PROJECT TITLE

BATH, ONTARIO
MILLHAVEN INSTITUTION
HWY. 33, BATH, ONTARIO
KOH 1G0

ELECTRICAL DISTRIBUTION SYSTEM UPGRADE

PROJECT NUMBER

R.053529.001

PROJECT DATE

2013-05-27

END

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Work covered by contract documents.

.2 Contract Method.

.3 Cost breakdown.

.4 Work sequence.

.5 Contractor use of premises.

.6 Owner occupancy.

.7 Alterations to existing building site.

1.2 PRECEDENCE

.1 For Federal Government projects, Division 01 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises replacement of electrical feeders, distibutuion panels, and feeder circuit breakers and the addition of surge protection at Millhaven Maximum Security Institution, Bath, Ontario.

1.4 CONTRACT METHOD

.1 Constuct work under lump sum contract.

1.5 COST BREAKDOWN

.1 Within 48 hours of notificaiton of accptance of bid furnish a cost breakdown by Section aggregating contract price.

.2 Show separately cost of equipment purchased exempt from Ontario Retail Sales Tax under your Ontario Sales Tax licence number.

.3 Within 48 hours of acceptance of bid submit a list of subcontractors.

1.6 WORK SEQUENCE

.1 Construct Work in stages to accommodate Owner's continued use of premises during construction.

.2 Coordinate Pogress Schedule and coordinate with Owner Occupancy during construction.

.3 Required stages:

.1 Demolition and removal of existing feeders is to take place after the new feeders a reconnected and functioning. Demolition work shall take place during regular daytime working hours where possible.

.2 Power must be maintained to all buildings at all times during construction and demolition. Overnight power shut downs to install new feeder breakers and to install new distribution panels for each building are to take place between the hours of 11 p.m. and 6 a.m. the next morning, and must be arranged at least 48 hours in advance with the CPM (Chief of Plant Maintenance). Contractor to include in price for all required overnight work.

.3 Replace feeder breakers in the main electrical room prior to installing new distribution panels. Reconnect existing feeder cables. This work is to take place overnight as described in 1.6.3.2.

.4 Prior to installing cables, install all cable tray, unistrut channel, hangers etc. Obtain approval from Departmental Repres entative before proceeding with cable installation. Approval is required to ensure required headroom is maintained and clearance in crawlspaces etc.

.5 Install all new feeder cables prior to replacing distribution panels. Installation of new feeder cables is to take place during regular daytime working hours, where possible.

.6 Only one distribution panel will be replaced during any one overnight period, in order to limit power disruptions at any given time. Submit a plan to the CPM to describe contingency plans in the case where the work cannot be completed within the above overnight time period. Plan may include supplying loads from the adjacent normal or essential distribution panel, using appropriate temporary jumpers. Replace one distribution panel and reconnect all existing loads during one overnight period . Provide sufficient workers and material to achieve this without risk of power interruption beyond 6 a.m. each morning.

.7 Raising of transformers as described in the project drawings is to take place in three

1.6 WORK SEQUENCE (Cont'd)

.3 Required stages:(Cont'd)
.7 (Cont'd)
steps: firstly, relocate the transformer and temporarily reconnect power, secondly, increase the height of the concrete housekeeping pad, thirdly, reinstall the transformer on the housekeeping pad and permanently connect.

.4 Maintain fire access/control.

1.7 CONTRACTOR USE OF PREMISES

.1 Contractor shall limit use of premises for Work, and for access, to allow;
.1 Owner occupancy.

.2 Coordinate use of premises under direction of Owner.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.8 OWNER OCCUPANCY

.1 Owner will occupy premises during entire construction period for execution of normal operations.

.2 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage. Refer to Section 01 35 13 regarding security requirements.

1.9 ALTERATIONS TO EXISTING BUILDING

.1 Remove and recycle, compost, sell material for reuse or dispose of:
.1 Existing feeder conduits and conductors.
.2 Existing distribution panels.
.3 Remove in good order, turn over to Departmental Representative and store within building where designated by Departmental Representative:
.1 Feeder circuit breakers in main electrical room, in panelboards 'S1' and 'S2'.

.3 Provide new openings required in existing construction.

.4 Block in openings where items removed with material and finish to match existing adjoining construction.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END

PART 1 - GENERAL

1.1 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, per Section 01 35 13 including stairs, runways, ramps or ladders, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work provide temporary means to maintain security.

.4 Departmental Representative will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.

.5 Arrange with institution 48 hours in advance for use of sallyport and/or designated entrance to basement for materials.

.6 Accept liability for damage, safety of equipment and overloading of existing equipment.

.7 Closures: protect work temporarily until permanent enclosures are completed.

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.4 EXISTING SERVICES

.1 Notify, Chief of Plant Maintenance (CPM) of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Chief of Plant Maintenance (CPM) 48 hours of notice for

1.4 EXISTING SERVICES (Cont'd)

.2 (Cont'd)
necessary interruption of mechnical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants.

.3 Provide for personnel and vehicular traffic.

.4 Construct barriers in accordance with Section 01 56 00.

1.5 SPECIAL REQUIREMENTS

.1 Submit schedule in accordance with Section 01 32 16 - Construction Progress Schedule - Bar (GANTT Chart).

.2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.3 Keep within limits of work and avenues of ingress and egress.

.4 Deliver materials outside of peak traffic. Coordinate with Chief of Plant Maintenance (CPM).

.5 Prior to cutting or drilling horizontal or vertical surfaces including concrete, concrete block or other structural substrate, determine location of reinforcing, service lines, pipes, conduits or other items by x-ray, ground penetrating radar or other appropriate method. Submit findings to Departmental Representative prior to cutting or drilling.

1.6 SECURITY

.1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

.2 Security clearances:
.1 Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.
.2 Obtain requisite clearance, as instructed for each individual required to enter premises.
.3 Personnel will be checked daily at start of work shift and provided with pass which must

1.6 SECURITY (Cont'd)

.2 Security clearances:(Cont'd)
.3 (Cont'd)
be worn at all times. Pass must be returned at end of work shift and personnel checked out.

.3 Security escort:
.1 Personnel employed on this project must be escorted when executing work in non-public areas during normal working hours. Personnel must be escorted in all areas after normal working hours.
.2 Submit an escort request to Chief of Plant Maintenance (CPM) at least 14 days before services is needed. For requests submitted within time noted above, costs of security escort will be paid for by Deaprmental Representative. Cost incurred by late request will be Contractor's responsibility.
.3 Any escort request may be cancelled free of charge if notification of cancellation is given at least 4 hours before scheduled time of escort. Cost incurred by late request will be Contractor's responsibility.
.3 Calculation of costs will be based on average hourly rate of security officer for minimum of 8 hours per day for late service request and of 4 hours for late cancellations.

1.7 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting 4 days in advance of meeting date to Departmental Representative.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within three days after meetings and transmit to Departmental Representative, meeting participants and affected parties not in attendance.

.8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

.1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

1.2 PRECONSTRUCTION MEETING (Cont'd)

.5 Agenda to include:
.1 Appointment of official representative of participants in the Work.
.2 Schedule of Work: in accordance with Section 01 32 16.07.
.3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00.
.4 Delivery schedule of specified equipment in accordance with Sections 26 24 16.01.
.5 Site security in accordance with Section 01 35 13.
.6 Health and safety in accordance with Section 01 35 29.06.
.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
.8 Record drawings and specifications in accordance with Section 01 33 00.
.9 Maintenance manuals in accordance with Section 01 78 00.
.10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00.
.11 Monthly progress claims, administrative procedures, photographs, hold backs.
.12 Appointment of inspection and testing agencies or firms.
.13 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work and four (4) weeks prior to project completion, schedule progress meetings monthly.

.2 Contractor, major Subcontractors involved in Work and Departmental Representative and Owner are to be in attendance.

.3 Notify parties minimum seven (7) days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within seven (7) days after meeting.

.5 Agenda to include the following:
.1 Review, approval of minutes of previous meeting.
.2 Review of Work progress since previous meeting.
.3 Field observations, problems, conflicts.

1.3 PROGRESS MEETINGS (Cont'd)

.5 Agenda to include the following:(Cont'd)

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for affect on construction schedule and on completion date.

.12 Other business.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Bar Chart is to be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately ten (10) working days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Certificate of Substantial Performance and Certificate of Completion as defined times of completion are of essence of this contract.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Submit to Departmental Representative within ten (10) working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.5 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

1.5 PROJECT SCHEDULE (Cont'd)

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
.1 Award.
.2 Shop Drawings, Samples.
.3 Permits.
.4 Mobilization.
.5 Delivery of equipment to site.
.6 Interior Architecture (Walls and Ceiling in new electrical chase).
.7 Installation of cable trays, unistrut channels, and hangers etc., prior to Departmental Representative approval.
.8 Installation of feeders to each building, following Departmental approval of cable trays, channels and hangers, etc.
.9 Installation of feeder breakers.
.10 Installation of distribution panels.
.11 Raising of transformers.
.12 Demolition.
.13 Testing and commissioning.

1.6 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on bi-weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.7 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings specified in Section 01 31 19, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END

PART 1 - GENERAL

1.1 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, and samples in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

1.1 ADMINISTRATIVE (Cont'd)

.11 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, NMSEdit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg files on CD/DVD, USB or through email or alternate electronic file sharing service as directed by Departmental Representative.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario of Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 5 working days for Departmental Representative's review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter, in duplicate, containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.

1.2 SHOP DRAWINGS AND PRODUCT DATA (Cont'd)

.7 (Cont'd)
.4 Identification and quantity of each shop drawing, product data and sample.
.5 Other pertinent data.

.8 Submissions shall include:
.1 Date and revision dates.
.2 Project title and number.
.3 Name and address of:
.1 Subcontractor.
.2 Supplier.
.3 Manufacturer.
.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
.5 Details of appropriate portions of Work as applicable:
.1 Fabrication.
.2 Layout, showing dimensions, including identified field dimensions, and clearances.
.3 Setting or erection details.
.4 Capacities.
.5 Performance characteristics.
.6 Standards.
.7 Operating weight.
.8 Wiring diagrams.
.9 Single line and schematic diagrams.
.10 Relationship to adjacent work.

.9 After Departmental Representative's review, distribute copies.

.10 Submit one hard copy and one electronic copy 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.

.11 Submit one hard copy and one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
.2 Testing must have been within 3 years of date of contract award for project.

1.2 SHOP DRAWINGS AND PRODUCT DATA (Cont'd)

.12 Submit one hard copy and one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
.2 Certificates must be dated after award of project contract complete with project name.

.13 Submit one hard copy and one electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.14 Submit one hard copy and one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.16 Submit one hard copy and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.17 Delete information not applicable to project.

.18 Supplement standard information to provide details applicable to project.

.19 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.

1.2 SHOP DRAWINGS AND PRODUCT DATA (Cont'd)

.20 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement and as directed by Departmental Representative.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: 2 locations.

.1 Viewpoints and their location as determined by Departmental Representative.

.4 Frequency of photographic documentation:

.1 Upon completion of: Cable tray installation, cable installation, distribution panel installation, feeder breaker installation, new wall construction, demolition and as directed by Departmental Representative.

1.4 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Safety and Insurance Board Experience Report.

1.5 FEES, PERMITS AND CERTIFICATES

.1 Provide authorities having jurisdiction with information requested.

.2 Pay fees and obtain certificates and permits required.

1.5 FEES, PERMITS AND CERTIFICATES (Cont'd)

.3 Furnish certificates and permits.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

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.

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.

.6 Currency over $25.00 when possessed by an inmate without prior authorization.

.7 Any item not described in paragraphs 1.2.1.1 to 1.2.1.6 that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization.

.2 "Unauthorized Smoking and related Items" means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing tobacco, cigarette making machines, matches and lighters.

.3 "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project.

.4 "CSC" means Correctional Service Canada.

.5 "Director" means Director, Warden or Superintendent of the Institution as applicable.

.6 "Construction Employees" means persons working for the General Contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies.

1.2 DEFINITIONS (Cont'd)

.7 "Departmental Representative" means the project manager from Public Works and Government Services Canada.

.8 "Perimeter" means the fenced or walled area of the Institution that restrains the movement of the inmates.

.9 "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.
.1 Construction limits for this project consist of basement areas, crawlspaces, electrical and mechanical rooms as shown on the drawings. Inmate areas are not included within the construction areas, except if required to pass through to reach the construction areas listed above, as directed by the Director.

1.3 PRELIMINARY PROCEEDINGS

.1 Prior to the 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.

.2 Contractor shall:
.1 Ensure that all Construction Employees are aware of the security requirements.
.2 Ensure that a copy of the security requirements is always prominently on display at the job site.
.3 Co-operate with institutional personnel in ensuring that security requirements are observed by all Construction Employees.

1.4 CONSTRUCTION EMPLOYEES

.1 Submit to the Director a list of the names with date of birth of all Construction Employees to be employed on the construction site and a security clearance form for each employee.

.2 Allow two (2) weeks for processing of security clearances. Employees will not be admitted to the Institution without a valid security clearance in place and a recent picture identification such as a provincial driver's

1.4 CONSTRUCTION EMPLOYEES (Cont'd)

.2 (Cont'd)
license. Security clearances obtained from other CSC Institutions are not valid at this Institution.

.3 The Director may require that facial photographs may be taken of Construction Employees and these photographs may be displayed at appropriate locations in the Institution or in an electronic database for identification purposes. The Director may require that Photo ID cards be provided for all Construction Employees. ID cards will then be left at the designated entrance to be picked upon arrival at the institution and shall be displayed prominently on the Construction Employees' clothing at all time while Construction Employees are in the institution.

.4 Entry to Institutional Property will be refused to any person there may be reason to believe may be a security risk.

.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.

.6 Smoking is prohibited anywhere on CSC property.

1.5 VEHICLES

.1 All unattended vehicles on CSC property shall have windows closed; doors and trunks shall be locked and keys removed. The keys shall be securely in the possession of the owner or an employee of the company that owns the vehicle.

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

.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. The Director may require that these vehicles be escorted by Institutional Staff or Commissionaires while in the Institution.

1.5 VEHICLES (Cont'd)

.4 If the Director permits 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.

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.

1.8 TELEPHONES

.1 There will be no installation of telephones, Facsimile machines and computers with Internet connections permitted within the 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.

.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 Institution unless approved by the Director. If wireless cellular telephones are permitted, the 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

.1 Normal work hours within the Institution are: Monday to Friday 07:30 a.m. to 4:00 p.m. Special arrangements with the Institution's CPM (Chief of Plant Maintenance) will be required for overnight work as described in Section 01 11 00 - 1.7.2

.2 Work will not be permitted during 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.

1.10 OVERTIME WORK AND OVERNIGHT WORK

.1 No overnight or weekend work will be allowed without permission of the Director. Give a minimum forty-eight (48) hours advance notice when overnight or weekend work on the construction project is necessary and approved.

.2 When overnight 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.

.3 For overnight work as described in this specification for replacement of circuit breakers, feeders and distribution panels, extra security staff, if required, will be paid for by the Departmental Representative.

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.

.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.

1.11 TOOLS AND EQUIPMENT (Cont'd)

.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.

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

.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.

.8 Certain tools/equipment such as cartridges and hacksaw blades are highly controlled items. The Contractor will be given at the beginning of the day, a quantity that will permit one day's work. Used blades/cartridges will be returned to the Director's representative at the end of each day.

.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.

.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).

1.12 KEYS (Cont'd)

.1 (Cont'd)

.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 Upon completion of each phase of the construction, the CSC representative will, in conjunction with the 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 CSC construction escort 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 workday 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 perimeter of a correctional facility and must not possess unauthorized smoking items within the 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 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 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.

1.17 SEARCHES (Cont'd)

.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 INSTITIUION 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 Institution through the vehicle access gate during the following hours:
.1 07:45 a.m. to 11:30 a.m.
.2 12:30 p.m. to 3:30 p.m.

.2 Construction vehicles shall not leave the Institution until an inmate count is completed.

.3 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.

.4 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.

.5 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.

.6 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.

.7 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.

.8 With prior approval of the Director, a vehicle may be used in the morning and evening to transport a group of employees to the work site. This vehicle will not remain within the Institution the remainder of the day.

1.19 MOVEMENT OF VEHICLES (Cont'd)

.9 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 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 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

1.22 STOPPAGE OF WORK (Cont'd)

.1 (Cont'd) of the 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.

.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.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 National Building Code 2010 (NBC):
.1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.

.2 National Fire Code 2010 (NFC):
.1 NFC 2010, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.

.3 Province of Ontario:
.1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
.2 O. Reg. 490/09, Designated Substances.
.3 Workplace Safety and Insurance Act, 1997.
.4 Municipal statutes and authorities.

.4 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&section=text.

.5 Fire Commissioner of Canada (FCC):
.1 FC-301 Standard for Construction Operations, June 1982.
.2 FC-302 Standard for Welding and Cutting, June 1982.

Human Resources and Social Development Canada
Labour Program
Fire Protection Engineering Services
4900 Yonge Street 8th Floor
North York, Ontario M2N 6A8

and copies may be obtained from:

Human Resources and Social Development Canada
Labour Program
Fire Protection Engineering Services
Ottawa, Ontario K1A 0J2

1.2 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00.

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed

1.2 SUBMITTALS (Cont'd)

.2 (Cont'd)
and prior to commencement of Work. Health and Safety Plan must include:
.1 Results of site specific safety hazard assessment.
.2 Results of safety and health risk or hazard analysis for site tasks and operations.
.3 Measures and controls to be implemented to address identified safety hazards and risks.
.4 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.3 prior to commencement of work. The plan shall be coordinated with, and integrated into, the existing Institution's Emergency Procedures and Evacuation Plan in place at the site. Departmental Representative will provide Institution's Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 14 days before commencing work.
.5 Contractor's and Sub-contractors' Safety Communication Plan.
.6 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Institution's Emergency Response requirements and procedures provided by Departmental Representative.

.3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 7 days after receipt of comments from Departmental Representative.

.4 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.5 Submit names of personnel and alternates responsible for site safety and health.

.6 Within two weeks of commencing work, submit to Departmental Representative proof of appropriate Arc-Flash training for each employee or subcontractor's employee proposed to work at the job site.

1.2 SUBMITTALS (Cont'd)

.7 Submit records of Contractor's Health and Safety meetings when requested.

.8 Submit 3 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, weekly.

.9 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.

.10 Submit copies of incident and accident reports.

.11 Submit Material Safety Data Sheets (MSDS).

.12 Submit Workplace Safety and Insurance Board (WSIB)- Experience Rating Report.

1.3 FILING OF NOTICE

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

1.4 WORK PERMIT

.1 Obtain building permits related to project prior to commencement of Work.

.2 Obtain Hot Work Permit from Chief Plant Maintenance.

1.5 SAFETY ASSESSMENT

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

1.6 MEETINGS

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

1.7 REGULATORY REQUIREMENTS

.1 Comply with the Acts and regulations of the Province of Ontario.

.2 Comply with specified standards and regulations to ensure safe operations at site.

1.8 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:
.1 Silica in concrete and/or concrete block, concrete brick, stucco, ceramic tile.
.2 Asbestos in pipe covering.
.3 Lead in paint.

.2 Hazardous work areas in crawl spaces MHK, MHL, MHR, and MHT are hazardous work areas. Appropriate PPE including as a minimum: bump cap, safety glasses, cartridge filter mask, coveralls, rubber gloves, leather gloves, kneepads, and safety boots are required, as well as portable gas monitor/alarm. Use of buddy system is mandatory with two persons minimum in crawlsapce together. See Appendix A. Contractor to provide required PPE for all their workers.

1.9 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns either accepting or requesting improvements.

.3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.

1.10 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.

1.11 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and

1.11 RESPONSIBILITY (Cont'd)

.2 (Cont'd)
local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act for the Province of Ontario.

1.12 UNFORSEEN HAZARDS

.1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.

.2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

1.13 ARC-FLASH TRAINING

.1 All employees of the contractor of their subcontractors who work at the jobsite will be required to have previously sucessfully completed an Arc-Flash training course. Proof of course completion for each employee will be required.

1.14 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
.1 Have working knowledge of occupational safety and health regulations.
.2 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
.3 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
.4 Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.15 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative.
.1 Contractor's Safety Policy.
.2 Constructor's Name.
.3 Notice of Project.
.4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
.5 Ministry of Labour Orders and reports.
.6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
.7 Address and phone number of nearest Ministry of Labour office.
.8 Material Safety Data Sheets.
.9 Written Emeregency Response Plan.
.10 Site Specific Safety Plan.
.11 Valid certificate of first aider on duty.
.12 WSIB "In Case of Injury At Work" poster.
.13 Location of toilet and cleanup facilities.

1.16 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.17 BLASTING

.1 Blasting or other use of explosives is not permitted.

1.18 POWDER ACTUATED DEVICES

.1 Use powder actuated devices only after receipt of written permission from the Director.

1.19 WORK STOPPAGE

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

.2 Assign responsibility and obligation to Health and Safety Coordinator to stop or start Work when, at Health and Safety Coordinator's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END

PART 1 - GENERAL

1.1 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00.

.2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.

