking paint on
wall in Room C8.
Sample No. P-1.
(7 Sept. 2016)



Photo 14:
Interior white
flaking paint on
ceiling in Room
A19 (shower).
Sample No. P-2.
(7 Sept. 2016)



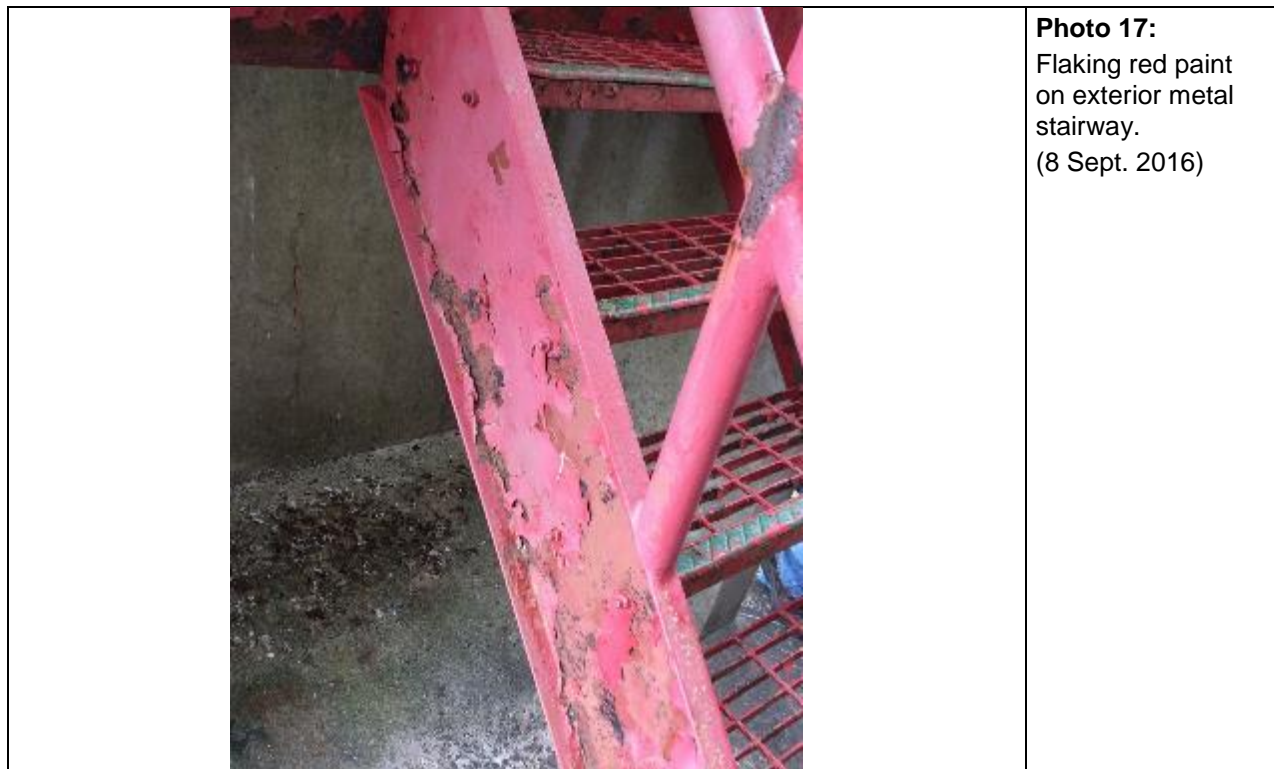




Photo 19:
Chemicals in
Room 107
(8 Sept. 2016)



Photo 20:
Chemicals in
Hallway of F-wing.
(8 Sept. 2016)



Photo 21:
Electric motor in
wall cavity off
laundry room of
each wing
containing <1 litre
of gear oil for
chain-driven riot
doors.
(8 Sept. 2016)



Photo 22:
Transformers in
Lower Mechanical
Room reported to
be dry-type (no
PCBs).
(8 Sept. 2016)



Photo 23:
Emergency lighting
unit in hallway of
main entrance,
near Room 104,
suspected of
containing a lead-
acid battery
(8 Sept. 2016)



Photo 24:
Emergency lighting
unit on floor in
hallway of main
entrance, near
Room 104,
containing a lead-
acid battery.
(8 Sept. 2016)

APPENDIX C

SAMPLE AND ANALYTICAL SUMMARY TABLES

Table C-1: Bulk Sample Descriptions and Asbestos Content Results
Building 10, CSC Springhill Institution

Sample ID	Material Analyzed	Detailed Material Description	Location / Photo No.	Analytical Result
A1	Flooring	Terrazzo Flooring, White	Near Main Entrance	<0.1 %
A2	Flooring	Anti-slip strip on interior stairs, Grey	Main Entrance, near Rm. 104.	<0.1 %
A3	Baseboard	Vinyl baseboard, Black.	Room 102	<0.1 %
A3	Mastic	Mastic on vinyl baseboard, Yellow.	Room 102	<0.1 %
A4	Floor Tile	Floor Tile (30 cm x 30 cm), Speckled Grey	Room 104	<0.1 %
A-DUP1	Floor Tile	Floor Tile (30 cm x 30 cm), Speckled Grey	Room 104	<0.1 %
A4	Mastic	Mastic on floor tile, Black	Room 104	<0.1 %
A-DUP1	Mastic	Mastic on floor tile, Black	Room 104	<0.1 %
A5	Ceramic Tile	Ceramic tile on floor, Grey	Room A18 (laundry room)	<0.1 %
A5	Mastic	Mastic on ceramic tile on floor, Brown	Room A18 (laundry room)	<0.1 %
A6	Floor Tile	Floor Tile (30 cm x 30 cm), Brown with white streaks	Room A11 (cell) / Photo 11	2% Chrysotile
A6	Mastic	Mastic on floor tile, Black	Room A11 (cell)	<0.1 %
A7	Floor Tile	Floor Tile (30 cm x 30 cm), Red with white streaks	Hallway near Rm. A16	<0.1 %
A7	Mastic	Mastic on floor tile, Black	Hallway near Rm. A16	<0.1 %
A8	Floor Tile	Floor Tile (30 cm x 30 cm), Beige with brown streaks	Room A7 (cell)	<0.1 %
A8	Mastic	Mastic on floor tile, Black	Room A7 (cell)	<0.1 %
A9	Concrete	Concrete ceiling panel. Grey	Hallway outside Room A18.	<0.1 %

Table C-1: Bulk Sample Descriptions and Asbestos Content Results
Building 10, CSC Springhill Institution

Sample ID	Material Analyzed	Detailed Material Description	Location / Photo No.	Analytical Result
A10	Floor Tile	Floor Tile (30 cm x 30 cm), Red with white speckles	Room E16 (cell)	<0.1 %
A10	Mastic	Mastic on floor tile, Black	Room E16 (cell)	<0.1 %
A11	Floor Tile	Floor Tile (30 cm x 30 cm), Beige with black dots	Room F17 (cell)	<0.1 %
A11	Mastic	Mastic on floor tile, Black	Room F17 (cell)	<0.1 %
A12	Floor Tile	Floor Tile (30 cm x 30 cm), Beige with grey speckles	Room F3 (cell)	<0.1 %
A12	Mastic	Mastic on floor tile, Black	Room F3 (cell)	<0.1 %
A13	Spackle	Ceiling Spackle, White	Room 201 (TV Room)	<0.1 %
A14	Grout	Ceramic tile grout, Grey	Room A19 (shower)	<0.1 %
A15	Grout	Ceramic tile grout, Grey	Room A19 (shower)	0.25 % Chrysotile
A16	Grout	Ceramic tile grout, Grey	Room A19 (shower)	<0.1 %
A17	Ceramic Tile	Ceramic tile grout, White	Room A19 (shower)	<0.1 %
A17	Grout	Ceramic tile grout, Grey	Room A19 (shower)	<0.1 %
A18	Caulking	Interior window caulking, Grey	Room E18 (laundry room)	<0.1 %
A-DUP2	Caulking	Interior window caulking, Grey	Room E18 (laundry room)	<0.1 %
A19	Wall board	Hard, Fibrous Wall board, White	Room 107	<0.1 %
A20	Caulking	Exterior window caulking, Black and Grey	Room D5 (cell)	<0.1 %
A21	Mortar	Mortar in corner between inner wall and exterior wall, Grey/White	Room D5 (cell)	<0.1 %
A22	Pipe Insulation	Paper-type pipe insulation, approx. 100 mm dia., Grey/black	Pipe chase, accessed via steel door near Rm. F5.	<0.1 %

Table C-1: Bulk Sample Descriptions and Asbestos Content Results
Building 10, CSC Springhill Institution

Sample ID	Material Analyzed	Detailed Material Description	Location / Photo No.	Analytical Result
A23	Insulation	Insulation on duct work, Yellow with white covering.	Upper Mech. Rm.	<0.1 %
A24	Caulking	Caulking on duct work, Grey.	Upper Mech. Rm.	<0.1 %
A25	Tar Paper	Tar paper on duct work, Brown.	Upper Mech. Rm.	<0.1 %
A-DUP3	Tar Paper	Tar paper on duct work, Brown.	Upper Mech. Rm.	<0.1 %
A26	Caulking	Caulking on duct work, Green.	Upper Mech. Rm.	<0.1 %
A27	Pipe Insulation	Pipe Insulating Cement (elbow), 75 m dia., White (painted yellow).	Upper Mech. Rm. / Photo 7	15% Chrysotile
A28	Pipe Insulation	Pipe Insulating Cement (tee), 250 mm dia. , Grey	Lower Mech. Room / Photo 1	20% Chrysotile
A29	Pipe Insulation	Pipe Insulation gasket (annulus of 300 mm dia. water main entering through wall), Grey/white. Note 300 mm dia. water main pipe also suspected to be asbestos (not sampled).	Lower Mech. Room / Photo 2	7% Amosite
A30	Insulating Pipe Cement	Pipe Insulation Cement (joint), 25 mm dia. , grey	Room 109/111 Wall Hatch / Photo 3	15% Chrysotile
A30	Pipe Insulation	Pipe wrap, white	Room 109/111 Wall Hatch	<0.1 %
A31	Pipe Insulation	Pipe wrap, grey	Room 109/111 Wall Hatch	<0.1 %
A31	Tar Paper	Tar paper on pipe wrap, black	Room 109/111 Wall Hatch	<0.1 %
A32	Pipe Insulation	Pipe wrap, brown	Room A7/A8 Wall Hatch	<0.1 %
A33	Pipe Insulation	Pipe wrap, brown	Room C12/C13 Wall Hatch	<0.1 %
A34	Pipe Insulation/cement	Pipe wrap + cement, grey	Room C12/C13 Wall Hatch	<0.1 %
A35	Pipe Insulation	Pipe wrap, 200 mm dia., overhead, brown	Lower Mech. Rm.	<0.1 %

Table C-1: Bulk Sample Descriptions and Asbestos Content Results
Building 10, CSC Springhill Institution

Sample ID	Material Analyzed	Detailed Material Description	Location / Photo No.	Analytical Result
A36	Pipe Insulation	Pipe wrap, brown	Lower Mech. Rm.	<0.1 %
A36	Pipe Insulation	Pipe insulation, yellow	Lower Mech. Rm.	<0.1 %
A36	Tar Paper	Tar paper on pipe wrap, black	Lower Mech. Rm.	<0.1 %
A37	Pipe Insulation	Pipe wrap, brown	Lower Mech. Rm.	<0.1 %
A37	Pipe Insulation	Pipe insulation, yellow	Lower Mech. Rm.	<0.1 %
A38	Pipe Insulation	Pipe wrap, 250 mm square ductwork, grey	Lower Mech. Rm.	<0.1 %
A38	Pipe Insulation	Pipe insulation, 250 mm square ductwork, yellow	Lower Mech. Rm.	<0.1 %
A39	Pipe Insulation	Pipe wrap, grey	Lower Mech. Rm.	<0.1 %
A39	Pipe Insulation	Pipe insulation, pink	Lower Mech. Rm.	<0.1 %
A40	Concrete	Concrete, exterior wall, grey	Rm. 201	<0.1 %
A41	Insulation	Insulation, exterior wall, black	Rm. 201	<0.1 %
A42	Concrete	Concrete, exterior wall, grey	Rm. 201	<0.1 %
A43	Mortar	Mortar, interior concrete block wall, grey	Rm. 201	<0.1 %
A44	Mastic	Mastic on vinyl trim, tan	Rm. 203	<0.1 %
A45	Ceiling Tile	Ceiling Tile, 60 cm x 120 cm, grey/white	Rm. 203	<0.1 %
A46	Drywall Joint Compound	Drywall Joint Compound, wall corner, grey	Rm. 202	<0.1 %
A47	Caulking	Caulking, interior window, grey	Rm. 202	<0.1 %
A48	Wall board	Gypsum board paper layer, grey/white	Rm. 105	<0.1 %

Table C-1: Bulk Sample Descriptions and Asbestos Content Results
Building 10, CSC Springhill Institution

Sample ID	Material Analyzed	Detailed Material Description	Location / Photo No.	Analytical Result
A49	Drywall Joint Compound	Drywall Joint Compound, grey	Rm. 105	<0.1 %
A50	Ceiling Tile	Ceiling Tile, 60 cm x 120 cm, grey/white, Duplicate of A45	Rm. 203	<0.1 %
A51	Floor Tile	Floor Tile (30 cm x 30 cm), Red with white streaks	Hallway outside Rm. F4	<0.1 %
A51	Mastic	Mastic on floor tile, Black	Hallway outside Rm. F4	<0.1 %
A52	Floor Tile	Floor Tile (30 cm x 30 cm), Red with white streaks	Hallway outside Rm. B3	<0.1 %
A52	Mastic	Mastic on floor tile, Black	Hallway outside Rm. B3	<0.1 %
A60	Rubber	Grey rubber and white caulking, joint, exterior wall	Near Rm. C16	<0.1 %
A60	Caulking	Grey rubber and white caulking, joint, exterior wall	Near Rm. C16	<0.1 %
A61	Caulking	Caulking, interior wall, white	Near Rm. C16	<0.1 %
A62	Concrete	Concrete, exterior foundation, grey	Near Rm. B18	<0.1 %
A-51D	Concrete	Concrete, exterior foundation, grey Duplicate of sample A-62	Near Rm. B18	<0.1 %
A63	Wallboard	Gypsum board, grey/white	Room 108	<0.1 %
A70	Caulking	Caulking, exterior ductwork on roof, grey/black	Roof / Photo 12	2% Chrysotile
A71	Joint Material	Flex joint material on ventilation, black	Roof	<0.1 %
A72	Insulation	Fibrous insulation/rubber roofing material, brown	Roof	<0.1 %
A72	Rubber	Fibrous insulation/rubber roofing material, brown	Roof	<0.1 %
A73	Roof material	Fibrous roofing material with tar, Black	Roof	<0.1 %
A75	Pipe Insulation	Pipe wrap, black paper layer, Brown/grey	Lower Mech. Rm.	0.25%

Table C-1: Bulk Sample Descriptions and Asbestos Content Results
Building 10, CSC Springhill Institution

Sample ID	Material Analyzed	Detailed Material Description	Location / Photo No.	Analytical Result
A76	Pipe Insulation	Pipe wrap, 75 mm dia., grey	Lower Mech. Rm.	<0.1 %
A76	Pipe Insulation	Pipe insulation, 75 mm dia., pink	Lower Mech. Rm.	<0.1 %
A77	Pipe Insulation	Pipe wrap with brown/black layer	Lower Mech. Rm.	<0.1 %
A78	Insulating pipe cement	Pipe cement, grey	Lower Mech. Rm. / Photo 4	30% Chrysotile
A78	Pipe Insulation	Pipe wrap, grey	Lower Mech. Rm.	<0.1 %
A79	Pipe Insulation	Pipe wrap, multilayered, brown/black	Lower Mech. Rm.	<0.1 %
A80	Insulating pipe cement	Pipe Insulation Cement, on 12 mm dia. copper, grey	Lower Mech. Room / Photo 5	30% Chrysotile
A80	Pipe Insulation	Pipe wrap, grey	Lower Mech. Rm.	<0.1 %
A81	Insulating pipe cement	Pipe Insulation Cement, on 12 mm dia. copper, grey	Lower Mech. Room / Photo 6	20% Chrysotile
A81	Pipe Insulation	Pipe wrap, grey	Lower Mech. Rm.	<0.1 %
A82	Pipe Insulation	Pipe wrap, Paper mesh with foil backing, grey	Lower Mech. Rm.	<0.1 %
A82	Pipe Insulation	Pipe insulation, Paper mesh with foil backing, yellow	Lower Mech. Rm.	<0.1 %
A83	Pipe Insulation	Pipe wrap, Paper mesh, no backing, brown/grey	Lower Mech. Rm.	<0.1 %
A83	Pipe Insulation	Pipe insulation, Paper mesh with no backing, yellow	Lower Mech. Rm.	<0.1 %
A84	Pipe Insulation	Pipe wrap, glazed mesh paper wrap, brown back, pink fibre, white	Lower Mech. Rm.	<0.1 %
A84	Pipe Insulation	Pipe insulation, glazed mesh paper wrap, brown back, pink fibre, yellow	Lower Mech. Rm.	<0.1 %
A84	Pipe Insulation	Paper backing, glazed mesh paper wrap, brown back, pink fibre, brown	Lower Mech. Rm.	<0.1 %

Table C-1: Bulk Sample Descriptions and Asbestos Content Results
Building 10, CSC Springhill Institution

Sample ID	Material Analyzed	Detailed Material Description	Location / Photo No.	Analytical Result
A85	Pipe Insulation	Pipe wrap, glazed mesh paper wrap, brown back, pink fibre, white	Lower Mech. Rm.	<0.1 %
A85	Pipe Insulation	Pipe insulation, glazed mesh paper wrap, brown back, pink fibre, yellow	Lower Mech. Rm.	<0.1 %
A85	Pipe Insulation	Paper backing, glazed mesh paper wrap, brown back, pink fibre, brown	Lower Mech. Rm.	<0.1 %
A86	Pipe Insulation	Pipe wrap, glazed mesh paper wrap, brown back, pink fibre, white	Lower Mech. Rm.	<0.1 %
A86	Pipe Insulation	Pipe insulation, glazed mesh paper wrap, brown back, pink fibre, yellow	Lower Mech. Rm.	<0.1 %
A86	Pipe Insulation	Paper backing, glazed mesh paper wrap, brown back, pink fibre, brown	Lower Mech. Rm.	<0.1 %
A87	Pipe Insulation	Pipe wrap, glazed mesh paper wrap, brown back, pink fibre, white	Lower Mech. Rm.	<0.1 %
A87	Pipe Insulation	Pipe insulation, glazed mesh paper wrap, brown back, pink fibre, yellow	Lower Mech. Rm.	<0.1 %
A87	Pipe Insulation	Paper backing, glazed mesh paper wrap, brown back, pink fibre, brown	Lower Mech. Rm.	<0.1 %
A88	Pipe Insulation	Pipe wrap, paper layers, 150 mm dia. cast iron line, brown	Lower Mech. Rm.	<0.1 %
A89	Pipe Insulation	Paper wrap with foil back, yellow fibre, 200 - 250 mm dia., beige	Lower Mech. Rm.	<0.1 %
A89	Pipe Insulation	Pipe insulation with foil back, yellow fibre, 200 - 250 mm dia., yellow	Lower Mech. Rm.	<0.1 %
A90D	Pipe Insulation	Pipe wrap, overhead pipe, 200 mm dia., brown	Lower Mech. Rm.	<0.1 %
A91D	Pipe Insulation	Pipe wrap, brown	Rm. 109/111 wall hatch	<0.1 %
A92D	Pipe Insulation	pipe wrap, multi-layered paper, brown	Lower Mech. Rm.	<0.1 %

Notes:

Shaded results greater than 0.5% asbestos by dry weight are considered to be asbestos-containing materials (ACMs) in Nova Scotia.

**Table C-2: Bulk Material (Caulking) Sample Descriptions and PCB Analytical Results
Building 10, CSC Springhill Institution**

Sample ID	RDL	A-18 PCB	A-20 PCB	PCB 40
Parameter	(mg/kg)	mg/kg	mg/kg	mg/kg
Aroclor 1016	0.50	<0.50	<0.50	<0.50
Aroclor 1221	0.50	<0.50	<0.50	<0.50
Aroclor 1232	0.50	<0.50	<0.50	<0.50
Aroclor 1248	0.50	<0.50	<0.50	<0.50
Aroclor 1242	0.50	<0.50	<0.50	<0.50
Aroclor 1254	0.50	0.75	<0.50	<0.50
Aroclor 1260	0.50	<0.50	<0.50	<0.50
Total PCB (Calculated)	5.0	0.75 ⁽¹⁾	<0.50	<0.50
Surrogate Recovery (%)				
Decachlorobiphenyl		132 ⁽¹⁾	105	113

Notes:

RDL: Reportable detection limit

<X: Non-detect

(1) PCB surrogate not within acceptance limits. Analysis was repeated with similar results.
Based on this, result has been qualified as "estimated, bias high".

Table C-3: Paint Sample Descriptions and Total Lead Analytical Results
Building 10, CSC Springhill Institution

Sample ID	Colour Description	Substrate	Location (Photo No.)	RDL (mg/kg)	Total Lead (mg/kg)
P1	Light Blue over green/beige (flaking).	Concrete and metal	Wall in Rm. C8. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	5	<u>640</u>
PDUP1	Light Blue over green/beige (flaking).	Concrete and metal	Wall in Rm. C8. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	5	<u>560</u>
P2	White on Shower Ceiling (flaking).	Concrete	Shower ceiling (Rm. A19). (Photo 14)	5	<u>6600</u>
PDUP2	White on Shower Ceiling (flaking).	Concrete	Shower ceiling (Rm. A19). (Photo 14)	5	<u>3900</u>
P3	Light Blue over green/beige.	Concrete and metal	Wall in Rm. A1. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	5	<u>860</u>
P4	Light Blue over green/beige.	Concrete and metal	Wall in Rm. B8. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	5	<u>960</u>
P5	Light Blue over green/beige.	Concrete and metal	Wall in Rm. C10. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	5	74
P6	Light Blue over green/beige.	Concrete and metal	Wall in Rm. D3. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	5	<u>800</u>
P7	Light Blue over green/beige.	Concrete and metal	Wall in Rm. E4. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	5	<u>160</u>
P8	Light Blue over green/beige.	Concrete and metal	Wall in Rm. F14. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	5	<u>1500</u>
P9	Beige over blue/yellow/green	Concrete	Wall near stairway in central portion	5	<u>190</u>
P10	Beige over blue/yellow/green	Concrete	Wall near stairway in central portion	5	<u>300</u>
P40 *	Beige	Concrete	Wall in TV Room (Rm. 201)	5	64
P41	Beige	Concrete	Wall in TV Room (Rm. 201)	5	<u>3100</u>
P43	White	Gypsum board	Ceiling in Rm 201	5	9
P45	Grey over yellow/brown/blue/black	Metal	Door frame outside Rm. 105	5	<u>980</u>

Table C-3: Paint Sample Descriptions and Total Lead Analytical Results
Building 10, CSC Springhill Institution

Sample ID	Colour Description	Substrate	Location (Photo No.)	RDL (mg/kg)	Total Lead (mg/kg)
P47	Brown	Metal	Interior window Trim, outer side of Rm. 110 (Guard Post)	5	<u>290</u>
P49	Yellow	Metal	Wall in shower (Rm E19)	5	9
P60	Red over grey/green (flaking)	Metal	Exterior steel stairs, three sets (Photos 17 & 18).	5	6700
P61	Light yellow	Wood	Interior Door in Rm 103.	5	53
P63	Light yellow over blue	Wood	Window sill in Rm. 103	5	<u>100</u>
P65	Dark blue	Metal	Exterior Door (Main entrance)	5	7
P66	Grey	Metal	Wall in stairwell in central portion	5	<u>570</u>
P68	Grey over black	Wood	Book case In Rm 107	5	6

Notes:

RDL: Reportable detection limit

<X: Non-detect

HPA: Hazardous Products Act

* Paint sample included substrate

Underlined results indicate that lead concentration is above the Federal HPA criterion of 90 mg/kg.

Shaded / bold results indicate that lead concentration is above the Nova Scotia Landfill Disposal criterion of 1,000 mg/kg (Attachment B).

Table C-4: Paint Sample Descriptions and Mercury Analytical Results
Building 10, CSC Springhill Institution

Sample ID	Colour Description	Substrate	Location (Photo No.)	RDL (mg/kg)	Total Mercury (mg/kg)
P1	Light Blue over green/beige (flaking).	Concrete and metal	Wall in Rm. C8. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	1	<u>36</u>
PDUP1	Light Blue over green/beige (flaking).	Concrete and metal	Wall in Rm. C8. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	1	<u>24</u>
P2	White on Shower Ceiling (flaking).	Concrete	Shower ceiling (Rm. A19). (Photo 14)	1	8
PDUP2	White on Shower Ceiling (flaking).	Concrete	Shower ceiling (Rm. A19). (Photo 14)	1	9
P3	Light Blue over green/beige.	Concrete and metal	Wall in Rm. A1. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	1	<u>12</u>
P4	Light Blue over green/beige.	Concrete and metal	Wall in Rm. B8. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	1	<u>25</u>
P5	Light Blue over green/beige.	Concrete and metal	Wall in Rm. C10. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	1	<u>11</u>
P6	Light Blue over green/beige.	Concrete and metal	Wall in Rm. D3. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	1	7
P7	Light Blue over green/beige.	Concrete and metal	Wall in Rm. E4. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	1	<u>13</u>
P8	Light Blue over green/beige.	Concrete and metal	Wall in Rm. F14. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	1	<u>17</u>
P9	Beige over blue/yellow/green	Concrete	Wall near stairway in central portion	1	1
P10	Beige over blue/yellow/green	Concrete	Wall near stairway in central portion	1	5
P40 *	Beige	Concrete	Wall in TV Room (Rm. 201)	1	2
P41	Beige	Concrete	Wall in TV Room (Rm. 201)	1	<u>26</u>
P43	White	Gypsum board	Ceiling in Rm 201	1	8
P45	Grey over yellow/brown/blue/black	Metal	Door frame outside Rm. 105	1	6

Table C-4: Paint Sample Descriptions and Mercury Analytical Results
Building 10, CSC Springhill Institution

Sample ID	Colour Description	Substrate	Location (Photo No.)	RDL (mg/kg)	Total Mercury (mg/kg)
P47	Brown	Metal	Interior window Trim, outer side of Rm. 110 (Guard Post)	1	9
P49	Yellow	Metal	Wall in shower (Rm E19)	1	<1
P60	Red over grey/green (flaking)	Metal	Exterior steel stairs, three sets (Photos 17 & 18).	1	1
P61	Light yellow	Wood	Interior Door in Rm 103.	1	<1
P63	Light yellow over blue	Wood	Window sill in Rm. 103	1	2
P65	Dark blue	Metal	Exterior Door (Main entrance)	1	<1
P66	Grey	Metal	Wall in stairwell in central portion	1	9
P68	Grey over black	Wood	Book case In Rm 107	1	<1

Notes:

RDL: Reportable detection limit

<X: Non-detect

HPA: Hazardous Products Act

* Paint sample included substrate

Underlined results indicate that mercury concentration is above the Federal HPA criterion of 10 mg/kg.

Shaded / bold results indicate that total mercury concentration is above the Nova Scotia Landfill Disposal criterion of 10 mg/kg (Attachment B).

Table C-5: Paint Sample Descriptions and PCB Analytical Results
Building 10, CSC Springhill Institution

Sample ID	RDL	P1	P2	P10	P41
Parameter	(mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
Aroclor 1016	5.0	<5	<5	<5	<5
Aroclor 1221	5.0	<5	<5	<5	<5
Aroclor 1232	5.0	<5	<5	<5	<5
Aroclor 1248	5.0	<5	<5	<5	<5
Aroclor 1242	5.0	<5	<5	<5	<5
Aroclor 1254	5.0	<5	<5	<5	<5
Aroclor 1260	5.0	<5	<5	<5	<5
Total PCB (Calculated)	5.0	<5	<5	<5	<5
Surrogate Recovery (%)					
Decachlorobiphenyl		14 ⁽¹⁾	31	31	19 ⁽¹⁾

Notes:

RDL: Reportable detection limit

<X: Non-detect

(1) PCB surrogate not within acceptance limits. Analysis was repeated with similar results.

Based on this, results has been qualified as "estimated, bias low".

Table C-6: Paint Sample Descriptions and Lead Leachate Analytical Results
Building 10, CSC Springhill Institution

Sample ID	Colour Description	Substrate	Location (Photo No.)	RDL (mg/L)	Lead Leachate (mg/L)
P2	White on Shower Ceiling (flaking).	Concrete	Shower ceiling (Rm. A19). (Photo 14)	0.005	0.800
P8	Light Blue over green/beige.	Concrete and steel	Wall in Rm. F14. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	0.005	0.048
P60	Red over grey/green (flaking)	Steel	Exterior steel stairs, three sets (Photos 17 & 18).	0.005	0.034

Notes:

RDL: Reportable detection limit

Leachable Lead Guideline is 5 mg/L from the Nova Scotia Guidelines for the Disposal of Contaminated Solids in Landfills (Attachment C Parameters).

Table C-7: Paint Sample Descriptions and Mercury Leachate Analytical Results
Building 10, CSC Springhill Institution

Sample ID	Colour Description	Substrate	Location (Photo No.)	RDL (mg/L)	Lead Leachate (mg/L)
P1	Light Blue over green/beige (flaking).	Concrete and steel	Wall in Rm. C8. Similar paint on all cell walls and steel surfaces in hallways, Wings A - F. (Photos 9 & 13).	0.001	0.006

Notes:

RDL: Reportable detection limit

Leachable Mercury Guideline is 0.1 mg/L from the Nova Scotia Guidelines for the Disposal of Contaminated Solids in Landfills (Attachment C Parameters).

APPENDIX D

LABORATORY CERTIFICATES OF ANALYSES



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EMSL Canada Order 551609848
Customer ID: 55AGRA57A
Customer PO: TV161217
Project ID:

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Collected:
Received: 9/14/2016
Analyzed: 9/21/2016

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: A31-Aircell **Lab Sample ID:** 551609848-0001

Sample Description: AIRCELL PIPE WRAP- HATCH 109/111

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	80%	20%	None Detected	

Client Sample ID: A31-Tar Paper **Lab Sample ID:** 551609848-0001A

Sample Description: AIRCELL PIPE WRAP- HATCH 109/111

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	80%	20%	None Detected	

Client Sample ID: A32 **Lab Sample ID:** 551609848-0002

Sample Description: AIRCELL PIPE WRAP- UTILITY TIE IN FOR RANGE A7/A8

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	60%	40%	None Detected	

Client Sample ID: A33 **Lab Sample ID:** 551609848-0003

Sample Description: AIRCELL PIPE WRAP- UTILITY TIE IN FOR RANGE C12/C13

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	60%	40%	None Detected	

Client Sample ID: A35 **Lab Sample ID:** 551609848-0004

Sample Description: AIRCELL PIPE WRAP- OVERHEAD PIPE ~8" BASEMENT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	60%	40%	None Detected	

Client Sample ID: A36-Wrap **Lab Sample ID:** 551609848-0005

Sample Description: PIPE WRAP WITH FIBERGLASS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	40%	60%	None Detected	

Client Sample ID: A36-Insulation **Lab Sample ID:** 551609848-0005A

Sample Description: PIPE WRAP WITH FIBERGLASS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Yellow	90%	10%	None Detected	



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 Project ID:

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: A36-Tar Paper **Lab Sample ID:** 551609848-0005B

Sample Description: PIPE WRAP WITH FIBERGLASS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	60%	40%	None Detected	

Client Sample ID: A37-Wrap **Lab Sample ID:** 551609848-0006

Sample Description: PIPE WRAP WITH YELLOW INSULATION

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	60%	40%	None Detected	

Client Sample ID: A37-Insulation **Lab Sample ID:** 551609848-0006A

Sample Description: PIPE WRAP WITH YELLOW INSULATION

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Yellow	0%	100%	None Detected	

Client Sample ID: A38-Wrap **Lab Sample ID:** 551609848-0007

Sample Description: PIPE WRAP WITH FIBERGLASS (10" SQUARE DUCTWORK)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	40%	60%	None Detected	

Client Sample ID: A38-Insulation **Lab Sample ID:** 551609848-0007A

Sample Description: PIPE WRAP WITH FIBERGLASS (10" SQUARE DUCTWORK)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Yellow	80%	20%	None Detected	

Client Sample ID: A39-Wrap **Lab Sample ID:** 551609848-0008

Sample Description: PIPE WRAP WITH YELLO ORANGE FIBERGLASS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A39-Insulation **Lab Sample ID:** 551609848-0008A

Sample Description: PIPE WRAP WITH YELLO ORANGE FIBERGLASS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Pink	80%	20%	None Detected	

Client Sample ID: A75 **Lab Sample ID:** 551609848-0009

Sample Description: AIRCELL PIPE WRAP (BLACK PAPER LAYER)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown/Gray	80%	20%	<1% Chrysotile	
400 PLM Pt Ct	9/21/2016	Brown/Gray	0%	99.75%	0.25% Chrysotile	



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 Project ID:

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: A76-Wrap **Lab Sample ID:** 551609848-0010

Sample Description: WHITE PIPE WRAP (PINK INSULATION ON 3" PIPE)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	60%	40%	None Detected	

Client Sample ID: A76-Insulation **Lab Sample ID:** 551609848-0010A

Sample Description: WHITE PIPE WRAP (PINK INSULATION ON 3" PIPE)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Pink	80%	20%	None Detected	

Client Sample ID: A77 **Lab Sample ID:** 551609848-0011

Sample Description: AIRCELL PIPE WRAP WITH BROWN/BLACK LAYER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	80%	20%	None Detected	

Client Sample ID: A79 **Lab Sample ID:** 551609848-0012

Sample Description: AIRCELL WRAP WITH MULTILAYERS OF PAPER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown/Black	80%	20%	None Detected	

Client Sample ID: A82-Wrap **Lab Sample ID:** 551609848-0013

Sample Description: PAPERMEHWRAP WITH FOIL BACKING, YELLOW FIBERGLASS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	80%	20%	None Detected	

Client Sample ID: A82-Insulation **Lab Sample ID:** 551609848-0013A

Sample Description: PAPERMEHWRAP WITH FOIL BACKING, YELLOW FIBERGLASS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Yellow	80%	20%	None Detected	

Client Sample ID: A83-Wrap **Lab Sample ID:** 551609848-0014

Sample Description: PAPERMEHWRAP NO BACKING, PINK INSULATION

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown/Gray	80%	20%	None Detected	

Client Sample ID: A83-Insulation **Lab Sample ID:** 551609848-0014A

Sample Description: PAPERMEHWRAP NO BACKING, PINK INSULATION

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Yellow	80%	20%	None Detected	



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Customer ID: 55AGRA57A
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Project ID:

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: A84-Wrap **Lab Sample ID:** 551609848-0015

Sample Description: GLAZED MESH PAPER WRAP, BROWN BACK, PINK FIBRE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	White	80%	20%	None Detected	

Client Sample ID: A84-Insulation **Lab Sample ID:** 551609848-0015A

Sample Description: GLAZED MESH PAPER WRAP, BROWN BACK, PINK FIBRE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Yellow	90%	10%	None Detected	

Client Sample ID: A84-Paper Backing **Lab Sample ID:** 551609848-0015B

Sample Description: GLAZED MESH PAPER WRAP, BROWN BACK, PINK FIBRE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	80%	20%	None Detected	

Client Sample ID: A85-Wrap **Lab Sample ID:** 551609848-0016

Sample Description: GLAZED MESH PAPER WRAP, BROWN BACK, PINK FIBRE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	White	80%	20%	None Detected	

Client Sample ID: A85-Insulation **Lab Sample ID:** 551609848-0016A

Sample Description: GLAZED MESH PAPER WRAP, BROWN BACK, PINK FIBRE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Yellow	80%	20%	None Detected	

Client Sample ID: A85-Paper Backing **Lab Sample ID:** 551609848-0016B

Sample Description: GLAZED MESH PAPER WRAP, BROWN BACK, PINK FIBRE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	80%	20%	None Detected	

Client Sample ID: A86-Wrap **Lab Sample ID:** 551609848-0017

Sample Description: GLAZED MESH PAPER WRAP, BROWN BACK, PINK FIBRE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	White	80%	20%	None Detected	

Client Sample ID: A86-Insulation **Lab Sample ID:** 551609848-0017A

Sample Description: GLAZED MESH PAPER WRAP, BROWN BACK, PINK FIBRE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Yellow	80%	20%	None Detected	



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 Customer ID: 55AGRA57A
 Customer PO: TV161217
 Project ID:

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: A86-Paper Backing		Lab Sample ID: 551609848-0017B				
Sample Description: GLAZED MESH PAPER WRAP, BROWN BACK, PINK FIBRE						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	80%	20%	None Detected	
Client Sample ID: A87-Wrap		Lab Sample ID: 551609848-0018				
Sample Description: GLAZED MESH PAPER WRAP, BROWN BACK, PINK FIBRE						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	White	80%	20%	None Detected	
Client Sample ID: A87-Insulation		Lab Sample ID: 551609848-0018A				
Sample Description: GLAZED MESH PAPER WRAP, BROWN BACK, PINK FIBRE						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Yellow	90%	10%	None Detected	
Client Sample ID: A87-Paper Backing		Lab Sample ID: 551609848-0018B				
Sample Description: GLAZED MESH PAPER WRAP, BROWN BACK, PINK FIBRE						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	80%	20%	None Detected	
Client Sample ID: A88		Lab Sample ID: 551609848-0019				
Sample Description: AIRCELL PIPE WRAP PAPER LAYERS (6" CAST LINE)						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	80%	20%	None Detected	
Client Sample ID: A89-Wrap		Lab Sample ID: 551609848-0020				
Sample Description: PAPER WRAP WITH FOIL BACK, YELLOW FIBRE, 8-10 WRAP						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Beige	80%	20%	None Detected	
Client Sample ID: A89-Insulation		Lab Sample ID: 551609848-0020A				
Sample Description: PAPER WRAP WITH FOIL BACK, YELLOW FIBRE, 8-10 WRAP						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Yellow	90%	10%	None Detected	
Client Sample ID: A90D		Lab Sample ID: 551609848-0021				
Sample Description: AIRCELL PIPE WRAP- OVERHEAD PIPE ~8" BASEMENT						
TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	40%	60%	None Detected	



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Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: A91D **Lab Sample ID:** 551609848-0022
Sample Description: AIRCELL PIPE WRAP- HATCH 109/111

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	60%	40%	None Detected	

Client Sample ID: A92D **Lab Sample ID:** 551609848-0023
Sample Description: AIRCELL WRAP WITH MULTILAYERS OF PAPER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	80%	20%	None Detected	

Client Sample ID: A30-Wrap **Lab Sample ID:** 551609848-0024
Sample Description: PIPE WRAP + CEMENT FROM HATCH 109-111

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	White	60%	40%	None Detected	

Client Sample ID: A30-Cement **Lab Sample ID:** 551609848-0024A
Sample Description: PIPE WRAP + CEMENT FROM HATCH 109-111

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	85%	15% Chrysotile	

Client Sample ID: A34 **Lab Sample ID:** 551609848-0025
Sample Description: PIPE WRAP + CEMENT FROM HATCH C12/C13

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	60%	40%	None Detected	

Client Sample ID: A78-Cement **Lab Sample ID:** 551609848-0026
Sample Description: PIPE WRAP + CEMENT BASEMENT PIPING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	70%	30% Chrysotile	

Client Sample ID: A78-Wrap **Lab Sample ID:** 551609848-0026A
Sample Description: PIPE WRAP + CEMENT BASEMENT PIPING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	80%	20%	None Detected	

Client Sample ID: A80-Cement **Lab Sample ID:** 551609848-0027
Sample Description: PIPE WRAP + CEMENT BASEMENT PIPING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	70%	30% Chrysotile	



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Project ID:

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: A80-Wrap

Lab Sample ID: 551609848-0027A

Sample Description: PIPE WRAP + CEMENT BASEMENT PIPING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	80%	20%	None Detected	

Client Sample ID: A81-Cement

Lab Sample ID: 551609848-0028

Sample Description: PIPE WRAP + CEMENT BASEMENT PIPING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	80%	20% Chrysotile	

Client Sample ID: A81-Wrap

Lab Sample ID: 551609848-0028A

Sample Description: PIPE WRAP + CEMENT BASEMENT PIPING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	80%	20%	None Detected	

Analyst(s):

Shorthri Kalikutty PLM (50)
400 PLM Pt Ct (1)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 09/21/2016 16:52:37



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Collected:
Received: 9/14/2016
Analyzed: 9/21/2016

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: A-1 **Lab Sample ID:** 551610045-0001

Sample Description: TERRAZO FLOORING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	White	0%	100%	None Detected	

Client Sample ID: A-2 **Lab Sample ID:** 551610045-0002

Sample Description: FLOORING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-3-Rubber Baseboard **Lab Sample ID:** 551610045-0003

Sample Description: RUBBER BASEBOARD WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-3-Mastic **Lab Sample ID:** 551610045-0003A

Sample Description: RUBBER BASEBOARD WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Yellow	0%	100%	None Detected	

Client Sample ID: A-4-Floor Tile **Lab Sample ID:** 551610045-0004

Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-4-Mastic **Lab Sample ID:** 551610045-0004A

Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-5-Ceramic Tile **Lab Sample ID:** 551610045-0005

Sample Description: CERAMIC TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	



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Client Sample ID: A-5-Mastic **Lab Sample ID:** 551610045-0005A
Sample Description: CERAMIC TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	0%	100%	None Detected	

Client Sample ID: A-6-Floor Tile **Lab Sample ID:** 551610045-0006
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	0%	98%	2% Chrysotile	

Client Sample ID: A-6-Mastic **Lab Sample ID:** 551610045-0006A
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-7-Floor Tile **Lab Sample ID:** 551610045-0007
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	0%	100%	None Detected	

Client Sample ID: A-7-Mastic **Lab Sample ID:** 551610045-0007A
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-8-Floor Tile **Lab Sample ID:** 551610045-0008
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-8-Mastic **Lab Sample ID:** 551610045-0008A
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-9 **Lab Sample ID:** 551610045-0009
Sample Description: CONCRETE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	



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Client Sample ID: A-10-Floor Tile **Lab Sample ID:** 551610045-0010
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	0%	100%	None Detected	

Client Sample ID: A-10-Mastic **Lab Sample ID:** 551610045-0010A
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-11-Floor Tile **Lab Sample ID:** 551610045-0011
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-11-Mastic **Lab Sample ID:** 551610045-0011A
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-12-Floor Tile **Lab Sample ID:** 551610045-0012
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-12-Mastic **Lab Sample ID:** 551610045-0012A
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-13 **Lab Sample ID:** 551610045-0013
Sample Description: CEILING SPECKLE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	White	0%	100%	None Detected	

Client Sample ID: A-14 **Lab Sample ID:** 551610045-0014
Sample Description: GROUT CERAMIC TILE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	



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Client Sample ID: A-15 **Lab Sample ID:** 551610045-0015
Sample Description: GROUT CERAMIC TILE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
400 PLM Pt Ct	9/21/2016	Gray	0%	99.75%	0.25% Chrysotile	

Client Sample ID: A-16 **Lab Sample ID:** 551610045-0016
Sample Description: GROUT CERAMIC TILE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-17-Ceramic Tile **Lab Sample ID:** 551610045-0017
Sample Description: GROUT + CERAMIC (CERAMIC TILE)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	White	0%	100%	None Detected	

Client Sample ID: A-17-Grout **Lab Sample ID:** 551610045-0017A
Sample Description: GROUT + CERAMIC (CERAMIC TILE)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-18 **Lab Sample ID:** 551610045-0018
Sample Description: WINDOW CAULKING (INTERIOR)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-19 **Lab Sample ID:** 551610045-0019
Sample Description: WALL BOARD

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	White	40%	60%	None Detected	

Client Sample ID: A-20 **Lab Sample ID:** 551610045-0020
Sample Description: WINDOW CAULKING (EXTERIOR)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-21 **Lab Sample ID:** 551610045-0021
Sample Description: MORTAR

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray/White	0%	100%	None Detected	



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Client Sample ID: A-22

Lab Sample ID: 551610045-0022

Sample Description: PIPE WRAP

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray/Black	70%	30%	None Detected	

Client Sample ID: A-23

Lab Sample ID: 551610045-0023

Sample Description: DUCT INSULATION

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Yellow	90%	10%	None Detected	

Client Sample ID: A-24

Lab Sample ID: 551610045-0024

Sample Description: CAULKING ON DUCTWORK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-25

Lab Sample ID: 551610045-0025

Sample Description: TAR PAPER ON DUCTWORK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	0%	100%	None Detected	

Client Sample ID: A-26

Lab Sample ID: 551610045-0026

Sample Description: CAULKING (GREEN) ON DUCTWORK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Green	0%	100%	None Detected	

Client Sample ID: A-27

Lab Sample ID: 551610045-0027

Sample Description: INSULATION PIPE CEMENT (ELBOW)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	White	0%	85%	15% Chrysotile	

Client Sample ID: A-28

Lab Sample ID: 551610045-0028

Sample Description: INSULATION PIPE CEMENT (TEE)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	80%	20% Chrysotile	

Client Sample ID: A-29

Lab Sample ID: 551610045-0029

Sample Description: INSULATION PIPE CEMENT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	93%	7% Amosite	



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Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: A-DUP1-Floor Tile **Lab Sample ID:** 551610045-0030
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-DUP1-Mastic **Lab Sample ID:** 551610045-0030A
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-DUP3 **Lab Sample ID:** 551610045-0031
Sample Description: TAR PAPER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	0%	100%	None Detected	

Client Sample ID: A-40 **Lab Sample ID:** 551610045-0032
Sample Description: CONCRETE EXTERIOR WALL IN UPSTAIRS REC ROOM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-41 **Lab Sample ID:** 551610045-0033
Sample Description: INSULATION - CONCRETE EXTERIOR WALL IN REC. ROOM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-42 **Lab Sample ID:** 551610045-0034
Sample Description: CONCRETE EXTERIOR SIDE WALL UPSTAIRS REC. ROOM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-43 **Lab Sample ID:** 551610045-0035
Sample Description: MORTAR INTERIOR BLOCK WALL - REC ROOM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-44 **Lab Sample ID:** 551610045-0036
Sample Description: MASTIC TRIM ON VINYL TRIM - OFFICE NEAR REC ROOM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Tan	0%	100%	None Detected	



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Phone/Fax: 289-997-4602 / (289) 997-4607
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EMSL Canada Order 551610045
Customer ID: 55AGRA57A
Customer PO: TV161217
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: A-45 **Lab Sample ID:** 551610045-0037
Sample Description: CEILING TILE FROM OFFICE NEAR REC. ROOM

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray/White	80%	20%	None Detected	

Client Sample ID: A-46 **Lab Sample ID:** 551610045-0038
Sample Description: DRYWALL JOINT COMPOUND, CORNER, EALL, UPSTAIRS OFFICE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-47 **Lab Sample ID:** 551610045-0039
Sample Description: GREY CAULKING FROM INTERIOR UPSTAIRS OFFICE WINDOW

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-48 **Lab Sample ID:** 551610045-0040
Sample Description: GYPSUM WALL PAPER, DOWNSTAIRS OFFICE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray/White	0%	100%	None Detected	

Client Sample ID: A-49 **Lab Sample ID:** 551610045-0041
Sample Description: DRYWALL JOINT COMPOUND, BEAM DOWNSTAIRS OFFICE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-50 **Lab Sample ID:** 551610045-0042
Sample Description: CEILING TILE DUPLICATE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray/White	80%	20%	None Detected	

Client Sample ID: A-51-Floor Tile **Lab Sample ID:** 551610045-0043
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	0%	100%	None Detected	

Client Sample ID: A-51-Mastic **Lab Sample ID:** 551610045-0043A
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	



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EMSL Canada Order 551610045
 Customer ID: 55AGRA57A
 Customer PO: TV161217
 Project ID:

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: A-51D **Lab Sample ID:** 551610045-0044
Sample Description: DUPLICATE FOR A-62 CONCRETE SAMPLE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-52-Floor Tile **Lab Sample ID:** 551610045-0045
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	0%	100%	None Detected	

Client Sample ID: A-52-Mastic **Lab Sample ID:** 551610045-0045A
Sample Description: VINYL FLOOR TILE WITH MASTIC

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-60-Grey Rubber **Lab Sample ID:** 551610045-0046
Sample Description: GREY RUBBER AND WHITE CAULKING JOINT- EXTERIOR WALL

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-60-White Caulking **Lab Sample ID:** 551610045-0046A
Sample Description: GREY RUBBER AND WHITE CAULKING JOINT- EXTERIOR WALL

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	White	0%	100%	None Detected	

Client Sample ID: A-61 **Lab Sample ID:** 551610045-0047
Sample Description: WHITE CAULKING OUTSIDE EXTERIOR WALL

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray/White	0%	100%	None Detected	

Client Sample ID: A-62 **Lab Sample ID:** 551610045-0048
Sample Description: CONCRETE- OUTSIDE EXTERIOR FOUNDATION

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	

Client Sample ID: A-63 **Lab Sample ID:** 551610045-0049
Sample Description: GYPSUM BOARD CEILING IN DOWNSTAIRS OFFICE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray/White	0%	100%	None Detected	



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EMSL Canada Order 551610045
Customer ID: 55AGRA57A
Customer PO: TV161217
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: A-70 **Lab Sample ID:** 551610045-0050
Sample Description: GREY CAULKING - VENTILATION DUCTWORK - ROOF

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray/Black	0%	98%	2% Chrysotile	

Client Sample ID: A-71 **Lab Sample ID:** 551610045-0051
Sample Description: BLACK FLEX JOINT MATERIAL - VENTILATION - ROOF

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-72-Insulation **Lab Sample ID:** 551610045-0052
Sample Description: BROWN FIBROUS INSULATION/ RUBBER - ROOFING MATERIAL

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Brown	90%	10%	None Detected	

Client Sample ID: A-72-Rubber **Lab Sample ID:** 551610045-0052A
Sample Description: BROWN FIBROUS INSULATION/ RUBBER - ROOFING MATERIAL

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-73 **Lab Sample ID:** 551610045-0053
Sample Description: BLACK FIBROUS MATERIAL WITH TAR - ROOFING MATERIAL

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Black	0%	100%	None Detected	

Client Sample ID: A-DUP-2 **Lab Sample ID:** 551610045-0054
Sample Description: GREY CAULKING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	9/21/2016	Gray	0%	100%	None Detected	Sample not on COC



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EMSL Canada Order 551610045
Customer ID: 55AGRA57A
Customer PO: TV161217
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Analyst(s):

Jon Delos Santos PLM (61)
400 PLM Pt Ct (1)
Ronald Ng PLM (7)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 09/21/2016 20:18:52

Your Project #: TV161217
Site Location: SPRINGHILL BLDG 10
Your C.O.C. #: D18889, D18888, D18890

Attention: John Krilow

AMEC Foster Wheeler Environment & Infrastructure
Sydney - Standing Offer
500 Kings Rd
Suite 208 Cabot House
Sydney, NS
B1S 1B1

Report Date: 2016/10/11
Report #: R4200522
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6J4968

Received: 2016/09/13, 11:20

Sample Matrix: Paint
Samples Received: 23

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Mercury - Total in Leachate (CVAA,LL) (1)	1	2016/10/06	2016/10/07	ATL SOP 00026	EPA 245.1 R3 m
Metals Leach TCLP/CGSB extraction (1)	3	2016/10/05	2016/10/06	ATL SOP 00058	EPA 6020A R1 m
Metals Paint Acid Extr. ICPMS (1)	5	2016/09/19	2016/09/19	ATL SOP 00058	EPA 6020A R1 m
Metals Paint Acid Extr. ICPMS (1)	18	2016/09/19	2016/09/20	ATL SOP 00058	EPA 6020A R1 m
PCBs in Paint by GC/ECD (1, 2)	4	2016/09/21	2016/09/23		EPA 8082A m
TCLP Inorganic extraction - pH (1)	4	N/A	2016/10/05	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - Weight (1)	4	N/A	2016/10/05	ATL SOP 00035	EPA 1311 m

Sample Matrix: Solid
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
PCBs in Solid by GC/ECD (1, 3)	2	2016/09/16	2016/09/21	ATL SOP 00105	EPA 8082A m
PCBs in Solid by GC/ECD (1, 3)	1	2016/09/19	2016/09/21	ATL SOP 00105	EPA 8082A m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Bedford

(2) Non accredited test method. Best laboratory practices and all routine QC procedures were employed.