.3 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.4 Environmental protection plan: include:
.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
.2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
.3 Names and qualifications of persons responsible for training site personnel.
.4 Descriptions of environmental protection personnel training program.
.5 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including

1.2 SUBMITTALS (Cont'd)

.4 Environmental protection plan:(Cont'd)

.5 (Cont'd)
monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.6 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

.12 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

1.3 FIRES

.1 Fires and burning of rubbish on site not permitted.

1.4 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site unless approved by Departmental Representative.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.5 DRAINAGE

.1 Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan: include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sedimentations control plan.

.3 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.4 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this contract.

.2 Control emissions from equipment and plant to local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area, by providing temporary enclosures.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.6 POLLUTION CONTROL (Cont'd)

.5 Spills of deleterious substances:
.1 Immediately contain, limit spread and clean up in accordance with provincial regulatory requirements.
.2 Report immediately to Ontario Spills Action Centre: 1-800-268-6060.
.3 Further information on dangerous goods emergency cleanup and precautions including a list of companies performing this work can be obtained from the Transport Canada 24-hour number (613) 996-6666 collect.

1.7 HALOCARBONS

.1 Comply with Federal Halocarbon Regulations 2003 under the Canadian Environmental Protection Act 1999, EPAM and PWGSC Ontario Region Halocarbon Information Sheet dated March 2010.

1.8 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) 2010, National Fire Code of Canada (NFC) 2010 and Ontario Building Code (OBC) 2012, including all amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:
.1 Contract documents.
.2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Stop work immediately and notify Departmental Representative if materials which may contain designated substances or PCB's, other than those identied in Section 02 82 00.02 are discovered in course of work.

1.3 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions.

1.4 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

1.5 EXAMINATION

.1 Examine existing conditions and determine conditions affecting work.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mock-ups.

.4 Mill tests.

.5 Equipment and system adjust and balance.

1.2 RELATED SECTIONS

.1 Section 01 91 00 - Commissioning - General Requirements.

1.3 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, 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.

1.4 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work, above and beyond those required of the Contractor. 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 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 reinspection.

1.5 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.

1.6 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.

1.7 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, Departmental Representative may deduct from Contract Amount difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

1.8 REPORTS

.1 Submit 4 copies of inspection and test reports to Departmental Representative.

.2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

1.9 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.

1.10 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.

.2 Construct in all locations acceptable to Departmental Representative.

.3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

1.10 MOCK-UPS (Cont'd)

.4 Failure to prepare mock-ups 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.

.5 If requested, Departmental Representative will assist in preparing a schedule fixing dates for preparation.

.6 Remove mock-up at conclusion of Work or when acceptable to Departmental Representative.

1.11 EQUIPMENT AND SYSTEMS

.1 Submit testing, adjusting and balancing reports for mechanical, electrical and building equipment systems.

.2 Submit Commissioning Documentation in accordance with Section 01 91 00.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Temporary utilities.

1.2 RELATED SECTIONS

.1 Section 01 52 00 - Construction Facilities.

.2 Section 01 56 00 - Temporary Barriers and Enclosures.

1.3 REFERENCES

.1 U.S. Environmental Protection Agency (EPA) / Office of Water
.1 EPA 833-R-06-004, May 2007, Developing Your Stormwater Pollution Prevention Plan - A Guide for Construction Sites.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

1.5 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.6 DEWATERING

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.7 WATER SUPPLY

.1 Departmental Representative will provide continuous supply of potable water for construction use.

.2 Departmental Representative will pay for utility charges at prevailing rates.

1.8 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:
.1 Facilitate progress of Work.
.2 Protect Work and products against dampness and cold.
.3 Prevent moisture condensation on surfaces.
.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
.5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Maintain temperatures of minimum 10°C in areas where construction is in progress.

.5 Ventilating:
.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
.4 Ventilate storage spaces containing hazardous or volatile materials.
.5 Ventilate temporary sanitary facilities.
.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.6 Permanent heating system of building, may not be used.

.7 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
.1 Conform with applicable codes and standards.
.2 Enforce safe practices.
.3 Prevent abuse of services.
.4 Prevent damage to finishes.
.5 Vent direct-fired combustion units to outside.

1.8 TEMPORARY HEATING AND VENTILATION (Cont'd)

.8 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.9 TEMPORARY POWER AND LIGHT

.1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools.

.2 Temporary power for electric cranes and other equipment is responsibility of Contractor.

.3 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

.4 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Departmental Representative provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

1.10 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Construction aids.

.2 Office and sheds.

.3 Parking.

.4 Project identification.

1.2 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)
.1 CCDC 2-2008, Stipulated Price Contract.

.2 Canadian Standards Association (CSA International)
.1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CSA Z797-09, Code of practice for Access Scaffold.
.3 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment, withdrawn but still available from CSA, CCOHS and Techstreet.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

1.4 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

1.5 SCAFFOLDING

.1 Scaffolding in accordance with CSA Z797.

.2 Provide and maintain scaffolding ramps ladders platforms.

1.6 HOISTING

.1 Provide, operate and maintain hoists/cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.

.2 Hoists/cranes shall be operated by qualified operator.

1.7 SITE STORAGE/LOADING

.1 Confine work and operations of employees to areas defined 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.

1.8 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

.4 Clean construction runways and taxi areas where used by Contractor's equipment.

1.9 SECURITY

.1 Pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.10 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.

1.10 OFFICES (Cont'd)

.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. Direct location of these offices.

1.11 EQUIPMENT, TOOL AND MATERIALS 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.

1.12 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.

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC (Cont'd)

.7 Construct access and haul roads necessary.

.8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.10 Dust control: adequate to ensure safe operation at all times.

.11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

.12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

.13 Provide snow removal during period of Work.

.14 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.14 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Barriers.

.2 Environmental Controls.

.3 Traffic Controls.

.4 Fire Routes.

1.2 RELATED SECTIONS

.1 Section 01 51 00 - Temporary Utilities.

.2 Section 01 52 00 - Construction Facilities.

1.3 REFERENCES

.1 Canadian General Standards Board (CGSB):
.1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
.2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA):
.1 CSA-O121-08, Douglas Fir Plywood.

1.4 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.5 HOARDING

.1 Erect temporary site enclosures using 38 x 89 mm construction grade lumber framing at 600 mm o.c. and 1200 x 2400 x 13 mm exterior grade fir plywood to CSA-O121.

.2 Apply plywood panels vertically flush and butt jointed.

.3 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.

.4 Paint public side of site enclosure in selected colours with one coat primer to CAN/CGSB-1.189 and one coat exterior paint to CAN/CGSB-1.59.

1.5 HOARDING (Cont'd)

.4 (Cont'd)
Maintain public side of enclosure in clean condition.

1.6 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, o.en stair wells, open edges of floors and roofs

.2 Provide as required by governing authorities.

1.7 WEATHER ENCLOSURES

.1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

.3 Design enclosures to withstand wind pressure and snow loading.

1.8 DUST TIGHT SCREENS

.1 Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

1.9 ACCESS TO SITE

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.10 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public.

1.11 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.12 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.13 PROTECTION OF BUILDING FINISHES

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Product quality, availability, storage, handling, protection, and transportation.

.2 Manufacturer's instructions.

.3 Quality of Work, coordination and fastenings.

.4 Existing facilities.

1.2 REFERENCES

.1 Within text of specifications, reference may be made to reference standards.

.2 Conform to these standards, in whole or in part as specifically requested in specifications.

.3 If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.4 The cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

.5 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

1.3 QUALITY

.1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of Products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense

1.3 QUALITY (Cont'd)

.2 (Cont'd) and be responsible for delays and expenses caused by rejection.

.3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.4 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.5 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

1.5 STORAGE, HANDLING AND PROTECTION (Cont'd)

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.6 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

1.7 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.9 CO-ORDINATION

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.10 CONCEALMENT

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

1.11 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.12 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Departmental Representative of conflicting installation. Install as directed.

1.13 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.14 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No.304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.15 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

1.16 EXISTING UTILITIES

.1 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Field engineering survey services to measure and stake site.

.2 Survey services to confirm inverts for Work.

.3 Recording of subsurface conditions found.

1.2 REFERENCES

.1 Owner's identification of existing survey control points and property limits.

1.3 QUALIFICATIONS OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practise in Place of Work, acceptable to Departmental Representative.

1.4 SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on drawings.

.2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.3 Make no changes or relocations without prior written notice to Departmental Representative.

.4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 Require surveyor to replace control points in accordance with original survey control.

1.5 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.6 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.7 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

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

1.8 SUBMITTALS

.1 Submit name and address of Surveyor to Departmental Representative.

.2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

1.1 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00.

.2 Submit written request in advance of cutting or alteration which affects:
.1 Structural integrity of elements of project.
.2 Integrity of weather-exposed or moisture-resistant elements.
.3 Efficiency, maintenance, or safety of operational elements.
.4 Visual qualities of sight-exposed elements.
.5 Work of Owner or separate contractor.

.3 Include in request:
.1 Identification of project.
.2 Location and description of affected Work.
.3 Statement on necessity for cutting or alteration.
.4 Description of proposed Work, and products to be used.
.5 Alternatives to cutting and patching.
.6 Effect on Work of Owner or separate contractor.
.7 Written permission of affected separate contractor.
.8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00.

1.3 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

1.3 PREPARATION (Cont'd)

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

.1 Execute cutting, fitting, and patching to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.7 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.8 Restore work with new products in accordance with requirements of Contract Documents.

.9 Submit proposed materials, finishes and installation method for patching to Departmental Representative for approval, prior to patching.

.10 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.11 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.12 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material in accordance with Section 07 84 00, full thickness of the construction element.

1.4 EXECUTION (Cont'd)

.13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Progressive cleaning.

.2 Final cleaning.

1.2 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for collection of waste materials and debris.

.5 Provide and use clearly marked separate bins for recycling. Refer to Section 01 74 20.

.6 Remove waste material and debris from site and deposit in waste container at end of each working day.

.7 Dispose of waste materials and debris off site.

.8 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.

.9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

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

.12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not

1.2 PROJECT CLEANLINESS (Cont'd)

.12 (Cont'd)
fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

.1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review, remove surplus products, tools, construction machinery and equipment.

.4 Remove waste products and debris other than that caused by Owner or other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.

.9 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.10 Clean equipment and fixtures to a sanitary condition.

.11 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

1.1 CONSTRUCTION & DEMOLITION WASTE

.1 Carefully deconstruct and source separate materials/equipment and divert, from D&C waste destined for landfill to maximum extent possible. Target for this project is 75 % diversion from landfill. Recycle, or sell material for reuse except where indicated otherwise. On site sales are not permitted.

.2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
.1 Provide facilities for collection, handling and storage of source separated wastes.
.2 Source separate the following waste:
.1 Brick and portland cement concrete.
.2 Corrugated cardboard.
.3 Wood, not including painted or treated wood or laminated wood.
.4 Gypsum board, unpainted.
.5 Steel.
.6 Bare copper or insulated copper wire.

.3 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill.

.4 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

1.2 WASTE PROCESSING SITES

.1 Province of: Ontario.
.1 Ministry of Environment and Energy, 135 St. Clair Avenue West, Toronto, ON, M4V 1P5.
.2 Telephone: 800-565-4923 or 416-323-4321.
.3 Fax: 416-323-4682.

.2 Recycling Council of Ontario: 215 Spadina Avenue, #225, Toronto, ON, M5T 2C7.
.1 Telephone: 416-657-2797
.2 Fax: 416-960-8053
.3 Email: rco@rco.on.ca.
.4 Internet: http://www.rco.on.ca/.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Government Chief Responsibility for the Environment.

Province	Address	General Inquiries	Fax
Ontario	Ministry of Environment and Energy 135 St Clair Avenue West Toronto, ON M4V 1P5	(416) 323-4321 (800) 565-4923	(416) 323-4682
	Environment Canada Toronto, ON	(416) 734-4494	

END

PART 1 - GENERAL

1.1 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
.1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
.2 Request Departmental Representative's Inspection.

.2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:
.1 Work has been completed and inspected for compliance with Contract Documents.
.2 Defects have been corrected and deficiencies have been completed.
.3 Equipment and systems have been tested, adjusted and are fully operational.
.4 Certificates required by ESA (Electrical Safety Authority have been submitted.
.5 Operation of systems have been demonstrated to Owner's personnel.
.6 Work is complete and ready for final inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request reinspection.

1.2 CLEANING

.1 In accordance with Section 01 74 11.

.2 Remove waste and surplus materials, rubbish and construction facilities from the site in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 As-built, samples, and specifications.

.2 Equipment and systems.

.3 Product data, materials and finishes, and related information.

.4 Operation and maintenance data.

.5 Warranties and bonds.

1.2 SUBMISSION

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection, with Departmental Representative's comments.

.3 Revise content of documents as required prior to final submittal.

.4 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of maintenance manuals English.

.5 If requested, furnish evidence as to type, source and quality of products provided.

.6 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.7 Pay costs of transportation.

1.3 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.

1.3 FORMAT (Cont'd)

.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in pdf format on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as FTP, as directted by Departmental Representative.

1.4 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;
.1 date of submission; names,
.2 addresses, and telephone numbers of Contractor with name of responsible parties;
.3 schedule of products and systems, indexed to content of volume.

.2 For each product or system:
.1 list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to 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 and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

1.5 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 Amendments and 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.

.6 Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work.

.7 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

1.6 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.

1.6 RECORDING ACTUAL SITE CONDITIONS (Cont'd)

.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 depths of elements of foundation in relation to finish first floor datum.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.4 Field changes of dimension and detail.
.5 Changes made by change orders.
.6 Details not on original Contract Drawings.
.7 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 Amendments and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.7 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

1.7 EQUIPMENT AND SYSTEMS (Cont'd)

.4 Include manufacturer's printed operation and maintenance instructions.

.5 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.6 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.7 Additional requirements: As specified in individual specification sections.

1.8 MAINTENANCE MATERIALS

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.9 STORAGE, HANDLING AND PROTECTION

.1 Store, maintenance materials, 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 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

1.10 WARRANTIES AND BONDS

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Certificate of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Procedures for demonstration and instruction of equipment and systems to Owner's O&M personnel.

.2 O&M personnel includes property facility manager, building operators, maintenenace staff, security staff and technical specialists, as applicable.

1.2 DESCRIPTION

.1 Demonstrate operation and maintenance of equipment and systems to Departmental Representative's personnel two weeks prior to date of final inspection.

.2 Departmental Representative will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.3 QUALITY CONTROL

.1 When specified in individual Sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

.2 Submit training schedule of time and date for demonstration and training of each item of equipment and each system in accordance with the training plan four weeks prior to designated dates, for Departmental Representative's approval.

.3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Report shall give time and date of each demonstration and training, with list of persons present.

1.4 CONDITIONS FOR DEMONSTRATIONS

.1 Equipment has been inspected and put into operation.

.2 Testing, adjusting, and balancing has been performed in accordance with Section 01 91 00 and equipment and systems are fully operational.

.3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.5 PREPARATION

.1 Verify that conditions for demonstration and instructions comply with requirements.

.2 Verify that designated O&M personnel are present.

1.6 DEMONSTRATION AND INSTRUCTIONS

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting,, servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.

.2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.

.3 Review contents of manual in detail to explain all aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

1.7 TIME ALLOCATED FOR INSTRUCTIONS

.1 Ensure amount of time required for instruction of each item of equipment or system as follows:
.1 Section 26 05 03 - Short Circuit, Coordination and Arc-Flash Study: 8 hours of instruction.
.2 Section 26 28 16.02 - Molded Case Circuit Breakers: 4 hours of instruction.
.3 Section 26 43 13 -Transient Voltage Surge Supressors: 2 hours of instruction.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Includes general requirements for commissioning facilities and facility systems.

1.2 QUALITY ASSURANCE

.1 Provide System Commissioning Administrator under provisions specified in Section 01 45 00.

.2 Comply with applicable procedures and standards of the certification sponsoring association.

.3 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.

1.3 REFERENCES

.1 NETA Standard for Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems 2009.

1.4 SUBMITTALS

.1 Within 15 working days of Award of Contract, submit name of Contractor personnel proposed to perform services who has managerial responsibilities for coordination of all commissioning activities.

.2 Submit documentation to confirm Contractor personnel compliance with quality assurance provision.

.3 Submit 3 preliminary specimen copies of each type of startup checklist, product information and performance verification report forms proposed for use.

.4 Submit completed report forms within 3 days after completion of each testing to Consultant for review and verification.

.5 Fifteen days prior to Substantial Performance, submit 3 copies of final reports on applicable forms for functional performance verification.

.6 Submit post-commissioning reports of testing, adjusting, and balancing postponed due to seasonal, climatic, occupancy, or other reasons

1.4 SUBMITTALS (Cont'd)

.6 (Cont'd)
beyond Contractor's control, promptly after execution of those services.

1.5 REPORT FORMS

.1 Contractor personnel having managerial responsibility shall make reports.

.2 Report forms shall include:
.1 Startup Checklists.
.2 Product Information (PI) Report forms.
.3 Performance Verification (PV) Report forms.

.3 Ensure each form bears signature of recorder.

.4 Submit signed form to Departmental Representative for review and approval.

.5 Identify each instrument used for testing, adjusting and balancing and its latest date of calibration.

1.6 CONTRACTOR'S RESPONSIBILITIES

.1 Prepare each system for testing and balancing.

.2 Provide personnel and operate systems at designated times, and under conditions required for proper testing, adjusting, and balancing.

.3 Notify Departmental Representative 7 days prior to time project will be ready for testing, adjusting, and balancing.

.4 Accurately record data for each step.

.5 Report to Departmental Representative any deficiencies or defects noted during performance of services.

.6 Correct deficiencies identified in accordance with Departmental Representative's written instructions.

1.7 PREPARATION

.1 Provide instruments required for testing, adjusting, and balancing operations.

.2 Make instruments available to Departmental Representative to facilitate spot checks during testing and functional performance verification.

1.7 PREPARATION (Cont'd)

.3 Retain possession of instruments and remove at completion of services.

.4 Verify systems installation is complete and in continuous operation.

.5 Verify lighting is turned on when lighting is included in load.

.6 Verify equipment such as computers, laboratory and electronic equipment are in full operation when these equipment are included in load.

1.8 EXECUTION

.1 Test equipment, balance distribution systems, and adjust devices for electrical systems.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

DECONSTRUCTION AND WASTE PRODUCTS WORKPLAN SUMMARY

Project Number R.053529.001 **Section 02 42 93**

General Contractor / Waste Management Coordinator	Contact Person(s)	Tel & Fax Nos. Phone - - Fax - -
Project Site:	Type & Work Location: Deconstruction and Renovation	

Material Division #	Material Category	Quantity	Unit of Measure	Material Receiving Body & Hauler	% of total Weight	Disposal Option - % Breakdown			
						Reuse	Recycle	Landfill	
Division 01 - General Requirements									
	Pallets		each						
	Wood		kg.						
	Cardboard Packaging		cu. m.						
	Plastic Packaging		cu. m.						
	Styrene Packaging		cu. m.						
	PS Polyethylene Sheet		sq. m.						
	FRPS Fiber Reinf. Polyethylene Sheet		sq. m.						
	Metal Banding		kg.						
				Subtotal	%	%	%	%	%
Division 02 - Existing Conditions									
	Deconstruction		tonnes						
	Asbestos Abatement Intermediate Precautions		cu. m.						
	Asbestos Abatement Glove Bag		cu. m.						
				Subtotal	%	%	%	%	%
Division 03 - Concrete									
	Poured Concrete		tonnes						
	Pre-Cast Concrete		each						
	Pre-Cast Concrete Sill		each						

General Contractor / Waste Management Coordinator	Contact Person(s)	Tel & Fax Nos. Phone - - Fax - -
Project Site:	Type & Work Location: Deconstruction and Renovation	

Material Division #	Material Category	Quantity	Unit of Measure	Material Receiving Body & Hauler	% of total Weight	Disposal Option - % Breakdown			
						Reuse	Recycle	Landfill	
	Pre-cast Concrete Lintel		each						
	Crushed Concrete Rubble		cu. m.						
	Concrete Reinforcing Steel, Rebars, Mesh		tonnes						
	Formwork-Wood & Plywood		cu. m.						
				Subtotal	%	%	%	%	%
Division 04 - Masonry									
	Concrete Blocks Decorative Blocks		each each						
	Clay Brick: Red		each						
	Clay Brick: Yellow		each						
	Calcium Silicate Brick		each						
	Paving Stones		each						
	Paving Slabs		each						
	Marble		sq. m.						
	Granite		sq. m.						
	Limestone		sq. m.						
	Structural Clay Tile		cu. m.						
	Glass Block		each						
	Anchor Bolts & Dowels		kg. or tonnes						
	Metal reinforcing ties and accessories		tonnes						
	Plastic reinforcing ties and accessories		cu. m.						

General Contractor / Waste Management Coordinator	Contact Person(s)	Tel & Fax Nos. Phone - - Fax - -
Project Site:	Type & Work Location: Deconstruction and Renovation	

Material Division #	Material Category	Quantity	Unit of Measure	Material Receiving Body & Hauler	% of total Weight	Disposal Option - % Breakdown			
						Reuse	Recycle	Landfill	
	Masonry Foundations		cu. m.						
				Subtotal	%	%	%	%	%
Division 07 - Thermal & Moisture Protection									
	Semi-Rigid Insulation: Glass fibre		cu. m.						
	Rigid Insulation: Mineral Fibre		cu. m.						
	Rigid Insulation: Glass Fibre		cu. m.						
	Rigid Insulation: Isocyanurate		cu. m.						
	Rigid Insulation: Polystyrene Extruded		cu. m.						
	Rigid Insulation: Polystyrene Expanded		cu. m.						
	Rigid Insulation: Phenolic		cu. m.						
	Rigid Insulation: Urethane		cu. m.						
	Loose Insulation: Mineral Fibre		cu. m.						
	Loose Insulation: Cellulose		cu. m.						
	Loose Insulation: Vermiculite		cu. m.						
	Sprayed Insulation: Mineral Fibre		cu. m.						
	Sprayed Insulation:		cu. m.						

General Contractor / Waste Management Coordinator	Contact Person(s)	Tel & Fax Nos. Phone - - Fax - -
Project Site:	Type & Work Location: Deconstruction and Renovation	

Material Division #	Material Category	Quantity	Unit of Measure	Material Receiving Body & Hauler	% of total Weight	Disposal Option - % Breakdown			
						Reuse	Recycle	Landfill	
	Glass Fibre								
	Sprayed Insulation: Asbestos Fibre		cu. m.						
	Sprayed Insulation: Cellulose Fibre		cu. m.						
	Poly Vapour Barrier		sq. m.						
	Air Barrier – list types		sq. m.						
				Subtotal	%	%	%	%	%
Division 09 - Finishes									
	Flooring: Vinyl Composition Tile		sq. m.						
	Flooring: Sheet Vinyl		sq. m.						
	Flooring: Ceramic Tile		sq. m.						
	Flooring: Porcelain Tile		sq. m.						
	Flooring: Quarry Tile		sq. m.						
	Flooring; Hardwood		sq. m.						
	Flooring: Laminate		sq. m.						
	Flooring: Granite		sq. m.						
	Flooring: Terrazzo		sq. m.						
	Flooring: Terrazzo Tile		sq. m.						
	Flooring: Access Floor Panels, Pedestals, Stringers and Ramps		sq. m.						
	Base: Metal		m.						
	Base: Wood		m.						
	Base: Rubber		m.						
	Base: Vinyl		m.						

General Contractor / Waste Management Coordinator	Contact Person(s)	Tel & Fax Nos. Phone - - Fax - -
Project Site:	Type & Work Location: Deconstruction and Renovation	

Material Division #	Material Category	Quantity	Unit of Measure	Material Receiving Body & Hauler	% of total Weight	Disposal Option - % Breakdown			
						Reuse	Recycle	Landfill	
	Base: Marble		m.						
	Gypsum Board Wall and Ceiling		sq. m.						
	Wall: Plaster / Lath		sq. m.						
	Wall: Wood Paneling		sq. m.						
	Acoustic Tile (12”X60”) Glass Fiber		sq. m.						
	Acoustic Tile (12”X48”) Glass Fiber		sq. m.						
	Acoustic Tile (12”X24”) Glass Fiber		sq. m.						
	Acoustic Tile (12”X12”) Glass Fiber		sq. m.						
	Acoustical Suspension System/T Bar Grid		sq. m.						
	Specialty Wood Finish		sq. m.						
	Integrated Ceiling Grid (60”X60”)		sq. m.						
	Acoustic Batt Insulation		cu. m.						
	Vinyl Wall Covering		sq. m.						
	Flexible Wood Wall Covering		sq. m.						
				Subtotal	%	%	%	%	%

Division 26 - Electrical

26 09 00 Instrumentation and Control for Electrical Systems

General Contractor / Waste Management Coordinator	Contact Person(s)	Tel & Fax Nos. Phone - - Fax - -
Project Site:	Type & Work Location: Deconstruction and Renovation	

Material Division #	Material Category	Quantity	Unit of Measure	Material Receiving Body & Hauler	% of total Weight	Disposal Option - % Breakdown			
						Reuse	Recycle	Landfill	
	Elec Power & Monitoring and Control		each						
	Lighting Control Device		each						
	Lighting Control Panelboard		each						
26 20 00 Low Voltage Electrical Transmission									
	Low Voltage Overhead Power System		each						
	Low Voltage Distribution Transformer		each						
	Low Voltage Buck Boost Transformer		each						
	Low Voltage Control & Signal Transformer		each						
	Paralleling Low Voltage Switchgear		each						
	Switchboard		each						
	Panelboard		each						
	Motor Control Centre		each						
	Enclosed Bus Assembly		each						
	Power Distribution Unit		each						
	Low Voltage Electricity Meter		each						
	Low Voltage Electrical Cabinet/Enclosure		each						

General Contractor / Waste Management Coordinator	Contact Person(s)	Tel & Fax Nos. Phone - - Fax - -
Project Site:	Type & Work Location: Deconstruction and Renovation	

Material Division #	Material Category	Quantity	Unit of Measure	Material Receiving Body & Hauler	% of total Weight	Disposal Option - % Breakdown			
						Reuse	Recycle	Landfill	
	Low Voltage Multi Outlet Assembly		each						
	Indoor Service Pole		each						
	Low Voltage Wiring Device		each						
	Low Voltage Door Chime		each						
	Low Voltage Fuse		each						
	Low Voltage Enclosed Switch & Circuit Breaker		each						
	Low Voltage Enclosed Controller		each						
	Low Voltage Variable Frequency Motor Controller		each						
26 35 00 Power Filters and Conditioners									
	Capacitor		each						
	Choke & Inductor		each						
	Electromagnetic Interference Filter		each						
	Harmonic Filter		each						
	Power Factor Correction Equip		each						
	Slip Controller		each						
	Static Frequency Converter		each						
	Radio Frequency Inter-		each						

General Contractor / Waste Management Coordinator	Contact Person(s)	Tel & Fax Nos. Phone - - Fax - -
Project Site:	Type & Work Location: Deconstruction and Renovation	

Material Division #	Material Category	Quantity	Unit of Measure	Material Receiving Body & Hauler	% of total Weight	Disposal Option - % Breakdown			
						Reuse	Recycle	Landfill	
	ference Filter								
	Voltage Regulator		each						
26 36 00 Transfer Switches									
	Manual Transfer Switch		each						
	Automatic Transfer Switch		each						
	Static Transfer Switch		each						
26 41 00 Facility Lightning Protection									
	Lightning Protection for Structures		each						
	Lightning Protection for Buildings		each						
	Lightning Prevention and Dissipation		each						
	Lightning Protection Surge Arrestors and Supressors		each						
26 42 00 Cathodic Protection									
	Passive CP for Underground and Submerged Piping		each						
	Passive CP for Underground Storage Tank		each						

General Contractor / Waste Management Coordinator	Contact Person(s)	Tel & Fax Nos. Phone - - Fax - -
Project Site:	Type & Work Location: Deconstruction and Renovation	

Material Division #	Material Category	Quantity	Unit of Measure	Material Receiving Body & Hauler	% of total Weight	Disposal Option - % Breakdown			
						Reuse	Recycle	Landfill	
26 43 00 Transient Voltage Suppression									
	Transient Voltage Suppression		each						

PART 1 - GENERAL

1.1 SUMMARY

.1 Comply with requirements of this Section when performing following Work:
.1 Refer to Appendix A: Designated Substances Report for areas where asbestos may be encountered. Asbestos removal is only required where disturbed by the work of this contract.
.2 Removal or disturbance of one square metre or less of friable asbestos containing material during the work of this contract.
.3 Removing non-friable asbestos containing materials by breaking, cutting, drilling, abrading, grounding, sanding or vibrating at locations indicated in the designated substances report if the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.
.4 Removing of asbestos containing material from a pipe, duct or similar structure using a glove bag.

1.2 SECTION INCLUDES

.1 Requirements and procedures for asbestos abatement of asbestos containing materials of the type described within.

1.3 REFERENCES

.1 O.Reg. 278/05, Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations.

.2 A Guide to the Regulations respecting Asbestos on Construction Projects and in Buildings and Repair Operations released in November 2007, http://www.labour.gov.on.ca/english/hs/asbestos/index.html.

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.205-94, Sealer for Application of Asbestos Fibre Releasing Materials.

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

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

1.3 REFERENCES (Cont'd)

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

.7 Underwriters' Laboratories of Canada (ULC).

1.4 DEFINITIONS

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

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

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

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

.5 Competent worker person: in relation to specific work, means a worker who:
.1 Is qualified because of knowledge, training and experience to perform the work.
.2 Is familiar with the provincial and federal laws and with the provisions of the regulations that apply to the work.
.3 Has knowledge of all potential or actual danger to health or safety in the work.

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

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

.8 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres

1.4 DEFINITIONS (Cont'd)

.8 HEPA vacuum:(Cont'd) greater than 0.3 microns in any dimension at 99.97% efficiency.

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

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

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

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

1.5 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00.

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

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

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

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

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

1.5 SUBMITTALS (Cont'd)

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

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

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

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

1.6 QUALITY ASSURANCE

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

.2 Health and Safety:
.1 Do construction occupational health and safety in accordance with Section 01 35 29.06.
.2 Safety Requirements: worker and visitor protection.
.1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:
.1 Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected

1.6 QUALITY ASSURANCE (Cont'd)

.2 Health and Safety:(Cont'd)

.2 Safety Requirements:(Cont'd)

.1 (Cont'd)

and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.

.2 Disposable type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective clothing to consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing. It includes suitable footwear, and it to be repaired or replaced if torn.

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

.4 Before leaving Asbestos Work Area, the worker can decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before

1.6 QUALITY ASSURANCE (Cont'd)

.2 Health and Safety:(Cont'd)

.4 (Cont'd)
removal from the work area, and removed from the work area frequently and at regular intervals.

.5 Ensure workers wash hands and face when leaving Asbestos Work Area. Facilities for washing are located at various locations in the basement of the Institution as designated by the Chief of Plant Maintenance.

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

.7 Visitor Protection:

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

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

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

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

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

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

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

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

.8 Disposal of asbestos waste generated by removal activities must comply with Federal,

1.7 WASTE MANAGEMENT AND DISPOSAL (Cont'd)

.8 (Cont'd) Provincial/Territorial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 0.15 mm thick (6 mil) bags or leak proof drums. Label containers with appropriate warning labels.

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

1.8 EXISTING CONDITIONS

.1 Reports and information pertaining to ACMS to be handled, removed, or otherwise disturbed and disposed of during this Project are bound into this specification as Appendix 'A'.

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

1.9 SCHEDULING

.1 Hours of Work: perform work involving asbestos removal during normal working hours. Include in Contract Sum additional costs due to this requirement.

1.10 OWNER'S INSTRUCTIONS

.1 Before beginning Work, provide Departmental Representative satisfactory proof that every worker has had instruction and training in 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 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 competent, qualified person.

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 concentration to provide thorough wetting of asbestos containing material.

.3 Waste Containers: contain waste in two separate containers.
.1 Inner container: 0.15 mm thick sealable polyethylene bag or where glove bag method is used, glove bag itself.
.2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
.3 Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site.

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

2.1 MATERIALS (Cont'd)

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

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

PART 3 - EXECUTION

3.1 SUPERVISION

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

.2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos-containing materials.

3.2 PROCEDURES

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06.

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

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

.4 Prevent spread of dust from Asbestos Work Area using measures appropriate to work to be done.
.1 Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over flooring in work areas where dust or

3.2 PROCEDURES (Cont'd)

.4 (Cont'd)

.1 (Cont'd)
contamination cannot otherwise be safely contained.

.2 When removing asbestos containing material from piping or equipment and "glove bag" method is not used erect enclosure of polyethylene sheeting around work area, shut off mechanical ventilation system serving work area and seal ventilation ducts to and from work area.

.5 Remove loose material by HEPA vacuum; thoroughly wet friable material containing asbestos to be removed or disturbed before and during Work unless wetting creates hazard or causes damage.

.1 Use garden reservoir type low - velocity sprayer or airless spray equipment capable of producing mist or fine spray.

.2 Perform Work in a manner to reduce dust creation to lowest levels practicable.

.6 Pipe Insulation Removal Using Glove Bag:

.1 A glove bag not to be used to remove insulation from a pipe, duct or similar structure if:

.1 It may not be possible to maintain a proper seal for any reason including, without limitation:

.1 The condition of the insulation.

.2 The temperature of the pipe, duct or similar structure.

.2 The bag could become damaged for any reason including, without limitation.

.1 The type of jacketing.

.2 The temperature of the pipe, duct or similar structure.

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

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

3.2 PROCEDURES (Cont'd)

.6 (Cont'd)

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

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

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

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

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

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

.8 Cleanup:

.1 Frequently during Work and immediately after completion of work, clean up dust and asbestos containing waste using HEPA vacuum or by damp mopping.

.2 Place dust and asbestos containing waste in sealed dust tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste and wet and fold to contain dust and then place in waste bags.

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

.4 Seal and remove double bagged waste from site. Dispose of in accordance with requirements of Provincial/Territorial and Federal authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of

3.2 PROCEDURES (Cont'd)

.8 Cleanup:(Cont'd)

.4 (Cont'd)
hazardous nature of material to be dumped and that guidelines and regulations for asbestos disposal are followed.

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

3.3 AIR MONITORING

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

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

.2 If air monitoring shows that areas outside Asbestos Work Area enclosures are contaminated, enclose, maintain and clean these areas in same manner as that applicable to Asbestos Work Area.

.3 Ensure that respiratory safety factors are not exceeded.

.4 During the course of Work, Departmental Representative to measure fibre content of air outside Work areas by means of fibrous aerosol monitors (FAM).

.1 When FAM readings exceed 0.25 f/cc, adopt more stringent Work procedures immediately and perform PCM test.

.2 Stop Work when PCM measurements exceed 0.01 f/cc and correct procedures.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 Reference Standards:

.1 ASTM International

.1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM D1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.3 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.2 CSA International

.1 CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA A283-06(R2011), Qualification Code for Concrete Testing Laboratories.

.3 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.3 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.2 ACRONYMS AND TYPES

.1 Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).

.1 Type GU or GUb - General use cement.

1.3 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00.

.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06.

1.4 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00.

.2 Installation of cement-based products must be by a qualified, factory-trained applicator.

1.4 QUALITY ASSURANCE (Cont'd)

.3 Site Meetings: Convene pre-installation meeting one week prior to beginning concrete works.
.1 Ensure key personnel attend.
.2 Verify project requirements.

.4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06.

.5 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.2 Divert unused concrete materials from landfill to local facility approved by. Departmental Representative
.3 Provide an appropriate area on the job site where concrete trucks can be safely washed.
.4 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by the Departmental Representative.
.5 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
.6 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial and National regulations.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Cement: to CAN/CSA-A3001, Type GU.

.2 Blended hydraulic cement: Type GUb to CAN/CSA-A3001.

.3 Supplementary cementing materials: to CAN/CSA-A3001.

.4 Water: to CSA-A23.1/A-23.2.

.5 For use in pre-leveling or when concrete topping is installed over 50mm thick, aggregate shall be well graded, washed gravel (3mm to 6mm or larger)

.6 Admixtures:
.1 Air entraining admixture: to ASTM C260/C260M.
.2 Chemical admixture: to ASTM C494 and ASTM C1017. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.7 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA-A23.1/A23.2.
.1 Compressive strength: 50 MPa at 28 days.
.2 Net shrinkage at 28 days: maximum 0%.

.8 Premoulded joint fillers:
.1 Bituminous impregnated fiber board: to ASTM D1751.
.2 Sponge rubber: to ASTM D1752, Type I, firm grade.

.9 Curing Compound: to CSA-A23.1/A23.2, white.

.10 Deformed steel wire for concrete reinforcement: to ASTM A82/A82M, minimum 30% recycled content.

.11 Sawcut Control Joint Filler: Two component self levelling epoxy joint sealant.

.12 Finished concrete topping surface shall be coated with an epoxy floor paint as specified in 09 91 23.

2.2 MIXES

.1 Performance Method for specifying concrete: to meet Departmental Representative performance criteria in accordance with CAN/CSA-A23.1/A23.2.

.2 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 - VERIFICATION.

.3 Provide concrete mix to meet following requirements:
.1 Finishing compound for overhead and vertical concrete walls.
.1 Portland cement-based
.2 Time to seal: 2 to 3 hours
.3 VOC: 0 g/L, calculated SCAQMD 1168
.4 high yield, non-shrinking

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 When applying concrete products, comply with manufacturer's written recommendations or specifications, including product technical bulletins; handling, storage, surface preparation and installation instructions; and datasheets.

3.2 PREPARATION

.1 Manufacturer shall provide verification that substrate preparation is compliant with all manufacturer recommendations prior to application of concrete products.

.2 All concrete substrates must be of adequate strength, clean, and free of all oil, grease, dirt, curing compounds and any substance that might act as a bond breaker before priming. Mechanically clean if necessary using shot blasting or other method. Acid etching and the use of sweeping compounds and solvents are NOT acceptable.

.3 All cracks in the substrates shall be repaired to minimize telegraphing through the concrete topping or compound.

.4 Moving Joints - honor all expansion and isolation joints up through the topping.

3.2 PREPARATION (Cont'd)

.5 Standard absorbent concrete subfloors, highly absorbent concrete subfloors, nonabsorbent substrates such as terrazzo, ceramic and stone tiles, and installations over concrete, must be primed with an epoxy-based primer.

.6 Do not install concrete topping below 50°F or above 85°F surface temperature.

.7 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.

.8 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
.1 Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.

.9 Protect previous Work from staining.

.10 Clean and remove stains prior to application for concrete finishes.

.11 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.12 Do not place load upon new concrete topping until authorized by Departmental Representative.

3.3 CONSTRUCTION

.1 Do cast-in-place concrete work in accordance with CSA-A23.1/A23.2.

.2 Finishing and curing:
.1 Use procedures as reviewed by Departmental Representative or those noted in CSA-A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
.2 Finish concrete floor to meet requirements of CSA-A23.1/A23.2. Table 22 Class C.
.3 Concrete floor to have finish hardness equal or greater than Mohs hardness in accordance with CSA-A23.1/A23.2.
.4 Provide screed float swirl-trowelled finish unless otherwise indicated.
.5 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.

3.3 CONSTRUCTION (Cont'd)

.3 Isolation joints:
.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.
.2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
.3 Locate and form isolation and construction joints as indicated.
.4 Install joint filler.

3.4 SURFACE TOLERANCE

.1 Concrete tolerance in accordance with CSA-A23.1/A23.2 Table 22, Class C.

3.5 FIELD QUALITY CONTROL

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.2 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve Contractor of contractual responsibility.

3.6 VERIFICATION

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established in PART 2 - Products and provide verification of compliance as described in PART 1 - Quality Assurance.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CAN/CSA-A165 SERIES-04(R2009), CSA Standards on Concrete Masonry Units.
.2 CSA A179-04(R2009), Mortar and Grout for Unit Masonry.
.3 CSA-A370-04(R2009), Connectors for Masonry.
.4 CSA-A371-04(R2009), Masonry Construction for Buildings.
.5 CSA G30.14-M1983(R1998), Deformed Steel Wire For Concrete Reinforcement.
.6 CAN/CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
.7 CSA-S304.1-04(R2010), Masonry Design for Buildings.

1.2 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Sections 01 33 00.
.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00

.2 Shop Drawings:
.1 Submit shop drawings in accordance with Section 01 33 00.
.2 Shop drawings consist of bar bending details, lists and placing drawings.
.3 On placing drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.

1.3 STORAGE AND HANDLING

.1 Protect on site stored or installed material from moisture damage in accordance with manufacturer's printed instructions.

PART 2 - PRODUCTS

2.1 MASONRY UNITS

.1 Standard concrete block units: to CAN/CSA-A165 Series (CAN/CSA-A165.1).
.1 Classification: S/15/A/M.
.2 Size: modular, CCMPA size code 15.
.3 Special shapes: provide bull- nosed units for exposed corners.
.4 75% solic - 2 hour Fire Resistance Rating.

2.2 REINFORCEMENT AND CONNECTORS

.1 Wire reinforcement: to CSA-A371 and CSA G30.14, truss type.

.2 Connectors shall be corrosion resistant: to CSA-A370 and CSA-S304.

2.3 MORTAR AND GROUT

.1 Mortar: to CSA A179. .1 Use aggregate passing
.1 Use aggregate passing 18 mm sieve where 6 mm thick joints are indicated.
.2 Colour: natural aggregates.

.2 Mortar Type: S

.3 Grout: to CSA A179, Table 3.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Do masonry work in accordance with CSA-A371 except where specified otherwise.
.1 Bond: running stretcher bond with vertical joints in perpendicular alignment and centred on adjacent stretchers above and below.
.2 Coursing height: 200 mm for one block and one joint.
.3 Jointing: tool where exposed or where paint or other finish coating is specified to provide smooth compressed concave surface.

.2 Build masonry plumb, level, and true to line, with vertical joints in alignment.

.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.2 CONSTRUCTION

.1 Exposed masonry:
.1 Remove chipped, cracked, and otherwise damaged units, in exposed masonry and replace with undamaged units.
.2 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects. Make cuts straight, clean, and free from uneven edges.

.2 Building-In:
.1 Install masonry connectors and reinforcement where indicated on drawings.
.2 Build in items required to be built into masonry.
.3 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
.4 Leave 6mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
.5 Built masonry to tie in with stabilizers, with provision for vertical movement.

.3 Interface with other work:
.1 Make good existing work. Use materials to match existing.