(3) Samples were analyzed for PCB using an accredited standard procedure modified for a non-standard matrix. Best laboratory practice and all routine QC procedures were employed. The accreditation does not extend to the matrix analyzed.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Candace Hillier, CI Svc - Sydney

Email: chillier@maxxam.ca

Phone# (902) 567 1255

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total Cover Pages : 1

Page 1 of 16

RESULTS OF ANALYSES OF PAINT

Maxxam ID		DBB578	DBC075	DBC081	DBC088		
Sampling Date		2016/09/07 12:00	2016/09/07 12:00	2016/09/07 12:00	2016/09/08 12:00		
COC Number		D18889	D18889	D18889	D18888		
	UNITS	P1	P2	P8	P60	QC Batch	MDL
Sample Weight (as received)	g	19	11	2.7	4.6	4687224	N/A
Initial pH	N/A	4.9	4.9	4.9	4.9	4687231	N/A
Final pH	N/A	5.2	5.3	5.7	5.0	4687231	N/A
QC Batch = Quality Control Batch N/A = Not Applicable							

MERCURY BY COLD VAPOUR AA (PAINT)

Maxxam ID		DBB578			
Sampling Date		2016/09/07 12:00			
COC Number		D18889			
	UNITS	P1	RDL	QC Batch	MDL
Leachable Mercury (Hg)	ug/L	6	1	4691526	N/A
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable					

ELEMENTS BY ICP/MS (PAINT)

Maxxam ID		DBC075	DBC081	DBC088			
Sampling Date		2016/09/07 12:00	2016/09/07 12:00	2016/09/08 12:00			
COC Number		D18889	D18889	D18888			
	UNITS	P2	P8	P60	RDL	QC Batch	MDL
Leachable Lead (Pb)	ug/L	800	48	34	5	4688947	N/A
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable							

ELEMENTS BY ATOMIC SPECTROSCOPY (PAINT)

Maxxam ID		DBB578	DBC075	DBC076	DBC077	DBC078	DBC079			
Sampling Date		2016/09/07 12:00	2016/09/07 12:00	2016/09/07 12:00	2016/09/07 12:00	2016/09/07 12:00	2016/09/07 12:00			
COC Number		D18889	D18889	D18889	D18889	D18889	D18889			
	UNITS	P1	P2	P3	P4	P5	P6	RDL	QC Batch	MDL
Acid Extractable Lead (Pb)	mg/kg	640	6600	860	960	74	800	5	4665989	N/A
Acid Extractable Mercury (Hg)	mg/kg	36	8	12	25	11	7	1	4665989	N/A
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable										

Maxxam ID		DBC080	DBC081	DBC082	DBC083	DBC084	DBC085			
Sampling Date		2016/09/07 12:00	2016/09/07 12:00	2016/09/07 12:00	2016/09/07 12:00	2016/09/08 12:00	2016/09/08 12:00			
COC Number		D18889	D18889	D18889	D18889	D18888	D18888			
	UNITS	P7	P8	P9	P10	P41	P43	RDL	QC Batch	MDL
Acid Extractable Lead (Pb)	mg/kg	160	1500	190	300	3100	9	5	4665989	N/A
Acid Extractable Mercury (Hg)	mg/kg	13	17	1	5	26	8	1	4665989	N/A
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable										

Maxxam ID		DBC086	DBC087	DBC088	DBC089	DBC090			
Sampling Date		2016/09/08 12:00	2016/09/08 12:00	2016/09/08 12:00	2016/09/08 12:00	2016/09/08 12:00			
COC Number		D18888	D18888	D18888	D18888	D18888			
	UNITS	P45	P47	P60	P61	P63	RDL	QC Batch	MDL
Acid Extractable Lead (Pb)	mg/kg	980	290	6700	53	100	5	4665989	N/A
Acid Extractable Mercury (Hg)	mg/kg	6	9	1	<1	2	1	4665989	N/A
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable									

Maxxam ID		DBC091		DBC092	DBC093	DBC094	DBC095	DBC106			
Sampling Date		2016/09/08 12:00		2016/09/08 12:00	2016/09/08 12:00	2016/09/08 12:00	2016/09/08 12:00	2016/09/08 12:00			
COC Number		D18888		D18888	D18888	D18890	D18890	D18890			
	UNITS	P65	RDL	P66	P68	PDUP1	PDUP2	P49	RDL	QC Batch	MDL
Acid Extractable Lead (Pb)	mg/kg	7	6	570	6	560	3900	9	5	4665992	N/A
Acid Extractable Mercury (Hg)	mg/kg	<1	1	9	<1	24	9	<1	1	4665992	N/A
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable											

POLYCHLORINATED BIPHENYLS BY GC-ECD (PAINT)

Maxxam ID		DBB578	DBC075	DBC083	DBC084			
Sampling Date		2016/09/07 12:00	2016/09/07 12:00	2016/09/07 12:00	2016/09/08 12:00			
COC Number		D18889	D18889	D18889	D18888			
	UNITS	P1	P2	P10	P41	RDL	QC Batch	MDL
Aroclor 1016	mg/kg	<5	<5	<5	<5	5	4669936	N/A
Aroclor 1221	mg/kg	<5	<5	<5	<5	5	4669936	N/A
Aroclor 1232	mg/kg	<5	<5	<5	<5	5	4669936	N/A
Aroclor 1248	mg/kg	<5	<5	<5	<5	5	4669936	N/A
Aroclor 1242	mg/kg	<5	<5	<5	<5	5	4669936	N/A
Aroclor 1254	mg/kg	<5	<5	<5	<5	5	4669936	N/A
Aroclor 1260	mg/kg	<5	<5	<5	<5	5	4669936	N/A
Surrogate Recovery (%)								
Decachlorobiphenyl	%	14 (1)	31	31	19 (1)	N/A	4669936	N/A
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) PCB surrogate not within acceptance limits. Analysis was repeated with similar results.								

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOLID)

Maxxam ID		DBC097	DBC104	DBC105			
Sampling Date		2016/09/08 12:00	2016/09/08 12:00	2016/09/08 12:00			
COC Number		D18890	D18890	D18890			
	UNITS	A-18 PCB	A-20 PCB	PCB 40	RDL	QC Batch	MDL
Aroclor 1016	mg/kg	<0.50	<0.50	<0.50	0.50	4663310	N/A
Aroclor 1221	mg/kg	<0.50	<0.50	<0.50	0.50	4663310	N/A
Aroclor 1232	mg/kg	<0.50	<0.50	<0.50	0.50	4663310	N/A
Aroclor 1248	mg/kg	<0.50	<0.50	<0.50	0.50	4663310	N/A
Aroclor 1242	mg/kg	<0.50	<0.50	<0.50	0.50	4663310	N/A
Aroclor 1254	mg/kg	0.75	<0.50	<0.50	0.50	4663310	N/A
Aroclor 1260	mg/kg	<0.50	<0.50	<0.50	0.50	4663310	N/A
Surrogate Recovery (%)							
Decachlorobiphenyl	%	132 (1)	105	113	N/A	4663310	N/A
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) PCB surrogate not within acceptance limits. Analysis was repeated with similar results.							

TEST SUMMARY

Maxxam ID: DBB578
Sample ID: P1
Matrix: Paint

Collected: 2016/09/07
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury - Total in Leachate (CVAA,LL)	CV/AA	4691526	2016/10/06	2016/10/07	Arlene Rossiter
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/19	Bryon Angevine
PCBs in Paint by GC/ECD	GC/ECD	4669936	2016/09/21	2016/09/23	Lisa Gates
TCLP Inorganic extraction - pH		4687231	N/A	2016/10/05	Emma deLory
TCLP Inorganic extraction - Weight		4687224	N/A	2016/10/05	Emma deLory

Maxxam ID: DBB578 Dup
Sample ID: P1
Matrix: Paint

Collected: 2016/09/07
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury - Total in Leachate (CVAA,LL)	CV/AA	4691526	2016/10/06	2016/10/07	Arlene Rossiter

Maxxam ID: DBC075
Sample ID: P2
Matrix: Paint

Collected: 2016/09/07
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Leach TCLP/CGSB extraction	CICP	4688947	2016/10/05	2016/10/06	Mike Leblanc
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/19	Bryon Angevine
PCBs in Paint by GC/ECD	GC/ECD	4669936	2016/09/21	2016/09/23	Lisa Gates
TCLP Inorganic extraction - pH		4687231	N/A	2016/10/05	Emma deLory
TCLP Inorganic extraction - Weight		4687224	N/A	2016/10/05	Emma deLory

Maxxam ID: DBC075 Dup
Sample ID: P2
Matrix: Paint

Collected: 2016/09/07
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PCBs in Paint by GC/ECD	GC/ECD	4669936	2016/09/21	2016/09/23	Lisa Gates

Maxxam ID: DBC076
Sample ID: P3
Matrix: Paint

Collected: 2016/09/07
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/19	Bryon Angevine

Maxxam ID: DBC077
Sample ID: P4
Matrix: Paint

Collected: 2016/09/07
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/19	Bryon Angevine

TEST SUMMARY

Maxxam ID: DBC078
Sample ID: P5
Matrix: Paint

Collected: 2016/09/07
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/19	Bryon Angevine

Maxxam ID: DBC079
Sample ID: P6
Matrix: Paint

Collected: 2016/09/07
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC080
Sample ID: P7
Matrix: Paint

Collected: 2016/09/07
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC081
Sample ID: P8
Matrix: Paint

Collected: 2016/09/07
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Leach TCLP/CGSB extraction	CICP	4688947	2016/10/05	2016/10/06	Mike Leblanc
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine
TCLP Inorganic extraction - pH		4687231	N/A	2016/10/05	Emma deLory
TCLP Inorganic extraction - Weight		4687224	N/A	2016/10/05	Emma deLory

Maxxam ID: DBC082
Sample ID: P9
Matrix: Paint

Collected: 2016/09/07
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC083
Sample ID: P10
Matrix: Paint

Collected: 2016/09/07
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine
PCBs in Paint by GC/ECD	GC/ECD	4669936	2016/09/21	2016/09/23	Lisa Gates

TEST SUMMARY

Maxxam ID: DBC084
Sample ID: P41
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine
PCBs in Paint by GC/ECD	GC/ECD	4669936	2016/09/21	2016/09/23	Lisa Gates

Maxxam ID: DBC085
Sample ID: P43
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC085 Dup
Sample ID: P43
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC086
Sample ID: P45
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC087
Sample ID: P47
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC088
Sample ID: P60
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Leach TCLP/CGSB extraction	CICP	4688947	2016/10/05	2016/10/06	Mike Leblanc
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine
TCLP Inorganic extraction - pH		4687231	N/A	2016/10/05	Emma deLory
TCLP Inorganic extraction - Weight		4687224	N/A	2016/10/05	Emma deLory

TEST SUMMARY

Maxxam ID: DBC089
Sample ID: P61
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC090
Sample ID: P63
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665989	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC091
Sample ID: P65
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665992	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC092
Sample ID: P66
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665992	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC093
Sample ID: P68
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665992	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC094
Sample ID: PDUP1
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665992	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC094 Dup
Sample ID: PDUP1
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665992	2016/09/19	2016/09/20	Bryon Angevine

TEST SUMMARY

Maxxam ID: DBC095
Sample ID: PDUP2
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665992	2016/09/19	2016/09/20	Bryon Angevine

Maxxam ID: DBC097
Sample ID: A-18 PCB
Matrix: Solid

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PCBs in Solid by GC/ECD	GC/ECD	4663310	2016/09/19	2016/09/21	Lisa Gates

Maxxam ID: DBC097 Dup
Sample ID: A-18 PCB
Matrix: Solid

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PCBs in Solid by GC/ECD	GC/ECD	4663310	2016/09/16	2016/09/21	Lisa Gates

Maxxam ID: DBC104
Sample ID: A-20 PCB
Matrix: Solid

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PCBs in Solid by GC/ECD	GC/ECD	4663310	2016/09/16	2016/09/21	Lisa Gates

Maxxam ID: DBC105
Sample ID: PCB 40
Matrix: Solid

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PCBs in Solid by GC/ECD	GC/ECD	4663310	2016/09/16	2016/09/21	Lisa Gates

Maxxam ID: DBC106
Sample ID: P49
Matrix: Paint

Collected: 2016/09/08
Shipped:
Received: 2016/09/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Paint Acid Extr. ICPMS	FICP/MS	4665992	2016/09/19	2016/09/20	Bryon Angevine

GENERAL COMMENTS

Added PBULK-SO to (and removed PCRUSH-SW from) the following samples P1; P3 to P47; P61; P68; PDUP1. LBC 2016/09/15

Sample DBB578-01 : Method Deviation Comment: Reduced sample weight used for leachate procedure due to insufficient sample. All extraction ratios maintained. Minimal impact on sample data quality.

Sample DBC075-01 : Method Deviation Comment: Reduced sample weight used for leachate procedure due to insufficient sample. All extraction ratios maintained. Minimal impact on sample data quality.

Sample DBC081-01 : Method Deviation Comment: Reduced sample weight used for leachate procedure due to insufficient sample. All extraction ratios maintained. Minimal impact on sample data quality.

Sample DBC088-01 : Method Deviation Comment: Reduced sample weight used for leachate procedure due to insufficient sample. All extraction ratios maintained. Minimal impact on sample data quality.

Sample DBC091-01 : Elevated reporting limits for trace metals due to a low sample weight used in the digestion.

POLYCHLORINATED BIPHENYLS BY GC-ECD (PAINT)

PCBs in Paint by GC/ECD: This data was generated using accepted laboratory practices and standard Quality Control procedures. However, due to the absence of a recognized reference method for the PCB Paints, an in-house method was used. Quality control (QC) samples were analyzed, however certain QA/QC elements may be unavailable, as noted:

- 1) Calculations of Method Detection Limit (MDL) as per CFR 40 (Part 136)
- 2) Accuracy and precision study
- 3) External performance evaluation study

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4663310	LGE	Matrix Spike	Decachlorobiphenyl	2016/09/21		119	%	30 - 130
4663310	LGE	Matrix Spike(DBC097)	Aroclor 1260	2016/09/21		112	%	30 - 130
4663310	LGE	Spiked Blank	Decachlorobiphenyl	2016/09/21		105	%	30 - 130
			Aroclor 1260	2016/09/21		99	%	30 - 130
4663310	LGE	Method Blank	Decachlorobiphenyl	2016/09/21		115	%	30 - 130
			Aroclor 1016	2016/09/21	<0.50		mg/kg	
			Aroclor 1221	2016/09/21	<0.50		mg/kg	
			Aroclor 1232	2016/09/21	<0.50		mg/kg	
			Aroclor 1248	2016/09/21	<0.50		mg/kg	
			Aroclor 1242	2016/09/21	<0.50		mg/kg	
			Aroclor 1254	2016/09/21	<0.50		mg/kg	
			Aroclor 1260	2016/09/21	<0.50		mg/kg	
4663310	LGE	RPD - Sample/Sample Dup	Aroclor 1016	2016/09/21	NC		%	50
			Aroclor 1221	2016/09/21	NC		%	50
			Aroclor 1232	2016/09/21	NC		%	50
			Aroclor 1248	2016/09/21	NC		%	50
			Aroclor 1242	2016/09/21	NC		%	50
			Aroclor 1254	2016/09/21	NC		%	50
			Aroclor 1260	2016/09/21	NC		%	50
4665989	BAN	Matrix Spike(DBC085)	Acid Extractable Lead (Pb)	2016/09/20		105	%	75 - 125
			Acid Extractable Mercury (Hg)	2016/09/20		NC	%	75 - 125
4665989	BAN	Spiked Blank	Acid Extractable Lead (Pb)	2016/09/19		102	%	75 - 125
			Acid Extractable Mercury (Hg)	2016/09/19		100	%	75 - 125
4665989	BAN	Method Blank	Acid Extractable Lead (Pb)	2016/09/19	<5		mg/kg	
			Acid Extractable Mercury (Hg)	2016/09/19	<1		mg/kg	
4665989	BAN	RPD - Sample/Sample Dup	Acid Extractable Lead (Pb)	2016/09/20	NC		%	35
			Acid Extractable Mercury (Hg)	2016/09/20	1.7		%	35
4665992	BAN	Matrix Spike(DBC094)	Acid Extractable Lead (Pb)	2016/09/20		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2016/09/20		NC	%	75 - 125
4665992	BAN	Spiked Blank	Acid Extractable Lead (Pb)	2016/09/20		101	%	75 - 125
			Acid Extractable Mercury (Hg)	2016/09/20		99	%	75 - 125
4665992	BAN	Method Blank	Acid Extractable Lead (Pb)	2016/09/20	<5		mg/kg	
			Acid Extractable Mercury (Hg)	2016/09/20	<1		mg/kg	
4665992	BAN	RPD - Sample/Sample Dup	Acid Extractable Lead (Pb)	2016/09/20	5.2		%	35
			Acid Extractable Mercury (Hg)	2016/09/20	1.7		%	35
4669936	LGE	Matrix Spike	Decachlorobiphenyl	2016/09/23		32	%	30 - 130
4669936	LGE	Matrix Spike(DBC075)	Aroclor 1254	2016/09/23		37	%	30 - 130
4669936	LGE	Spiked Blank	Decachlorobiphenyl	2016/09/23		51	%	30 - 130
			Aroclor 1254	2016/09/23		117	%	30 - 130
4669936	LGE	Method Blank	Decachlorobiphenyl	2016/09/23		92	%	30 - 130
			Aroclor 1016	2016/09/23	<5		mg/kg	
			Aroclor 1221	2016/09/23	<5		mg/kg	
			Aroclor 1232	2016/09/23	<5		mg/kg	
			Aroclor 1248	2016/09/23	<5		mg/kg	
			Aroclor 1242	2016/09/23	<5		mg/kg	
			Aroclor 1254	2016/09/23	<5		mg/kg	
			Aroclor 1260	2016/09/23	<5		mg/kg	
4669936	LGE	RPD - Sample/Sample Dup	Aroclor 1016	2016/09/23	NC		%	50
			Aroclor 1221	2016/09/23	NC		%	50
			Aroclor 1232	2016/09/23	NC		%	50
			Aroclor 1248	2016/09/23	NC		%	50
			Aroclor 1242	2016/09/23	NC		%	50
			Aroclor 1254	2016/09/23	NC		%	50

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Aroclor 1260	2016/09/23	NC		%	50
4687224	EDL	Method Blank	Sample Weight (as received)	2016/10/05	NA		g	
4688947	MLB	Matrix Spike(DBC075)	Leachable Lead (Pb)	2016/10/06		NC	%	75 - 125
4688947	MLB	Spiked Blank	Leachable Lead (Pb)	2016/10/06		100	%	80 - 120
4688947	MLB	Method Blank	Leachable Lead (Pb)	2016/10/06	<5		ug/L	
4691526	ARS	Matrix Spike(DBB578)	Leachable Mercury (Hg)	2016/10/07		NC	%	80 - 120
4691526	ARS	Leachate Blank	Leachable Mercury (Hg)	2016/10/07	<1		ug/L	
4691526	ARS	Spiked Blank	Leachable Mercury (Hg)	2016/10/07		98	%	80 - 120
4691526	ARS	Method Blank	Leachable Mercury (Hg)	2016/10/07	<0.01		ug/L	
4691526	ARS	RPD - Sample/Sample Dup	Leachable Mercury (Hg)	2016/10/07	NC		%	20

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Leachate Blank: A blank matrix containing all reagents used in the leaching procedure. Used to determine any process contamination.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

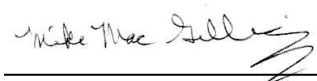
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Kevin MacDonald, Inorganics Supervisor



Mike MacGillivray, Scientific Specialist (Inorganics)



Phil Deveau, Scientific Specialist (Organics)

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: TV161217
Site Location: SPRINGHILL BUILDING 10
Your C.O.C. #: D18717

Attention: John Krilow

AMEC Foster Wheeler Environment & Infrastructure
Sydney - Standing Offer
500 Kings Rd
Suite 208 Cabot House
Sydney, NS
B1S 1B1

Report Date: 2016/10/17
Report #: R4213120
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6L6808

Received: 2016/10/07, 12:35

Sample Matrix: Solid
Samples Received: 1

Analyses	Date		Date Analyzed	Laboratory Method	Reference
	Quantity	Extracted			
Metals Bulk Acid Extr. ICPMS (1)	1	2016/10/14	2016/10/14	ATL SOP 00058	EPA 6020A R1 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Bedford

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Candace Hillier, CI Svc - Sydney

Email: chillier@maxxam.ca

Phone# (902) 567 1255

=====

This report has been generated and distributed using a secure automated process.

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOLID)

Maxxam ID		DFC175			
Sampling Date		2016/09/07 12:00			
COC Number		D18717			
	UNITS	P40	RDL	QC Batch	MDL
Acid Extractable Lead (Pb)	mg/kg	64	5.0	4701192	N/A
Acid Extractable Mercury (Hg)	mg/kg	1.9	1.0	4701192	N/A
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable					

TEST SUMMARY

Maxxam ID: DFC175
Sample ID: P40
Matrix: Solid

Collected: 2016/09/07
Shipped:
Received: 2016/10/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Bulk Acid Extr. ICPMS	FICP/MS	4701192	2016/10/14	2016/10/14	Bryon Angevine

Maxxam ID: DFC175 Dup
Sample ID: P40
Matrix: Solid

Collected: 2016/09/07
Shipped:
Received: 2016/10/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Bulk Acid Extr. ICPMS	FICP/MS	4701192	2016/10/14	2016/10/14	Bryon Angevine

GENERAL COMMENTS

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4701192	BAN	Matrix Spike(DFC175)	Acid Extractable Lead (Pb)	2016/10/14		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2016/10/14		93	%	75 - 125
4701192	BAN	Spiked Blank	Acid Extractable Lead (Pb)	2016/10/14		99	%	75 - 125
			Acid Extractable Mercury (Hg)	2016/10/14		104	%	75 - 125
4701192	BAN	Method Blank	Acid Extractable Lead (Pb)	2016/10/14	<5.0		mg/kg	
			Acid Extractable Mercury (Hg)	2016/10/14	<1.0		mg/kg	
4701192	BAN	RPD - Sample/Sample Dup	Acid Extractable Lead (Pb)	2016/10/14	15		%	35
			Acid Extractable Mercury (Hg)	2016/10/14	NC		%	35

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Eric Dearman, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

APPENDIX B

Equipment Detail List

Report Criteria

Site(s): Include all

System(s): Include all

Subsystem(s): Include all

Equipment Type Description: Include all

Location: Include Bldg #10

Serial Number: Include all

Display: Asset Id

Show Equipment Details ? Yes

Maker(s): Include all

Model(s): Include all

Equipment Owner(s): Include all

Equipment Level(s): Include all (Exclude DUMMY-POOL)

Show Current Equipment ? Yes

Show the lenses on cameras ? No

EQUIPMENT DETAIL LIST

Mes Amis

Site: **210 Springhill Institution**

Region: **AT Atlantic Region**

System	Subsystem	Equipment Type / PM Number	Equipment ID	Manufacturer	Model	Serial #	Asset Id	Location	Qty
CATV	NETWORK	Distribution Amplifier	10000711	Lindsay	743	363342		Bldg #10	1
	NETWORK	Subsystem Total							1
CATV	RADIAX	Distribution Amplifier	10003627	DBC	DA-61	0010		Bldg #10	1
	RADIAX	Subsystem Total							1
CATV		System Total							2
CCS-2	ACP	Primary Annunciator CTL Panel TS	26003906	Dynatrol	OP-7200	08-0001-4.0-XXX		Bldg #10	1
CCS-2	ACP	Primary Annunciator CTL Panel TS	26003907	Dynatrol	OP-7200	08-0002-4.0-XXX		Bldg #10	1
	ACP	Subsystem Total							2
CCS-2	EOLD	CCD - Call Cancelling Device DUAL	26004712	Generic	CCD Dual	n/a		Bldg #10	51
CCS-2	EOLD	COD - Call Originating Device	26004711	Generic	COD	n/a		Bldg #10	102
	EOLD	Subsystem Total							153
CCS-2	NETWORK	Programmable Dig IP/OP module	26003903	Dynatrol	4040	08-0200-40-R-A-4.1-X		Bldg #10	1
CCS-2	NETWORK	Programmable Dig IP/OP module	26003904	Dynatrol	4040	08-0201-40-R-A-4.1-X		Bldg #10	1
CCS-2	NETWORK	Programmable Dig IP/OP module	26003905	Dynatrol	4040	08-0202-40-R-A-4.1-X		Bldg #10	1
CCS-2	NETWORK	Switch Ethernet 8-port 10/100	26003912	Linksys	SRW-208MP	RMX00G100350		Bldg #10	1
CCS-2	NETWORK	PS 12 Vdc @ 8.5 amps	26003914	Omron	S82J-10012A	N/A		Bldg #10	5
CCS-2	NETWORK	Fiber Optic Converter	26004703	TRENDnet	TFC-110MSC	CA08261C00404		Bldg #10	1
	NETWORK	Subsystem Total							10
CCS-2		System Total							165
CCTV-NET	EOLD	Camera C NWK Day/Night	26003933	Axis	221	00408C93B44D		Bldg #10	1
CCTV-NET	EOLD	Camera C NWK Day/Night	26003934	Axis	221	00408C93B44E		Bldg #10	1
CCTV-NET	EOLD	Camera C NWK Dome PTZ Int	26003898	Axis	232D	00408CA27BAB		Bldg #10	1
CCTV-NET	EOLD	Camera C NWK Dome ext	26004472	Axis	P3343-VE	00408CBA5B52		Bldg #10	1
CCTV-NET	EOLD	Camera C NWK Dome ext	26004473	Axis	P3343-VE	00408CBA5B54		Bldg #10	1
CCTV-NET	EOLD	Camera C NWK Dome ext	26004474	Axis	P3343-VE	00408CBA5B55		Bldg #10	1
CCTV-NET	EOLD	Camera C NWK Dome ext	26004475	Axis	P3343-VE	00408CBA5B53		Bldg #10	1

EQUIPMENT DETAIL LIST

Mes Amis

Site: **210** **Springhill Institution**

Region: **AT** **Atlantic Region**

System	Subsystem	Equipment Type / PM Number	Equipment ID	Manufacturer	Model	Serial #	Asset Id	Location	Qty
CCTV-NET	EOLD	Camera C NWK Dome ext	26004493	Axis	P3343-VE	00408CBA5B56		Bldg #10	1
CCTV-NET	EOLD	Camera C NWK Dome ext	26004496	Axis	P3343-VE	00408CBA5B59		Bldg #10	1
CCTV-NET	EOLD	Encl Dome Outdoor 7" w heater	26004708	Videolarm	FDW-75-T12N	n/a		Bldg #10	1
	EOLD	Subsystem Total							10
CCTV-NET	NETWORK	Fiber Optic Transceiver	26003977	Amer Fibertek	MX-45-FX			Bldg #10	2
CCTV-NET	NETWORK	Switch Ethernet 24-port L2	26003930	NetGear	GS-724TP	1N1179400012		Bldg #10	1
	NETWORK	Subsystem Total							3
CCTV-NET	UPS	UPS 1.5 Kva Rack-M	26004669	Eaton Powerware	PW5115-1500RM	UY421A0474		Bldg #10	1
	UPS	Subsystem Total							1
CCTV-NET		System Total							14
PA	CCE	Amplifier Audio Modular 250W	26004269	Bogen	V250	10180307		Bldg #10	1
PA	CCE	Programmable Dig IP/OP w PA Supr module	26004732	Dynatrol	4040-S2/16	10-0293-001		Bldg #10	1
	CCE	Subsystem Total							2
PA		System Total							2
PA-PRMTR	NETWORK	Fiber Optic Transceiver	26004720	Amer Fibertek	MT-45-ML-SC	255529		Bldg #10	1
	NETWORK	Subsystem Total							1
PA-PRMT		System Total							1
Site:	210	Springhill Institution							184
Admin Region:	AT	Atlantic Region							184
		Grand Total:							184

APPENDIX C

Equipment Removal List

Appendix C

1. All Cameras relocated (refer to drawing L-102) are **NOT** to be worked on by inmate labour. Relocation by contractor forces only.
2. Components to be turned over to Facilities Management Springhill are as follows. The following are **NOT** to be removed or worked on by inmate labour.

CX Office:

- Small Fire Panel, to be removed (TBR) by Simplex.

Bubble:

- Lighting Control Panel.
- Door Control Panel.
- Gang Release Panel.
- Cell Call Panel - Outside Bubble.

Ranges:

- Cell Doors 4 only.
- Cell Door Motor right and left 20 each. 40 total.
- Cell door Plungers, all. Located above all cell doors
- Cell Door Rollers (Top of Doors) 20 only.
- Cell Door Dead Latch Locking column - 4 only.
- Complete front door all hardware and operator
- Folger Adams Electric Locks @ fire exits. All
- Range Barriers Complete. 2 only
- Range Barriers operators (Above the Barriers). All
- All Dead Lock Panels.
- 2 only Riot Door Operators.
- All Remaining Folger Adams Locks from access doors and mechanical room doors, etc.
- All Remaining Best lock hardware.
- All Building Management TA Controllers.