3.3 REINFORCING AND CONNECTING

.1 Install masonry connectors and reinforcement in accordance with CSA-A370, CSA-A371 and CSA-S304.1 unless indicated otherwise.

.2 Prior to placing grout, obtain Departmental Representative's approval of placement of reinforcement and connectors.

3.4 GROUTING

.1 Grout masonry in accordance with CSA-S304.1, CSA-A371 and CSA-A179 and as indicated.

3.5 ANCHORS

.1 Supply and install metal anchors as indicated.

3.6 LATERAL SUPPORT AND ANCHORAGE

.1 Supply and install lateral support and anchorage in accordance with CSA-S304.1 and as indicated.

3.7 SITE TOLERANCES .1 Tolerances in notes to Clause 5.3 of CSA-A371 apply.

3.8 CLEANING .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.9 PROTECTION .1 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

END

PART 1 - GENERAL

1.1 REFERENCES

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

.2 Underwriter's Laboratories of Canada (ULC)
.1 CAN/ULC-S101-07, Standard Methods of for Fire Endurance Tests of Building Construction and Materials.
.2 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.3 CAN/ULC-S115-11, Standard Method of Fire Tests of Firestop Systems.

1.2 DEFINITIONS

.1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.

.2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.

.3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

.4 Continuity of Fire Separations: NBC 2010, Division B, Parts 3.1.8 and 3.1.9.1, 9.10.9):
.1 Wall, partition or floor assemblies required to be a fire separation shall be: constructed as a continuous element; have a fire resistance rating; have openings protected by a closure; and have penetrations sealed by a firestop.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets.

.3 Shop Drawings:
.1 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation.
.2 Construction details should accurately reflect actual job conditions.

.4 Quality assurance submittals: submit following:
.1 Test reports: in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.
.1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.4 QUALITY ASSURANCE

.1 Qualifications:
.1 Installer: company specializing in fire stopping installations with 5 years documented experience approved by manufacturer.
.2 All fire stopping material shall be from one manufacturer.
.3 All fire stopping installation work for entire project shall be by a single contractor experienced in firestopping. Individual disciplines shall NOT fire stop their own work.

.2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Departmental

1.4 QUALITY ASSURANCE (Cont'd)

.2 Pre-Installation Meetings:(Cont'd)
Representative in accordance with Section 01 32 16 to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

.3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
.1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
.2 During progress of Work at 50% complete.
.3 Upon completion of Work, after cleaning is carried out.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
.1 Deliver, store and handle materials in accordance with Section 01 61 00.
.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
.3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.2 Storage and Protection:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

.3 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Fire stopping and smoke seal systems: in accordance with CAN/ULC-S115.
   .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3.
   .2 Fire stop system rating: F or FT as required by location.

.2 Service penetration assemblies: systems tested to CAN/ULC-S115.

.3 Service penetration fire stop components: certified by test laboratory to CAN/ULC-S115.

.4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.10 Sealants for vertical joints: non-sagging.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
.1 Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.4 SEQUENCES OF OPERATION

.1 Proceed with installation only when submittals have been reviewed by Departmental Representative.

.2 Install floor fire stopping before interior partition erections.

.3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.

3.5 FIELD QUALITY CONTROL

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

.2 Manufacturer's Field Services:
.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 11.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.7 SCHEDULE

.1 Fire stop and smoke seal at:
.1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
.2 Top of fire-resistance rated masonry and gypsum board partitions.
.3 Intersection of fire-resistance rated masonry and gypsum board partitions.

3.7 SCHEDULE (Cont'd)

.1 (Cont'd)

.4 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.

.5 Openings and sleeves installed for future use through fire separations.

.6 Around mechanical and electrical assemblies penetrating fire separations.

END

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 04 04 99: Masonry.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM):
.1 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 ASTM B209-10, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.2 Canadian General Standards Board (CGSB):
.1 CAN/CGSB-1.81-M89, .
.2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
.3 CAN/CGSB-1.108-M89, Bituminous Solvent Type Paint.
.4 CGSB 31-GP-107MA-90, Non-Inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.

.3 The Master Painters Institute (MPI) / Architectural Painting Specification Manual - 2011.
.1 MPI# 79 - Primer, Alkyd, Anti-Corrosive for Metal.

.4 Underwriters Laboratories of Canada (ULC)

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 11 00.

.2 Clearly indicate type, size and anchor or mounting details and ULC listing.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Sheet steel: commercial quality, stretcher levelled sheet steel to ASTM A653/A653M, minimum 25% recycled content, Z275 zinc coating designation.

.2 Prime paint: to MPI# 79. Ecologo certified.

.3 Baked enamel: 1 coat metal conditioner to CGSB 31-GP-107Ma, Ecologo certified; 1 coat primer to CAN/CGSB-1.81, Type 2, Ecologo certified; 2 coats gloss enamel to CAN/CGSB-1.88, Ecologo certified, bake to smooth, hard finish.

2.2 FABRICATION

.1 Wall type flush:
.1 Frame: 2.0 mm thick galvanized, sheet steel, angle shaped, 25 mm wide face.
.2 Leaf: 2.0 mm thick sheet steel.
.3 Hardware: hinges for 150° opening, screwdriver operated flush cam locks.
.4 Finish: shop primed.

.2 Fire rated:
.1 ULC listed and labelled, 1-1/2 hr, temperature rise 30 minutes, 250°F max.
.2 Frame 1.6 mm thick stainless steel.
.3 Leaf: 0.9 mm thick stainless steel.
.4 Self latching.
.5 Ring operated lock.
.6 Hardware: hinges for 150° opening, screwdriver operated flush cam locks.
.7 Finish: shop primed.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Supply other sections with templates and instructions.

.2 Do not install access doors in openings which have not been reinforced on all four sides.

.3 Apply bituminous paint to metal surfaces in contact with concrete and masonry.

.4 Install work straight, plumb, level and square, flush with adjoining applied surface.

3.1 INSTALLATION (Cont'd)

.5 Touch-up scratched or chipped primer and baked enamel.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 Architectural Painting Specifications Manual, Master Painters Institute (MPI), 2011.

.2 National Fire Code of Canada 2010.

.3 MPI Maintenance Repainting Specifications Manual.

1.2 QUALITY ASSURANCE

.1 Contractor shall have a minimum of five years proven satisfactory experience. When requested, provide a list of last three comparable jobs including, job name and location, specifying authority, and project manager.

.2 Conform to latest MPI requirements for exterior painting work, including preparation and priming.

.3 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) shall be in accordance with MPI Painting Specification Manual "Approved Product" listing and shall be from a single manufacturer for each system used.

.4 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

.5 Standard of Acceptance:
.1 Walls: No defects visible from a distance of 1000 mm at 90° to surface.
.2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.3 DESIGNATED SUBSTANCES

.1 Designated substances have been identified on this project. Contractor must comply with all applicable legislation when working with designated substances. Refer to 'Final DSHMS Report, Millhaven Institution', dated October 12, 2006, in Appendix A.

1.4 SCHEDULING OF WORK

.1 Schedule painting operations to minimize disruption of occupants in and about the building.

1.5 SUBMITTALS

.1 Submit product data and manufacturer's installation/application instructions for each paint and coating product to be used in accordance with Section 01 33 00.

.2 Submit WHMIS MSDS - Material Safety Data Sheets.

1.6 DELIVERY, HANDLING AND STORAGE

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

.2 Labels shall clearly indicate:
.1 Manufacturer's name and address.
.2 Type of paint or coating.
.3 Compliance with applicable standard.
.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Provide and maintain dry, temperature controlled, secure storage.

.5 Observe manufacturer's recommendations for storage and handling.

.6 Store materials and supplies away from heat generating devices.

.7 Store materials and equipment in a well ventilated area with temperature range 7°C to 30°C.

.8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Departmental Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative.

.10 Remove paint materials from storage only in quantities required for same day use.

1.6 DELIVERY, HANDLING AND STORAGE (Cont'd)

.11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.12 Fire Safety Requirements:
.1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
.3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.7 SITE REQUIREMENTS

.1 Heating, Ventilation and Lighting: .1 Ventilate enclosed spaces.
.1 Perform no painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10°C for 24 hours before, during and after paint application until paint has cured sufficiently.
.2 Coordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
.3 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
.4 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities shall be provided by General Contractor.

.2 Surface and Environmental Conditions:
.1 Apply paint finish only in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
.2 Apply paint only to adequately prepared surfaces and to surfaces within moisture limits noted herein.

1.7 SITE REQUIREMENTS (Cont'd)

.2 (Cont'd)

.3 Apply paint only when previous coat of paint is dry or adequately cured.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

.2 Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.,) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.

.3 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Paint materials for paint systems shall be products of a single manufacturer.

.3 Only qualified products with E2 "Environmentally Friendly" rating are acceptable for use on this project.

2.2 COLOURS

.1 Colour shall be based upon the selection of two colours for components indicated.

.2 Selection of colours shall be from manufacturer's full range of colours.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site.

.2 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following values:

Gloss Level Category	Units @ 60	Units @ 85
G1 - matte finish	0 to 5	max. 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	min. 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

.2 Gloss level ratings of painted surfaces as indicated.

2.5 PAINTING SYSTEMS

.1 Steel Components (steel doors and frames):
.1 EXT 5.10 Alkyd over alkyd primer; gloss level 5 semi-gloss.

.2 Concrete block and concrete walls & ceilings:
.1 INT 4.2A Latex over latex prier; gloos level 4, satin.

PART 3 - EXECUTION

3.1 GENERAL

.1 Perform preparation and operations for painting in accordance with MPI Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.2 EXISTING CONDITIONS

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

3.2 EXISTING CONDITIONS (Cont'd)

.2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter and report findings to Departmental Representative. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 In areas requiring the repainting of the existing building the contractor is to evaluate the existing surface condition and evaluate adhesion of existing coatings. The contractor by apply paint accepts substrate. Proper preparation of surfaces is to be completed as necessary to achieve proper adhesion and surface preparation. Repainting is to be completed to MPI requirements for repainting. Standard of acceptance for repainted areas is the same as noted above.

3.3 PROTECTION

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Departmental Representative.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.5 As painting operations progress, place "WET PAINT" signs in occupied areas to approval of Departmental Representative.

3.4 CLEANING AND PREPARATION

.1 Steel Components (chase access doors & frames:
.1 Clean and prepare surfaces in accordance with MPI Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
.2 Remove dust, dirt, and other surface debris by vacuuming or wiping with dry, clean cloths.
.3 Wash surfaces with a biodegradable detergent and bleach where applicable and clean

3.4 CLEANING AND PREPARATION (Cont'd)

.1 (Cont'd)

.3 (Cont'd)
warm water using a stiff bristle brush to remove dirt, oil, and other surface contaminants.

.4 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.

.5 Allow surfaces to drain completely and allow to dry thoroughly.

.6 Treat between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.2 Concrete block and concrete walls:

.1 All concrete surfaces must be structurally sound, solid and free of any contaminant that might act as a bond breaker, including all weak or loose areas, form release, sealers, paints, latex or gypsum compounds, curing compounds, dust, dirt, or oils. If necessary, mechanically clean the surface down to sound, solid concrete. Acid etching, adhesive removers, solvents and sweeping compounds are not acceptable means of cleaning the surface. The use of sanding equipment is not an effective method to remove curing and sealing compounds. Surfaces must be dry for a successful installation.

3.5 APPLICATION

.1 Apply paint/sealer by spray, brush or roller. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:

.1 Apply paint/sealer in a uniform layer using brush and/or roller of types suitable for application.

.2 Work paint/sealer into cracks, crevices and corners.

.3 Paint/seal surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint/seal surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Departmental Representative.

.5 Remove runs, sags and brush marks from finished work and repaint.

.6 Edges of painted/sealed areas must be clean and straight.

3.5 APPLICATION (Cont'd)

.3 Spray application:
.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
.2 Keep paint/sealer ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
.3 Apply paint/sealer in a uniform layer, with overlapping at edges of spray pattern.
.4 Brush out immediately all runs and sags.
.5 Use brushes to work paint/sealer into cracks, crevices and places which are not adequately covered by spray.
.6 Edges of painted/sealed areas must be clean and straight.

.4 Apply coats of paint/sealer as a continuous film of uniform thickness. Recoat thin spots or bare areas before next coat of paint is applied.

.5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.6 Sand and dust between coats to remove visible defects.

.7 Finish all surfaces of specified components including tops of rafters and inside of steel channels.

.8 Ensure adequate ventilation according to manufacturer's written instructions throughout application and drying period.

3.6 FIELD QUALITY CONTROL

.1 Field inspection of painting operations to be carried by Departmental Representative.

.2 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.3 Co-operate with Departmental Representative and provide access to areas of work.

3.7 RESTORATION

.1 Clean and re-install all hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA C22.1-2012, Canadian Electrical Code, Part 1 (21st Edition), Safety Standard for Electrical Installations.
.2 CSA C22.2 No.131-07 (R2102), Type TECK 90 Cable.
.3 CSA-C22.2 No. 0.3-09, Test Methods for Electical Wires and Cables, includes update No. 1 (2010).
.4 CSA C22.2 No. 38 - 10, Thermoset-Insulated Wires and Cables.

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

.3 The Ontario Electrical Safety Code 2012, and all bulletins (Ontario).

.4 Electrical Safety Authority (ESA) requiremenets.

1.2 DESIGN REQUIREMENTS

.1 Language operating requirements: provide identification nameplates and labels for control items in English only.

1.3 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00.

.2 Provide main single line electrical diagrams under plexiglass and locate in main electrical room.

.3 Shop drawings:
.1 Submit drawings within 3 weeks of Award of Contract.
.2 Submit 6 copies of drawings to Departmental Representative.
.3 If changes are required, notify Departmental Representative of these changes before they are made.

.4 Quality Control:
.1 Provide CSA, cUL or cETL certified equipment and material.

1.3 SUBMITTALS (Cont'd)

.4 Quality Control:(Cont'd)

.2 Where CSA certified equipment and material is not available, submit such equipment and material to inspection authorities for special approval before delivery to site.

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

.4 Permits and fees: in accordance with General Conditions of contract. Pay associated fees. Departmental Representative will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.

.5 Submit certificate of acceptance from Electrical Safety Authority (ESA), upon completion of work, to Departmental Representative.

1.4 QUALITY ASSURANCE

.1 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction.

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

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

.2 Site Meetings:

.1 In accordance with Section 01 31 19.

.2 Schedule site visits, to review Work, at stages listed.

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

.2 Twice during progress of Work at 25% and 60% complete.

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

.3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of Contract.

.2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

1.6 SYSTEM STARTUP

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

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00.

.2 Material and equipment to be CSA, cUL or cETL certified. Where certified material and equipment are not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in Section 01 33 00.

.3 Factory assemble distribution panels.

2.2 WIRING TERMINATIONS

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

2.3 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates and labels as follows:
.1 Nameplates: lamicoid 3 mm thick engraving sheet, white face, black core, lettering accurately aligned and engraved into core mechanically attached with self tapping screws.
.2 Sizes as follows:

2.3 EQUIPMENT IDENTIFICATION (Cont'd)

.1 (Cont'd)

.2 Sizes as follows:(Cont'd)

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

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate and label.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

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

.7 Transformers: indicate capacity, primary and secondary voltages.

2.4 WIRING IDENTIFICATION

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

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA-C22.1.

2.5 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
.1 Paint indoor switchgear and distribution enclosures ASA61 gray.

PART 3 - EXECUTION

3.1 INSTALLATION

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

3.2 NAMEPLATES AND LABELS

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

3.3 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.
.1 Sleeves through concrete (not inlcuding fire rated walls): plastic, sized for free passage of conduit, and protruding 50 mm.

.2 If sleeves are used in fire rated walls or floors, sleeves to match fire rating of wall.

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

3.4 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.
.1 Panelboards: as required by Code or as indicated.

3.5 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings. Refer to Section 26 05 03 - Electrical Coordination Study.

3.6 FIELD QUALITY CONTROL

.1 Conduct following tests:
.1 Distribution panels: phasing, voltage, and grounding.
.2 Verify operation of branch circuits originating from distribution panels.
.3 Insulation resistance testing:
.1 Megger new 600 volt feeders with a 1000 V instrument, prior to connecting to supply and loads.
.2 Check resistance to ground before energizing.

.2 Carry out tests in presence of Departmental Representative.

.3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.7 CLEANING

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

.2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

END

PART 1 - GENERAL

1.1 DESCRIPTION

.1 Provide a short-circuit and protective device coordination and ARC flash study for the electrical distribution system. The intent of these studies are to verify that the specified and supplied equipment are properly rated, correctly applied, and within industry and manufacturer's tolerances, and to provide warning labels specifying requied PPE (Personal Protetive Equipment) and safe approach boundaries.

.2 Study shall:
.1 Include transformers #1 and #2, 600/347 volt switchgear and 600 volt switch board in the Millhaven main electrical room in building MHU, new feeders and new normal and essential distribution panels in buildings MHA, MHE, MHJ, MHS and MHT. The Bath Institution is not included in the study except that the short circuit and ARC flash contribution from the utility and generator supply through the switchgear in buidling BA-04 will be included in the study. Note that loads downstream from the new distribution panels in each building are not included in the study.
.2 Consider operation during normal conditions, alternate operations, emergency power conditions, and any other operations which could result in maximum fault conditions.

.3 Coordination study shall:
.1 Determine the correct settings for the protective devices which will minimize the damage caused by an electrical fault and allow for selective coordination between the devices.
.2 Include the closest upstream utility protective device down to the panelboard main, branch, or feeder circuit breakers.
.3 Consider operation during normal conditions, alternate operation, and during emergency power conditions.

1.2 QUALIFICATIONS

.1 Contractor shall have the study prepared by qualified engineers of an independent consultant. Consultant shall be a Registered Professional Electrical Engineer, licensed in the province where the project is completed, who

1.2 QUALIFICATIONS (Cont'd)

.1 (Cont'd) has at least ten (10) years of experience and specializes in performing power system studies.

.2 Perform short circuit, ARC flash and coordination study using the industry recognized program for Windows computer software package.

1.3 SUBMITTALS

.1 Submit power system studies within 30 days after the electrical equipment submittals have been received for review by the Departmental Representative.

.2 Submit three (3) copies of the power systems study.

.3 After the study is approved, provide ARC flash labels according to CSA-Z462 for new distribution panels, and existing switchboards in the main electrical room. Include labels for normal and emergency sides, and existing manual transfer switch.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 IMPEDANCE ONE-LINE DIAGRAM

.1 Create an impedance one-line diagram. Protect all electrical equipment wiring by overcurrent devices installed under this project and indicate each location where the fault current will be calculated. Clearly indicate, on the single-line, the schematic wiring of the electrical distribution system.

.2 Show reference nodes on the single-line diagram referring to a formal report and include the following specific information:
.1 X/R ratios, utility contribution, and short circuit values (asymmetrical and symmetrical) at the bus of the main service, and all downstream equipment containing overcurrent devices.

3.1 IMPEDANCE ONE-LINE DIAGRAM (Cont'd)

.2 (Cont'd)
.2 Transformer kVA and voltage ratings, percent impedance, X/R ratios and wiring connections.
.3 Voltage at each bus.
.4 Identifications of each bus.
.5 Conduit material, feeder sizes and length.

3.2 SHORT CIRCUIT AND ARC FLASH STUDY

.1 Calculate by means of the industry recognized program for Windows computer software package. Incorporate pertinent data, rationale employed, and assumptions in developing the calculations in the introductory remarks of the study.

.2 Do study in accordance with applicable ANSI and IEEE Standards, and CSA-Z462.

.3 Determine available 3 phase short circuit and ground fault currents at each bus. Incorporate motor contribution in determining momentary and interrupting ratings of the protective devices.

.4 Present data determined by short circuit study in table format. Include:
.1 Node & Device identification.
.2 Operating voltage.
.3 Type of Protective device. (i.e. fuse, molded case circuit breaker, etc.)
.4 Device short circuit rating.
.5 Calculated maximum short circuit current, 3 phase or ground fault, asymmetrical and symmetrical, and X/R ratio.
.6 PPE (Personal Protective Equipment) category, and safe approach boundaries.
.7 De-rate the devices where the tested X/R ratio is less than the calculated X/R ratio. (maximum fault current multiplied by MF.)
.8 Comments section indicating that device is underrated.

3.3 PROTECTIVE DEVICE COORDINATION STUDY

.1 Calculate by means of the industry recognized program for Windows computer software package.

.2 Meet or exceed CSA-C22.1-2009 Canadian Electrical Code (CEC) and Ontario Electrical Safety Code 2009 (OESC).

.3 Include the closest upstream utility protective device down to the panelboard main, branch, or feeder circuit breakers. Prepare coordination

3.3 PROTECTIVE DEVICE COORDINATION STUDY (Cont'd)

.3 (Cont'd)
curves to determine the required settings of protective devices to assure selective coordination.

.4 Include phase and ground overcurrent protection, as well as settings for all other adjustable protective devices.

.5 Graphically illustrate on log-log paper that adequate time separation exists between devices. Use sufficient curves to clearly indicate the coordination achieved between devices. Maintain reasonable coordination intervals and separation of characteristic curves. Plot the specific time-current characteristics of each protective device in such a manner that the upstream devices will be clearly depicted on the sheet.

.6 Plots shall include complete titles, representative one-line diagram and legends, associated power company's relays or fuse characteristics, and complete parameters of transformers. Maximum of eight protective devices per sheet.

.7 Indicate the following specific information on the coordination curves:
.1 Device identifications.
.2 Time and current ratio for curves.
.3 Fuse circuit breaker, and relay curves, showing complete operating bands of low-voltage circuit breaker trip curves.
.4 Significant maximum symmetrical or asymmetrical short circuit cutoff point.
.5 Electric utility's relays and/or fuses including manufacturer's minimum melt, total clearing, tolerance.
.6 Medium voltage equipment relays.
.7 Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
.8 Low voltage equipment circuit breaker trip devices, including manufacturers tolerance bands.
.9 Pertinent transformer full-load currents at 100% and 600%.
.10 Ground fault protective device settings.
.11 Other system load protective devices for largest branch circuit and feeder circuit breaker in each motor control center and panelboard.

3.3 PROTECTIVE DEVICE COORDINATION STUDY (Cont'd)

.8 Develop a table to summarize the settings selected for the protective devices. Include the following:
.1 Device identification.
.2 Current transformer ratio, relay tap, time delay, and instantaneous pickup.
.3 Circuit breaker sensor rating, long-time, short-time, and instantaneous settings, and time bands.
.4 Fuse rating and type.
.5 Ground fault pickup and time delay.

3.4 ANALYSIS

.1 Analyze short circuit calculations and highlight any equipment that is determined to be underrated as specified or not coordinated. Propose approaches to effectively protect the underrated equipment. Proposed major corrective modifications will be taken under advisement by the Departmental Representative, and the Contractor will be given further instructions.

.2 After developing the coordination curves, highlight areas lacking coordination. For each sheet, present a technical evaluation with a discussion of the logical compromises for best coordination.

3.5 REPORT

.1 Summarize the results of the power system study in a final report.

.2 Report shall include the following sections:
.1 Introduction, executive summary and recommendations, assumptions, impedance one line drawing, and copies of the project single-line drawings.
.2 Tabulations of equipment ratings versus calculated short circuit values and X/R ratios, and commentary regarding same.
.3 Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.
.4 Copies of manufacturer's time current curves for the devices studied and plotted.
.5 ARC flash information including PPE category for each point in the study.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 34 Conduits, conduit fastenings and conduit fittings.

1.2 REFERENCES

.1 CSA International
.1 CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.
.2 CAN/CSA-C22.2 No.65-03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
.1 EEMAC 1Y-2-1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.5 DELIVERY, STORAGE AND HANDLING (Cont'd)

.3 Storage and Handling Requirements:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect wire and box connectors from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Clamps or connectors for TECK cable as required to: CAN/CSA-C22.2 No.18.

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 wire and box connectors installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Remove insulation carefully from ends of conductors and cables and:
.1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.

3.3 CLEANING

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

.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.

END

PART 1 - GENERAL

1.1 PRODUCT DATA

.1 Provide product data in accordance with Section 01 33 00.

1.2 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: remove for reuse of pallets crates paddling and packaging materials in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 BUILDING WIRES

.1 Conductors: stranded copper.

.2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, Jacketted.

2.2 TECK 90 CABLE

.1 Cable: in accordance with Section 26 05 00 - Common Work Results For Electrical.

.2 Conductors:
.1 Grounding conductor: copper.
.2 Circuit conductors: bare, annealed copper, size as indicated, Class B stranded in accordance with ASTM B8.

.3 Constructed of Lead Free (<300 ppm) and RoHS compliant materials.

.4 Insulation:
.1 Cross-linked polyethylene meeting CSA C22.2 NO. 38 type RW90 for unshielded cables rated 5 kV or less.
.2 Rating: 1000 V.

.5 Inner jacket: black polyvinyl chloride material per CSA C22.2 No. 131-07, 90°C temperature rating, flame retardant, low acid gas emitting. per CSA C22.2 No. 0.3-01 and Marked AG14.

.6 Armour: Interlocking aluminum.

2.2 TECK 90 CABLE (Cont'd)

.7 Fastenings:
.1 Two hole aluminum straps to secure surface cables.
.2 Aluminum channel type supports for two or more cables at 1000 mm centers.
.3 Threaded rods: 6 mm (1/4") diameter to support suspended channels.
.4 Hardware to be stainless steel, including bolts, nuts, washers adn lockwashers.

.8 Connectors:
.1 Watertight, aluminum, approved for TECK cable, per Section 26 05 22.

.9 Outer Jacket: Black overall polyvinyl chloride jacket er CSA C22.2 No. 131-07, Low Acid Gas Emission; Limited Flame Spread.

.10 Circuit conductor Identification: Red, black, blue coloured insulation or printed colour stripe.

.11 Bending Radius:
.1 Fixed position: Maximum 7 x cable overall diameter.
.2 During pulling: Maximum 14 x cable overall diameter.

.12 Flame retardant, outer jacket marked FT4.

.13 Cables are low acid gas emitting per CSA C22.2 No. 0.3-01 and Marked AG14.

.14 Temperature rating of 90°C dry and wet, 130°C emergency rating and 250°C short circuit rating. -40°C low temperature rating.

.15 Cables are rated for hazardous locaitons (HL) per CSA C22.2 No. 174-M1987(R2008).

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00, Section 3.6.

.2 Perform HI-POT tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation. Refer to Section 26 05 00, Section 3.6.

.3 Perform tests before energizing electrical system.

3.2 CABLE INSTALLATION

.1 Lay cable in cable trays in accordance with Section 26 05 36.

.2 Terminate cables in accordance with Section 26 05 20.

.3 Parallel feeders are not to be used unless indicated as such on the drawings.

.4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:
.1 In conduit systems in accordance with Section 26 05 34.

3.4 INSTALLATION OF TECK90 CABLE (0 -1000 V)

.1 Group cables wherever possible on channels, or cable trays, as indicated.

.2 Install cable exposed securely supported by two hole straps, hangers, or cable tray as indicated.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for TECK 90 cable connectors.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CSA C22.2 No.131.
.2 CSA C22.2 No.41-07, Grounding and Bonding Equipment.

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

.2 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 CONNECTORS AND TERMINATIONS

.1 Use connectors specifically designed for TECK 90 cable and CSA or cUL approved for the purpose.

.2 Connectors to be aluminum.

.3 Connectors to be wateright.

.4 Conectors to be equipped with grounding ring to make contact with aluminum armour of cable.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.

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

PART 2 - PRODUCTS

2.1 SUPPORT CHANNELS

.1 U shape, aluminum, size 41 x 41 mm, 2.5 mm thick, surface mounted suspended.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Secure equipment to poured concrete with expandable inserts.

.2 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.3 Fasten exposed conduit or cables to building construction or support system using straps.
.1 Two-hole steel straps.
.2 Beam clamps to secure conduit to exposed steel work.

.4 Suspended support systems.
.1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.

3.1 INSTALLATION (Cont'd)

.4 (Cont'd)

.2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.5 For surface mounting of two or more cables or conduits use channels at 1 m on centre spacing.

.6 Provide aluminum brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.7 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.8 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.9 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.

.10 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA-C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
- .2 CAN/CSA-C22.2 NO. 18.1-04, Metallic Outlet Boxes.
- .3 CAN/CSA-C22.2 NO. 18.2-06, Nonmetallic Outlet Boxes.
- .4 CAN/CSA-C22.2 No. 18.3-04(R2009),Conduit, Tubing, and Cable Fittings (Tri-National standard, with ANCE NMX-J-017 and UL 514B).
- .5 CSA C22.2 No. 45.1-07, Electrical Rigid Metal Conduit - Steel (Tri-National standard, with UL 6 and NMX-J-534-ANCE-2007).
- .6 CSA C22.2 No. 56-04(R2009), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .7 CSA C22.2 No. 83-M1985(R2008), Electrical Metallic Tubing.
- .8 CSA C22.2 No. 211.2-06(R2011), Rigid PVC (Unplasticized) Conduit.
- .9 CAN/CSA-C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
- .1 Submit cable manufacturing data.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

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

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

PART 2 - PRODUCTS

2.1 CONDUITS

.1 Rigid metal conduit: Aluminum to CSA C22.2 No. 45.

.2 Flexible metal conduit: to CSA C22.2 No. 56, aluminum liquid-tight flexible.

2.2 CONDUIT FASTENINGS

.1 Two hole aluminum straps.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 2 m on centre.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

2.4 FISH CORD

.1 Polypropylene.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Surface mount conduits.

3.2 INSTALLATION (Cont'd)

.3 Use rigid aluminum threaded conduit except where specified otherwise.

.4 Use liquid tight flexible metal conduit for loads subject to vibration, including transformers.

.5 Minimum conduit size for lighting and power circuits: 21 mm

.6 Bend conduit cold:
.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.7 Mechanically bend steel conduit over 21 mm diameter.

.8 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.9 Install fish cord in empty conduits.

.10 Remove and replace blocked conduit sections.
.1 Do not use liquids to clean out conduits.

.11 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on aluminum unistrut channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.5 CLEANING

.1 Proceed in accordance with Section 01 74 11.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
  .1 CAN/CSA-C22.2 No.126-, Cable Tray Systems.

.2 National Electrical Manufacturers Association (NEMA) standards
  .1 NEMA VE 1-2002, Metal Cable Tray Systems.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with section 01 33 00.

.2 Identify types of cabletroughs used.

.3 Show actual cabletrough installation details and suspension system.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiringmaterials from landfill to metal recycling facility as approved by Departmental Representative .

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

PART 2 - PRODUCTS

2.1 CABLETROUGH

.1 Ladder type, Class A, C1, D1, E to CAN/CSA C22.2 No.126 to suit cables to be installed.

.2 Trays: aluminum 150, 300, 450, 600 mm wide with depth of 76 mm.

.3 Fittings: Aluminum, horizontal elbows, end plates, drop outs, vertical risers and drops, tees, wyes, expansion joints and reducers where required, manufactured accessories for cabletrough supplied.
.1 Radii on fittings: 600 mm minimum.

.4 All mounting hardware including bolts, nuts washers and lockwashers to be stainless steel.

2.2 SUPPORTS

.1 Provide supports as required.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install complete cabletrough system.

.2 Support cabletrough on both sides. See Section 26 05 29, Hangers and Supports for Electrical Systems.

.3 Remove sharp burrs or projections to prevent damage to cables or injury to personnel.

3.2 CABLES IN CABLETROUGH

.1 Install cables individually.

.2 Lay cables into cabletrough. Use rollers when necessary to pull cables.

.3 Secure cables in cabletrough at 6 m centres, with nylon ties.

.4 Identify cables every 30 m with size 2 nameplates in accordance with Section 26 05 00.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 28 16.02 Molded Case Circuit Breakers.

1.2 REFERENCES

.1 CSA International
.1 CSA C22.2 No.29-11, Panelboards and Enclosed Panelboards.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for panelboards and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Include on drawings:
.1 Electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for panelboards for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

1.5 DELIVERY, STORAGE AND HANDLING (Cont'd)

.3 Storage and Handling Requirements:(Cont'd)
.2 Store and protect panelboards from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove pallets, crates, padding and packaging materials.

PART 2 - PRODUCTS

2.1 PANELBOARDS

.1 Panelboards: to CSA C22.2 No.29 and product of one manufacturer.
.1 Install circuit breakers indicated on drawings in panelboards before shipment.
.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

.2 600 V, 400 Amp panelboards: bus and breakers rated for 25 kA (symmetrical) interrupting capacity or as indicated.

.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

.4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.5 Provide lock for each panel board door.

.6 Two keys for each panelboard and key panelboards alike.

.7 Copper bus.

.8 Mains: suitable for bolt-on molded case breakers.

.9 Trim and door finish: light gray enamel.

.10 Surface mounting.

.11 Maximum dimensions of panelboards to be 1854 mm (73.5") high x 813 mm (32") wide. Minimum width to be 762 mm (30") to alow for reconnection of existing circuits without additional junction

2.1 PANELBOARDS (Cont'd)

.11 (Cont'd) boxes or splicing. Add factory mounted wiring trough to panel if required.

.12 Panelboards to have space for a minimum of twelve (12) 3 pole, breakers, 25 kA rated.

.13 Enclosure rating to be NEMA 3R/12. Remove drain screws if applicable.

.14 Ensure panelboards submitted as shop drawing will fit in all existing positions indicated on drawings. Field verify dimensions on site prior to submission.

2.2 BREAKERS

.1 Breakers: to Section 26 28 16.02.

.2 Main breaker: lockable, switch duty (non auto), or LSI electronic trip, separately mounted on top of panel or branch mounted to suit cable entry. When mounted vertically, down position should open breaker.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00.

.2 Nameplate for each panelboard size 4 engraved as indicated.

.3 Nameplate for each circuit in distribution panelboards size 2 engraved as indicated.

.4 Complete circuit directory with typewritten legend showing location and load of each circuit, mounted in plastic envelope at inside of panel door.

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 panelboards installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

.2 Install surface mounted panelboards in same positions as existing panelboards to be repalced.

.3 Mount in position to provide the maximum clearance from floor.

.4 Connect loads to circuits.

3.3 CLEANING

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by panelboards installation.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 CSA International (CSA)
.1 CSA C22.2 No. 5-09, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for circuit breakers and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Include time-current characteristic curves for breakers with ampacity of 100 A and over.

.4 Certificates:
.1 Prior to installation of circuit breakers in either new or existing installation, Contractor must submit 3 copies of a production certificate of origin from the manufacturer. Production certificate of origin must be duly signed by factory and local manufacturer's representative certifying that circuit breakers come from this manufacturer and are new and meet standards and regulations.
.1 Production certificate of origin must be submitted to Departmental Representative for approval.
.2 Delay in submitting production of certificate of origin will not justify any extension of contract and additional compensation.
.3 Any work of manufacturing, assembly or installation to begin only after acceptance of production certificate of origin by Departmental Representative. Unless complying with this requirement, Departmental Representative reserves the right to mandate manufacturer listed on circuit breakers to authenticate new circuit breakers under the contract, and to Contractor's expense.
.4 Production certificate of origin must contain:
.1 Manufacturer's name and address and person responsible for authentication.

1.2 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.4 Certificates:(Cont'd)
.4 (Cont'd)
.1 (Cont'd)
Person responsible must sign and date certificate.
.2 Licensed dealer's name and address and person of distributor responsible for Contractor's account.
.3 Contractor's name and address and person responsible for project.
.4 Local manufacturer's representative name and address. Local manufacturer's representative must sign and date certificate.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store circuit breakers indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect circuit breakers from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 BREAKERS GENERAL

.1 Moulded-case circuit breakers: to CSA C22.2 No. 5.

.2 Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.

.3 Plug-in moulded case circuit breakers: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.

2.1 BREAKERS GENERAL (Cont'd)

.4 Circuit breakers to have minimum 25kA symmetrical rms interrupting capacity rating.

2.2 THERMAL MAGNETIC BREAKERS

.1 New distribution panels for buildings MHA, MHE, MHJ, MHS, MHT except where indicated as "LSI" on drawings: Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 SOLID STATE TRIP LSIG BREAKERS LSIG

.1 Distribution panel "S1" and "S2" in main electrical room and where indicated as "LSIG" on the drawings: Moulded case circuit breaker to operate by means of solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, with adjustable long time, short time, instantaneous and ground fault tripping for phase and ground fault circuit protection.

2.4 SOLID STATE TRIP LSI BREAKERS LSI

.1 Where indicated as LSI on the drawings: Moulded case circuit breaker to operate by means of solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, with adjustable long time, short time instantaneous, tripping for phase fault circuit protection.

PART 3 - EXECUTION

3.1 CLEANING

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

.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.

3.1 CLEANING (Cont'd)

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END

PART 1 - GENERAL

1.1 SCOPE

.1 These specifications describe pertinent material requirements and installation practices for Low Voltage AC Power Panel Surge Protective Devices (SPD), also known as Transient Voltage Surge Suppressors (TVSS). The contractor shall furnish and install the SPDs equipment having the electrical characteristics, ratings and modifications as specified herein and as shown on the contract drawings.

1.2 APPLICABILITY

.1 SPDs shall be fully applicable for the purpose of protecting all facility AC electrical circuits from the hazardous effects of transient voltages. These transients may be generated externally by lightning induced energies, utility load factor corrections, and substation switching or they can be internally generated due to inductive and/or capacitive load switching.

1.3 SUITABILITY

.1 SPDs shall be suitable for all service entrance switchboards, panelboards and motor control centres as indicated on the electrical floor plans. Products are to be configured for parallel installation - no series designs shall to be considered acceptable. Design products to allow installation as a stand-alone device allowing mounting adjacent to panelboards, MCCs. Installation is to be accomplished by a qualified electrical contractor.

1.4 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.

.2 Section 26 05 29: Fastenings and Supports.

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

.4 Section 26 05 21: Wires and Cables (0-1000 V).

.5 Section 26 05 34: Conduits, Conduit Fastenings and Conduit Fittings.

1.4 RELATED SECTIONS (Cont'd)

.6 Section 26 28 16.02: Moulded Case Circuit Breakers.

1.5 REFERENCES

.1 Institute of Electrical and Electronics Engineers (IEEE):
.1 IEEE C62.41-1991, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
.2 IEEE C62.45-2002, Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits.
.3 IEEE C62.62-2000, Standard Test Specifications for Surge Protective Devices.
.4 IEEE 142-2007, Recommended Practice for Grounding of Industrial and Commercial Power Systems - Green Book.
.5 IEEE 1100-2005, Recommended Practice for Powering and Grounding Electronic Equipment - Emerald Book.

.2 Canadian Standards Association (CSA):
.1 CSA-C22.1-2009, Canadian Electrical Code, Part I.

.3 Underwriters Laboratories, Inc (UL):
.1 UL 1449(R2006), Standard for Transient Voltage Surge Suppressors.
.2 UL 1283 (Fourth Edition)- 2005, Standard for Electromagnetic Interference Filters.

.4 National Electrical Manufacturer's Association (NEMA):
.1 NEMA LS1 - 1992 (R2000), Low Voltage Surge Protective Devices (1000 volts or less).Withdrawn

.5 Other relevant standards:
.1 MIL-STD-220A, Method of Insertion-Loss Measurement.

.6 National Fire Protection Association (NFPA 70, 75, 780).

1.6 DEFINITIONS

.1 L-G: measurements from phase to equipment grounding conductor as line terminals of utilization equipment.

1.6 DEFINITIONS (Cont'd)

.2 L-L: measurements from phase to phase in a polyphase system, or from one line to another line in a single phase system.

.3 L-N: measurement from phase(s) to neutral for both single and three phase systems.

.4 N-G: measurements from neutral to equipment grounding conductor at line terminal of utilization equipment.

.5 External mounted surge suppressor: Transient Voltage Surge Suppressor (TVSS) mounted outside of the power panel as a separate component.

1.7 SUBMITTALS

.1 Product data: submit manufacturer's printed product literature, specifications and data sheets in accordance with Section 01 33 00.

.2 Maintenance data: submit operation and maintenance data, and engineering data for incorporation into manual specified in Section 01 78 00.

.3 Test reports: submit cover sheet of Test Report certifying compliance with UL 1449 Second Edition.
.1 Submit Test Reports in accordance with Section 01 33 00.
.2 Submit copy of Test Report certifying compliance with MIL-STD-220B for sound attenuation.
.3 Submit documentation showing equipment testing to ANSI/IEEE C62.41 and IEEE C62.45.

.4 SPD submittals shall include, but shall not be limited to, the following information:
.1 Data for each suppressor type indicating conductor sizes, conductor types, and connection configuration and lead lengths.
.2 Manufacturer's certified test data indicating the ability of the product to meet or exceed requirements of this specification.
.3 Drawings, with dimensions, indicating SPD mounting arrangement and lead length configuration, and mounting arrangement of any optional remote diagnostic equipment and assemblies.
.4 List and detail all protection systems such as fuses, disconnecting means and protective materials.

1.7 SUBMITTALS (Cont'd)

.4 (Cont'd)

.5 Indicate SPD wiring, bonding, and grounding connections on wiring diagrams for each system. Include installation details demonstrating mechanical and electrical connections to equipment to be protected.

1.8 QUALITY ASSURANCE

.1 Qualifications:

.1 All SPDs shall be manufactured by a single ISO-9001 registered company normally engaged in the design, development and manufacture of such devices for electrical and electronic system equipment protection.

.2 Manufacturer shall be regularly engaged in the manufacture of surge suppression products for the specified categories for minimum of ten (10) years.

.3 Manufacturer shall offer repair or replacement service for all materials and components incorporated in the Surge Protective Devices.

.4 Technical assistance (no cost to customer) shall be provided by manufacturer through a factory representative or a local distributor and a factory staffed toll-free technical hotline.

.5 Manufacturer shall provide a toll-free Customer Service number to facilitate all inquiries regarding product returns, warranty claims, purchasing requirements and payment or credit issues.

.6 Equipment certification: Equipment shall bear CSA, cUL or cETL Listing Mark for the category "Transient Voltage Surge Suppressors" or TVSS. Provide Listing Card under category TVSS to confirm compliance to UL 1449 Second Edition Standard and assigned Suppressed Voltage Ratings.