* When requested Facilities Management staff will accompany contractor on the site to identify best practice for removal of identified items without causing damage, as well as the best items for Facilities Management use when less than all are identified.

3. The following ARE **NOT** to be removed or worked on by inmate labour and do not need to be returned to Facilities Management Springhill (Disposal by Contractor):
 - Cell Doors.
 - Cell Door Motor right and left.
 - Cell Door Rollers (Top of Doors).
 - Cell Door Dead latch.
 - Locking columns.

Appendix C

- Remaining Range Barriers.
 - Complete Remaining Dead Lock Panels.
 - All door control panels in upper Mechanical room.
4. The following **CAN** be removed or worked on by inmate labour and are to be turned over to Springhill Facilities Management:
- Door handles from cells and mechanical rooms.
 - All Access plates above cells. 1 range only
 - 15 Complete range Cell windows complete with casing.
 - 20 only Cell window exterior galvanized screens.
 - 2 only New Fire hose cabinets.
 - All new interior doors.
 - All Glass and Stops from Control Post.
 - New emergency lights.
 - All exterior LED lights.
 - Heating Pump P-2.
 - Hot Water Recirculation Pump.
 - Renewair ERV Complete unit.
 - Exterior Rear Step (Safe Egress).
 - Complete Safe Egress Door.
 - Complete All Belimo Actuators.
 - All Backflow Devices.
 - HVAC Blower Motor Basement Mechanical room only 1.
 - All Shower Controls.

- END -

APPENDIX D

ES/SOW-0101

**Correctional Service Canada
Technical Services Branch
Electronics Systems**

**ES/SOW-0101
Revision 3
15 April 2004**

**ELECTRONICS ENGINEERING
STATEMENT OF WORK


PROCUREMENT & INSTALLATION OF
ELECTRONIC SECURITY SYSTEMS**

AUTHORITY


This Statement of Work is approved by Correctional Service Canada for the procurement and installation of all telecommunications and electronic security systems, subsystems, and equipment in Canadian penal institutions.

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address: Director, Engineering Services, Correctional Service of Canada, 340 Laurier Avenue West, Ottawa, Ontario, K1A 0P9

Prepared by:


**Manager,
Electronics Systems Research**

Approved by:


**Director,
Engineering Services**
15 Apr 04

RECORD OF REVISIONS

Revision	Paragraph	Comment
3	10.1 – Manuals and Drawings	Added equipment operating software
	10.4 – Documentation Format	Added equipment operating software

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ABBREVIATIONS

The following abbreviations are used in this specification:

ATP	Acceptance Test Plan
CM	Corrective Maintenance
COTS	Commercial-Off-The-Shelf
CSC	Correctional Service Canada
DA	Design Authority
DCR	Design Change Request
DES	Director, Engineering Services
DL	Deficiency List
FDR	Final Design Report
MRT	Mean Response Time
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
PDR	Preliminary Design Report
PM	Preventative Maintenance
PW&GSC	Public Works & Government Services Canada
QA	Quality Assurance
RFP	Request For Proposal
SOW	Statement of Work
STR	Statement of Technical Requirement

DEFINITIONS

The following definitions are used in this specification:

Design Authority	Director, Engineering Services (DES) - Correctional Service Canada (CSC) is responsible for all technical aspects of the system design and implementation.
Contract Authority	Public Works and Government Services Canada (PW&GSC) is responsible for all contractual matters associated with the system design and implementation.
Contractor	The company selected as the successful bidder.
Project Officer	A CSC employee or a contracted person designated by DES to be responsible for the implementation of the project.
Off-the-shelf	Equipment currently on the market with available field reliability data, manuals, engineering drawings and parts price list.
Custom Equipment	Equipment designed and/or manufactured specifically for a specific contract.

1.0 INTRODUCTION

This Statement of Work (SOW) defines the work and responsibilities for the design, procurement, installation, test and integration of all telecommunications and electronic security equipment in CSC Institutions.

The SOW provides guidelines, procedures and responsibilities to the contractor and/or the project officer for the implementation of all telecommunications and electronic security systems in CSC facilities.

All work performed shall adhere to this SOW, CSC Specifications, Standards and Statement of Technical Requirements (STRs).

1.1 Commercial-Off-The-Shelf Equipment

The contractor shall use commercial off-the-shelf (COTS) equipment and proven designs to the maximum extent possible. All new equipment shall meet the specified lifespan requirements. New equipment designs shall be restricted to unique interfaces and common control console.

1.2 Technical Acceptability

The Correctional Service Canada (CSC) operational environment is unique for its diversity of locations, climate exposures and the physical restrictive construction techniques of penal institutions. Maintaining national security, the safety of staff and offenders alike is CSC's commitment to the government and public. Electronic security systems operating in this unique environment shall maintain very high standards of dependability and reliability.

The CSC Engineering Services Division has established technical specifications and equipment standards for specific electronic security systems which are based on very specific and restrictive operational performance criteria as detailed in its Electronic Engineering Standard. Technical acceptability of these systems means that the equipment complies with the pertinent CSC specifications and standards.

The technical acceptance process shall involve system and subsystem evaluation in accordance with the applicable CSC specifications in one of CSC facilities or may be tested in a CSC facility to verify the effectiveness of the proposed technologies when subjected to the restrictive operational environment.

CSC shall also verify in depth any of the system technical specifications called up. CSC may when it deems necessary, request the supplier to arrange for a full site demonstration. CSC may rely on manufacturer's test results for specific areas of the specification where an independent test facility has conducted the test, and the facility is deemed acceptable to CSC.

It is the supplier's responsibility to make new developments in products available to CSC for evaluation. Equipment qualification is an ongoing process and can be initiated at any time by a vendor. Any vendor can have access to the CSC specifications and standards. Any new development or products should be submitted to the CSC Engineering Services Division, Technical Authority in a suitable time frame prior to any tendering process to allow for an acceptable evaluation period. The evaluation period may take up to sixteen (16) months.

1.3 Equipment Procurement

Any ordering of equipment/material before the approval of the final design report will be undertaken at the contractor's own risk. The Design Authority may authorize the procurement of certain long lead items at, or shortly after the preliminary design review.

1.4 Quantity of Equipment

The quantity and location of the equipment required for CSC institutions will be contained in the specification identified in the STR.

2.0 **APPLICABLE DOCUMENTS**

CSC Specifications, Standards and STRs are approved by the Director of Engineering Services (DES) for the procurement and installation of all telecommunications and electronic security systems in all CSC facilities. These documents promulgate DES policy and shall not be modified or changed without prior consultation and approval of the Director. The documents of the issue in effect will form part of the Request for Proposal (RFP) issued by the contract authority.

3.0 **REQUIREMENTS**

3.1 The contractor shall:

- a. Design, procure or manufacture, install, test and document the installation of all electronic security and telecommunications systems in accordance with the CSC specifications, standards and STR;
- b. Provide the operator and maintenance training in accordance with the CSC requirements;
- c. Provide the maintenance support and spares in accordance with the CSC maintenance requirements;
- d. Provide quality assurance (QA) to ensure equipment performance and reliability are in accordance to CSC requirements;
- e. Provide warranty coverage to include spare parts provision and equipment repair;
- f. Provide a program schedule to show all major elements from a contract award to completion of the warranty period and shall include anticipated time of occurrence, interrelationships between events, and time scale; and
- g. Be responsible for the integration of the proposed system to any existing telecommunications and electronic security systems.
- h. Provide a lightning protection system for the installation of all electronic security systems/equipment in the CSC facilities. As a minimum, surge suppression type lightning arrestors shall be required for all power, communications and antenna cables/wires entering or leaving a building.

4.0 **SYSTEM DEVELOPMENT**

The contractor shall design systems and equipment to meet all of the requirements stipulated in the applicable CSC specifications. The system design shall be modular and address the following criteria:

- a. ease of operation and maintenance;
- b. optimize and concentrate control functions and capabilities;
- c. enhance the security of the working environment, extend staff capabilities to observe and control; and
- d. minimize the number and types of display and control devices.

4.1 **Preliminary Design**

The preliminary design baseline shall be established by the review and approval of the preliminary design report (PDR) by the Design Authority (DA) or his designate. Specifications, drawings and the approved PDR shall make up the preliminary design baseline.

The contractor shall prepare and submit two (2) copies of the PDR to the Design Authority and one (1) copy to the Contract Authority at least ten (10) days prior to the PDR meeting. The PDR shall consist of:

- a. performance specifications with functional block diagrams of the proposed system. The technical analysis and equipment performance data shall verify system requirements;
- b. preliminary equipment layouts including control consoles and racks;
- c. list of off-the-shelf equipment with part number, model number, manufacturer and the quantity of each item;
- d. list of custom designed equipment with model number and the quantity of each item;
- e. functional schematics for all custom designed equipment;
- f. conceptual drawings for all custom designed equipment;
- g. a proposed product assurance plan;
- h. a proposed maintenance plan;

- i. proposed sparing plan; and
- j. proposed training plan.

4.2 Preliminary Design Review

The PDR meeting shall be convened by the contractor to review the PDR contents. The contractor shall provide the venue and all of the necessary facilities. The Design Authority will identify any portions of the PDR that are not acceptable to CSC.

4.3 Final Design

The final design baseline shall be established by the review and approval of the Design Authority of the final design report (FDR). It establishes the start of change control in equipment design and performance. The FDR shall consist of:

- a. all elements of the preliminary design baseline;
- b. control console mockups, ergonomics considerations, etc., as necessary;
- c. drawings and operational descriptions for the custom designed equipment including interface specifications;
- d. Installation drawings and instructions; and
- e. availability model and analysis updates to reflect the final system design and hardware selection.

The FDR shall be prepared to good commercial practice. Two (2) copies shall be submitted to the Design Authority at least ten (10) working days before the FDR meeting.

4.4 Final Design Review

The final design review meeting shall be convened to review the contents of the FDR. The contractor shall provide the venue and all of the necessary facilities. All of the contractor's staff responsible for the system/equipment engineering shall be available.

4.5 Design Change Control

Design changes shall be in accordance with the following procedure:

- 4.5.1 **Type I.** Changes that affect cost, schedule, reliability, maintainability, or availability shall be submitted as a design change request (DCR).

Changes shall not be actioned until specifically directed in writing by the Design Authority through the Contract Authority.

- 4.5.2 **Type II.** Changes to correct a design error without affecting cost, schedule, reliability, maintainability, or availability shall not require a DCR.

Changes shall be reported to the Design Authority and the final design baseline shall be updated by the contractor. The Design Authority will review and acknowledge the change.

4.6 **Design Change Request (DCR)**

Type I changes shall be forwarded to the Design Authority through the Contract Authority on DCRs initiated by either the contractor or the Design Authority.

DCRs shall be reviewed and approved before implementation and shall include:

- a. specification requirement being effected;
- b. final design baseline element being changed;
- c. description of the design change;
- d. reason for the change;
- e. impact on cost, schedule, reliability, maintainability and availability; and
- f. trade-off recommendations.

4.7 **In-Plant Testing**

Details of in-plant tests are contained in the ES/SOW-0102, Statement of Work. In-plant tests shall be performed according to the Design Authority approved procedures.

Equipment with deficiencies as the result of the in-plant tests shall be subject to retest. The Design Authority reserves the right to add or modify tests.

5.0 SYSTEM INSTALLATION

The contractor shall be responsible for ensuring that sufficient site utilities are available. No work will be permitted at the site before the approval of the Design Authority. All installation activities shall be conducted in accordance with ES/SOW-0102, Statement of Work.

5.1 Schedule

The contractor shall provide a detailed work schedule for the installation activities. This schedule shall reflect the complete implementation plan by identifying the nature of the work to be performed and the area affected.

5.2 On-Site Inspections

Design Authority or an appointed CSC representative shall perform ongoing inspections of the contractor's activities. These inspections shall verify compliance with the project requirements, the quality of work performed and assess the contractor's progress in relation to the approved schedule. Installation deficiencies requiring corrective action will be brought immediately to the contractor's attention in writing.

5.3 On-Site Coordination

Design Authority shall be responsible for the appointment of an on-site CSC representative. This representative will handle all site related matters and will periodically inspect the installation.

When electronic system installations are part of a construction program or a major redevelopment that involves Public Works & Government Services of Canada, the electronic system installation contractor shall coordinate all activities with the relevant site manager and shall comply with this SOW.

5.4 Facility Criteria

The contractor shall provide the facility criteria data in the proposal. Details as to the power, cooling, space and/or other requirements relating to electronic security system installation at the site must be provided. Final facility criteria information must be provided as part of the FDR.

5.5 Installation Design

The system installation design and planning shall make maximum use of existing ducts, conduits, and other cable routing facilities. Where this is not possible, the contractor shall design and install facilities in a manner acceptable to the Design Authority.

5.6 Subcontractor Supervision

The contractor shall provide an on-site supervision of all subcontractors. The subcontractors shall abide by the regulations of this Statement of Work and the conditions in the contract.

5.7 System Checkout

Before conducting the formal on-site testing for the CSC acceptance, the contractor shall conduct and document a system checkout to assure the system readiness for formal testing and on-line operations. The test sheets used for the system checkout shall be signed by a company representative and provided to the Design Authority at least seven (7) days prior to the scheduled date of the Acceptance testing. The Design Authority will verify readiness through review of the checkout report. The report may be used as reference during the formal witnessed testing for acceptance.

5.8 As-Built Drawings

Thirty (30) days after the system installation acceptance, the contractor shall deliver a complete set of equipment and installation as-built drawings for Design Authority's review and approval. Within thirty (30) days after CSC approval, two (2) complete sets of revised drawings shall be delivered to the Design Authority.

The contractor shall update these drawings throughout the warranty period by the design control procedures. Within thirty (30) days of completion of the warranty period, the contractor shall deliver one (1) set of final revised drawings reflecting all changes to the Design Authority. Upon final CSC approval, the contractor shall deliver two (2) sets of original prints of the final drawings.

6.0 **SYSTEM ACCEPTANCE**

System acceptance shall occur when the acceptance testing has been completed according to the ES/SOW-0102, Statement of Work and when all of the other requirements of the contract have been completed to the satisfaction of the Design Authority. A final acceptance certificate signed by the Design Authority shall certify the system acceptance.

On-site system acceptance testing shall not begin until all of the on-site installation activities have been completed.

6.1 **Acceptance Test Plans (ATPs)**

The contractor shall provide ATPs for all system, subsystem and equipment tests for Design Authority review and approval. The requirements for the ATP are detailed in the ES/SOW-0102, Statement of Work.

6.2 **System Testing**

The contractor shall conduct the approved ATP and record the results. The Design Authority or an appointed CSC representative shall witness the tests.

6.3 **Deficiency Lists (DL)**

The contractor shall prepare and submit a list of deficiencies divided into three categories:

- a. Visual/Mechanical,
- b. Operational, and
- c. Technical/Functional.

6.4 **Technical Acceptance**

Upon verifying that all of the deficiencies have been corrected, the Design Authority shall issue a letter of Technical Acceptance.

7.0 **QUALITY ASSURANCE (QA)**

The QA program shall include quality control and system tests/verification programs to verify that new design and off-the-shelf equipment requirements have been met. System tests/verification will be conducted by the contractor in-plant and on-site, and may be witnessed by the CSC representatives where appropriate. The system shall pass all tests before approval will be given to commence the operator and maintenance training programs and warranty period.

7.1 **Quality Control Program**

The contractor shall provide a description of their internal quality control programs for CSC review and approval. CSC reserves the right to audit and verify that all materials destined for use in CSC systems have been thoroughly inspected and that QA procedures are applied during production and testing.

7.2 **System Test Program**

The contractor shall prepare and provide the documents describing: number, type and details of equipment, subsystem and system tests for CSC review and approval. These documents must be approved before any formal testing and will consist of the following:

7.2.1 **System Test Plan.**

This plan shall contain the test philosophy, the tests to be conducted, the pass-fail criteria, the retest requirements, and the instructions for the validation and the sign-off of all final design baseline requirements.

Before witnessing these tests, the CSC representative will perform a visual and mechanical inspection to ensure that the system installation meets the requirements of ES/SOW-0102, Statement of Work.

7.2.2 **Test Procedures.** These procedures shall ensure that:

- a. all equipment supplied meets the performance specification;
- b. each subsystem meets the applicable performance requirements; and
- c. the overall system meets the performance requirements.
- d. test procedure contains the step sequence for each test to be conducted, and the expected results.

7.2.3 Contractor Testing.

All tests are conducted by the contractor and may be witnessed by an appointed CSC representative. Tests are conducted as stipulated in the approved plan and procedures. The contractor shall inform CSC at least five (5) working days before the test start date.

7.2.4 Test Reports.

The contractor shall submit final copies of the test results for CSC review and approval within ten (10) working days of the completion of the testing. Two copies of the report shall be submitted and shall include:

- a. a summary description of the tests;
- b. test results consisting of completed test procedures verified by a CSC representative;
- c. incident reports, including analysis and corrective action; and
- d. results of any retest.

8.0 **TRAINING**

The contractor shall develop, document and conduct training for both the operational and the technical staff. The training shall be conducted on-site at the institution in the period designated by the schedule.

8.1 **Classroom Training**

Classroom lectures and demonstrations will be conducted on-site to train operations staff in the use and technical personnel in the maintenance of the systems.

8.2 **Training Documentation**

The contractor shall develop and deliver a complete training plan to the Design Authority for comments and approval. This plan must be submitted to CSC at least thirty (30) days in advance of the training date to allow for CSC review. As a minimum, the training material shall contain:

- a. training plans for CSC operations trainers and technical personnel;
- b. manuals for each student to add notes;
- c. training aids; and
- d. student materials.

Training material shall be provided in the language that is dominant at the site (French in Quebec). Sufficient copies of all student materials shall be provided by the contractor at the beginning of the training course to assure one copy for each student. CSC shall stipulate the number of staffs who are to be trained. Upon approval by the Design Authority, two (2) copies of all material shall be delivered to CSC.

9.0 **MAINTENANCE and SPARES**

The contractor shall provide maintenance and spares support plans according to the ES/SOW-0102, Statement of Work for the Design Authority approval. These plans shall be submitted according to the schedule.

9.1 **Maintenance Plan**

The maintenance plan shall describe the philosophy, the Preventive Maintenance (PM) procedures and schedules, the Corrective Maintenance (CM) methods and response times, Mean-Time-To-Repair (MTTR) for all systems. The plan shall recommend tools, jigs and test equipment, and detail the recommended manning method for the system. Issue of the final maintenance support plan will be contingent on Design Authority approval.

9.2 **Spares Plan**

The spares plan shall list the required spares and recommended quantities. The quantity recommendations shall be supported by system availability and reliability analysis and available experience data. The bidder shall identify spare parts and components by their original manufacturer's code, cross-referenced to the equipment vendor's part number.

9.3 **Spares List**

The spares list shall identify the following:

- a. the spare parts and the subassemblies with the recommended quantities;
- b. the cross-reference listings between the vendors and the original manufacturer's codes;
- c. the unit and extended prices for stocking; and
- d. the expected life or the annual consumption of each part.

The contractor shall maintain the spares plan through to the end of the warranty period, and shall ensure that any changes because of approved design changes are incorporated in the spares list.

9.4 **Test Equipment**

The contractor shall provide a list of test equipment required for the on-site maintenance of the system within thirty (30) days from Design Authority's acceptance of the final design.

10.0 **DOCUMENTATION**

All final documentation in hard-copy format shall be in a 3-ring binder with all foldout pages having reinforced ring holes.

10.1 **Manuals and Drawings**

The following items make up the final documentation requirements:

- a. Operator Manual,
- b. Maintenance Manual,
- c. Installation As-built Drawings,
- d. Equipment As-built Drawings, and
- e. Equipment Operating Software.

The contractor shall prepare and submit all manuals and drawings to the Design Authority for review and approval. The manuals and drawings will be approved when all changes have been satisfactorily incorporated. All drawings must be produced with AUTOCAD (latest available version)

10.2 **List of Equipment**

The contractor shall provide a list of equipment itemizing the location, quantity, model number, serial number and revision level of all installed equipment.

10.3 **Baseline Measurements**

The contractor shall provide a copy of the final test results. These results will be used as a reference baseline measurement for monitoring system degradation over time.

10.4 **Documentation Format**

All manuals, documentation including as-built drawings, lists of equipment and baseline measurements shall be submitted as per the following schedule:

- One (1) hard-copy version of all documentation.
- One (1) electronic version of all documentation in a 'read-only' format on a 3½ inch diskette medium; suitable for duplication without any special requirements.

- One (1) electronic version of all documentation in a full 'read-write' format to serve as a master of the documents and drawings.
- all software requirements to access the electronic versions of the documentation.
- One (1) CD containing the equipment operating software.

10.5 Operator Manuals

The contractor shall provide CSC approved manuals to support the operation of the system in the format as outlined in section 10.4 of this specification. These manuals shall be prepared to the best commercial standards. Photo copies shall not be accepted. All hard-copy versions shall be on paper stock 8 1/2" x 11" and shall be presented in a 3-ring binder. The manuals shall comply with the following format and content requirements:

- a. title page;
- b. revision notice page, lined, with columns for revision numbers, dates and initials;
- c. table of contents;
- d. warnings and cautions;
- e. introduction - general information including a description of equipment or system and summary of capabilities;
- f. theory of operation including an explanation of all major system components;
- g. detailed description and use of all user accessible computer screens; and
- h. block diagrams.

A hard copy draft version of the manual(s) shall be submitted for CSC approval on or before the date given in the schedule. Upon acceptance and approval by the Design Authority, a total of two copies shall be provided for use during the warranty period. The contractor shall update these manuals through the warranty period and provide revision bulletins to record manufacturers' recommended modifications, etc. during the life of the equipment.

Within thirty (30) days of the warranty expiry date the contractor shall submit one (1) set of final, updated manuals for CSC approval. Following the final CSC approval, the required number of sets of operator manuals shall be delivered to the Design Authority in the format as specified in section 10.4 of this Statement of Work.

10.6 Maintenance Manuals

The contractor shall provide CSC approved manuals to support the maintenance of the system in the format as outlined in section 10.4 of this specification. These manuals shall be prepared to the best commercial standards. Photo copies shall not be accepted. All hard-copy versions shall be on paper stock 8 ½" x 11" and shall be presented in a 3-ring binder. The manuals shall comply with the following format and content requirements:

- a. title page;
- b. warranty page - explaining the warranty period and expiry dates;
- c. revision notice page, lined, with columns for revision numbers, dates and initials;
- d. table of contents;
- e. introduction - general information including a full description of equipment or system, technical summary, specifications and detailed block diagrams;
- f. theory of operation including a detailed explanation of all circuits and parts;
- g. alignment and test procedures;
- h. repair procedures including step by step fault finding or fault localizing;
- i. block diagrams;
- j. circuit schematics (clear, easy to read, foldout type);
- k. complete parts list;
- l. mechanical drawings, chassis layout illustrations and wiring data lists; and
- m. drawings including as-built and as-installed drawings.

A hard copy draft version of the manual(s) shall be submitted for CSC approval on or before the date given in the schedule. Upon acceptance and approval by the Design Authority, a total of two copies shall be provided for use during the warranty period. The contractor shall update these manuals through the warranty period and provide revision bulletins to record manufacturers' recommended modifications, etc. during the life of the equipment.

Within thirty (30) days of the warranty expiry date the contractor shall submit one (1) set of final, updated manuals for CSC approval. Following the final CSC approval, the required number of sets of maintenance manuals shall be delivered to the Design Authority in the format as specified in section 10.4 of this Statement of Work.

11.0 PROJECT PROVISIONS

11.1 Monthly Progress Reports

The contractor shall submit monthly progress reports. These reports shall report the activities for the previous period. One (1) copy shall be delivered to the Design Authority and one (1) copy to the Contract Authority by the fifth (5th) day of each month. A review meeting may be required.

Monthly reports shall contain the following:

- a. summary of the month's activities;
- b. scheduled shortfalls and rescheduled dates;
- c. problem areas and proposed solutions;
- d. review of next month's activities;
- e. summary of meetings held during the month; and
- f. cash flow forecast.

11.2 Monthly Review Meetings

Review meetings shall be held at the contractor's premises, Design Authority's office, Contract Authority's office, or the site depending on the need. The contractor shall make the design staff members available upon request by the Design Authority.

11.3 Maintenance Support

During the training period, the contractor shall provide maintenance support. This support is expected to be not less than on-site coverage during the normal working day.

11.4 Shipment and Delivery

Contractor shall be responsible for the shipment and delivery of equipment and materials to the site. Packing, crating, and shipment of equipment shall be to good commercial practice, and any damage to, or loss of equipment shall be repaired or replaced to the satisfaction of CSC. The contractor must properly label all shipments to assure correct identification and disposition on arrival at the site, as specified in ES/SOW-0102, Statement of Work.

12.0 **SYSTEM AVAILABILITY**

All elements of customed and off-the-shelf equipment shall be designed to operate in a highly reliable fashion, consistent with available technology, with a minimum of system downtime due to scheduled and unscheduled maintenance. System availability will be achieved when each of the included subsystems availabilities have been proved as required.

12.1 **Common Facilities**

Where units or subsystems are integrated into common facilities no single failure of a component, assembly subassembly, or subsystem shall result in the failure of any other subsystem; nor result in reduced capacity or quality of performance of other subsystems or parts of it.

12.2 **Single Point of Failure**

The system shall be designed such that no failure of a single component, unit, subassembly or subsystem will result in failure of the next higher hierarchical elements of that subsystem or the system.

12.3 **Availability Model**

The bidder's technical proposal shall include a complete model and analysis of the availability of each subsystem and of the complete system being offered. This analysis shall include both MTBF and MTTR calculations and shall treat the Mean-Response-Time (MRT) as zero. This availability analysis may be based on either:

- a. summation of failure rates of the individual components; or
- b. the bidder's documented experience with the same equipment operating in a similar physical environment.

In either case, the source of all failure-rate shall be clearly shown.

The contractor shall maintain the availability model and analysis up-to-date throughout the contract period. A statement of impact of the proposed change would have on the availability model and analysis shall be submitted with all Type I DCRs.

12.4 **Availability**

Availability is the probability that the system, or subsystem will meet operational performance requirements at all time. Time includes the operating time, the active repair time and the administrative and logistic time. To calculate this availability, the contractor must include all of the pertinent factors such as:

12.4.1 **Mean Time Between Failure (MTBF).**

The total operating time of the equipment divided by the total number of failures of that equipment.

12.4.2 **Mean Time To Repair (MTTR).**

The repair time divided by the number of failures.

12.4.3 **Mean Response Time (MRT).**

The time to respond to a call for service divided by the number of calls.

12.5 **Expected Life Duration**

This is the time during which the equipment is expected to provide useful service, without an unusual amount of service and without becoming obsolete.

13.0 INTERFERENCE

13.1 Interference to the System

Performance of the system shall not be affected by the use of standard electronic equipment used at the institution. Distance limits of standard electronic equipment are as follows:

13.1.1 CB transceivers at 1 metre or more;

13.1.2 VHF and UHF transceivers at 1 metre or more;

13.1.3 Other radio frequency transmitting, receiving and re-distribution equipment at 5 metres or more; and

13.1.4 Personal computer and/or computer work stations at 5 metres or more.

13.2 Interference by the System

The system shall not interfere with any standard electronic equipment used at the institution, any commercial TV or radio equipment at a minimum distance of 5 metres, or any other electronic security systems at a distance of 1 metre or more.