.2 Pre-installation meetings:

.1 Pre-installation meetings: conduct pre-installation meeting one week prior to commencing work of this Section and on-site installations to verify project requirements, substrate conditions and co-ordination with other building subtrades, to review manufacturer's installation instructions and warranty requirements.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00.

.2 Store materials in dry, secure location and protect from weather.

.3 Protect from moisture and humidity.

.4 Store in accordance with manufacturer's written instructions.

.5 Waste management and disposal in accordance with Section 01 74 20.

1.10 WARRANTY

.1 For the work of this Section 26 43 13 the 12 month warranty period prescribed in GC3.13 of General Conditions is extended to thirty (30) years.

.2 Any SPD device that shows evidence of failure or incorrect operation, during thirty (30) year warranty period, shall be replaced by the manufacturer without question. Repairs to modules are not acceptable, only new and unused materials are to be allowed (Excludes installation labor and site preparations).

.3 Since "Acts of Nature" or similar statements typically include the threat of lightning to which the SPD shall be exposed, any such clause limiting warranty responsibility in the general conditions of this specification shall not apply to this section. This is, the warranty shall cover the effects of lightning, single phasing, and all other electrical anomalies. The warranty shall cover the entire device, not just various components, such as modules only.

.4 All SPD devices, subassemblies, and components are to be 100% tested and certified by the manufacturer to meet their published performance parameters. A certificate of compliance shall be provided with all goods delivered.

PART 2 - PRODUCTS

2.1 GENERAL

.1 The SPD shall be listed by CSA, cUL, cETL or other nationally recognized test laboratory to UL's 1283 and UL's 1449 standards (latest edition, latest revision), and not merely the components or modules. All SPD's shall be Type 1 for use in Type 1 and Type 2 locations. All SPD units shall to RoHS compliant.

.2 The SPD shall protect all modes L-G, L-N, L-L, and N-G, for WYE systems have discrete suppression circuitry in L-G, L-N and N-G, and have bidirectional, positive and negative impulse protection. Line-to-neutral-to-ground protection is not acceptable where line-to-ground is specified, and accordingly reduced mode units with suppression circuitry built into only 4 modes are not acceptable. For delta systems, the unit shall have discrete suppression circuitry in L-G and L-L.

.3 Obtain all surge suppression devices through one source from a single manufacturer.

.4 The maximum continuous operating voltage (MCOV) of all components shall not be less than 125% for a 120V system and 120% for 220 and 240V systems, and 115% for 277 and 600V systems.

.5 All SPD's shall be equipped with a comprehensive monitoring system which shall include a visual LCD panel display providing information on unit status and phase loss/protection loss.

.6 No unit will be accepted unless it meets the warranty, strength, safety features, IEEE let-through levels, modes of discrete suppression circuitry, fusing, independent third party per mode surge testing, and all other requirements of this specification.

.7 If a disconnect switch is specified, the disconnect switch and the SPD as a system shall be capable of interrupting up to a 200kA symmetrical fault current with 600 VAC applied.

.8 Each design configuration shall have the maximum single pulse surge current capacity per mode verified through testing at an independent, nationally recognized test laboratory. To be

2.1 GENERAL (Cont'd)

.8 (Cont'd)
considered for approval, the manufacturer must submit a test report on a unit which was tested with internal over current fusing in place. The test shall include a 1.2 X 50 µsec 6000V open circuit voltage waveform and an 8 X 20 µsec 500A short circuit current waveform to benchmark the unit's suppression voltage, followed by a single pulse surge of maximum rated surge current magnitude with an approximated 8 X 20 µsec waveform. To complete the test, another identical surge shall be applied to verify the unit's survival. Compliance is achieved if the suppression voltage found from the two impulses do not vary by more than +10%. Test data on an individual module is not acceptable.

2.2 SERVICE ENTRANCE PROTECTION PANELBORADS - "S1" AND "S2"

.1 1. The SPD for this location shall be as indicated on project drawings. SPD shall be separate from panelboard. Integral SPD shall not be acceptable. SPD's shall be certified to UL1283 and UL 1449 Third Ed. Type 1 for use in Type 1 or Type 2 locations. All SPD units shall be RoHS compliant.

.2 The manufacturer shall provide written specifications showing let-through voltage of the unit with six inches of lead length (at the module or at the lug data is not acceptable as it does not represent true "as installed" performance) pursuant to ANSI/IEEE C62.41 and C62.45, 2002, categories B3/C1 impulse wave and C3-impulse wave, 90 degree phase angle, positive polarity, measurements in peak voltage from the zero reference, all dynamic tests except N-G, and UL suppressed voltage ratings, all of which shall be no higher than: ANSI/IEEE C62.41-2002 Measured Limiting Voltage

B3/C1 Impulse (6kV, 3kA) Voltage (Voltage Code)
L-G L-L 600 delta (600NN) 2095V 2098V

C3 Impulse (20kV, 10kA) Voltage (Voltage Code)
L-G L-L 600 delta(600NN) 2420V 2203V

UL Voltage Protection Ratings

Voltage (Voltage Code)	L-G	L-L
600 delta (600NN)	2500V	2500V

.3 The unit shall have a peak surge current of no less than : 240kA/phase, 120kA/mode, 8 X 20 us

2.2 SERVICE ENTRANCE PROTECTION PANELBORADS - "S1" AND "S2" (Cont'd)

.3 (Cont'd) waveform, single impulse, independently verified.

.4 Internal Fusing - Overcurrent Protection a. Each Metal Oxide Varistor, or other primary suppression component, shall be individually fused for safety and performance to allow the SPD to withstand the full rated single pulse peak surge capacity per mode without the operation or failure of the fuses. Overcurrent fusing that limits the listed peak surge current of the SPD is not acceptable. Replaceable cartridge type per phase or per mode overcurrent fusing is not acceptable where there is more then one MOV per mode. b. For arc quenching capability, minimization of smoke and contaminates in the event of a failure, and to ensure the safest possible design, all surge components, current carrying paths and fusing shall be packed in fuse grade silica sand. c. Fusing shall be present in every mode, including Neutral-to-Ground. d. The fusing shall be capable of interrupting up to a 200kA symmetrical fault current with 600VAC applied.

.5 The SPD shall come standard with not less than a Thirty Year Warranty, and the warranty shall include unlimited free replacements of the unit if destroyed by lightning or other transients during the warranty period. Special or optional warranties in excess of the unit's standard warranty for purposes of this bid are not acceptable.

.6 The suppressor shall include Form C dry contacts (N.O. or N.C.) for remote monitoring capability, and shall have at minimum a Nema 4 steel enclosure.

.7 The SPD shall have an internal audible alarm with mute on front cover.

2.3 DISTRIBUTION PANELS - NORMAL AND ESSENTIAL BUILDINGS MHA, MHE, MHJ, MHS, MHT

.1 SPD(s) for this location shall be as indicated on project drawings. SPD shall be separate from panelboard. Integral SPD shall not be acceptable. SPD's shall be certified to UL 1283 and UL1449 Third Ed. Type 1 for use in Type 1 and Type 2 locations. All SPD units shall be RoHS compliant.

2.3 DISTRIBUTION PANELS - NORMAL AND ESSENTIAL BUILDINGS MHA, MHE, MHJ, MHS, MHT (Cont'd)

.2 The manufacturer shall provide written specifications showing let-through voltage of the unit with six inches of lead length (at the module or at the lug data is not acceptable as it does not represent true "as installed" performance) pursuant to ANSI/IEEE C62.41 and C62.45, 2002, categories B3/C1 impulse wave and C3 impulse wave, 90 degree phase angle, positive polarity, measurements in peak voltage from the zero reference, all dynamic tests except N-G, and UL suppressed voltage ratings, all of which shall be no higher than: ANSI/IEEE C62.41-2002 Measured Limiting Voltage

B3/C1 Impulse (6kV, 3kA)

Voltage (Voltage Code)	L-G	L-L
600 (600NN)	2202V	2217V

C3 Impulse (20kV, 10kA)

Voltage (Voltage Code)	L-G	L-L
600 (600NN)	2420V	2410V

UL Voltage Protection Ratings

Voltage (Voltage Code)	L-G	L-L
600 (600NN)	2500V	2500V

.3 The unit shall have a peak surge current of no less than 160kA/phase, 80kA/mode, 8 X 20 us waveform, single impulse, verified by third party test reports.

.4 Internal Fusing - Overcurrent Protection a. Each Metal Oxide Varistor, or other primary suppression component, shall be individually fused for safety and performance to allow the SPD to withstand the full rated single pulse peak surge capacity per mode without the operation or failure of the fuses. Overcurrent fusing that limits the listed peak surge current of the SPD is not acceptable. Replaceable cartridge type per phase or per mode overcurrent fusing is not acceptable where there is more then one MOV per mode b. For arc quenching capability, minimization of smoke and contaminates in the event of a failure, and to ensure the safest possible design, all surge components, current carrying paths and fusing shall be packed in fuse grade silica sand. c. Fusing shall be present in every mode, including Neutral-to-Ground. d. The fusing shall be capable of interrupting up to a 200kA symmetrical fault current with 600VAC applied.

2.3 DISTRIBUTION PANELS - NORMAL AND ESSENTIAL BUILDINGS MHA, MHE, MHJ, MHS, MHT (Cont'd)

.5 The SPD shall come standard with not less than a Thirty Year Warranty, and the warranty shall include unlimited free replacements of the unit if destroyed by lightning or other transients during the warranty period. Special or optional warranties in excess of the unit's standard warranty for purposes of this bid are not acceptable.

.6 The suppressor shall include Form C dry contacts (N.O. or N.C.) for remote monitoring capability, and shall have at minimum a Nema 4 steel enclosure.

.7 The SPD shall have an internal audible alarm with mute on front cover.

2.4 LOW IMPEDANCE CABLE

.1 Low impedance cable is required for the installation of the Surge Protection unit for the "S2" location.

PART 3 - EXECUTION

3.1 INSTALLATION

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

.2 Do complete installation in accordance with CSA-C22.1, CAN/CSA-C22.2 No. 0 and ANSI/IEEE C62.41 and all other applicable codes.

.3 Locate surge suppressors as indicated and mount securely, plumb, true and square to adjoining surfaces.

.4 Install surface mounted surge suppressors as recommended in manufacturer's written instructions.

.5 Mount SPD as close as possible to panel being protected in a position that will minimize lead lengths between suppressor and control breaker(s) to which suppressor connects. Utilize conduit, preferably metallic, to accomplish these connections with a recommended minimum wire size of #10 AWG or a maximum of #4 AWG (for ease of dressing). Suppressor leads shall not be extended beyond manufacturer's recommended

3.1 INSTALLATION (Cont'd)

.5 (Cont'd)
maximum length without specific engineering approval. The rationale for this is the longer connecting leads between the SPD and the power panel, the higher the residual transient voltage.

.6 Connect SPD to service panel being protected via a circuit breaker for each phase.

.7 Install SPD in a neat, workmanlike manner. Lead dress shall be as short and as straight as possible and be consistent with recommended industry practices for the application on which these units are installed. Bind phase, neutral, and ground conductors tightly, over entire run, from suppressor to service panel and always use the shortest length of connecting cable possible.

3.2 FIELD QUALITY CONTROL

.1 Have manufacturer of products supplied under this Section review Work involved in the handling, installation/application, protection and cleaning of it's products. Submit written reports in acceptable format to verify compliance of Work with Contract in accordance with Section 01 33 00 and 01 78 00.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits to review work at stages listed:
.1 After delivery and storage of products, and when preparatory work on which the work of this Section depends is complete, but before installation begins.
.2 Once during progress of work at 66% complete.
.3 Upon completion of the work, after cleaning is carried out.

.4 Obtain reports within three (3) days of review and submit immediately to Departmental Representative.

END

CORRECTIONAL SERVICES CANADA
Generic Safe Work Procedure—Crawlspace

Location:	Millhaven Hazardous Work Location – Basement Crawlspaces.	Analysis By:	Date:	
Job Title:		Supervisor:	Task Frequency:	**Low**
Task:	Maintenance/repairs and installations	Date Reviewed By IJOSH:		

<u>REQUIRED PERSONAL PROTECTIVE EQUIPMENT</u>: Bumper cap/hard hat (as appropriate), safety footwear, respiratory protection (see control column), Communication equipment, eye protection, work gloves, flash light, means of communication in case of accident/emergency; gas monitor where applicable.

<u>GENERAL NOTES:</u> Crawlspaces at Millhaven Institution are considered hazardous work locations and should be assessed and categorized according to the level of risk at the time of entry. It is important to consider that the level of risk may increase due to the task being performed in the crawlspace and the conditions in the crawlspace at any given point in time. For example a crawlspace may become a confined space due to fugitive emissions from welding or the displacement of oxygen. A confined space may be entered only by qualified and authorized personnel. IF IN DOUBT, DO NOT ENTER. IF SPACE IS IDENTIFIED AS CONFINED SPACE, COMPLETE CONFINED SPACE ENTRY PERMIT. Crawlspaces that have standing (black) water pose a hazard to the entrant, as the water may release hydrogen sulfide gas when disturbed. If standing water is present, contact the Works Department to ensure that air is tested and water pumped out. Do not enter crawlspace and perform work without ensuring that required lock out/tag out procedures have been followed, if applicable. Do not enter crawlspace without flashlight even when permanent lighting is provided that illuminates all areas of the crawlspace. Ensure that a proper ladder is available to allow worker to safely accommodate height to crawlspace opening. It was reported that human biological material (e.g. blood, urine, feces, and saliva) may be inside the crawlspaces. Wear appropriate respiratory protection (full facepiece respirator equipped with organic vapour and particulate cartridges). Workers need to ensure that they are aware of phone numbers to call in case of an emergency or accident and that means of communication is available. A rescue plan should be discussed before entering the crawlspace. Work should not be performed without employing the "buddy system". Upon completion of work ensure that all entrants have exited the crawlspace before locking up the area.

To enter this area, along with this safe work procedure, you will need the following;

- **Hazardous work location checklist**
- **Hazardous work location hazard assessment (to be completed on day of entry)**

Step	Description	Hazard	Controls
1	Before entering the crawlspace, inform the ESO or CPM and ensure that a second person is with you to alert others in case of an emergency. Be aware of any and all real as well as potential hazards associated with the space in which you wish to perform work.	Work alone hazard; exposure to hazardous atmosphere, physical injuries, exposure to toxic substances; fire; exposure	• Buddy System; ensure that means of communication is available in case of an accident/emergency. • Conduct hazard assessment and discuss safe work procedure as well as PPE requirements and emergency equipment. • Ensure that the opening for the crawlspace is sufficient to allow the safe passage of a person using protective equipment.
2	Open door to crawlspace/tunnel Door may be heavy or difficult to open. Ensure that door to crawlspace cannot be closed while you are in the crawlspace. **DO NOT ENTER** crawlspace if standing water is visible, as the water may release hydrogen sulfide gas.	Musculoskeletal; hazardous atmosphere may have developed recently	• Exercise caution. If standing (black) water is present, do not enter---call Maintenance Officer to ensure that air is tested and water is pumped out.
3	Use ladder to reach entry point of crawlspace or tunnel. Inspect ladder before each use.--Make sure all rivets, joints, nuts, and bolts are tight; feet, steps, and rungs are secure; spreaders and pail shelf function properly (step ladders). Ladder should be clean, free from grease, oil, snow, mud, wet paint, or any slippery material. Keep shoes clean.--Never make temporary repairs to a ladder**.--Inspect the ladder by checking the following:**-- GENERAL: Loose steps or rungs. Loose nails, screws, bolts, or other metal parts. Cracked, split or unbroken uprights, braces, steps, or rungs.-- STEPLADDERS: Wobbly (from side to side). Loose or bent hinge spreaders. Broken stop on hinge spreaders. Loose Hinges—**Refer to Fall Protection Program for further details.**	Fall	• Ensure that certified ladder in good working order is available and that it is clean and dry; check shoes to ensure that you won't slip off rungs; use caution when carrying and setting up ladder.
4	Do not use ladder if you are in poor health, subject to fainting spells, have a physical handicap that would impair your climbing ability, or if you are under the influence of any drugs/medication that may cause drowsiness.	Fall	• Assess muscle strength, be sure you are capable of climbing a ladder
5	Set up ladder, make sure ladder is fully open, spreaders are secure, and pail shelf is in position (step ladders).	Fall	• Place ladder on a level surface-- -Assess muscle strength.

6	There may be atmospheric hazards present in the space. You must use caution to ensure that the atmosphere that you are entering is safe for breathing and does not pose a fire or explosion hazard. Use gas detector to test atmosphere. Your gas monitor tests for oxygen, Lower Explosive Limits (LEL), hydrogen sulfide, and carbon monoxide.	Oxygen Deficiency (Less than 19.5%) Oxygen Enrichment (Greater than 23.0%), Explosion or Fire, chemical asphyxiants (interfere with the bodies ability to use oxygen)	• Utilize the air monitoring device to test for oxygen, carbon monoxide, Lower Explosive Limits, and hydrogen sulfide Test at various depths or distances (e.g. top, middle, and bottom) into the space, as gases may be in layers or pockets. • If the air monitoring device goes into alarm mode, **DO NOT ENTER**. Close the space immediately, notify your supervisor and review Confined Space Entry program prior to attempting any future entry.
7	Identify any presence of mould and aerosolized sewage. It was reported that human biological material (e.g. blood, urine, feces, and saliva) may be inside the crawlspaces. Other biological agents (bird and rodent feces, mould, dried sewage) may also be present. These biological materials contain bacteria, fungi, parasites, and viruses which may cause intestinal, lung, and other infections.	Biological Agents	• Where mould is present and oxygen level is between 19.5% and 23.0%, half face respirator equipped with a N100 or P100 filter and safety glasses / goggles. • Where aerosolized sewage is present and oxygen level is between 19.5% and 23.0%, utilize full face respirator equipped with a N95 or P95 filter, or a half face respirator equipped with a N95 or P95 filter and tight fitting safety glasses / goggles. • Bring any presence to the attention of the supervisor for clean-up. • Impervious rubber gloves should also be worn and good hygiene practices (ie washing with soap and water) should be observed when cleaning is completed.

8	Identify the presence of any other airborne hazards.	Dust, Mists, and Fumes	• Wet down dried material to minimize dust movement. • Control ignition sources. • Utilize a suitable dust mask / respirator and safety glasses. • Utilize local exhaust ventilation (inlet located adjacent to source of contaminant) where welding, grinding, or other vapour or dust generating task is being carried out in side the confined space. • Confirm whether any sewage pipe breaks have occurred in the past to determine the likelihood of exposure to dried sewage dust. • Utilize TYVEC suit or ensure that coveralls are washed after use. *Where fumes are present or being generated consult the MSDS sheets for the products and utilize the recommended controls and equipment.*
9	Identify any chemical or toxic substances in area.	Exposure to Chemical and Toxic Substances	• Consult any hazardous substance reports and MSDS sheet for the products contained in the confined space. • Utilize the procedures and personal protective equipment listed in the reports or on the MSDS sheets. *Remove the material and clean the confined space from outside prior to entry where possible.*
10	Identify machinery and mechanical equipment that may pose a hazard.	Machinery and Mechanical Equipment	• Lockout / tagout the equipment at its source and dissipate any stored energy. • Block and guard moving parts where required to prevent movement. • Test the equipment controls to ensure the device is isolated.

11	Identify electrical equipment and circuits that may pose a hazard.	Electrocution, shocks, Burns	• Have a qualified person lockout / tagout the electrical equipment and circuits at its source and dissipate any stored energy. **Only qualified electricians are to perform work on electrical equipment.** • Test the circuits to ensure isolation. • Wear electrically insulated footwear and other PPE as appropriate.
13	Ensure working environment is of a safe temperature and humidity.	Temperature and humidity	• Block and bleed any steam or hot water lines, lockout / tagout any supply valves on lines entering or passing through the space. • Allow the space sufficient time to dissipate any residual heat; • Ventilate the space as required to maintain acceptable temperature levels. • Monitor entrant for signs of heat stress schedule breaks and provide with fluids as necessary.
14	Identify any engulfment and drowning hazards. Ensure safe procedures are followed.	Entrapment, Engulfment, Drowning	• Ensure that any liquids inside the space are drained or pumped out prior to entry. • Ensure that qualified person, i.e. plumber or maintenance engineer, as appropriate, locks out kinetic energy from water sources.
15	Ensure workspace has sufficient lighting.	Visibility	• Ensure that any permanent lighting in the space is functional prior to entry. • Provide portable lighting that is intrinsically safe.
16	Determine if noise level in workspace will likely exceed 87 dBA while work is conducted.	Noise	• Hearing protection shall be worn when work is to be undertaken in a confined space where the noise level will likely exceed 87 dBA. • Hearing protection worn shall have an attenuation reduction value of at least 25 dBA.

17	Enter crawlspace to perform tasks [There is the potential for hand, knee, head, and foot injuries due to pipes overhead, debris on ground, protruding nails, for example. There may be dust and small amounts of mould disturbed as you move through the area creating the potential for respiratory impacts and eye injury. Confirm whether any sewage pipe breaks have occurred in the past to determine the likelihood of exposure to dried sewage dust. Lights may be shut off or a power failure may occur while in the crawlspace which would greatly increase the potential for hand, head, knee, and foot injuries. Although hot and cold water pipes run through the area, the water temperature may be such that burns are not to be expected even if pipes should break while worker is in the crawlspace. Verify water temperature and location of pipes.]	Respiratory, hand, head, knee, eye and foot injuries; back strain; entrapment.	• Never enter the crawlspace without a flashlight and ensure that your 'buddy" has available a backup flashlight. • Ensure that lighting is working properly, and that it distributes a sufficient amount of light to illuminate the crawlspace area. **PPE:** Work gloves; bump hat; safety boots, N95/100 depending on exposure (fit testing required); depending on exposure/hazard: disposable TYVEC suit or similar, or wash coveralls after use; eye protection. • Ensure the crawlspace hatch cannot be closed while you are in the crawlspace. Place a lockout on the hasp so that it cannot be locked shut.
18	Exiting the crawlspace Materials and/or tools left in a space may pose unknown and unexpected hazards to the next person entering this space. No person shall close off a crawlspace until a qualified person has verified that no person is inside it.	Hand, head, knee, eye, and foot injuries, back strain, respiratory hazards, electrocution, entrapment, mechanical hazards, explosion, fire, exposure to toxic substances.	• Ensure that all materials and tools taken into the space are removed. • Use Hazardous Work area checklist to ensure the area is not closed off with persons inside. • Ensure that any modifications to the space are noted and that the generic safe work procedures for that space are reviewed in accordance with any and all changes to the space

	EMERGENCY RESPONSE PROCEDURES 1. Ensure that means of communication is available prior to commencing task. 2. Ensure implementation of Buddy System. 3. Ensure that workmen are provided with address and exact name of location. 4. Ensure that the Chief of Plant Maintenance is informed of tasks to be performed and location prior to commencing work. **5.** In case of an emergency, immediately call MCCP—extension **8155** 6. After calling MCCP, immediately call the Chief of Plant Maintenance at ---extension **8208** 7. Ensure that a person is posted outside the building to direct Emergency Response Team to where victim is located. 8. Attend to victim consistent with training. Ensure that victim is not left unattended.		

Hazard Assessment Form

Assessment Date:

Hazardous Work Location ID. #	Location	Description	Activities Conducted in Area	Frequency of Entry

Note: to be reviewed every three years

Note: N/A denotes Not Able to obtain readings.

Atmospheric Assessment Readings – prior to entering			
Oxygen (%02)	Hydrogen Sulphide (ppm H2S)	Carbon Monoxide (ppm CO)	Flammable Gas (%LEL)

Potential Hazards	**Observations**
Oxygen	
Flammables	
Toxic Chemicals	
Mechanical Hazards	
Electrical Hazards	
Physical Hazards	
Other Hazards	

Atmospheric Assessment Readings – peak screen reading after completion			
Oxygen (%02)	Hydrogen Sulphide (ppm H2S)	Carbon Monoxide (ppm CO)	Flammable Gas (%LEL)

Conducted By: _____

Signature: _____Date:_____

Millhaven Institution – Hazardous Work Location Checklist

YES	NO	N/A	Answer Prior to Entry into the Hazardous Work Location
			All participants have valid certification for this Confined Space Entry (incl. WHMIS, CPR,)
			All participants have been briefed on all potential hazards
			All departments have been informed of potential service interruption (if applicable)
			All hazard sources have been isolated, blanked or blocked with locks and tags
			All energy sources have been isolated, blanked, or locked out and tagged
			All potential ignition sources have been eliminated
			All tools and equipment have been checked and found to be in good repair
			All materials taken into the space have been recorded and WHMIS info provided & reviewed
			The opening for entry into and exit from the space is sufficient to allow safe passage of a person using protection equipment
			The space has been drained, washed and purged of all potential chemical/biological hazards
			There is adequate ventilation for a good fresh air supply
			All appropriate emergency equipment is readily available (First-Aid, Fire extinguisher, etc.)
			All required pre-atmospheric testing has been completed and recorded below
			All additional permits have been acquired (Hot Work Permit)
			Area has been secured for entrants and public
			The CPM has been alerted of the space entry
			Attendant, entrants, and all other participants have been pre-briefed
			A written rescue plan has been developed for the space entry

Initial Atmospheric Monitoring		
Monitoring Device:	**Calibration Date:** (DD/MM/YY) **Bump Test Date:** (DD/MM/YY)	**Calibrated By:** **Bump Tested By:**
Test	**Allowable Limits**	**Initial Results Time: _____**
Oxygen	>19.5 to <23.0%	
Flammability	10% LEL	
H_2S	10 ppm	
CO	25 ppm	
Other		
Other		

Entry Supervisor (Print)**:**	**Signature:**

17. MHK - CELL UNIT

17.1 Building Description

The MHK building was constructed in 1969 and contains three floors and a basement (crawl space). The crawl space is classified as a Confined Space. Floor plans MHK-1 (basement), MHK-2 (first floor), MHK-3 (second floor) and MHK-4 (third floor) showing the approximate building layout, dimensions, sampling locations and locations and/or areas with ACMs or lead are provided in Appendix 17. The location of this building is shown on site plan Figure 1-2 in Section 1 of this report.

17.2 Survey Findings

The DSHMS in MHK was conducted by Aqua Terre personnel on June 9 and 28, 2006. The results of the DSHMS are presented in the subsections of Section 17.2. Recommendations for mitigative measures and construction and removal procedures for the identified designated substances and hazardous materials in this building are presented in Section 40. Laboratory certificates of analysis for asbestos and lead samples are included in Appendix 17. Selected photographs showing areas of concern are also provided in Appendix 17.

17.2.1 Asbestos-Containing Materials (ACMs)

No samples were collected from the building for asbestos analysis. Information for ACMs observed and previously sampled (THEM, 1997) is summarized in Table 17.1. The room number (where observed), description of material, friability, condition, accessibility, recommended action, asbestos content and estimated quantity (only for ACMs) are also included in Table 17.1. Approximate sampling locations and areal or lateral extent of ACMs (if present) are shown on the floor plans in Appendix 17.

The following ACMs were identified:

- Insulated pipe elbows were observed in room 131 and 301. The insulation around these elbows was previously sampled by THEM (1997) and found to contain up to 60% chrysotile asbestos. A total of 25 ACM insulated elbows were observed.

- Parging material used on concrete equipment bases was previously sampled by THEM (1997) and found to contain 20 to 30% chrysotile asbestos. This parging material was observed by Aqua Terre on an equipment base in room 301. The parging material is approximately 5 cm wide around the edge of 1 concrete equipment base.

- Three incandescent light fixtures with ACM heat shields were observed in MHK (Rooms 131 and 231). Similar heat shields were previously sampled by THEM (1997) and found to contain 60% chrysotile asbestos.

- Insulation around pipe hangers was observed in the crawlspace (confined space 5). Similar insulation was sampled in MHL (MHL-As-1) and found to contain 70% chrysotile asbestos.

The fire doors within MHK should be assumed to have asbestos cores.

Table 17.1 Summary of Asbestos Survey, Building MHK

Sample ID	Room Number	Materials	Friable[1]	Condition[2]	Accessibility[3]	Action[4]	Asbestos Content[5]	Estimated Quantity
Not Sampled	Crawl Space (Confined Space 5)	Insulation around pipe hangers, as sampled by Aqua Terre (MHL-AS-1)	Friable	Good	C(concealed)	7	(C) 70%	22 (4 inch diameter)
Not Sampled	301	Insulation around pipe elbows, as sampled by THEM	Friable	Good	B	7	(C) 10-60% (THEM, 1997)	20 (3 to 6 inch diameter)
Not Sampled	131	Insulation around pipe elbows, as sampled by THEM	Friable	Poor	C (exposed)	4	(C) 10-60% (THEM, 1997)	5 (3 inch diameter)
Not Sampled	301	Parging material on concrete equipment bases, as sampled by THEM	Friable	Poor	B	3	(C) 20-30% (THEM, 1997)	0.6 m^2
Not Sampled	131 & 231	Light shield on incandescent light fixture, as sampled by THEM	Friable	fair	C (exposed)	5	(C) 60% (THEM, 1997)	3 fixtures

Notes:

1 Friability is assessed as friable or non-friable

2 Condition is rated as good, fair or poor

3 Accessibility is A, B, C(exposed), C(concealed) or D as defined in Section 2.3.1.

4 Action is 1, 2, 3, 4, 5, 6, or 7 as defined in Section 2.3.1.

5 Asbestos Content is Chrysotile ©, Amosite (A) or other Fibre (O) expressed as a percentage.

ND None Detected (for PLM <0.1%; TEM <0.1%)

17.2.2 Lead-Containing Materials

Three samples of paint were collected from the building and submitted for laboratory analysis of lead. The results of the analysis for lead are summarized in Table 17.2. The sample identification numbers, room number (where sampled), description, condition, layers, lead content and approximate area (for paint containing greater than 600 ppm of lead) are also included in Table 17.2. Approximate sample locations and areal extent of paint containing greater than 600 ppm of lead are shown in the floor plans in Appendix 17.

Table 17.2 Summary of Lead Paint Survey, Building MHK

Sample ID	Room Number	Colour, Location and Description	Condition[1]	Layers Noted[2]	Lead Content (ppm)	Estimated Quantity (m^2)
MHK-Pb-1	134	Salmon on cell doors	Good	No	37	-
MHK-Pb-2	202	White/off-white on walls	Good	No	112	-
MHK-Pb-3	**232**	**Dark grey on access doors**	**Good**	**No**	**6020**	**33.6**
Not Sampled	**130, 132, 133, 134, 201, 202, 203 & 204**	**Light blue on walls, as sampled by Aqua Terre (MHH-Pb-3)**	**Good**	**No**	**1820**	**250**
Not Sampled	**201, 202, 203 & 204**	**Dark blue on trim and doors, as sampled by Aqua Terre (MHH-Pb-4)**	**Good**	**No**	**846**	**23**
Not Sampled	**all (except stairs, 301 and crawl space)**	**Grey floor paint, as sampled by Aqua Terre (MHC-Pb-6)**	**Good**	**No**	**3480**	**598.4**

Notes:

1 Condition is rated as good, fair or poor with peeling and/or flaking

2 Layers of paint are noted visually and can only be observed if the layers are different colour

bold Exceeds the Surface Coating Materials Regulations limit of 0.06 % by weight (mg/g), or 600 ppm

Analytical results indicate that one of the paint samples contained a concentration of lead above 600 ppm. The dark grey paint on the access doors in room 232 (range K2) contains 6020 ppm of lead and was observed to be in good condition.

In addition, the light blue paint observed in rooms 130, 132, 133, 134, 201, 202, 203 & 204 is assumed to be the same as the light blue sampled in MHH (MHH-Pb-3) which contained 1820 ppm. The dark blue paint observed in 201, 202, 203 and 204 is assumed to be the same as the dark blue sampled in MHH (MHH-Pb-4) which contained 846 ppm. The grey paint observed on the floor of

most of MHK is assumed to be the same as the sample MHC-Pb-6 which contained 3480 ppm. One of the two cells (130) available for inspection in MHK had the same light blue and as such any light blue found in the cells in MHK should be assumed to be lead-based unless determined otherwise.

The solder on the water supply lines throughout the facility should be considered to contain lead.

Cast iron pipe flanges likely containing leaded packing material (as sampled in building MHH (sample # MHH-Pb-8) and found to contain 91.3% lead) were observed in the crawl space (confined space #5). A total of 50 pipe flanges were observed ranging in diameter from 3 to 6 inches.

17.2.3 Mercury

Fluorescent light bulbs were the only source of mercury observed during Aqua Terre's site inspection of MHK. The fluorescent light bulbs contain between 0.01 to 0.04 g of mercury vapour depending on manufacturer and age (Environment Canada, 2002). The number of fluorescent light fixtures observed during the site visit was approximately 41. Assuming two bulbs per fixture an estimated 82 fluorescent light bulbs are in-use, indicating that the total amount of mercury in the bulbs at MHK could range from an estimated 0.8 g to 3.3 g.

17.2.4 Silica

Silica is contained in the concrete and concrete blocks observed throughout the interior and exterior of MHK.

17.2.5 Other Designated Substances

During this survey, none of the following designated substances were observed in MHK: acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxide, isocyanates or vinyl chloride.

17.2.6 Polychlorinated Biphenyls (PCBs)

During the environmental audit conducted in 2006 (Aqua Terre, 2006) CSC staff informed Aqua Terre that, although a number of the PCB-containing fluorescent light ballasts had been removed from the facility, an estimated 800 to 1000 light fixtures that are likely PCB-containing still remain throughout the facility. There are an estimated 41 fluorescent light fixtures in MHK. Fixtures in

this area could not be inspected since they could not be accessed (due to presence of secure fittings in areas accessible to inmates).

No other sources of PCBs were observed in this building during this survey. During the previous environmental audit (Aqua Terre, 2006), CSC staff informed Aqua Terre that all PCB-containing "wet" transformers had been replaced with non-PCB containing "dry" transformers.

17.2.7 Ozone Depleting Substances (ODSs)

An updated Halocarbon Inventory for the entire institution is provided in Appendix 40. A summary of ODS containing equipment observed in MHK is provided in Table 17.3.

Table 17.3 Halocarbon Inventory, Building MHK

Room Number	Equipment Type	Manufacturer	Model #	Serial #	Refrigerant	Amount[1] (kg)
132	Milk Cooler	Silver King	SK2RS	SRB37443M	R401a	5.5oz
132	Refrigerator	LG	GR382R	503MRKU00237	R134a	4.94oz
204	Bar Fridge	GE	GMR02BANACW	illegible	R134a	1.59oz
206	Milk Cooler	Gaylord Regethermic	EPF-2	2-1499	R12	4.75oz
206	Refrigerator	Camco	LW12JYRRW	FH255382	R12	4oz

Notes:

1 Amount of refrigerant recorded in Kg unless specified otherwise.

17.2.8 Urea Formaldehyde Foam Insulation (UFFI)

No UFFI was identified in MHK.

17.2.9 Fuel, Oil and/or Waste Oil Storage

No issues with fuel, oil and/or waste oil storage were identified in MHK.

17.2.10 Chemical Storage

A limited amount of chemicals were observed in MHK. Five plastic jugs without proper WHMIS labels were observed in Room 133. The jugs were labelled "floor" and "shower".

17.2.11 Radioactive Materials

No radioactive materials were observed in MHK.

17.2.12 Mould

No mould or water damage was observed in MHK.

18. MHL - CELL UNIT

18.1 Building Description

The MHL building was constructed in 1969 and contains three floors and a basement (crawl space). The crawl space is classified as a Confined Space. Floor plans MHL-1 (basement), MHL-2 (first floor), MHL-3 (second floor) and MHL-4 (third floor) showing the approximate building layout, dimensions, sampling locations and locations and/or areas with ACMs or lead are provided in Appendix 18. The location of this building is shown on site plan Figure 1-2 in Section 1 of this report.

18.2 Survey Findings

The DSHMS in MHL was conducted by Aqua Terre personnel on June 9 and 29, 2006. The results of the DSHMS are presented in the subsections of Section 18.2. Recommendations for mitigative measures and construction and removal procedures for the identified designated substances and hazardous materials in this building are presented in Section 40. Laboratory certificates of analysis for asbestos and lead samples are included in Appendix 18.

18.2.1 Asbestos-Containing Materials (ACMs)

One sample was collected from the building for asbestos analysis. The results are presented in Table 18.1 along with information for ACMs observed and previously sampled (THEM, 1997). The room number (where observed), description of material, friability, condition, accessibility, recommended action, asbestos content and estimated quantity (only for ACMs) are also included in Table 18.1. Approximate sampling locations and areal or lateral extent of ACMs (if present) are shown on the floor plans in Appendix 18.

The following ACMs were identified:

- Pipe hangers with ACM insulation were observed in the crawl space. Similar insulation was sampled in MHL (MHL-AS-1) and was found to contain 70 % chrysotile asbestos. A total of 22 pipe hangers with ACM insulation were observed.

- Insulated pipe elbows were observed in room 231 and 301. The insulation around these elbows was previously sampled by THEM (1997) and found to contain up to 60% chrysotile asbestos. A total of 12 ACM insulated elbows were observed.

- An insulated pea trap was observed in room 301. The insulation was previously sampled by THEM (1997) and found to contain up to 60% chrysotile asbestos.

- Parging material used on concrete equipment bases was previously sampled by THEM (1997) and found to contain 20 to 30% chrysotile asbestos. This parging material was observed by Aqua Terre on an equipment base in room 301. The parging material is approximately 5 cm wide around the edge of 1 concrete equipment base.
- One incandescent light fixture with an ACM heat shield was observed in MHL (Room 231). The light heat shield was previously sampled by THEM (1997) and was found to contain 60% chrysotile asbestos.

The fire doors within MHL should be assumed to have asbestos cores.

Table 18.1 Summary of Asbestos Survey, Building MHL

Sample ID	Room Number	Materials	Friable [1]	Condition[2]	Accessibility [3]	Action[4]	Asbestos Content[5]	Estimated Quantity
MHL-AS-1	Crawl Space (Confined Space 6)	Insulation around pipe hangers.	Friable	Good (3 inch) Poor (6 inch)	C (exposed)	7 4	(C) 70%	11 (3 inch) 11 (6 inch)
Not Sampled	231	Insulation around pipe elbows, as sampled by THEM	Friable	Good	C (exposed)	7	(C) 10-60% (THEM, 1997)	2 (3 inch diameter)
Not Sampled	301	Insulation around pipe elbows, as sampled by THEM	Friable	Good	B	7	(C) 10-60% (THEM, 1997)	8 (3 to 6 inch diameter)
Not Sampled	301	Insulation around pea trap, as sampled by THEM	Friable	Good	B	7	(C) 10-60% (THEM, 1997)	1 (6 inch diameter)
Not Sampled	301	Parging material on concrete equipment bases, as sampled by THEM	Friable	Poor	B	3	(C) 20-30% (THEM, 1997)	0.6 m^2
Not Sampled	231	Light shield on incandescent light fixture, as sampled by THEM	Friable	fair	C (exposed)	5	(C) 60% (THEM, 1997)	1 fixtures

Notes:

1 Friability is assessed as friable or non-friable

2 Condition is rated as good, fair or poor

3 Accessibility is A, B, C(exposed), C(concealed) or D as defined in Section 2.3.1.

4 Action is 1, 2, 3, 4, 5, 6, or 7 as defined in Section 2.3.1.

5 Asbestos Content is Chrysotile (C), Amosite (A) or other Fibre (O) expressed as a percentage.

ND None Detected (for PLM <0.1%; TEM <0.1%)

18.2.2 Lead-Containing Materials

Two samples of paint were collected from the building and submitted for laboratory analysis of lead. The results of the analysis for lead are summarized in Table 18.2. The sample identification numbers, room number (where sampled), description, condition, layers, lead content and approximate area (for paint containing greater than 600 ppm of lead) are also included in Table 18.2. Approximate sample locations and areal extent of paint containing greater than 600 ppm of lead are shown in the floor plans in Appendix 18.

Table 18.2 Summary of Lead Paint Survey, Building MHL

Sample ID	Room Number	Colour, Location and Description	Condition[1]	Layers Noted[2]	Lead Content (ppm)	Estimated Quantity (m^2)
MHL-Pb-1	132, 133, & 134,	Off-white on ceiling and walls	Good	No	15	-
MHL-Pb-2	131, 231, 232, 233, 234 & 301	White on ceilings and walls	Poor with pealing in 231	No	4	-
Not Sampled	**134 & 234**	**Light blue on access doors, as sampled by Aqua Terre in MHH (MHH-Pb-3)**	**Good**	**No**	**1820**	**36**
Not Sampled	**131 &231**	**Dark blue doors, as sampled by Aqua Terre in MHH (MHH-Pb-4)**	**Good**	**No**	**846**	**84**
Not Sampled	**all (except stairs, 301 and crawl space)**	**Grey floor paint, as sampled by Aqua Terre in MHC (MHC-Pb-6)**	**Good**	**No**	**3480**	**510**

Notes:

1 Condition is rated as good, fair or poor with peeling and/or flaking

2 Layers of paint are noted visually and can only be observed if the layers are different colour

bold Exceeds the Surface Coating Materials Regulations limit of 0.06 % by weight (mg/g), or 600 ppm

None of the paint samples collected in MHL had analytical results that indicate the paint samples contain a concentration of lead above 600 ppm. However, the dark blue paint observed in 131 and 231 is assumed to be the same as the dark blue sampled in MHH (MHH-Pb-4) which contained 846 ppm. In addition, the light blue paint observed in 134 and 234 is assumed to be the same as the light blue sampled in MHH (MHH-Pb-3) which contained 1820 ppm. The grey paint observed on the floor of most of MHL is assumed to be the same as sample MHC-Pb-6 which contained 3480 ppm of lead.

The solder on the water supply lines throughout the facility should be considered to contain lead.

Cast iron pipe flanges likely containing leaded packing material (as sampled in building MHH (sample # MHH-Pb-8) and found to contain 91.3% lead) were observed in the crawl space (confined space #6). A total of 50 pipe flanges were observed ranging in diameter from 3 to 6 inches.

18.2.3 Mercury

Fluorescent light bulbs were the only source of mercury observed during Aqua Terre's site inspection of MHL. The fluorescent light bulbs contain between 0.01 to 0.04 g of mercury vapour depending on manufacturer and age (Environment Canada, 2002). The number of fluorescent light fixtures observed during the site visit was approximately 35. Assuming two bulbs per fixture an estimated 70 fluorescent light bulbs are in-use, indicating that the total amount of mercury in the bulbs at MHL could range from an estimated 0.7 g to 2.8 g.