14.0 **LIGHTNING PROTECTION**

Surge suppression-type lightning arrestors shall be installed to protect all power, communications and antenna cables or wires entering or leaving a building.

These arrestors must be installed where the cable enters the building i.e. not in the CER or other equipment room.

APPENDIX E

ES/SOW-0102

**Correctional Service Canada
Technical Services Branch
Electronics Systems**

**ES/SOW-0102
Revision 6
1 May, 2008**

**ELECTRONICS ENGINEERING
STATEMENT OF WORK**

**QUALITY CONTROL FOR
PROCUREMENT AND INSTALLATIONS OF
ELECTRONIC SECURITY SYSTEMS**

AUTHORITY

This Statement of Work is approved by Correctional Service Canada for the procurement and installation of all telecommunications and electronic security systems, subsystems, and equipment in Canadian penal institutions.

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address: Director, Engineering Services, Correctional Service Canada, 340 Laurier Avenue West, Ottawa, Ontario, K1A 0P9

Prepared by:



**Manager,
Electronics Systems Research**

Approved by:

**Director,
Engineering Services**



18 Aug 08

RECORD OF REVISIONS

Revision	Paragraph	Comment
3	5.1 - Design Considerations	Tabletop or wall mount power supplies/transformers
4	3.1.1 - Wiring/Cabling Methods	Wiring/cable access
	3.2.1 - AC Wiring	Power outlet strip
		Separate circuit breakers connected to opposite phases of the AC feed
	3.2.2 - AC Power Connections	Power connections via flexible armoured cable
5	Abbreviations	Additions
	1.4 – Manufactured Equipment	Approval of custom equipment
	1.5 – Commonality of Equipment	Add security screws
	3.1.1 – Wiring and cabling	Single conductor wire only on IDC connectors
		Identification of conductors
	3.1.2 – Cable/Wiring Labelling	Acceptable labelling
	3.2.1 – AC Wiring	Mounting of power strips
	3.3.4 - Labelling	Acceptable labelling of racks, boxes, etc.
	5.1 – Design Considerations	DIN rail power supplies preferred
6	2.1 – Environmental Conditions	Expand airborne containments
	2.6 – Finish Application	Change finish material definition
	2.2.2 - Plastic	Remove last sentence
	3.1.1 – Wiring/Cabling Methods	Change “Hydro Codes” to “Electrical Authority”
	3.3.2 - Enclosures	Add requirement to meet IP64

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ABBREVIATIONS

The following abbreviations are used in this specification:

AC	Alternating Current
ATP	Acceptance Test Procedure
BER	Beyond economical repair (repair cost in excess of 60% of replacement cost)
CER	Common Equipment Room
COTS	Commercial -of-the-Shelf
CSC	Correctional Service Canada
CSA	Canadian Standards Association
DC	Direct Current
DA	Design Authority
DES	Director, Engineering Services
EIA	Electronic Industries Association
EMT	Electrical Metallic Tubing
IDC	Insulation Displacement Connector
ISO	International Standards Organization
PCB	Printed Circuit Board
PVC	Polyvinyl Chloride
QA	Quality Assurance
RFP	Request For Proposal
STR	Statement of Technical Requirements

DEFINITIONS

The following definitions are used in this specification:

Design Authority	Director, Engineering Services (DES), Correctional Service Canada (CSC) is responsible for all technical aspects of the system design and implementation.
Contract Authority	Public Works and Government Service Canada (PW&GSC) and/or the Materiel Management Division of CSC is responsible for all contractual matters associated with the system design and implementation.
Project Manager	A CSC employee and/or a contracted person designated by DES to be responsible for the implementation of the project.
Project Officer	A CSC employee and/or a contracted person designated by DES to provide technical and/or engineering services in support of the project.
Contractor	The company selected as the successful bidder.
Off-the-shelf	Equipment which is commercially, complete with field reliability data, manuals, engineering drawings and parts price list.
Custom Equipment	Equipment designed and/or manufactured specifically for a specific contract.

APPLICABLE DOCUMENTS

The following documents of the issue in effect on the date of the Request For Proposal (RFP) shall form a part of the specification to the extent specified herein.

CSA STANDARD C22.1-1986 Canadian Electrical Code - Part 1 Safety Standard for Electrical Installations

EIA STANDARD EIA-310-D Racks, Panels and Associated Equipment

CSA STANDARD C22.2 Canadian Electrical Code - Part II

EIA RS-406/IPC-C--405A Connectors, Electric, Printed Wiring Boards

Any other applicable industrial safety and control standards governing specific aspects for equipment and/or installations.

1.0 INTRODUCTION

1.1 General

This document defines the quality control requirements for the design, installation, testing and acceptance of telecommunications and electronic security systems in all Correctional Service Canada (CSC) facilities.

1.2 Scope

This specification has been developed to ensure high standards for the installation of electronic systems. It defines workmanship standards which may not be fully covered in subsidiary specifications. All contractor's documentation and installation procedures shall meet this specification for equipment reliability, maintainability, longevity, appearance and operational use.

1.3 Off-The-Shelf Equipment

The contractor shall provide commercial off-the-shelf (COTS) equipment wherever possible. COTS equipment shall meet or exceed the manufacturing standards as listed in this specification.

1.4 Manufactured Equipment

Where COTS equipment is unavailable or unsuitable for a specific application, the contractor may manufacture or arrange for the manufacturing of a particular item to suit the requirements. Manufactured equipment shall meet or exceed the best commercial equipment manufacturing standards. Approval of the final design, appearance and ergonomics of all custom manufactured equipment shall rest with the DES, Project Manager or CSC delegate.

1.5 Commonality of Equipment

The contractor shall provide commonality of hardware components within the design parameters ie. switch locks, racks, panels, security screws, etc. All equipment, if appropriate shall be interchangeable.

2.0 MATERIAL AND EQUIPMENT REQUIREMENTS

2.1 Environmental Conditions

All materials and equipment which is used in CSC installations shall be equal to, or better than the standards established in the original equipment and shall be chosen with due consideration being given to the intended use, safety, retention of appearance, maintainability and durability under rugged operating conditions. These materials shall be suitable to perform over the following environmental ranges:

a. Indoor Equipment

Temperature: 0° C to 40° C; and
Humidity: 20% to 95% non-condensing.

b. Outdoor Equipment

Temperature: -40° C to +50° C; and
Humidity: 0 to 100%, condensing.

Outdoor equipment shall operate reliably and not be damaged by combinations of direct exposure to the sun, wind, rain, lightning, hail, snow and ice as may be expected to occur at each institution location.

Complete assemblies of indoor equipment shall be resistant to liquid spills, airborne contaminants (dust, pollen and water droplets), shock and vibration.

2.2 Materials

2.2.1 Metals

Metals used shall be either corrosion resistant or be suitably treated to resist corrosion in all potential atmospheric conditions, including tear gas, to which the installation may be subjected.

For the connection of copper to a cadmium or galvanized surface, effective "wiping" of the copper surface shall be considered satisfactory protection.

No cut galvanized fitting shall be used without protection equal to or greater than the original galvanized surface. All parts shall be free from burrs and sharp edges.

Metal which has been cut, scraped, or drilled shall be properly treated (primed and painted) to retain a uniform appearance.

2.2.2 Plastic

Plastic materials must be stable and shall retain their original shape and finish over the range of operating environmental conditions specified in 2.1

No material shall be used that softens or hardens within the storage environment in a way which is detrimental to its suitability as replacement parts for existing equipment.

Metal screws shall not be threaded into plastic materials.

2.2.3 Natural Rubber

The use of natural rubber is prohibited.

2.2.4 Wood

The use of wood or wood products is not acceptable.

2.3 Toxic Materials

Materials capable of producing harmful toxic effects under any operating condition, equipment malfunction, or accidental cause shall not be used.

2.4 Flammable Materials

Materials, used either for electrical insulation or mechanical purposes which are combustible or capable of causing an explosion, shall not be used.

2.5 Fungus and Insect Supporting Materials

Materials capable of providing a nutrient medium for fungus or insects shall not be used.

2.6 Finish Application

Finish shall be applied to all surfaces where consideration of appearance and protection against corrosion, toxicity, and other deterioration exists.

Application of finish shall not impair equipment performance, and will maintain uniformity in outward appearance.

Finish materials must be scratch resistant, not react to normal cleaning products and applied so as to last at least ten years.

3.0 **INSTALLATION REQUIREMENTS**

3.1 **Wiring and Cabling**

Prior to the installation, all wires and cables shall be tested in accordance with the manufacturer's instructions and shall meet all performance parameters.

Wire and cable harnesses shall be neatly formed and clamped in position. If brackets, forms or clamps are required, these shall be the responsibility of the contractor.

All wires and cables shall be stranded. Single conductor type wires are not acceptable except when such cables are specified to terminate on an IDC type connector. This does not apply to coaxial cables with single centre conductors.

Electrical tape, masking tape, or its equivalent shall not be used on wires, cables or any installed equipment.

3.1.1 **Wiring/Cabling Methods**

Three (3) or more individual wires or cables which are located in one(1) cable run shall be formed into a cable harness, properly dressed, supported and securely tied with flat lacing twine or equivalent.

Wires and cables which are installed by the contractor external to consoles, equipment racks, pull boxes and junction boxes shall be contained in securely mounted conduit or cable tray systems.

Plastic PVC conduits may be used in underground installations unless otherwise specified at time of bidder's conference.

A rigid steel conduit shall be used in indoor, security sensitive areas and outdoor above-ground applications.

Signal and 120 VAC power wiring shall not be run in the same conduit, cable tray, or raceway; and shall be separated in accordance with the local Electrical Authority.

Wire splicing in cable runs shall not be permitted. All cable runs shall be continuous. If continuous cable runs are not possible, terminal block configurations are acceptable provided they are approved by the Design Authority.

Cross-connects installed on BIX, or similar blocks, must not pass across the face of the block, but must be carried around the block, so as not to impede access to the connections.

BIX, or similar, blocks are to be used for solid wire only. Stranded wires are not to be directly terminated on BIX, or other IDC terminations.

Wires in multi-conductor cables which terminate on connectors, and which are not being used, must be twisted around the cable in a neat fashion. They are not to be cut off.

Wires in multi-conductor cables which terminate on BIX or similar IDC connector blocks, and which are not being used, must be punched down on the block. They are not to be cut off.

All conductors on IDC and any other type of terminal block will be identified with a cable marker and cross referenced in the as-built drawings.

Rectangular slots shall be cut in the computer floor, underneath any cabinets, racks, and consoles, for the running of cables. These slots must constitute at least 1/2 of the available floor area. Sharp edges on the computer floor shall be supplied with suitable protection to eliminate possible nicks, tears or wear in cable insulation sheaths. Individually drilled holes for the purpose of carrying cables from the under floor to the inside of the cabinet, rack or enclosure are not permitted.

3.1.2 Cable/Wiring Labelling

The contractor shall label all cables and cable runs. The labelling method shall be logical and conform to industry standards.

All cables shall be identified with commercially produced or machine printed alpha numeric labels protected by clear heat shrink tubing. Hand printed labels are not acceptable.

All wiring shall be identified at both ends of the wire. The coding shall enable a technician to identify the wire or cable without referring to manual tracing methods, test equipment or as-built drawings.

Cable identification labels shall be attached as follows:

- a. within 30 cm of the termination for both ends.
- b. in the middle of any access point, i.e. pull box, wall shaft opening, cable tray, etc.

All individual wires shall be labelled according to a cable numbering system or wire function plan, which is acceptable to the Design Authority.

All terminal strips shall be identified with its own unique terminal number and function.

3.1.3 Exterior Cabling

Where a cable enters or exits an exterior box, chassis, or conduit, the cable entrance shall be completely sealed to prevent an influx of water. A drip loop shall be formed in the cable to assist in maintaining this weather tight seal.

Conduit bushings shall be used on all conduit entrances/exits.

Sharp edges on metal boxes or chassis enclosures shall be supplied with suitable protection to eliminate possible nicks, tears or wear in cable insulation sheaths.

3.1.4 **Slack**

Wires and cables shall be as short as practical, with sufficient slack to:

- a. allow a minimum of three (3) reconnects due to wire breakage;
- b. prevent undue stress on cable forms, wires, terminals and connections;
- c. enable parts to be removed and replaced during servicing without disconnecting adjoining wires or circuits;
- d. facilitate movement of equipment for maintenance purposes; and
- e. provide drip loops in exterior cabling.

Slack shall be provided in junction boxes where space permits. Slack shall not exceed one single loop of cable forming the circumference of the junction box.

Slack shall be provided below equipment racks and shall be neatly coiled below the access flooring. The length of slack shall be equal to the height of the associated equipment rack. Units in drawers and slide out racks shall be provided with sufficient slack to permit removing the units without severing connections.

All cross connection wiring shall be neat and tidy, properly bundled, and tied. This procedure shall allow sufficient slack for tracing of individual wires via manual methods.

Parts mounted on a hinged door shall be wired by means of a single cable, and arranged to flex without being damaged by the opening and closing of a door. If physical separation between wires is essential so as to make a single cable impractical, more than one flexible cable may be utilized.

3.1.5 **Terminations**

All terminations relying on friction for electrical and mechanical connection shall be tested in accordance with the manufacturer's instructions and shall meet the performance requirements detailed therein.

Terminal fanning strips shall be used where a number of wires are contained in a harness, shall be used unless a multi-pin connector is provided.

Spade terminal lugs shall be used on all wiring, connections to screw-thread terminals, except where solder or other type of terminal is specified.

Where wires are connected to lugs, which are clamped under screw terminals in the form of a terminal connection strip, no more than one wire shall be attached to each lug, in order that each wire may be removed individually. This requirement will not apply in the case of common connections, daisy chain distribution circuits, or similar terminations where wires will not need to be disconnected for servicing.

No more than two (2) lugs shall be attached to each terminal.

Wire and cable insulation shall be stripped back to allow for proper connection to the lug. No bare wire shall be visible between the terminal lug and the insulator.

Terminal strips must be fastened to a hard surface using a screw, or nut and bolt. Adhesive supports to secure the terminal strip, or floating terminal strips are not acceptable.

3.1.6 **Splicing and Joining**

Splicing of wires on new installations is not permitted.

Where connectors are used on cable assemblies, they shall be a locking type which will not disengage under tension.

All joints or splices in underground cable runs shall be located inside accessible, secure, waterproof, and lockable steel enclosures. The enclosures shall be located at least one (1) metre above grade and be firmly secured to existing structures or to stub pole supports.

Splices in underground cable runs, if required to repair Crown caused damage, shall be subject to approval from the Design Authority.

Stranded conductor splices shall be held by wire binding terminals in order to prevent stray strands from causing either short circuits or grounds.

Joints and splices shall be soldered and encased in waterproof shrink tubing for protection against leaching, oxidization, moisture damage, etc.

Joints and splices shall be clearly and accurately identified on applicable as-built drawings.

3.1.7 **Shielding**

Shielding shall be secured on wires and cables to prevent accidental contacting or shorting exposed current-carrying parts, grounded metal objects, or structures.

Shielding shall terminate at sufficient distance from the exposed conductors of the cable to prevent shorting or arcing between the cable conductor and the shielding.

Ends of the shielding material shall be secured against fraying.

3.1.8 **Protection**

Wires and cables shall be strategically located and protected to avoid contact with rough, irregular surfaces or sharp edges.

Wires and cables shall be protected by suitable grommets or bushings when passing through openings in metal.

Guards or other suitable protection shall be provided on insulated high voltage cables.

3.1.9 **Support**

Wires and cables shall be properly supported with adequate strain relief to prevent excessive strain on the connections, devices, or joints of any electrical apparatus connected therein.

Adhesive supports with ty-wrap products shall not be used unless they are secured by a nut and bolt device.

3.1.10 **Clearance**

Physical clearance between wires/cables and associated heat emitting parts, i.e. amplifiers, shall be sufficient to prevent deterioration of the wires or cables. Refer to Table 19 of CSA Standard C22.1 Part 1.

3.1.11 **Inductive and Capacitive Effects**

Wires and cables, including harness wire and cables, shall be located such that inductive and capacitive effects do not adversely affect system operation. The amount of twists in paired wires shall be increased over the length of wire not covered by the cable sheath.

3.2 **Power Wiring**

The contractor shall not employ "Marette" (TM) type connectors regardless of CSA Standard C22.1 regulations. All wiring shall terminate on an insulated or protected barrier strip or terminal board, and be provided with spade terminal lugs where required.

Where control and signal wires which are run in conduit, cable-harness, or cable-trough systems, shall be run in separate wire ways. The separation shall be a physical barrier of suitable material and shall conform to applicable building codes and wiring methods.

All high voltage and/or high current terminations shall be provided with protective guard devices by the contractor. The device shall be mounted to allow for maintenance access to the terminals.

Terminal lugs shall be used on all power wiring, both VAC and VDC.

Warning labels must be installed in accordance with the CSA guidelines to warn maintenance personnel of any hazardous voltages and currents.

3.2.1 AC Wiring

AC wiring methods shall conform to all local and national wiring regulations.

Outlet boxes shall be installed such that all outlets are clear of any obstructions including wiring and cabling, and shall be easily accessible.

Power distribution within a cabinet or rack shall be via a power outlet strip, as provided by the original cabinet or rack manufacturer. A third party outlet strip is not acceptable. All power strips must be mounted into the equipment cabinet with rack mounting hardware.

All power cable installations shall be completed in a neat and sturdy fashion and shall meet all requirements of the specifications detailed herein.

Power cords within equipment cabinets and racks shall be maintained as short as practicable with due consideration for maintenance needs.

Systems which use redundant equipment, such as dual microprocessors, shall power each unit from two separate breakers connected to opposite phases of the AC feed.

3.2.2 AC Power Connections

All AC power connections from the cabinet or rack power outlet strip to the AC junction box shall be via flexible armoured cable. AC power connectors are not permitted.

3.3 Conduits, Enclosures, Cable Troughs and Raceways

3.3.1 Conduits

Conduits installed above ground, and accessible to the inmate population, shall be rigid steel.

Metal conduits installed in secure and inmate accessible areas shall be fitted with double the normal quantity of support hangars.

In locations subject to extreme temperature changes, and/or where conduit lengths are of non-standard size, the contractor shall make provisions for the inclusion of conduit expansion joints.

Rigid PVC conduits shall be used only in buried applications.

Rigid PVC conduits shall not be threaded, but may be used with approved adapters and couplings applied in a manner consistent with industry standards.

EMT conduit may be used in administrative areas, and locations which are not normally assessable to the inmate population.

Liquid-tight flexible metal conduits may be used where a flexible connection is required, i.e. cameras, microwave dishes, etc. In such applications, the length of "flex" conduit shall not exceed one (1) metre.

PVC conduits which cross roadways shall be encased in poured concrete.

The contractor shall provide a suitable means of protecting the buried conduit against damage caused by digging or excavating. The preferred method is installing a tape marker directly above the conduit path.

In addition to these requirements, the applicable industrial standards apply, including:

- a. CSA Standard C22.2 No. 45-M1981 - Rigid Metal Conduit
- b. CSA Standard C22.2 No. 56-1977 - Flexible Metal Conduit

3.3.2 Enclosures

All electrical connections, terminations, and cross connections shall be made within lockable, covered steel enclosures, using good quality locks. At least two keys must be supplied to CSC.

Outdoor enclosures shall be environmentally sealed and gasketed to provide a moisture/dust free and secure environment.

Enclosures which contain electrical equipment such as circuit breakers, relays, switches, and transformers, or cable networks, connections and terminations, shall be weatherproof and dust-tight and meet the provisions of IP64.

All enclosures such as junction boxes, racks and consoles shall be positioned for ease of maintenance, service, and connection/disconnection of cables and cable harnesses.

The contractor shall provide a proper drain hole in all enclosures which are grouted in concrete.

All floor mounted cabinets, racks, and consoles shall be secured to prevent overturning when associated drawers, shelves and movable parts are extended, or when heavy objects are placed on pull out shelves or writing tables.

In addition to the provisions stated herein, the applicable industrial standards shall apply, including:

- a. CSA Standard C22.2 No. 29-M1983 for Industrial Products.
- b. CSA Standard C22.2 No. 94-1976 for Special Purpose Enclosures.

3.3.3 Cable Troughs and Raceways

Cable troughs and raceways shall be continuous and shall be constructed of metal.

The contractor shall provide adequate mounting devices which will permit the use of fastening devices that will not damage conductor insulation.

Cable troughs, raceways, and fittings shall be free from burrs or other sharp edges which may cause damage to the cable or insulated conductors.

Cable troughs and raceways shall be installed as a complete system before the conductors or cables are installed.

Cable troughs may be either ventilated or solid and unless otherwise specified, shall be equipped with covers and steel guards to protect against damage.

In addition to these provisions, the appropriate standards shall apply, including:

- a. CSA Standard C22.2 No. 126-M1980 - Cable Troughs and Fittings.
- b. CSA Standard C22.2 No. 79-1978 - Raceways and Fittings.
- c. CSA Standard C22.2 No. 62-1972 - Surface Raceways and Fittings.

3.3.4 Labelling

The contractor shall label equipment racks, junction boxes etc. The labelling method shall be logical and conform to industry standards. All equipment racks and junction boxes shall be identified with commercially produced or machine printed alpha numeric labels. Hand printed labels are not acceptable.

Identification of chassis equipment shall be located in a suitable location within the rack and affixed to the rack, not the chassis.

Approved materials used for labels include lamicoyd strip, etched metal, stamped labels, or indelible ink.

3.4 **Soldering**

On solder connections, the insulation on individual wires shall not be stripped back more than 1.5 mm from the solder area.

Soldering shall be executed so that positive electrical and strong mechanical connections are assured.

Leads shall not be wrapped more than once around the terminal.

Soldered connections on the back of connector plugs, i.e. cannon plugs, switches, relay sockets or any other device employing solder lugs, shall be insulated by means of a short length of insulating tubing placed over each wire in the connector.

"Cold" solder joints, and excessive solder on connections shall not be acceptable.

Each soldered connection shall be tested for mechanical and electrical strength to ensure that a strong connection is achieved.

Use of acid based solder flux is not permitted.

Where insulation material is subject to heating during soldering, the material shall be undamaged and the fastened parts shall not be loosened.

3.5 **Welding**

All welds shall be free of harmful defects such as cracks, porosity, undercuts, voids and gaps.

There shall be no burn through.

Weld fillets shall be uniform, smooth, and shall cover a sufficient area of the welded surface to ensure that a solid bond is achieved.

Surfaces to be welded shall be free of extraneous particles which may affect the mechanical elements of the welded area.

3.6 **Crimping**

Crimp connections shall be made in accordance with the manufacturer's instructions. Industry standards shall be observed at all times.

Solid conductors may be used with crimp connections where the use of solid conductor wiring cannot be avoided. In all other cases only stranded wiring shall be used on crimp connections.

Solid conductors which are connected to terminals by crimping shall be soldered as well. This provision only applies to terminal lugs. It does not apply where wires may be spliced by crimping except in the case of some LED's and indicator lights which employ pigtail leads which should be soldered or connected by screw terminals.

3.7 **Cleaning**

Upon completion of the installation, the equipment shall be cleaned of smudges, loose or excess solder, weld beads, metal chips, burrs, mold release agents, or any other foreign material which might detract from the intended operation, function, or appearance of the equipment.

All corrosive materials shall be removed.

The cleaning processes employed shall leave no harmful residues and shall not have a negative effect on the equipment or its parts.

4.0 GROUNDING REQUIREMENTS

4.1 General

Grounding source and distribution points shall be provided by the Crown unless otherwise specified at the bidder's conference, in the Statement of Technical Requirement (STR), or any applicable documents.

The grounding shall be such that the signal ground, equipment ground, and electrical power ground shall be connected at one point and shall follow the shortest possible path. Where necessary, ground isolation techniques shall be employed.

The path from the tie point to any ground shall be permanent, continuous, have sufficiently low impedance to limit the potential above ground, and facilitate the operation of the 'over current' devices in the circuits.

Ground conductors shall be made of copper, sized for a minimum of 200 circular mils for each 300 mm length of conductor.

Inactive wires installed in long cable or conduit runs shall be grounded to prevent stray or static electrical discharges, with proper consideration given to prevent ground loops or other grounding problems.

Installation must be such that ground loops are prevented.

4.2 Signal Ground

Signal grounds shall be used to provide a ground potential reference which is independent of the frame ground and the power equipment ground.

An insulated grounding conductor shall be connected from the equipment signal ground terminal to the main ground connection point for single units such as equipment racks.

An insulated ground plate shall be used with insulated grounding conductors for multiple units, such as common equipment room (CER) equipment, from each equipment signal ground terminal connected to the plate. The plate shall be connected to the main ground connection point by means of a single insulated grounding conductor.

4.3 Frame Ground

The ground connection of the receptacle may be used for the frame ground as long as that ground connection is isolated and insulated from the power equipment ground system. Such receptacles shall be clearly identified so that they will not be used to supply equipment that does not require frame grounds.

The receptacle ground connection conductor shall be insulated and isolated from the power equipment grounding system, and shall be connected from the receptacle ground connection to an isolated ground plate.

The isolated ground plate may be an insulated buss bar for low power applications,.

Size of grounding conductors shall be in accordance with the requirements of CSA Standard C22.1 Section 10 and Table 17.

4.4 Combined Signal and Frame Ground

Connection between the signal ground terminal and the frame ground terminal shall be part of the equipment wiring. The connection to the main ground connection point shall be similar to that for a frame ground.

4.5 Main Ground Connection Point

Main ground connection point shall be installed in accordance with CSA Standard C22.1 Section 10, and C22.2 No. 41.

4.6 Ground to Chassis

Ground connections to an electrically conductive chassis or frame shall be made by:

- a. soldering to a spot-welded terminal lug.
- b. soldering to a portion of the chassis or frame that has been formed into a soldering lug.
- c. using a terminal on the ground wire and securing the terminal by a screw, nut and lockwasher.

When using a terminal on a ground wire which is secured by a screw, nut and lockwasher, the screw shall fit in a tapped hole in the chassis or frame, or it shall be held in a through hole by a nut.

When the chassis or frame is painted, the metal around the screw hole shall be scraped clean and plated (or tinned) to provide a corrosion resistant connection.

4.7 Shielding

Shielding on wire and cable shall be grounded to the chassis or frame, in the manner specified in Section 2.5.5

4.8 Lightning Protection

All equipment with external cabling including radiating cables or other forms of antennas which may be susceptible during lightning strikes or other static discharges shall be protected fully in accordance with the relevant safety rules and regulations.

The ground rod used for lightning protection shall be copper or copper-plated steel, and shall be a minimum of 2.5 metres in length. Where the ground conditions preclude installation of a single ground rod, multiple rods of a shorter length may be used in parallel to provide the lightning protection.

The copper ground conductor shall be fastened to the ground rod using a thermic welding technique. Clamps are not acceptable.

5.0 ELECTRICAL/MECHANICAL DESIGN REQUIREMENTS

5.1 Design Considerations

All equipment shall be manufactured and finished with a degree of uniformity and grade of workmanship which shall comply with applicable industry standards, and the generally accepted principles of safe practice.

Exposed and moving parts that might constitute a safety hazard shall be provided with protective guards and warning labels.

All elements of the equipment shall be designed to operate in a highly reliable fashion, consistent with available technology, with a minimum of system downtime due to scheduled and unscheduled maintenance.

Where units or subsystems are integrated into common facilities, no single failure of a component, sub-assembly, assembly, or sub-system shall result in the failure of any other sub-system or reduced capacity or performance of other sub-systems or parts thereof.

The system shall be designed such that no failure of a single component, unit, subassembly, or subsystem will result in failure of the system or the next higher hierarchical elements.

All equipment shall be designed and installed to provide useful service, with minimal maintenance for a period of no less than 10 years, unless otherwise specified.

Tabletop or wall-mount power supplies or transformers shall not be used to power equipment installed within equipment racks and cabinets. Power supplies or transformers used within racks and cabinets shall be securely fastened to the rack equipment rails or side of the cabinet. DIN rail mounted power supplies are preferred.

5.2 Assemblies

The contractor (or manufacturing agent) shall apply special considerations in the execution of assembling system component parts.

Rack mounted equipment chassis; whose depth from the front face panel to the rear of the chassis exceeds 25 cm shall be equipped with rack slides.

Each assembly shall have a permanently fixed label showing the model number, serial number, and power requirements.

Materials used in assemblies shall be chosen with due consideration being given to the intended use, safety, durability, retention of appearance, and ability to resist corrosion from a variety of causes including tear gas.

In addition to applicable CSC/DES specifications, the appropriate industrial standards shall apply, including:

- a. EIA-310-D Racks, Panels, and Associated Equipment.
- b. CSA C22.2 No. 94-1976 Special Purpose Enclosures.
- c. CSA C22.2 No. 29-M1983 Panel boards and Enclosures.

5.3 Printed Circuit Board (PCB)

PCBs shall be constructed of non-flammable material, preferably a glass epoxy base.

The contractor shall provide extractor devices at the front of each card assembly.
All cards shall have keyed edges to prevent accidental replacement by another type of card.

Each device shall be identified and properly labelled, showing card type, and revision number.

All PCBs shall be etched. Wire wrap connections are not acceptable.

In addition to the requirements set forth herein the appropriate industrial standards shall apply, including:

- a. CSA C22.2 No.154-M1983 Data Processing Equipment.
- b. CSA C22.2 No.0.7-M1985 Equipment Electrically Connected to a Telecommunications Network.
- c. EIA RS-406/IPC-C-405A General Document for Connectors, Electric, Printed Wiring Boards.

5.4 Components

All electrical equipment, i.e. power supplies, amplifiers, etc. attached to the equipment structure shall be fastened securely and rigidly not using nuts and lockwashers.

Electrical components used in manufacturing in-house products shall be of commercial quality and shall comply with the standards of the Canadian Electrical Code, Part II.

Electronic circuit components, such as resistors, capacitors, inductors, or semiconductor devices which have no applicable standards in the Canadian Electrical Code, Part II shall comply with the test parameters as set forth in CSA C22.2 No. 154-M1983 Part 6.

6.0 **QUALITY ASSURANCE REQUIREMENTS**

The contractor shall provide objective evidence that the system and any major component therein have been designed, manufactured, inspected and tested under the umbrella of a quality assurance program capable of meeting the requirements of the applicable ISO Standard 9002 Series. More stringent requirements will be identified on a case by case basis, as needed.

In addition, the contractor shall develop a site-acceptance test/inspection procedure to demonstrate that all parameters of the system are fully operational and conform to the Statement of Technical Requirements.

6.1 **In-plant Inspection**

The equipment shall meet all functional, electrical, and visual/mechanical test parameters and shall have been fully tested and inspected by the contractor. Results shall be documented and reported to the Design Authority. Periodic inspections may be done by the Design Authority or his designated representative to verify that the equipment meets all requirements.

Particular attention shall be given to the following:

- a. Inventory of received equipment.
- b. Physical condition of equipment i.e.: scratches, dents, paint chips, etc . . .
- c. Construction techniques, board and components accessibility.
- d. Neatness, clamping and tying of wiring, cabling and harnesses.
- e. Strain relief of cables and wire connections.
- f. Legibility of nameplates, identification plates, and markings.
- g. Safety and protective covers, warning labels and grounding.
- h. Tightness of connectors, screw type fasteners, etc.
- i. Soldered and weld joints.
- j. Completeness.
- k. Operation of drawers, adjustable and sliding parts, controls etc.

-
- l. Shielding.
 - m. Cable and wire connections, ground clamps and terminal strips.
 - n. Type and quality of paint finish.
 - o. Quality of printed circuitry, etching, the electronic components and other associated parts.
 - p. Quality of locks, cabinets and other materials.

It must be noted that the in-plant tests are performed as a requirement of the financial arrangements and serve to guarantee that the design parameters of the FDR are followed and will meet the requirements of the applicable system specification. Sign-off of in-plant tests will not denote any form of final acceptance of the equipment and design.

6.2 Test Equipment

All test equipment shall be supplied by the contractor.

All instruments and test equipment shall be checked periodically by the QA Inspector in order to ensure accuracy of measurement. Records showing when the test equipment was last calibrated are to be provided as proof of accuracy.

6.3 Calibration

All test equipment used by the contractor shall bear a calibration seal showing the date calibrated and the due date for the next calibration.

The contractor shall ensure that the test equipment's calibration due date does not occur during the test period.

All equipment performance measurements shall be made with instruments whose accuracy and calibration guarantee that the results comply with the terms of the contract.

CSC reserves the right to furnish and/or require the use of any applicable instruments and standards in order to ascertain the accuracy of any measurements.

Test equipment suspected of being damaged or out of calibration shall be rejected by the Design Authority.

6.4 **Safety Design Aspects**

Particular attention is to be given to the safety design aspects of CSC installations, so as to minimize any hazards while in gaining access to, operating and servicing equipment. Such design aspects shall include the proper grounding of equipment, the installation of protective covers and warning labels over high voltage areas, the installation of warning labels on x-ray equipment, etc.

Radio and TV camera towers must receive careful attention in regards to make them accessible for servicing, especially during inclement weather.

7.0 ON-SITE INSTALLATION

7.1 Inspections

Inspections will be performed by the Design Authority or their designated representative. A thorough visual and mechanical inspection of the installation shall be performed to ensure that all applicable requirements and safety precautions have been met.

7.2 Damage to Government Property

Damage to Government property, including buildings, equipment, etc. during the course of the installation shall be made good by the contractor.

The contractor shall replace all equipment which has suffered major damage, i.e. damage which renders the equipment BER, unserviceable, or subject to deterioration.

If stocks of the applicable equipment are at such a level that replacement of the damaged items cannot be made, and the contractor cannot readily obtain new equipment in order to allow the installation to proceed without delay, the contractor shall:

- a. repair the damage immediately with available materials.
- b. return to the site and replace the equipment as soon as new equipment is procured. Minor damage shall be repaired in a manner which leaves the government property in a condition equivalent to its original state and performing the original function, with no deterioration in appearance, performance, and/or reliability.

Any equipment where the paint finish becomes scratched or marred during the installation shall be completely refinished and repainted consistent with the appearance of new equipment.

Equipment shall neither be exposed to rain, nor be left out-of-doors during inclement weather. This stipulation does not apply to construction materials.

7.3 Protection of Surfaces

The contractor shall obtain approval from the appropriate Institution authority before moving heavy loads or equipment on floors, roofs and other surfaces.

The contractor shall adequately protect floors, finished surfaces and roofs from damage during the installation and shall implement special measures when moving heavy loads or equipment on them.

The contractor shall keep the floors free of oils, grease, or other materials likely to damage or discolour them.

The contractor shall provide dust protection for the equipment during the installation period, as related construction activities may occur simultaneously.

7.4 Cutting, Patching and Digging

The contractor shall perform all cutting, patching or digging necessary for the installation of the system.

The contractor shall be responsible for changes or damage to any existing work, cables or equipment by cutting, welding, drilling, or digging without prior consent from the Design Authority.

The contractor shall promptly repair any damage for which he is responsible in order to restore the facilities to their original condition.

7.5 Visual-Mechanical Inspection

Inspection shall be performed by the Design Authority or his designated representative.

Prior to the commencement of performance and operational testing, the installation shall be inspected to ensure that all applicable requirements and standards have been met.

Particular attention shall be given to the following:

- a. Physical condition and positioning of equipment.
- b. Neatness, clamping and tying of wire and cable harnesses.
- c. Cable and wire connections, ground clamps, and terminal strips.
- d. Soldered and welded joints.
- e. Strain relief of cables, wire connections, and cable harnesses.
- f. Cleanliness of equipment boxes under computer flooring.
- g. Nameplates, identification methodology and markings.
- h. Operation of drawers, adjustable and sliding parts and controls.

-
- i. Equipment fit, fastening devices and accessibility of parts.
 - j. Construction and finishes.
 - k. Legibility of labels and tags.
 - l. Safety aspects, including secure provisions for climbing and working on towers.
 - m. Shielding.
 - n. Grounding.
 - o. Equipment Cooling Provisions.
 - p. Washers and lock-washers.
 - q. Tightness of screw type fasteners & connectors.
 - r. Screws, nuts and bolts shall show no evidence of cross-threading or mutilation.
 - s. Bottom of equipment racks etc. shall be free of debris and loose parts.

7.6 **Final System Acceptance**

The system shall be accepted when all of the following items have been completed to the satisfaction of the Design Authority and with the written certification of the project manager:

- a. performance and operational tests.
- b. all documentation.
- c. all training.
- d. all other terms and conditions.

The system warranty shall be deemed to begin at the completion of the Final System Acceptance or when the system is taken into service with accepted deficiencies, whichever comes first.

7.7 On-Site Maintenance

Building and site maintenance shall be interpreted to include all the areas in which the contractor is carrying out installation activities.

All sites and buildings shall be maintained by the contractor in a clean and tidy condition.

Upon completion of each day's work, all areas such as hallways, stairways, elevators and storage rooms used by the contractor in delivering or storing equipment shall be left in a clean and tidy condition.

The contractor shall store all electronic components not yet installed in a lockable storage room/trailer at the end of each workday. This procedure will reduce the probability of damaged and/or stolen equipment prior to system acceptance. Prior to the commencement of performance and operational testing, the installation shall be inspected to ensure that all applicable requirements and standards have been met.

8.0 DELIVERY

8.1 Packaging

All equipment shall be packaged to ensure that the equipment will not be damaged during shipment and/or delivery to the institution, as well as any associated handling on site.

Fragile components must be clearly identified and labelled.

All circuit cards, equipment modules, etc. shall be protected by the original packaging material until the equipment is placed into service.

8.2 Addressing

Address labelling shall be clearly marked in a minimum of two (2) locations on each package. The following format shall be observed:

- a. Complete name of the institutional site.
- b. Complete shipping address.
- c. Clear description of contents.
- d. Complete name of the Institutional representative.

All of the above addressing items will be provided at the Bidder's Conference.

- END OF TEXT -

APPENDIX F

ES/SOW-0110

Correctional Service Canada
Technical Services Branch
Electronics Systems

ES/SOW-0110
Revision 1
24 June, 2008

ELECTRONICS ENGINEERING
STATEMENT OF WORK

STRUCTURED CABLE SYSTEMS
FOR
ELECTRONIC SECURITY INSTALLATIONS

AUTHORITY

This Statement of Work is approved by Correctional Service Canada for the procurement and installation of all telecommunications and electronic security systems, subsystems, and equipment in Canadian penal institutions.

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address: Director, Engineering Services, Correctional Service Canada, 340 Laurier Avenue West, Ottawa, Ontario, K1A 0P9

Prepared by:



Manager,
Electronics Systems Research

Approved by:



Director,
Engineering Services

23 July 08

RECORD OF REVISIONS

Revision	Paragraph	Comment
0	Original	Original
1	4.3.1 - Cable	Cable upgraded to meet OM3 standards
	Multiple	Copper cable upgraded to CAT 6

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ABBREVIATIONS

The following abbreviations are used in this specification:

BICSI	Building Industry Consultant Service International
CER	Common Equipment Room
CET	Certified Electronic Technologist
COTS	Commercial -of-the-Shelf
CSC	Correctional Service Canada
CSA	Canadian Standards Association
CSV	Certified System Vendor
DVO	Data/Voice Outlet
EIA	Electronic Industries Association
EMT	Electrical Metallic Tubing
LOF	Laser Optimized Fiber
IDF	Intermediate Distribution Frame
OTDR	Optical Time Domain Reflectometer
RCDD	Registered Communications Distribution Designer
TC	Telecomm Closet
TIA	Telecommunications Industry Association
UTP	Unshielded Twisted Pair

DEFINITIONS

The following definitions are used in this specification:

Design Authority	Director, Engineering Services (DES), Correctional Service Canada (CSC) is responsible for all technical aspects of the system design and implementation.
Contract Authority	Public Works and Government Service Canada (PW&GSC) and/or the Materiel Management Division of CSC is responsible for all contractual matters associated with the system design and implementation.
Project Manager	A CSC employee or a contracted person designated by DES to be responsible for the test and evaluation or feasibility study project.
Project Officer	A CSC employee or a contracted person designated by DES to provide technical and/or engineering services in support of the project.
Contractor	The company is responsible for assuring that all system/equipment performance and test & evaluation requirements are met.
Off-the-shelf	Equipment which is commercially, complete with field reliability data, manuals, engineering drawings and parts price list.
Custom Equipment	Equipment designed and/or manufactured specifically for a specific contract.

APPLICABLE DOCUMENTS

The following documents of the issue in effect on the date of the Request For Proposal (RFP) shall form a part of the specification to the extent specified herein.

- a. EIA/TIA Standard EIA/TIA-568 Commercial Building Telecommunications Wiring Standard
- b. EIA/TIA Technical Systems Bulletin TSB-36 Additional Cable Specifications for Unshielded Twisted Pair Cables
- c. EIA/TIA Technical Systems Bulletin TSB-40 Additional Transmission Specifications for Unshielded Twisted Pair Connecting Hardware.
- d. International standard ISO/IEC 11801-2nd Edition: Information technology — Generic cabling for customer premises.

Any other applicable industrial safety and control standards governing specific aspects for equipment and/or installations.

1.0 INTRODUCTION

1.1 General

This document defines the quality control requirements for the design, installation, testing and acceptance of structured cable systems for use in security systems installed in all Correctional Service Canada (CSC) facilities.

1.2 Scope

This specification has been developed to ensure high standards for the installation of electronic systems. It defines workmanship standards which may not be fully covered in subsidiary specifications. All contractor's documentation and installation procedures shall meet this specification for equipment reliability, maintainability, longevity, appearance and operational use.

1.3 Off-The-Shelf Equipment

The contractor shall provide commercial off-the-shelf (COTS) equipment wherever possible. COTS equipment shall meet or exceed the manufacturing standards as listed in this specification.

1.4 Manufactured Equipment

Where COTS equipment is unavailable or unsuitable for a specific application, the contractor may manufacture or arrange for the manufacturing of a particular item to suit the requirements. Manufactured equipment shall meet or exceed the best commercial equipment manufacturing standards.

1.5 Commonality of Equipment

The contractor shall provide commonality of hardware components within the design parameters ie. switch locks, racks, panels etc. All equipment, if appropriate shall be interchangeable.

2.0 MATERIAL AND EQUIPMENT REQUIREMENTS

2.1 Environmental Conditions

All materials and equipment which is used in CSC installations shall be equal to, or better than the standards established in the original equipment and shall be chosen with due consideration being given to the intended use, safety, retention of appearance, maintainability and durability under rugged operating conditions. These materials shall be suitable to perform over the following environmental ranges:

a. Indoor Equipment

Temperature: 0° C to 40° C; and

Humidity: 20% to 95% non-condensing.

b. Outdoor Equipment

Temperature: -40° C to +50° C; and

Humidity: 0 to 100%, condensing.

Outdoor equipment shall operate reliably and not be damaged by combinations of direct exposure to the sun, wind, rain, lightning, hail, snow and ice as may be expected to occur at each institution location.

Complete assemblies of indoor equipment shall be resistant to liquid spills, airborne contaminants, shock and vibration.

3.0 **TELECOMMUNICATIONS OVERVIEW**

3.1 **Structured Cabling System**

The design objective is a flexible network that is easy to re-configure, easy to manage and capable of incremental growth. The network is based on a structured cabling system conforming to Electric Industry Association/Telecommunications Industry Association Specification 568 (EIA/TIA-568) and Canadian Standards Association 529 (CSA 529) and using a star wired topology for the horizontal distribution with Category 6 Unshielded Twisted Pair (UTP) and 50/125 Micron Laser Optimized Fibre. The design will support Ethernet, Fast Ethernet, and network management.

4.0 DESCRIPTION OF WORK

4.1 General System Requirements

4.1.1. Outline

This section defines the minimum requirements for a structured cabling system to be provided on an engineered, furnished, installed, tested, and commissioned basis. Products and installation practices shall conform with the EIA/TIA documents identified in the **APPLICABLE DOCUMENTS** section of this Statement of Work.

The structured cabling system includes the following basic elements arranged into backbone feeders and horizontal distribution subsystems that are cross connected or patched together in Telecom Closets or Common Equipment Rooms on Intermediate Distribution Frames (IDFs).

- a. Unshielded Twisted Pair (Horizontal)
- b. 8-pin modular Telecom outlets
- c. Insulation displacement connector type terminal blocks
- d. LOF optic cable (Backbone)
- e. Fibre optic (duplex) interconnect patch panels
- f. Patch cords for patch panels
- g. Line cords for workstation data equipment (Office Cables)

Notes:

- 1) 3 metre length is standard for Office Cables
- 2) All cables provided for a project shall have a **GREEN** jacket.

4.2 Horizontal Data Cable

4.2.1 Cable

Each cable shall consist of 8 each of 24 AWG thermoplastic insulated solid copper conductors formed into four individually twisted pairs and enclosed by a jacket with the appropriate protection rating determined by Provincial codes.

The cable shall fully conform with EIA/TIA-568 design requirements for 100 ohm UTP cable and fully conform with EIA/TIA-568 TSB-36 transmission requirements for Category 6 cable. Cables shall bear evidence of verified Level 6 or Category 6 and also bear evidence of certification by a recognized standard or testing body. (eg: Bearing NORDX Brand name and have length clearly marked on cable sheath)

The cable bundles will be fed to locations in either a supplied cable tray or conduit system. Outlet cables will then be fed to the user locations via either pac poles or fished down hard wall offices. A pull string will remain in the conduit/cable tray for future installations.

The cable run length from the IDC to the workstation location shall NOT exceed 90 metres. The combined length for patch cords for data network horizontal distribution connections shall not exceed 10 metres for an overall length from data network hub equipment to workstation equipment not exceeding 100 metres.

4.2.2 User Termination

Termination at the user end will be made onto a certified Category 6 RJ45 module for data. These modules will then be housed in a certified faceplate. The faceplate to house the modules will have the capability to equip up to six each 8 pin modular jacks. Other configurations to be used will vary with locations: A duplex flush mount faceplate for drywall applications, a duplex surface mount kit for PAC pole applications and duplex single gang outlets mounted into custom furniture with adapter plates. Surface mount kits will not exceed a 6.5 cm. protrusion from the wall. For custom furniture it is assumed that the cable runs will be fed to the outlet via raceways in the legs of furniture. For security reasons, jacks are NOT be installed in exterior walls or walls not totally part of CSC space. All cables must either terminate on a patch panel or on a faceplate, loose or unterminated cables are not acceptable.

The 8 pin modular jack connectors shall comply for termination of 4 wire pairs with 24 AAWG solid copper conductors: minimum contact force of 100g and conductors separated by jack comb.

Each modular outlet will be wired per EIA/TIA-568 polarization sequence, designation T568A (reference CAN/CSA T529 Clause 11.2 Figure 11-1 and Table 10-1).

This illustration is a front view of the connector

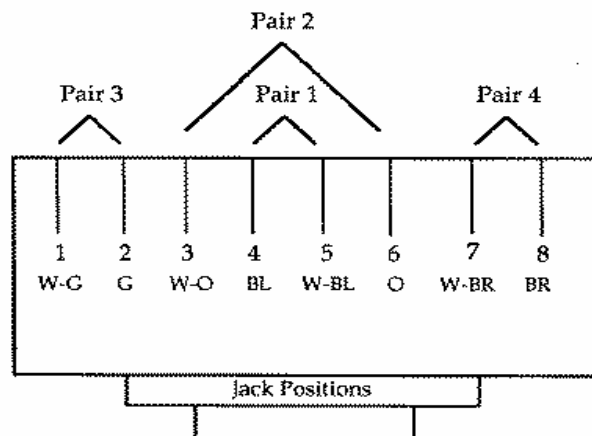


Figure 11-1
Eight-Position Jack Pin/Pair Assignments
(T568A Type)

Figure 11-1 and Table 10-1 outlines the sequencing required to construct line, office, and patch cables.

Each modular outlet will conform with EIA/TIA TSB 40 transmission requirements for Category 6 and will also be compatible with existing standard electrical outlet boxes.

Table 10-2 outlines the correct punch down positioning when using Northern Telecom T568A BIX DVOs', T568A ISDN QCBIX36DI and T568A ISDN QCBIX46DI Modular Jack Connectors, and T568A QPBIX Modular Patch Panels.

Table 10-1

Colour Codes for patch, line, and office cables		
<u>Colour Identification</u>	<u>Colour Code</u>	<u>Abbreviation</u>
Pair 1	White-Blue	(W-BL)
	Blue	(BL)
Pair 2	White-Orange	(W-O)
	Orange	(O)
Pair 3	White-Green	(W-G)
	Green	(G)
Pair 4	White-Brown	(W-BR)
	Brown	(BR)

Table 10-2

Colour Codes for punch down and modular outlets

<u>Position</u>	<u>Colour Code</u>	<u>Abbreviation</u>
1	White-Blue	(W-BL)
2	Blue	(BL)
3	White-Orange	(W-O)
4	Orange	(O)
5	White-Green	(W-G)
6	Green	(G)
7	White-Brown	(W-BR)
8	Brown	(BR)

4.2.3 Closet Termination

Supply and installation of RJ45 Category 6 hardware for system connection in communications closet using 24 NT certified patch panels rack mounted with cable organizer panels installed for each patch panel.

Active components will be connected to equipment by 8 conductor patch cords manufactured to CAT 6 compliance. Patch cords shall be stranded conductor and have a “no-snag” boot over the RJ45 connector.

Multi-Level building installations will require individual patch panels be installed for each level of the building. Patch panel(s) for each level of a multi-level building must have at least 15% unused ports. The same holds true for single story, multi ICC buildings.

4.2.4 Cable Protection

All ceiling distribution cabling shall be enclosed and protected by 3/4” and 1” rigid conduit from communications closet(s) room(s) and cabinets to all user outlets located in inmate accessible areas. In areas that CSC designated as non inmate accessible, EMT zone conduit will be allowed. Conduits must have end bushings installed to protect the cable from sharp edges.

Conduit containing Copper backbone cable must be designated “CAUTION SECURITY SYSTEM CABLE”

Conduit containing Fibre Optic backbone cable must be designated “CAUTION FIBRE OPTIC SECURITY SYSTEM CABLE”

4.2.5 Line Cords

The cabling company will supply RJ45, 8 pin modular line cords to connect owner provided data equipment to the horizontal distribution outlets at the workstation. They must be consistent with CAT 6 specification and provide end-to-end CAT 6 connectivity. Line cords shall be stranded conductor and have a “no-snag” boot over the RJ45 connector.

4.2.6 Testing

All cables/pairs will be scanned with a MicroTest Penta cable scanner or equivalent at 100 Mbs to determine DC loop resistance, near end cross talk and attenuation to meet or exceed the performance stated in EIA/TIA TSB-36 and TSB-40, noise, pair mapping and ranking. These tests must be conducted as originating from both the punch down location and modular outlet location of each cable segment.

4.2.7 Labeling

All jacks must be identified by means of labels with unique numbers. These markings will be made with printed labels. The Correctional Service of Canada expects that all drops at the user end will be sequential and not out of order.

The closet terminations must be identified with these same numbers marked on BIX labels adhered to BIX 20A designation strips and patch panels. The CAN/CSA 568 colour code will apply.

Labels will also be placed on the horizontal wire, 6-9" from termination points. This would include closets, main cabinet, and jacks.

4.2.8 Documentation

Customer to supply CAD or Visio Version 5 floor plans when available. If CAD documents are not available, contractor will be responsible to scan hard copy of plans.

Contractor to supply site plans, individual runs, risers, wire #'s, jack #'s, patch panel #'s in both hard and soft copy.

All test results shall be machine printed, hand written test result sheets are NOT acceptable.

4.3 Fibre Optic Backbone Cable

4.3.1 Cable

The cable to be supplied and installed for backbone purposes shall consist of 12 strands (6 pairs) of Laser Optimized Fibre with nominal 50/125 um core/cladding diameter formed into a single cable.

Optical cable shall physically conform with ANSI/ICEA S-83-596 mechanical and environmental specifications for outdoor fibre optic cable.

Fibre optic cable shall conform with the requirements of OM3 as per the ISO 11801-2nd Edition standards

4.3.2 Terminations

Fibre optic cables shall be terminated to SC Physical contact Connectors shall be able to sustain a minimum of 200 mating cycles per EIA/TIA-455-21 without violating specifications. These connectors will terminate within interconnect sleeves to facilitate patching in patch panels. The maximum optical attenuation per pair of mated connectors shall not exceed 0.75 db.

All fibre strands, whether used in the project or not, shall be terminated with SC type connectors and installed into a fibre patch panel: generally one duplex patch per cable (i.e. 12 connectors per panel for 12 strand fibre cable). Please note that these cables shall be SC to ST unless otherwise noted.

The patch panel proposed shall provide strain relief for each fibre as an integral part of the panel design. This standard type and size of panel should be uniformly used throughout the project.

Installed fibre panels shall be completed with all guides, brackets and other accessories to facilitate cable cross connect to active components for administration and management, including provisions for labeling that are consistent with EIA/TIA-568.

4.3.3. Testing

All terminated fibre media and related connecting hardware shall be tested with a power meter and certified at the conclusion of the initial installation with an OTDR, in both directions. Testing will include end-to-end attenuation testing that shall measure each fibre in one direction and compare with the calculated loss based on the manufacturers specifications and known length of cable using 850 nanometres and 1300 nanometres wavelengths. The difference in value between any two mated fibre shall not exceed 0.5 db.

The power levels of the terminated fibres shall be documented to allow the equipment vendor to select the correct strapping options for their equipment. This will prevent the receivers from being overloaded.

If the attenuation measurements are not within the required specifications, an Optical Time Domain Reflectometer shall be used to find the cause and location of the power loss. Any failure will be rectified.

All test results to be machine printed, and documented in duplicate and delivered complete with As-Built drawings to Corrections Canada Regional Office.

The fibre optic cable testing will also include a basic light test:

- on each of the fibres before installation to ensure that no damage had occurred during shipping;
- on each of the fibres before termination to ensure that no damage had occurred during installation.

4.3.4 **Labeling**

All fibre optic cables will be identified by means of Warning Labels located on all related conduit, pullboxes and backboards.

Both ends of all fibre cables will be labeled indicating destination and number of strands.

All ports on each Fibre optic patch panel will be labeled to identify the backbone destinations. Both ends will be labeled with this same numbering scheme.

4.4 **Cross Connect**

4.4.1 **Data Cross-connect**

Cross connection of the UTP horizontal cables to the tie field will be completed after testing of installed cables has taken place.

Jumper wire shall be provided, if requested, and will conform with EIA/TIA TSB-40 transmission requirements for Category 6.

APPENDIX G

ES/SPEC-0006

**Correctional Service Canada
Technical Services Branch
Electronics Systems**

**ES/SPEC-0006
Revision 2
14 January, 2002**

**ELECTRONICS ENGINEERING

SPECIFICATION
CONDUIT, SPACE AND POWER REQUIREMENTS
FOR SECURITY SYSTEMS FOR USE IN
FEDERAL CORRECTIONAL INSTITUTIONS**

AUTHORITY

This Specification is approved by the Correctional Service of Canada for the procurement and Installation of Conduits for Electronic Security Systems in Canadian federal correctional institutions.

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address: Director, Engineering Services, Correctional Service of Canada, 340 Laurier Avenue West, Ottawa, Ontario, K1A 0P9

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ABBREVIATIONS

The following abbreviations are used in this specification:

CER	Common Equipment Room
COTS	Commercial-Off-The- Shelf
CSA	Canadian Standards Association
CSC	Correctional Service Canada
DES	Director Engineering Services
EIA	Electronic Industries Association
EMT	Electrical Metallic Tubing
GFE	Government Furnished Equipment
MCCP	Main Communications and Control Post
PVC	Polyvinyl Chloride
RFP	Request for Proposal
SOW	Statement of Work
STR	Statement of Technical Requirements
TES	Terminal Equipment Space

DEFINITIONS

The following definitions are used in this specification:

Design Authority	Director, Engineering Services (DES) - Correctional Service Canada (CSC) is responsible for all technical aspects of the system design and implementation.
Contract Authority	Public Works and Government Services Canada (PW&GSC) is responsible for all contractual matters associated with the system design and implementation.
Contractor	The company selected as the successful bidder.
Project Officer	A CSC employee or a contracted person designated by DES to be responsible for the implementation of the project.
Off-the-shelf	Equipment currently on the market with available field reliability data, manuals, engineering drawings and parts price list.
Custom Equipment	Equipment designed and/or manufactured specifically for a specific contract.

1.0 INTRODUCTION

1.1 General

This specification defines the requirements for the design and installation of conduits, cable troughs and raceways as well as space and power requirements for telecommunications and electronic security systems in the Correctional Service of Canada (CSC) facilities.

1.2 Scope

This specification has been developed to ensure high standards for the installation of conduits, cable troughs and details equipment space and power requirements for electronic systems. It defines workmanship standards which may not be fully covered in subsidiary specifications. All contractor's documentation and installation procedures shall meet this specification for reliability, maintainability, longevity, appearance and operational use.

1.3 Off-The-Shelf Equipment

The contractor shall provide commercial off-the-shelf (COTS) materials wherever possible. COTS materials shall meet or exceed the manufacturing standards as listed in this specification.

Where COTS material is unavailable or unsuitable for a specific application, the contractor may manufacture or arrange for the manufacturing of a particular item to suit the requirements. Manufactured materials shall meet or exceed the best commercial equipment manufacturing standards.

1.4 Equipment Procurement

Any ordering of material before the approval of the system design report will be undertaken at the contractor's own risk. The Design Authority may authorize the procurement of certain long lead items at, or shortly after a preliminary design review of the proposed system.

2.0 **APPLICABLE DOCUMENTS**

The following documents of the issue in effect on the date of the Request for Proposal (RFP) shall form a part of this specification to the extent specified herein.

ES/SOW-0101	Statement of Work for Procurement and Installation of Electronic Systems
ES/SOW-0102	Statement of Work for Quality Control of Electronic Systems
EIA-310-C	Electronic Industries Association Standard for Racks, Panels and Associated Equipment.
CSA C22.1	Canadian Electrical Code - Part 1 Safety Standard for Electrical Installations
CSA C22.2	Canadian Electrical Code - Part II

3.0 REQUIREMENTS

3.1 General

The contractor shall supply all necessary conduits, cable troughs and raceways and any other items that may be required for the satisfactory completion of the specified project. All installation workmanship shall be performed in accordance with the Statement of Work, Standards specified in Section 2.0 of this specification and all applicable national, provincial, and local electrical codes.

A conduit diagram shall be supplied in the installation documentation to detail where connections terminate and how conduits are routed and terminated.

Conduits, ducts, trays, etc. may be either Government Furnished Equipment (GFE) or supplied and installed by the contractor depending on the particular institution. The determination will be made by the Design Authority and will be identified in the STR.

The contractor shall provide Electronic Industries Association (EIA) standard racks, panels and associated hardware according to the space requirements of this specification.

The contractor shall provide all necessary wiring, circuit panels, circuit breakers and associated hardware according to the power requirements of this specification.

3.2 Environmental Conditions

All materials and equipment which are used in CSC installations shall be chosen with consideration being given to the intended use, safety, retention of appearance, maintainability and durability under rugged operating conditions. These materials shall perform over the following environmental ranges:

a. Indoor Equipment

Temperature: 0° C to 50° C; and

Humidity: 20% to 95% non-condensing.

b. Outdoor Equipment

Temperature: -40° C to +55° C; and

Humidity: up to 100% condensing.

3.3 Conduits, Cable Troughs and Raceways

3.3.1 Conduits

Conduits installed above ground, and accessible to the inmate population, shall be rigid steel. Metal conduits installed in secure and inmate accessible areas shall be fitted with double the normal quantity of support hangars.

In locations subject to extreme temperature changes, and/or where conduit lengths are of non-standard size, the contractor shall make provisions for the inclusion of conduit expansion joints.

Outdoor conduit shall not be damaged by combinations of direct exposure to the sun, wind, rain, lightning, hail, snow and ice as may be expected to occur at each institution location.

Rigid Polyvinyl Chloride (PVC) conduits shall be used only in buried applications. Rigid PVC conduits shall not be threaded, but may be used with approved adapters and couplings applied in a manner consistent with industry standards. PVC conduits which cross roadways shall be encased in poured concrete. The contractor shall provide a suitable means of protecting the buried conduit against damage caused by digging or excavating. The preferred method is installing a tape marker directly above the conduit path.

Electrical Metallic Tubing (EMT) conduit may be used in administrative areas, and locations which are not normally assessable to the inmate population.

Liquid-tight flexible metal conduits may be used where a flexible connection is required, ie. cameras, microwave dishes, etc. In such applications, the length of "flex" conduit shall not exceed one (1) metre.

In addition to these requirements, the latest issue of applicable industrial standards apply, including:

- a. CSA Standard C22.2 - Rigid Metal Conduit
- b. CSA Standard C22.2 - Flexible Metal Conduit

3.3.2 Cable Troughs and Raceways

Cable troughs and raceways shall be continuous and shall be constructed of metal. The contractor shall provide adequate mounting devices which will permit the use of fastening devices that will not damage conductor insulation.

Cable troughs, raceways, and fittings shall be free from burrs or other sharp edges which may cause damage to the cable or insulated conductors. All troughs and raceways shall be installed as a complete system before the conductors or cables are installed.

Cable troughs may be either ventilated or solid and unless otherwise specified, shall be equipped with covers and steel guards to protect against damage.

In addition to these provisions, the latest issue of appropriate standards shall apply, including:

- a. CSA Standard C22.2 - Cable Troughs and Fittings.
- b. CSA Standard C22.2 - Raceways and Fittings.
- c. CSA Standard C22.2 - Surface Raceways and Fittings.

4.0 **SYSTEM REQUIREMENTS**

Summary tables of the electronic security systems minimum conduit, space and power requirements are provided as Appendix A, Appendix B and Appendix C respectively to this specification.

4.1 **Perimeter Intrusion Detection Systems**

4.1.1 **Motion Detection System**

The Motion Detection System (MDS) is designed to detect motion between the fences. One system which is type approved for use in CSC uses the Leaky Coax - buried cable technology. The perimeter is divided into sectors and two sectors are controlled by a single local control module. Signal and power fed to the field mounted electronic controllers via the buried coax cables. The main MDS control modules are installed in the common equipment room (CER).

4.1.1.1 **Conduit Requirements**

Cable entry to the area between the two perimeter fences is made at a single point, usually at the gatehouse. One (1) 38 mm conduit is required from the CER to the area between the two perimeter fences. This conduit is stubbed underground between the fences several meters from the gatehouse.

4.1.1.2 **Space Requirements**

The MDS control equipment will normally occupy about half of the area of a 2.483 meter rack, usually supplied by the PIDS contractor.

4.1.1.3 **Power Requirements**

The power requirement for the MDS equipment in the CER is a 110.0 VAC, 15.0 ampere, uninterruptable power supply.

4.1.2 **Fence Disturbance Detection System**

The Fence Disturbance Detection System (FDS) is designed to detect particular movement and vibration patterns on the inner perimeter fence. This is accomplished by mounting electro-mechanical fence sensors (geophones, electret or piezoelectric vibration detectors) on the fence. The perimeter is divided into sectors and one array of sensors covers one sector. The cables from all the sectors are run along the top of the fence to the gatehouse and to the control equipment mounted in the CER.

4.1.2.1 Conduit Requirements

FDS cable entry to the inner perimeter fence is made at a single point, usually at the gatehouse. Depending on the size of the perimeter and the number of sectors, the requirement is for a minimum of one (1) 38 mm conduit from the gatehouse to the top of the inner fence. The conduit is capped with a weather proof cable outlet.

4.1.2.2 Space Requirements

The FDS control equipment will normally occupy approximately half of the area of a 2.483 m rack supplied by the contractor.

4.1.2.3 Power Requirements

The power requirement for the FDS equipment in the CER is a 110.0 VAC, 15.0 ampere, uninterruptible power supply.

4.1.3 PIDS Microwave

Bistatic microwave (beam) systems are normally installed across the pedestrian and vehicle entrance portals (sallyports) to detect movement in the area. The microwave systems are integrated into the PIDS motion detection system. These systems allow small portal sectors to be turned off to allow authorized staff and vehicle access without effecting the entire perimeter security.

4.1.3.1 Conduit Requirements

Microwave cable to each of the pedestrian and vehicle sallyport areas are required from the closest motion detection system (MDS) local control module. One buried (1) 19 mm PVC conduit is required from each sallyport to the closest perimeter MDS unit.

4.1.3.2 Space Requirements

The control equipment will normally occupy approximately 0.5 metre of rack space supplied by the contractor.

4.1.3.3 Power Requirements

The power requirement for the microwave equipment in the CER is a 110.0 VAC, 15.0 ampere, interruptible power supply.

4.1.4 PIDS Closed Circuit Television

Closed Circuit Television (CCTV) monochrome cameras are placed in strategic positions around the perimeter fence. The cameras monitor the institutional side of the inside perimeter fence and the area between the fences. When there is an alarm on the FDS and/or MDS, the CCTV cameras monitoring the appropriate sector inside fence and between the fences are selected for viewing. During an alarm period the video displayed on the monitors from the selected cameras are recorded on a time-lapse video cassette recorder.

The CCTV cameras are usually grouped at the corners of the perimeter and mounted on self supporting towers. 110 VAC power is provided to an VAC distribution panel mounted at each corner of the perimeter. VAC power is distributed to the cameras.

External vertical synchronization of the CCTV cameras is by the distribution of an independent vertical pulse to all the cameras and components of the system.

4.1.4.1 Conduit Requirements

CCTV Signal and Control. Two (2) 50 mm conduits run from the CER to the cameras in the corners of the perimeters in both directions. These conduits for the CCTV camera signal and control wiring terminate in a exterior distribution box mounted on the closest camera towers. Two (2) 50 mm conduits run around the perimeter terminating at each of the camera groups at the perimeter corners.

CCTV AC Power. Two (2) 38 mm conduits are required from the power distribution panel in the CER to the power junction box on the closet perimeter camera tower. One conduit is required to run in both directions. VAC power is required for the cameras and the heater and wipers in the camera housings. One (1) 38 mm conduit is required to run from the power junction box around the perimeter providing power to each camera group.

4.1.4.2 Space Requirements

The video distribution and switching equipment in the CER require approximately 1.0 m of rack space.

The four video monitors, wiper control and camera on/off switch panels in the MCCP console require space in one (1) EIA standard console cabinet..

A separate standalone rack in the MCCP is provided to accommodate five (5) time lapse VCRs.

4.1.4.3 Power Requirements

The power required in the CER for video switching and control equipment is one 110.0 VAC, 15.0 ampere uninterruptible power supply.

The power requirement for the perimeter cameras is a 110.0 VAC, 20 ampere supply to each group of usually four (4) cameras from the power distribution panel in the CER.

A camera and housing requires 300 watts each, including heaters, wipers and all other the environmental control units for the camera housing units.

4.1.5 **MCCP Console**

The control and annunciation equipment for the PIDS and the Facility Alarm Annunciation System are mounted in the console cabinets in the MCCP. The control and annunciation units are normally connected to processing equipment in the CER by cables running under the computer flooring. There is a requirement for rigid conduit between the MCCP and the CER for the 110 VAC uninterruptible power supply (UPS).

4.1.5.1 **Conduit Requirements**

One (1) 19 mm conduit is required from the UPS location in the CER to the MCCP console.

4.1.5.2 **Space Requirements**

The console cabinet space requirement will depend on the number of systems provided at the institution and usually consists of six console racks in the MCCP joined together to form the control console. One medium equipment rack for the maintenance video display unit (VDU) and a low profile cabinet with sliding shelves for the time-lapse VCRs and printer.

The MCCP will require a room with a floor area of no less than approx. 23.6 square metres. The CER will require a room with a floor area of no less than 9.0 square metres for the equipment and approx. 6.3 square metres for spare equipment storage and maintenance. Both rooms require computer flooring, all conduits entering will be stubbed or terminated under the computer floor. Both rooms need to be as square as possible to allow for optimum equipment placement.

The UPS will require a room with a floor area of approx. 6.3 square metres if the UPS is located at a different site to the CER. The UPS can be located in the CER within the requirement shown above. The floor may be concrete.

The ventilation system in the CER should keep the temperature below 29.0 degrees C and vent to the outside to eliminate gases that may escape during battery operation or charging.

4.1.5.3 **Power Requirements**

The power requirement for the MCCP console is two 110.0 VAC, 15.0 ampere, uninterruptible power circuits.

4.2 Facility Alarm Systems

4.2.1 Inmate Cell Call System

The ICCS is provided so that an occupant of a cell may request assistance from the control post. This is achieved by operating a call originating device (COD) mounted in the cell. The call is annunciated in the control post, the guard responds to the call and cancels the call by operating a call cancelling device (CCD) external to the cell and adjacent to the cell door.

4.2.1.1 Conduit Requirements

One (1) 15 mm conduit is required from each cell, the conduits from four cells are combined in a junction box in the pipe chase. Two or three of these junction boxes are linked together by 25 mm conduit. One (1) 38 mm conduit connects the group to the terminal equipment space (TES) where they are terminated.

One (1) 25 mm conduits are provided from the TES to the control post. These are shared by the electronics contractors with each contractor using at least one each.

The cables interconnecting the equipment in the TES to the CER are normally installed in a cable tray which runs throughout the institution.

4.2.1.2 Space Requirements

The equipment should normally occupy half the area of an one (1) 2.483 m rack in each TES.

4.2.1.3 Power Requirements

The power requirement for this system is a 110.0 VAC, 15.0 ampere circuit.

4.2.2 Fixed Point Security Alarm System

The FPSA system is provided so that an occupant of designated rooms may request assistance from the control post. This is achieved by operating a call originating device (COD) mounted on the wall or under a desk. The call is annunciated in the control post, the guard responds to the room.

4.2.2.1 Conduit Requirements

One (1) 15 mm conduit is required from each designed room, the conduits from these rooms may be combined in a junction box. Two or three of these junction boxes may be linked together. The link will be 25 mm conduit and one (1) conduit (38 mm) is then run to the CER where it is terminated under the computer flooring.

4.2.2.2 Space Requirements

The FPSA COD is mounted on a wall or under the desk in the designated room.

4.2.2.3 Power Requirements

The power requirement for this system is a 110.0 VAC, 15.0 ampere circuit.

4.2.3 Personal Portable Alarm System

The PPA system is used by CSC staff working in all areas of the institution to alert the central security post staff to serious incidents or potentially dangerous personal security or safety situations. The PPA system consists of a central controller, a central receiver and a number of portable wireless transmitting devices (transmitters) in belt worn leather cases. PPA alarms are sent to the security post when these small portable transmitters are activated by the staff member. Alarm identification, alarm time and cancellation may be recorded on a data logger.

4.2.3.1 Conduit Requirements

One (1) 15 mm conduit is required from the PPA receiver which is located in a central area of the institution to the MCCP where the PPA controller is located. This conduit will accommodate the twisted and alarm signal wires. One (1) 15 mm conduit is required between the PPA receiver and the antenna which is located on the roof, the side of a building or on an existing radio tower.

4.2.3.2 Space Requirements

The PPA receiver will be mounted in a rack or on the wall in a central location of the institution. The PPA controller will be mounted in the MCCP control or on a shelf in the CER.

4.2.3.3 Power Requirements

The power requirement for the PPA equipment in the MCCP is a 110 VAC, 15.0 ampere, uninterruptible power circuit.

4.2.4 Portable Alarm Location System

The PAL system operates in conjunction with the Personal Portable Alarm (PPA) system to locate an area where the PPA alarm is originating from. The PAL system consists of central monitoring equipment, a number of nodes and a number of wireless sensors distributed within an institution. PPA alarm locations can be determined and sent to the security post. Alarm identification, alarm time and cancellation are data logged.

4.2.4.1 Conduit Requirements

One (1) 15 mm conduit is required from each PAL node which is located throughout the institution to the CER where the PAL controller is located. This conduit will accommodate a co-axial cable for the alarm signal from each node.

4.2.4.2 Space Requirements

The PALS nodes and wireless sensors will be mounted in the ceilings throughout the institution. The PALS controller in the CER will require approximately three (3) feet of rack space.

4.2.4.3 Power Requirement

The power requirement for the PALS equipment in the CER is one 110 VAC, 15.0 ampere, uninterruptible power circuit.

4.3 Access Control & Supplementary Systems

4.3.1 Door Control & Corridor Monitoring System

This system provides room and corridor access by door control from a designated CP. The door control system is usually integrated with a CCTV system to allow staff to view the person(s) requesting access.

4.3.1.1 Conduit Requirements

Two (2) 15 mm conduits are required from under the CER floor or the TES to the room and corridor doors requiring controlled access. One conduit will accommodate the CCTV system for video and camera control purposes. The other conduit is required for the door access control system.

4.3.1.2 Space Requirements

The rack space requirement will usually consists of approximately two (2) feet of one (1) 2.483 m rack in the CER or TES and one rack in the MCCP control console or CP console.

4.3.1.3 Power Requirements

The power requirement for the door control and monitoring system is one 110.0 VAC, 15.0 ampere circuit.

4.3.2 Closed Circuit Television System

This system allows observations to be made in cells, corridors, exercise yards and other locations where there is a need. The system usually consists of several cameras mounted at these locations with monitors grouped together at a convenient point such as the control post or the MCCP.

4.3.2.1 Conduit Requirements

Two (2) 15 mm conduits are required to each camera location, one for signal wiring and the other for VAC power to the camera and housing. If the camera has pan/tilt/zoom facilities, one of the two conduits may have to be increased in size to 19 mm to accommodate possible control wiring.

4.3.2.2 Space Requirements

The only space requirement for this system is rack space in a console for the monitors and possibly a pan/tilt/zoom controller.

4.3.2.3 Power Requirements

The power requirement for the CCTV equipment is one 110.0 VAC, 15.0 ampere circuit.

4.3.3 Supplementary Intrusion Detection System

This system provides supplement outdoor intrusion detection from the MCCP. The SIDS monochrome CCD camera is usually mounted on a high tower or roof top to provide surveillance and assessment of designated area(s).

4.3.3.1 Conduit Requirements

Two (2) 15 mm conduits are required from under the CER floor to the outdoor camera location. One conduit will accommodate the CCTV system for video and camera control cables. The other conduit is required for the camera and enclosure VAC power.

4.3.3.2 Space Requirements

Rack space in the MCCP control console is required for the SIDS monitor and camera Pan/Tilt/Zoom controller. The size of the rack space will depend on the size of the monitor and controller.

4.3.3.3 Power Requirements

The power requirement for this system is a 110.0 VAC, 15.0 ampere supply.

4.3.4 Voice Recording Equipment

The Voice Recorder Equipment (VRE) records all conversations on the telephones, radios, PA and PIDS PA systems in the MCCP.

VRE wiring can be run under the computer flooring and conduit is not normally required.

4.3.4.1 Space Requirements

The VRE is self contained in its own moveable rack and requires a floor area of 650 mm square with an equal area in front and behind for operator and technician access. It can be mounted with its back against a wall if required, however this is not preferable.

4.3.4.2 Power Requirements

The power requirement for this system is a 110.0 VAC, 15.0 ampere supply.

4.3.5 Video Recording Equipment

The Video Cassette Recorders (VCR) record all video from the various CCTV cameras installed throughout the institution. VCR installed in the MCCP will record the PIDS video from the perimeter cameras. VCR install in Security CP throughout the institution will record the video from their particular areas of surveillance interest.

VCR wiring can be run under the computer flooring and conduit is not required.

4.3.5.1 Space Requirements

The VCRs are normally installed in moveable racks and requires a floor area of 650 mm square with an equal area in front and behind for operator and technician access. Due to limited space in some CP, the VCRs may be on shelves under the desks.

4.3.5.2 Power Requirements

The power requirement for this system is a 110.0 VAC, 15.0 ampere supply.

4.4 **Communications Systems**

4.4.1 **Two Way Communications Radio**

The two way radio system provides routine operational, maintenance as well as emergency response communications between control posts, guards and vehicles in and around the facility. Base station radios and Digital Interface Units are installed in standard EIA electronic equipment racks in the CER.

The MCCP base station radios are connected to a common antenna mounted on an external tower. In the repeater configuration, the base stations are connected via a series of filters to a common antenna. Rack mounted remote radio controllers are mounted in the MCCP console. Digital Interface Units (DIU) are used to configure the base station radios for digital communications

Base station radios located in security control posts and maintenance control centres are connected to their own local antennas.

4.4.1.1 **Conduit Requirements**

One (1) 19 mm conduit is required from the CER to the antenna tower. The conduit may terminate at the base of the tower, if the tower is mounted on the roof. In the case of a ground mounted tower the conduit will continue up the tower. The lower portion of the tower is protected by anti climb shields.

4.4.1.2 **Space Requirements**

Three base station radios with associated DIUs will use approximately half of a EIA standard 2.483 m equipment rack in the CER. If the radios are configured as repeaters and filters are used, another EIA standard 2.483 m rack will be required.

In the MCCP console, the remote controller will require 5¼ inches (3 U) of console cabinet space.

4.4.1.3 **Power Requirements**

The power requirement for this system is a 110.0 VAC, 15.0 ampere supply.

4.4.2 **Public Address System**

The PA system is designed to allow the entire institution to be addressed or limited areas to be addressed from various points throughout the institution.

4.4.2.1 Conduit Requirements

Loudspeakers are distributed throughout the institution in areas where they are required. They are mounted in 254 mm x 254 mm x 102 mm back boxes mounted in the walls or in the ceilings. The boxes are joined in series by 15 mm conduit for the first ten or so boxes and then by 19 mm conduit to the cable tray. Where two strings of speaker boxes combine into one the resultant conduit is usually 19 mm. A 25 mm conduit is used between a TES and its respective control post.

4.4.2.2 Space Requirements

The PA equipment requires approximately half of a 2.483 m rack in the CER or half of a 2.483 m rack in a TES.

4.4.2.3 Power Requirements

The power requirement is for a 110 VAC, 15.0 ampere supply in the CER or a 110 VAC, 15.0 ampere supply in a TES.

4.43 Limited Call Intercom System (LCIS)

The LCIS is designed to provide communications between the control posts and points such as beyond a barrier controlled by the post. The control post has a master station mounted in a console and the remote station is mounted in a back box in the wall.

4.4.3.1 Conduit Requirements

The remote station is mounted in a 102 mm x 102 mm x 65 mm back box placed 1500 mm from the floor. One (1) 15 mm conduit connects these points to the TES or the cable tray. One (1) 25 mm conduit is used between a TES and its respective control post.

4.4.3.2 Space and Power Requirements

The LCIS usually forms part of the PA. Refer to the PA section for space and power requirements.

4.4.4 Restricted Visit Intercom System

The purpose of the RVIS is to provide a means of two-way (full-duplex) voice communication between an inmate and visitor while denying physical exchange. Typically, by providing transparent partitioning between the inmate and visitor, physical access is denied while allowing visual contact between each half of a restricted visiting booth. Within each booth, telephone handset will allow voice communication between the two halves. The control post has a master station mounted in a console.

4.4.4.1 Conduit Requirements

One (1) 15 mm conduit is required from each booth to the Restricted Visit Control Post.

4.4.4.2 Space Requirements

The RVIS telephone handsets are securely mounted on the wall of the booths. The RVIS controller is mounted in the console in the Restricted Visit CP.

4.4.4.3 Power Requirements

The power requirement for this system is a 110.0 VAC, 15.0 ampere supply.

4.4.5 Entertainment Cable Television

The Entertainment Cable Television (ECTV) System distributes FM radio and television signals to each cell and various other points throughout the institution.

The signals are received off-air via an antenna array for local and satellite signals or from a cable company. A signal from a VCR can be introduced. All these signals are processed in the head-end equipment and then distributed via splitters and amplifiers distributed throughout the system.

4.4.5.1 Conduit Requirements

A conduit outlet is required in each cell and in various inmate and staff lounges. Groups of four cell block outlet boxes are connected to a junction box by 19 mm conduit. The junction boxes are linked in groups of two or three and then to the TES using 38 mm conduit.

All other locations utilize 19 mm conduit to their respective TES locations.

The cable distributing the signals to the TES from the head end location is installed in a cable tray which runs throughout the institution. One (1) 19 mm conduit is required between the head-end equipment rack and the antenna site.

4.4.5.2 Space Requirements

The head-end equipment will occupy a half of a 2.483 m rack in the equipment room closest to the antenna site. The remainder of the equipment consists of amplifiers and splitters and is accommodated in a 400 mm x 400 mm x 100 mm cabinet located in each of the pertinent TES. This cabinet can either be mounted on the wall or placed under the computer flooring.

4.4.5.3 Power Requirements

The power requirement for this system is a 110 VAC, 15.0 ampere supply.

4.5 **Control Posts (CP) and Terminal Equipment Spaces (TES)**

There are several control posts and TES's throughout the institution. They are usually paired and connected by banks of conduits to enable connection between the main equipment of the various systems and the control panels that are associated with them. The number of conduits provided is normally very generous and provides for any possible expansion or replacement of the systems.

4.5.1 **Conduit Requirements**

All the consoles in the control posts with computer flooring do not require conduits. Normally the TES and CP locations are connected by cable trays or at least one 50 mm conduit.

4.5.2 **Space Requirements**

In each TES accommodation is required for two 2.483 racks, one rack to house the cell call system and the other the PA and LCIS equipment.

4.5.3 **Power Requirements**

Two (2) 110.0 VAC, 15.0 ampere power circuits are required.

4.6 **Installation Requirements**

The conduit shall be installed at the site in accordance with the ES/SOW-0101, Statement of Work and the ES/SOW-0102, Statement of Work.

4.7 **Documentation Requirements**

All as-build drawings and documentation shall be in accordance with the ES/SOW-0101, Statement of Work.

5.0 **QUALITY ASSURANCE**

5.1 **General**

All on-site installation work, and installation acceptance shall be conducted in accordance with the ES/SOW-0101, Statement of Work.

6.0 **DELIVERY**

Delivery requirements for drawings, plans, etc. (where applicable) shall be in accordance with the ES/SOW-0101, Statement of Work.

APPENDIX A

SUMMARY OF SYSTEM CONDUIT REQUIREMENTS

System	Conduit Requirements
MDS	One 38 mm conduit from the CER to the area between the two perimeter fences.
FDS	One 38 mm conduit from the CER to the inner perimeter fence.
MICROWAVE	One 19 mm conduit from the closest local control module to the sallyport area.
PIDS CCTV	<p>Signal and Control. Two 50 mm conduits from the CER to the perimeter camera towers in both directions with junction boxes at each of the towers. One 19 mm conduit from the junction box to the cameras on the tower.</p> <p>VAC Power. Two 50 mm conduits from the electrical distribution panel in the CER to the junction box on the perimeter. One 38 mm conduit around the perimeter providing power to each camera group.</p>
PIDS PA	Two 25 mm conduits from the CER to the first group of speakers on the perimeter fence, one in each direction. One 25 mm conduit between speaker locations.
MCCP	Control and signal cables (no conduit required) under the computer flooring to the CER. VAC UPS power in 19 mm conduit from the CER.
ICCS	One 15 mm conduit from each cell to a junction box in the pipe chase. Junction boxes linked together by 25 mm conduit. One 38 mm conduit from the group junction box to the CP/TES. One 25 mm conduit from the TES to the CP.
FPSA	One 15 mm conduit from each designed room to a junction box. Junction boxes connected by 25 mm conduit. One 38 mm conduit from a main junction box to the CER.
PPA	One 15 mm conduit from the PPA receiver to the MCCP. One 15 mm conduit from the PPA receiver to the antenna.
PALS	One 15 mm conduit from each PALS node to the CER.
Door Control	Two 15 mm conduits (one for CCTV, one for power) from the CER or from the TES to the room and/or corridor doors requiring controlled access.

System	Conduit Requirements
Supp. CCTV	Two 15 mm conduits to each camera location, one for signal wiring and the other for AC power to the camera and housing. If the camera has pan/tilt/zoom facilities, one of the two conduits may have to be increased in size to 19 mm to accommodate additional control wiring.
SIDS	Two 15 mm conduits from the CER to the camera location. One conduit for video and camera control cables. The other conduit for the camera and enclosure VAC power.
MCCP/VRE	Cables under the computer flooring.
MCCP/VCR	Cables under the computer flooring.
Two-way Radio	One 19 mm conduit from the Base Station to the antenna location.
Interior PA	One 15 mm conduit between speaker locations. Combine speaker locations require one 19 mm conduit. One 25 mm conduit from the TES to the CP.
LCIS	One 15 mm conduit from remote stations to the TES or the cable tray.
RVIS	One 15 mm conduit from each booth to the RVIS CP.
ECTV	One 15 mm conduit to in each cell and various inmate lounges. Groups of cell outlet boxes are connected to a junction box by 19 mm conduit. One 38 mm conduit from junction boxes to the TES. One 19 mm conduit from the head-end equipment rack and the antenna site.
CER/TES	CER and various TES are linked by one 50 mm conduit.

APPENDIX B

SUMMARY OF SYSTEM SPACE REQUIREMENTS

System	Space Requirements
MDS	The MDS control equipment requires approximately 1.5 m of EIA standard equipment rack space in the CER.
FDS	The FDS control equipment requires approximately 1.5 m of EIA standard equipment rack space in the CER.
MICROWAVE	The microwave control equipment requires approximately 0.5 m of EIA standard equipment rack space in the CER.
PIDS CCTV	<p>The video distribution and switching equipment require approximately 1.0 m of EIA standard equipment rack space in the CER.</p> <p>The PIDS CCTV equipment in the MCCP requires approximately 1.0 m of EIA standard console cabinet space.</p> <p>A separate standalone rack is required to housed five (5) time lapse VCRs in the MCCP.</p>
PIDS PA	The PIDS PA equipment requires approximately 0.5 m of EIA standard equipment rack space in the CER.
MCCP	<p>The MCCP console usually consists of six EIA standard console cabinets joined together to form the control console.</p> <p>The maintenance video display unit (VDU) and ancillary equipment require approximately 1.0 m of EIA standard equipment rack space in the MCCP.</p> <p>The time-lapse VCRs and printer require a low profile cabinet with sliding shelves in the MCCP.</p>
ICCS	The ICCS control equipment requires approximately 1.5 m of EIA standard equipment rack space in the TES.
FPASA	The FPASA control equipment requires approximately 0.5 m of EIA standard equipment rack space in the CER.
PPA	The PPA receiver requires to be mounted on a shelf in a rack or on the wall in a central location of the institution. The PPA controller mounted on a shelf requires approximately 0.25 m of the rack space in the ancillary equipment rack space in the MCCP.

System	Space Requirements
PALS	The PALS nodes and wireless sensors will be mounted in the ceilings throughout the institution. The PALS controller requires approximately 1.0 m of EIA standard equipment rack space in the CER.
Door Control	The hall and door control equipment require approximately 1.0 m of EIA standard equipment rack space in the CER or TES. The operator control equipment requires approximately 0.25 m of rack space in the control console.
Suppl. CCTV	<p>Video switchers, multiplexers, etc. require rack space in EIA standard equipment racks in the CER or TES. The space requirement will depend on the type and amount of video equipment being used.</p> <p>The space requirement in the control console for the monitors and the pan/tilt/zoom controller if applicable will depend on the type and amount of video equipment being used.</p>
SIDS	The space requirement for the SIDS control equipment in the CER will depend on the type of equipment being used. Rack space in the control console is required for the monitors and a pan/tilt/zoom controller if applicable.
MCCP/VRE	The Voice Recording Equipment is usually self contained in its own moveable rack in the MCCP and requires a floor area of 650 mm square with an equal area in front and behind for operator and technician access.
MCCP/VCR	The Time Lapse Video Cassette Recorders are normally installed in moveable racks in the MCCP and require a floor area of 650 mm square with an equal area in front and behind for operator and technician access.
Two-way Radio	<p>Three base station radios with associated DIUs require approximately 1.5 m of EIA standard equipment rack space in the CER. If the radios are configured as repeaters, another EIA standard equipment is required for the filters.</p> <p>In the MCCP console, the remote controller requires 5¼ inches (3 U) of console cabinet space.</p>
Interior PA	The Public Address equipment requires approximately 1.5 m of EIA standard equipment rack space in the TES.

System	Space Requirements
LCIS	The Limited Call Intercom System usually forms part of the interior PA system.
RVIS	The Restricted Visit Intercom System controller is mounted in the console in the Restricted Visit CP.
ECTV	<p>The Entertainment Cable TV system head-end equipment requires approximately 1.5 m of EIA standard equipment rack space close to the antenna site.</p> <p>Amplifiers and splitters will be accommodated in the EIA standard equipment racks in the TES or amplifiers and splitters can be a small cabinet mounted on the wall or placed under the computer flooring.</p>
TES	Each TES requires two EIA standard equipment racks, one rack to house the inmate cell call system and ancillary equipment. The other rack will house the interior PA and LCIS equipment.

APPENDIX C

SUMMARY OF SYSTEM POWER REQUIREMENTS

System	Power Requirements
MDS	The power requirement for the MDS equipment in the CER is one 110.0 VAC, 15.0 ampere, uninterruptible power circuit.
FDS	The power requirement for the FDS equipment in the CER is a 110.0 VAC, 15.0 ampere, uninterruptible power circuit.
MICROWAVE	The power requirement for the microwave equipment in the CER is a 110.0 VAC, 15.0 ampere, uninterruptible power circuit.
PIDS CCTV	The power required in the CER for video switching and control equipment is one 110.0 VAC, 15.0 ampere uninterruptible power circuit. The power requirement for the perimeter cameras is a 110.0 VAC, 20 ampere circuit to each group of usually four (4) cameras from the power distribution panel in the CER.
PIDS PA	The power requirement for the PIDS PA equipment in the CER is a 110.0 VAC, 15.0 ampere, uninterruptible power circuit.
MCCP	The power requirement for the MCCP console is two 110.0 VAC, 15.0 ampere, uninterruptible power circuits.
ICCS	The power requirement for the Inmate Cell Call System equipment in the security Control Post is a 110.0 VAC, 15.0 ampere circuit.
FPSA	The power requirement for the Fixed Point Security Alarm system equipment in the CER is a 110.0 VAC, 15.0 ampere circuit.
PPA	The power requirement for the Personal Portable Alarm system equipment in the MCCP is a 110.0 VAC, 15.0 ampere circuit.
PALS	The power requirement for the Portable Alarm Location System equipment in the CER is a 110.0 VAC, 15.0 ampere circuit.
Door Control	The power requirement for the Hall, Corridor and Door Monitor and Control system in the security Control Post is a 110.0 VAC, 15.0 ampere circuit.
Suppl. CCTV	The power requirement for the Supplementary CCTV system equipment in the security Control Post is a 110.0 VAC, 15.0 ampere circuit.
SIDS	The power requirement for the Supplementary Intrusion Detection System equipment in the CER is a 110.0 VAC, 15.0 ampere circuit.

System	Power Requirements
MCCP/VRE	The power requirement for the Voice Recording Equipment in the MCCP is a 110.0 VAC, 15.0 ampere circuit.
MCCP/VCR	The power requirement for the Video Cassette Recorder equipment in the MCCP is a 110.0 VAC, 15.0 ampere circuit.
Two-way Radio	The power requirement for the Radio Communications system equipment is a 110.0 VAC, 15.0 ampere circuit.
Interior PA	The power requirement for the Interior Public Address system equipment in the security Control Post is a 110.0 VAC, 15.0 ampere circuit.
LCIS	The Limited Call Intercom System is usually part of the Interior PA system. If a standalone LCIS installed, the power requirement for this system is a 110.0 VAC, 15.0 ampere circuit.
RVIS	The power requirement for the Restricted Visits Intercom System equipment in the RV Control Post a 110.0 VAC, 15.0 ampere circuit.
ECTV	The power requirement for the Entertainment Cable TV system equipment is a 110.0 VAC, 15.0 ampere circuit.
TES	The power requirement for the Terminal Equipment Space room is two 110.0 VAC, 15.0 ampere circuits.

APPENDIX H

ES/SPEC-0101

**Correctional Service Canada
Technical Services Branch
Electronics Systems**

**ES/SPEC-0101
Revision 2
14 January 2002**

**ELECTRONICS ENGINEERING
SPECIFICATION**

**PUBLIC ADDRESS SYSTEM
FOR USE IN
FEDERAL CORRECTIONAL INSTITUTIONS**

AUTHORITY

This Specification is approved by the Correctional Service of Canada for the procurement and Installation of Public Address (PA) systems in Canadian federal correctional institutions.

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address: Director, Engineering Services, Correctional Service of Canada, 340 Laurier Avenue West, Ottawa, Ontario, K1A 0P9

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ABBREVIATIONS

The following abbreviations are used in this specification:

CER	Common Equipment Room
COTS	Commercial-Off-The- Shelf
CSA	Canadian Standards Association
CSC	Correctional Service Canada
DES	Director Engineering Services
EIA	Electronic Industries Association
GFE	Government Furnished Equipment
MCCP	Main Communications and Control Post
RFP	Request for Proposal
STR	Statement of Technical Requirements
SOW	Statement of Work
TES	Terminal Equipment Space

DEFINITIONS

The following definitions are used in this specification:

Design Authority	Director, Engineering Services (DES) - Correctional Service Canada (CSC) is responsible for all technical aspects of the system design and implementation.
Contract Authority	Public Works and Government Services Canada (PW&GSC) is responsible for all contractual matters associated with the system design and implementation.
Contractor	The company selected as the successful bidder.
Project Officer	A CSC employee or a contracted person designated by DES to be responsible for the implementation of the project.
Off-the-shelf	Equipment currently on the market with available field reliability data, manuals, engineering drawings and parts price list.
Custom Equipment	Equipment designed and/or manufactured specifically for a specific contract.

1.0 INTRODUCTION

1.1 General

This specification defines the essential technical and functional requirements of the Correctional Service of Canada (CSC) for the procurement and installation of a Public Address (PA) system for federal correctional institutions.

1.2 Purpose

The purpose of the Public Address system is to provide a means for institutional staff members to make voice announcements within the institution, either on a selected, specific-area or a general, all-call basis. The primary uses of the PA system are to enable the staff to page a specific inmate or group of inmates and make high-priority announcements regarding emergency conditions such as fire, disturbance, etc.

The system described herein would be applicable to new institutions to be constructed. It could also be retrofitted into existing institutions whenever it becomes necessary to add a PA capability or replace existing obsolete equipment.

1.3 Commercial-Off-The-Self Equipment

The PA system shall use commercial off-the-shelf (COTS) equipment and proven designs to the maximum extent possible. All new equipment shall meet the specified lifespan requirements. New equipment designs shall be restricted to unique interfaces and common control console.

1.4 Technical Acceptability

The Correctional Service Canada (CSC) operational environment is unique for its diversity of locations, climate exposures and the physical restrictive construction techniques of penal institutions. Maintaining national security, the safety of staff and offenders alike is CSC's commitment to the government and public. Electronic security systems operating in this unique environment shall maintain very high standards of dependability and reliability.

The CSC Engineering Services Division has established technical specifications and equipment standards for specific electronic security systems which are based on very specific and restrictive operational performance criteria as detailed in its Electronic Engineering Standard. Technical acceptability of these systems means that the equipment complies with the pertinent CSC specifications and standards.

The technical acceptance process shall involve system and subsystem evaluation in accordance with the applicable CSC specifications in one of CSC facilities. CSC may when it deems necessary, request the supplier to arrange for a full site demonstration. CSC shall verify in depth any of the system technical specifications called up. CSC may rely on manufacturer's test results for specific areas of the specification where an independent test facility has conducted the test, and the facility is deemed acceptable to CSC.

It is the supplier's responsibility to make new developments in products available to CSC for evaluation. Equipment qualification is an ongoing process and can be initiated at any time by a vendor. Any vendor can have access to the CSC specifications and standards. Any new development or products should be submitted to the CSC Engineering Services Division, Technical Authority in a suitable time frame prior to any tendering process to allow for an acceptable evaluation period. The evaluation period may take up to sixteen (16) months.

1.5 Equipment Procurement

Any ordering of equipment/material before the approval of the PA system design report will be undertaken at the contractor's own risk. The Design Authority may authorize the procurement of certain long lead items at, or shortly after a preliminary design review of the proposed system.

1.6 Quantity of Equipment

The quantity and location of the Public Address equipment required for CSC institutions will be contained in the specification identified in the Statement of Technical Requirements (STR).

2.0 **APPLICABLE DOCUMENTS**

The following documents of the issue in effect on the date of the Request for Proposal shall form a part of this specification to the extent specified herein.

ES/SOW-0101	Statement of Work for Electronic Systems for Correctional Service of Canada Institutions.
ES/SOW-0102	Statement of Work for Quality Control for installation of Electronic Systems in Federal Correctional Institutions.
EIA-310-C	Electronic Industry Association Standard for Racks, Panels and Associated Equipment

3.0 REQUIREMENTS

3.1 General

The contractor shall design, supply, install, test and provide documentation and training for a PA system in accordance with this specification and Statement of Work, ES/SOW-0101. The PA system may be interfaced with the institution telephone system or it may be a stand alone PA system.

3.1.1 System Capacity

The control station(s) may be interfaced with the institution telephone system or may be installed as a stand alone system. In either case, the control station(s) shall be capable of selecting any number of zones simultaneously by actuating the desired zone-select switches. Similarly, the secondary control station(s) shall be capable of selecting more than one sub-zone at a time or ALL-CALL to enable all constituent sub-zones within the overall zone.

The system shall be of a modular design and it shall be possible at a future date to add more control stations and associated speaker equipment to the basic installed complement without requiring the existing hardware.

3.1.2 Period of Operation

The Public Address system and all associated equipment shall be rated for and capable of 24 hours per day, seven days per week operation.

3.2 System Configuration

The PA system shall be functionally divided into a number of zones and sub-zones covering designated sections of the institution. The area covered by each, together with the number and location of the various control stations will be given in the STR. Also included will be the quantity and location of the various hardware elements making up the complete PA system.

These system elements are, as follows:

- a. one or more Master Control Stations, each consisting of a master control panel and a microphone or an institution telephone set;
- b. one or more Secondary Control Stations, each consisting of a secondary control panel and a microphone or an institution telephone set;
- c. one or more loudspeaker assemblies, each consisting of a loudspeaker and matching transformer, an enclosure and a baffle plate or horn;
- d. common equipment (amplifiers, power supplies, switchers, etc.);

- e. interconnecting wiring, cables, etc.; and
- f. conduit, ducts, outlet boxes, etc.

The system shall be a constant-voltage type having tap selectable speaker transformers to permit the proper audio power output from each speaker.

3.3 System Elements Description

3.3.1 Master Control Panel

The master control panel or the interfaced telephone set shall contain the necessary controls and annunciators to permit the operator to select any desired Public Address zone or to make ALL-CALL announcements into all zones simultaneously. It shall contain one illuminated, latching-type alternate-action switch for each desired Public Address zone, and one for ALL-CALL.

The required physical configuration of the master control panel or the telephone set and the number of zones to be accessed from it may vary with the particular application and will be specified in the STR.

3.3.2 Microphone

A microphone shall be provided for each master and secondary control panel. It shall be a rugged unit capable of withstanding rough handling. The STR will specify the physical style to be supplied. It shall contain a Push-To-Talk (PTT) switch to enable the selected voice path. The switch shall be a non-latching type which automatically disables the microphone when released.

3.3.3 Secondary Control Panel

The secondary control panel shall contain the necessary controls and annunciators to permit the operator to select the desired sub-zone or to make ALL-CALL announcements within his own local zone(s).

It shall contain one illuminated, latching-type, alternate-action switch for each local PA sub-zone plus one for local-area ALL-CALL. The panel shall also contain a small speaker to permit the operator to hear voice announcements made to his area from a master control station. A volume control shall be provided on the rear panel. The required physical configuration of the secondary control panel and the number of sub-zones to be accessed from it may vary with the particular application and will be specified in the STR.

3.3.4 Loudspeaker Assemblies

The loudspeaker assembly will consist of the following items in the quantities specified in the STR: a loudspeaker and matching transformer, enclosure and baffle plate.

Different types of loudspeaker assemblies may be required depending on the specific application: indoor ceiling/wall mounted (e.g., living unit), indoor wide area (e.g., gymnasium) and outdoor wide area (e.g., sports field).

The horn and driver assemblies for outdoor mounting shall be rugged weatherproof units capable of satisfactory operation under the environmental conditions defined in this specification.

All speaker assemblies shall have high resistance to damage and destruction due to deliberate physical abuse. The contractor shall submit a prototype sample of each proposed type of loudspeaker assembly for approval by the Design Authority prior to proceeding with procurement of system quantities.

3.3.5 **Loudspeaker**

The loudspeaker shall be capable of satisfactorily handling the required power level and shall be compatible with the enclosure in which it is mounted.

3.3.6 **Enclosures**

The loudspeaker enclosure shall be physically rugged to prevent damage by deliberate abuse. It shall be free of mechanical resonances which would adversely affect the system performance or sound quality. The STR will specify whether the enclosures are Government Furnished Equipment (GFE) or to be supplied by the contractor. Physical protection shall be provided by the contractor to speaker assemblies mounted in areas where they may be subject to abuse by inmates.

3.3.7 **Baffle Plate**

The baffle plate for the speaker enclosure shall be heavy-gauge steel construction and shall be secured to the enclosure by tamper-proof screws. It shall be designed to adequately disperse the sound over the required area and shall protect the speaker from attempted forced entry of foreign objects such as pencils, piano wire, etc.

3.3.8 **Matching Transformer**

The matching transformer which is part of the loudspeaker assembly shall have a number of selectable taps to permit on-site selection of the proper power level to be delivered to each speaker.

3.4 System Requirements

3.4.1 Wires, Cables, Conduits, Ducts

The contractor shall supply all necessary terminations, cross connection cabinets, conduits, wire and cabling and any other items that may be required for the satisfactory completion of the specified system. All installation workmanship shall be performed in accordance with ES/SOW-0102, Statement of Work and all applicable national, provincial, and local electrical codes.

A wiring diagram shall be supplied in the Installation section of the Maintenance Manual to detail where module connections terminate and how wires are routed and terminated.

Conduits, cables, ducts, trays, etc. may be either Government Furnished Equipment or supplied and installed by the contractor depending on the particular institution. The determination will be made by the Design Authority and will be identified in the STR.

Connectors provided on the ends of any cable must mate with the corresponding connector on the equipment. Adapters from one type of connector to another are not acceptable.

3.4.2 Control Equipment

The maximum feasible amount of common control equipment (power supplies, logic boards, amplifiers, etc.) Shall be located in Terminal Equipment Spaces (TES) and Common Equipment Room (CER) provided for the purpose. These areas will be identified in the STR. It is preferred that only equipment such as lights, switches, actuators, etc. which the operator must access directly should be located in the Control Posts.

3.5 Design Requirements

3.5.1 General

To the maximum practical extent, off-the-shelf equipment should be selected for use in the PA system. New designs should be restricted to common interface areas, control panels and consoles, or unique devices for which an off-the-shelf item does not exist.

A design objective is to minimize the number of wires required between all elements of the system.

A space-diversity approach to system planning shall be employed to ensure that loss of one interconnection routing does not impair the operational capability of the complete system.

3.5.2 Wiring Supervision

Wiring shall be supervised in all PA system modes. An alarm shall occur if any system wiring is cut or shorted to other wires or if the system devices are tampered with by unauthorized people or environmental conditions.

3.5.3 Sabotage, Tampering and Survivability

Elements of the system must operate in areas exposed to inmate access and shall have high resistance to damage, destruction, or conversion to other uses (including weapons). All interconnecting service must be secure against tampering or improper interference.

3.5.4 Power Failure

Loss or restoration of primary power to the system shall not produce spurious call annunciations. When power is returned after a power failure, the system shall resume normal operation without operator action.

3.5.5 System Failure

A PA system failure shall be deemed to have occurred when any required communications or any required control function cannot be performed.

3.5.6 Human Factors

Elements of the PA system which are used directly by staff (i.e., control panels, etc.) shall conform with accepted principles of good human factors design.

3.5.7 Existing Equipment

In most installations, control elements of the system will share console space with other electrical/electronic equipment such as door controls, lighting controls, etc. and will be operated by the same staff member. In such cases it is important that effort be made to coordinate the functional and operational design of the system according to accepted human engineering principles to ensure a uniform appearance and commonality of a layout to assist the operator in the performance of his duties.

3.5.8 Control Panels

Mounting space within control posts is usually limited and the problem of determining a suitable equipment mounting location is minimized if the control panels are small. Therefore, the designer should make maximum possible use of control devices which combine two or more functions into a single unit (e.g., a lighted push-button instead of a separate light and an unlit push-button).

The system may use EIA standard display and control panels or video display units. The design of either display and control method shall be in accordance with the ES/STD-0802 or ES/STD-0803, Standards.

3.6 Operational Requirements

3.6.1 General

The PA system shall provide satisfactory sound distribution within each designated area of the institution. The equipment shall produce high speech intelligibility throughout the area covered by the system at all normal microphone distances and shall be entirely free of audible transients as circuits are selected and de-selected and microphones are switched.

CSC experience has shown that in acoustically "live" environments (long reverberation time) better intelligibility will be obtained by using a larger number of low-power speakers instead of a few high-power ones.

The microphone input circuit shall employ automatic level control with a minimum of 40 dB limiting range. The outdoor speaker system shall provide satisfactory sound coverage over the area(s) defined in the STR. The contractor shall provide design calculations prior to commencement of installation to demonstrate that his planned configuration will provide the required coverage.

3.6.2 Secondary Control Station

The secondary control station shall be able to make a PA announcement to a particular sub-zone or zone by:

- a. momentarily depressing the associated push-button selector switch on the secondary control panel causing it to become illuminated steady ON, then
- b. depressing the microphone Push-to-Talk (PTT) switch to activate the voice circuit.

Releasing the PTT switch will remove the microphone from the voice circuit but will leave the zone/sub-zone selector actuated and the push-button illuminated.

Where a sub-zone consists of more than one speaker assembly, all shall be selected by a single push-button selector.

When the announcement is complete, momentarily depressing the push-button selector causing the illuminated push-button to extinguish and the associated voice circuit to be released.

Other secondary annunciation panels shall not receive the audio message from the first panel. It shall not be possible for a secondary station to preempt a call in progress originating at a master station.

3.6.3 Master Control Station

The master control station shall be able to make PA announcements into any one of the zones, but not address a specific sub-zone. The method of performing this is identical to that described above for the secondary control panel.

The master control panel shall have the capability to override (preempt) an announcement in progress originating from any secondary panel. When this occurs, the priority message shall be heard on the monitor speaker at the secondary station and the voice message from the secondary station shall be cut off. When a system contains more than one master control station the STR will define the required precedence of preemption capability.

3.7 Environmental Requirements

The PA system shall operate over the following indoor environmental conditions:

- 3.7.1 Temperature: 0° C to +50° C;
- 3.7.2 Humidity: 0 to 90% relative, non-condensing; and.
- 3.7.3 Location: sheltered environment.

The PA system shall operate over the following outdoor environmental conditions:

- 3.7.4 Temperature: -40° C to +55° C;
- 3.7.5 Humidity: up to 100% relative condensing; and
- 3.7.6 Location extremes of wind, driving rain, ice loading, blown sand and dust, sun exposure.

3.8 Power Requirements

The system shall use VAC power within the following limits:

- 3.8.1 Voltage: 120 VAC \pm 10%;
- 3.8.2 Frequency: 60 Hz \pm 1.5%;
- 3.8.3 Transients: up to 5 times nominal voltage for up to 100 msec durations. Changes in the input power or any fluctuations within the above limits shall not cause damage to the unit; and
- 3.8.4 Power: power consumption shall not exceed 100 watts.

3.9 Installation Requirements

The system shall be installed at the site in accordance with the ES/SOW-0101, Statement of Work and the ES/SOW-0102, Statement of Work.

3.10 Documentation Requirements

All final system documentation shall be provided in accordance with the ES/SOW-0101, Statement of Work.

3.11 Support Requirements

The system maintenance and spares support shall be provided in accordance with the ES/SOW-0101, Statement of Work.

3.12 Training Requirements

Operator training and maintenance training on the system shall be in accordance with the ES/SOW-0101, Statement of Work.

4.0 **QUALITY ASSURANCE**

4.1 **General**

The system Quality Assurance programme shall be provided as detailed in the ES/SOW-0101, Statement of Work.

All on-site installation work, test plans and system acceptance testing shall be conducted in accordance with the ES/SOW-0101, Statement of Work.

5.0 **DELIVERY**

Delivery requirements for the system documents, drawings, plans, manuals, etc. (where applicable) shall be in accordance with the ES/SOW-0101, Statement of Work.

Delivery requirements of the system equipment shall be in accordance with the ES/SOW-0102, Statement of Work.

6.0 **INTERFERENCE**

Performance of the system shall not be affected by the use of standard electronic equipment used at the institution. Distance limits of standard electronic equipment shall be in accordance with ES/SOW-0101, Statement of Work.

7.0 **SAFETY**

All system electrically powered elements shall meet the applicable Canadian Safety Association (CSA) standards.