18.2.4 Silica

Silica is contained in the concrete and concrete blocks observed throughout the interior and exterior of MHL.

18.2.5 Other Designated Substances

During this survey, none of the following designated substances were observed in MHL: acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxide, isocyanates or vinyl chloride.

18.2.6 Polychlorinated Biphenyls (PCBs)

During the environmental audit conducted in 2006 (Aqua Terre, 2006) CSC staff informed Aqua Terre that, although a number of the PCB-containing fluorescent light ballasts had been removed from the facility, an estimated 800 to 1000 light fixtures that are likely PCB-containing still remain at the facility. There are an estimated 35 fluorescent light fixtures in MHL. Aqua Terre inspected one ballast in MHL and results are provided in Table 18.3.

Table 18.3 Summary of Inspected Fluorescent Light Ballasts, MHL

Room Number	Manufacturer	Condition	PCB containing
132	Advance	Good	No

No other sources of PCBs were observed in this building during this survey. During the previous environmental audit (Aqua Terre, 2006), CSC staff informed Aqua Terre that all PCB-containing "wet" transformers had been replaced with non-PCB containing "dry" transformers.

18.2.7 Ozone Depleting Substances (ODSs)

An updated Halocarbon Inventory for the entire institution is provided in Appendix 40. A summary of ODS containing equipment observed in MHL is provided in Table 18.4.

Table 18.4 Halocarbon Inventory, Building MHL

Room Number	Equipment Type	Manufacturer	Model #	Serial #	Refrigerant	Amount[1] (kg)
232	Refrigerator	LG	GR-382R	503MRXX00218	R134a	4.94oz

Notes:

1 Amount of refrigerant recorded in Kg unless specified otherwise.

18.2.8 Urea Formaldehyde Foam Insulation (UFFI)

No UFFI was identified in MHL.

18.2.9 Fuel, Oil and/or Waste Oil Storage

No issues with fuel, oil and/or waste oil storage were identified in MHL.

18.2.10 Chemical Storage

No chemicals were observed to be stored in MHL.

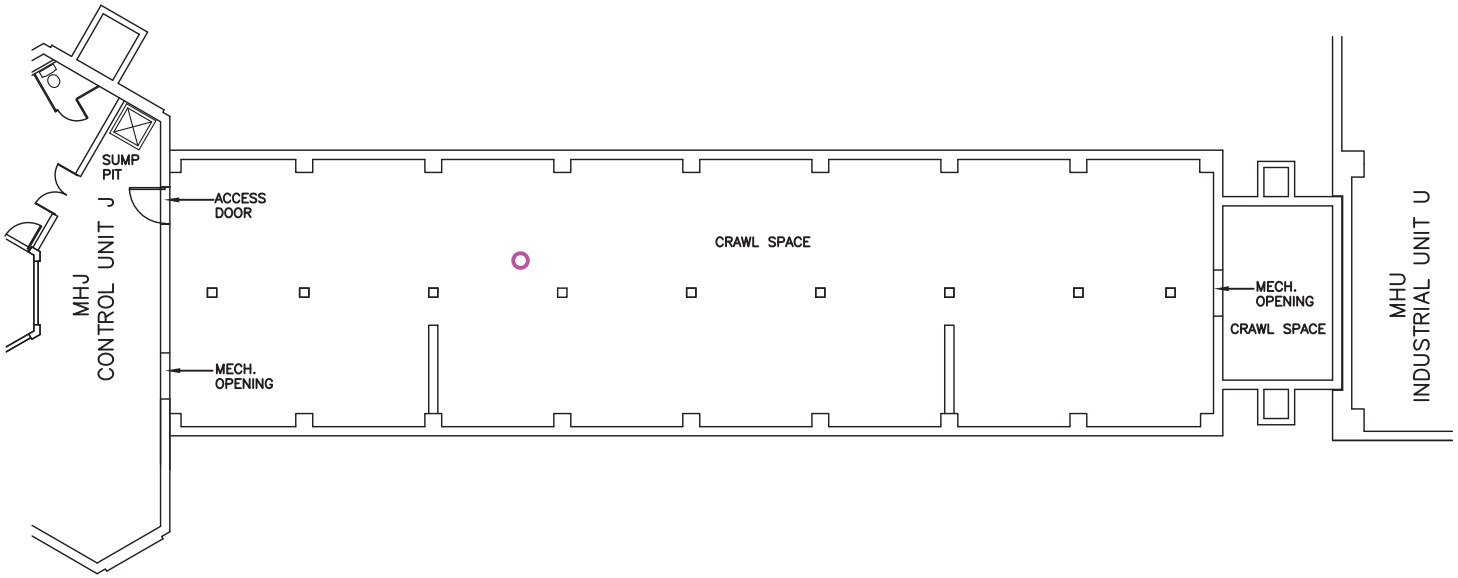
18.2.11 Radioactive Materials

No radioactive materials were observed in MHL.

18.2.12 Mould

No mould or water damage was observed in MHL.

MHK CELL UNIT K



LEGEND

- FLOOR TILE SAMPLE LOCATION
- CEILING TILE SAMPLE LOCATION
- PAINT SAMPLE LOCATION
- WALL OR CEILING SURFACING MATERIAL SAMPLE
- PIPE INSULATION LOCATION [ASBESTOS CONTAINING MATERIAL AS SAMPLED BY THEM (1997) & OBSERVED BY AQUA TERRE]
- PIPE INSULATION SAMPLE LOCATION
- LIGHT WITH ASBESTOS CONTAINING MATERIAL HEAT SHIELD
- LEAD CONTAINING PAINT ON WALL (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON FLOOR (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON CEILING (>0.06%/600ppm)
- ASBESTOS CONTAINING FLOOR TILES
- ASBESTOS CONTAINING CEILING TILES OR SURFACE
- (Pb=921ppm) EXCEEDANCE IN ANALYSED SAMPLE

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED OR FAXED
3. 'ppm': PARTS PER MILLION
4. 'Pb': LEAD

SOURCE(S):
1. PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, MHK CELL UNIT K, BASEMENT FIRE PLAN, JUNE 14, 2001

SCALE 1:250

0 5 10m

BASEMENT PLAN

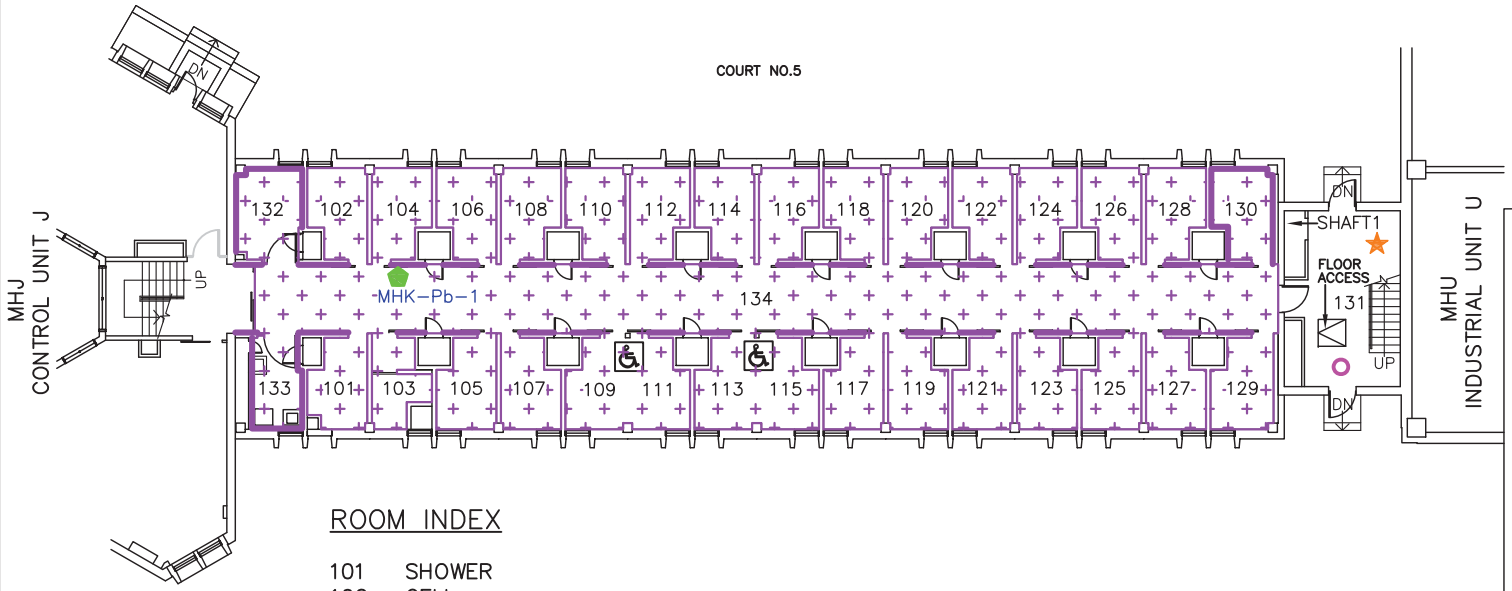
Public Works
Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics
Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

AQUA TERRE

Client/Location: PWGSC MILLHAVEN INSTITUTION BATH, ONTARIO		Title: SAMPLING LOCATIONS – MHK CELL UNIT K (BASEMENT)	
Project No: 06811	Filename: 06811–MHK–BSMT.DWG	Date: 14–JUL–2006	Dwg No: FIGURE MHK–1
Drawn: EM	Verified: MH	Project Manager: MRF	

MHK CELL UNIT K



ROOM INDEX

101	SHOWER
102	CELL
103	H/C SHOWER
102	CELL
I	I
130	CELL
131	STAIR
132	COMMON AREA
133	LAUNDRY
134	CORRIDOR

LEGEND

- FLOOR TILE SAMPLE LOCATION
- CEILING TILE SAMPLE LOCATION
- PAINT SAMPLE LOCATION
- WALL OR CEILING SURFACING MATERIAL SAMPLE
- PIPE INSULATION LOCATION [ASBESTOS CONTAINING MATERIAL AS SAMPLED BY THEM (1997) & OBSERVED BY AQUA TERRE]
- PIPE INSULATION SAMPLE LOCATION
- LIGHT WITH ASBESTOS CONTAINING MATERIAL HEAT SHIELD
- LEAD CONTAINING PAINT ON WALL (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON FLOOR (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON CEILING (>0.06%/600ppm)
- ASBESTOS CONTAINING FLOOR TILES
- ASBESTOS CONTAINING CEILING TILES OR SURFACE
- (Pb=921ppm) EXCEEDANCE IN ANALYSED SAMPLE

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED OR FAXED
3. 'ppm': PARTS PER MILLION
4. 'Pb': LEAD

SOURCE(S):
1. PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, MHK CELL UNIT K, FIRST FLOOR FIRE PLAN, JUNE 14, 2001

SCALE 1:250
0 5 10m

FIRST FLOOR PLAN

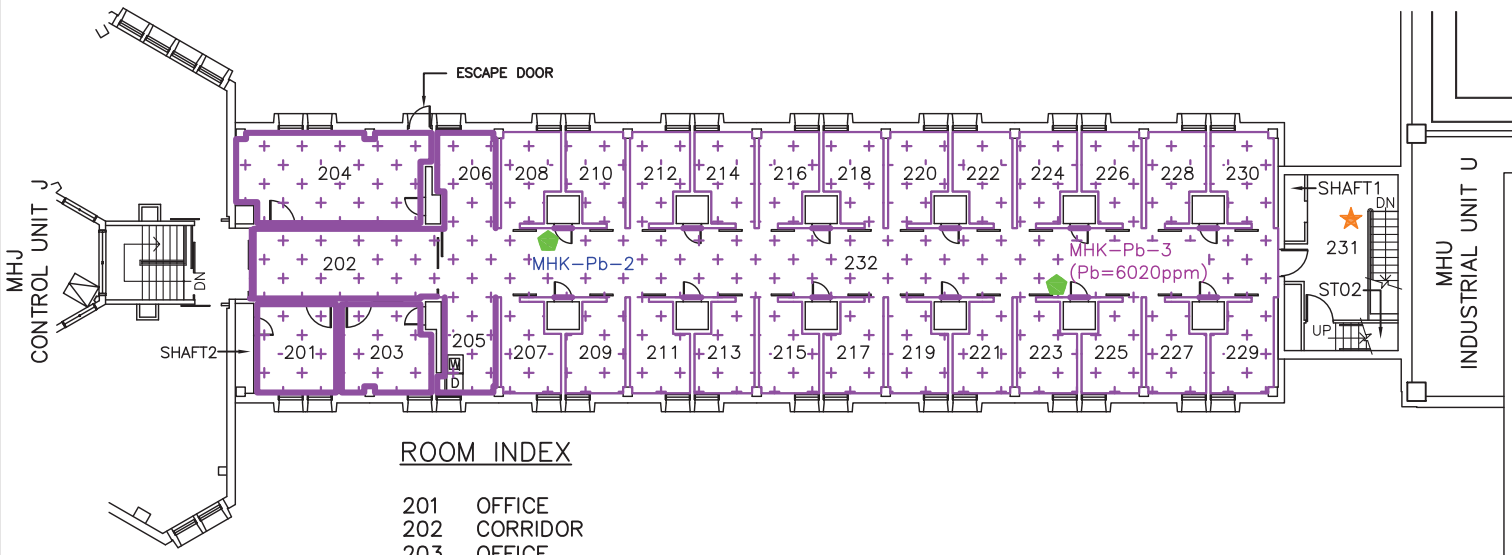
Public Works
Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics
Services gouvernementaux Canada
Services d'architecture et de genie
Région de l'Ontario

AQUA TERRE

Client/Location: PWGSC MILLHAVEN INSTITUTION BATH, ONTARIO		Title: SAMPLING LOCATIONS – MHK CELL UNIT K (FIRST FLOOR)	
Project No: 06811	Filename: 06811–MHK–1FLR.DWG	Date: 28–JUL–2006	Dwg No: FIGURE MHK–2
Drawn: EM	Verified: MH	Project Manager: MRF	

MHK CELL UNIT K



ROOM INDEX

201	OFFICE
202	CORRIDOR
203	OFFICE
204	OFFICE
205	LAUNDRY
206	COMMON AREA
207	CELL
|	|
230	CELL
231	STAIR
232	CORRIDOR
ST02	STAIR NO.2

LEGEND

- FLOOR TILE SAMPLE LOCATION
- CEILING TILE SAMPLE LOCATION
- PAINT SAMPLE LOCATION
- WALL OR CEILING SURFACING MATERIAL SAMPLE
- PIPE INSULATION LOCATION [ASBESTOS CONTAINING MATERIAL AS SAMPLED BY THEM (1997) & OBSERVED BY AQUA TERRE]
- PIPE INSULATION SAMPLE LOCATION
- LIGHT WITH ASBESTOS CONTAINING MATERIAL HEAT SHIELD
- LEAD CONTAINING PAINT ON WALL (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON FLOOR (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON CEILING (>0.06%/600ppm)
- ASBESTOS CONTAINING FLOOR TILES
- ASBESTOS CONTAINING CEILING TILES OR SURFACE
- (Pb=921ppm) EXCEEDANCE IN ANALYSED SAMPLE

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED OR FAXED
3. 'ppm': PARTS PER MILLION
4. 'Pb': LEAD

SOURCE(S):
1. PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, MHK CELL UNIT K, SECOND FLOOR FIRE PLAN, JUNE 14, 2001

SCALE 1:250
0 5 10m

SECOND FLOOR PLAN

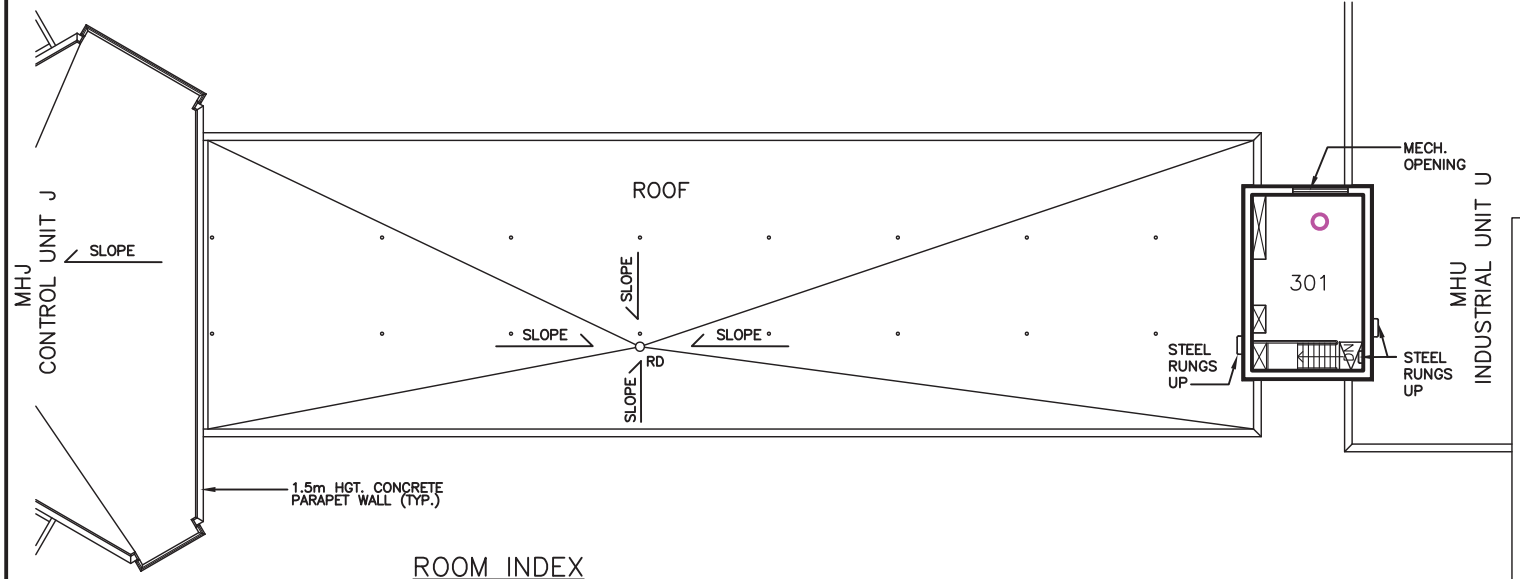
Public Works
Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics
Services gouvernementaux Canada
Services d'architecture et de genie
Région de l'Ontario

AQUA TERRE

Client/Location: PWGSC MILLHAVEN INSTITUTION BATH, ONTARIO		Title: SAMPLING LOCATIONS – MHK CELL UNIT K (SECOND FLOOR)	
Project No: 06811	Filename: 06811–MHK–2FLR.DWG	Date: 28–JUL–2006	Dwg No: FIGURE MHK–3
Drawn: EM	Verified: MH	Project Manager: MRF	

MHK CELL UNIT K



ROOM INDEX

301 MECHANICAL ROOM

LEGEND

- FLOOR TILE SAMPLE LOCATION
- CEILING TILE SAMPLE LOCATION
- PAINT SAMPLE LOCATION
- WALL OR CEILING SURFACING MATERIAL SAMPLE
- PIPE INSULATION LOCATION [ASBESTOS CONTAINING MATERIAL AS SAMPLED BY THEM (1997) & OBSERVED BY AQUA TERRE]
- PIPE INSULATION SAMPLE LOCATION
- LIGHT WITH ASBESTOS CONTAINING MATERIAL HEAT SHIELD
- LEAD CONTAINING PAINT ON WALL (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON FLOOR (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON CEILING (>0.06%/600ppm)
- ASBESTOS CONTAINING FLOOR TILES
- ASBESTOS CONTAINING CEILING TILES OR SURFACE
- (Pb=921ppm) EXCEEDANCE IN ANALYSED SAMPLE

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED OR FAXED
3. 'ppm': PARTS PER MILLION
4. 'Pb': LEAD

SOURCE(S):
1. PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, MHK CELL UNIT K, THIRD FLOOR FIRE PLAN, JUNE 14, 2001

SCALE 1:250

0 5 10m

THIRD FLOOR PLAN

Public Works
Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics
Services gouvernementaux Canada
Services d'architecture et de genie
Région de l'Ontario

AQUA TERRE

Client/Location: PWGSC MILLHAVEN INSTITUTION BATH, ONTARIO		Title: SAMPLING LOCATIONS – MHK CELL UNIT K (THIRD FLOOR)	
Project No: 06811	Filename: 06811–MHK–3FLR.DWG	Date: 14–JUL–2006	Dwg No: FIGURE MHK–4
Drawn: EM	Verified: MH	Project Manager: MRF	

ACCUTEST LABORATORIES LTD.

Report of Analysis

Client: Aqua Terre Solutions Inc.

2 Gurdwara Rd., Suite 200
Nepean, ON
K2E 1A2

Report Number: 2612157
Date Reported: 2006-06-16
Date Submitted: 2006-06-12
Project: 06-811

Attention: Mr. Mark Foerster

P.O. Number: 260233
Matrix Paint Chips

METHOD: Analysis was performed on an Aqua-Regia digest of the sample material.

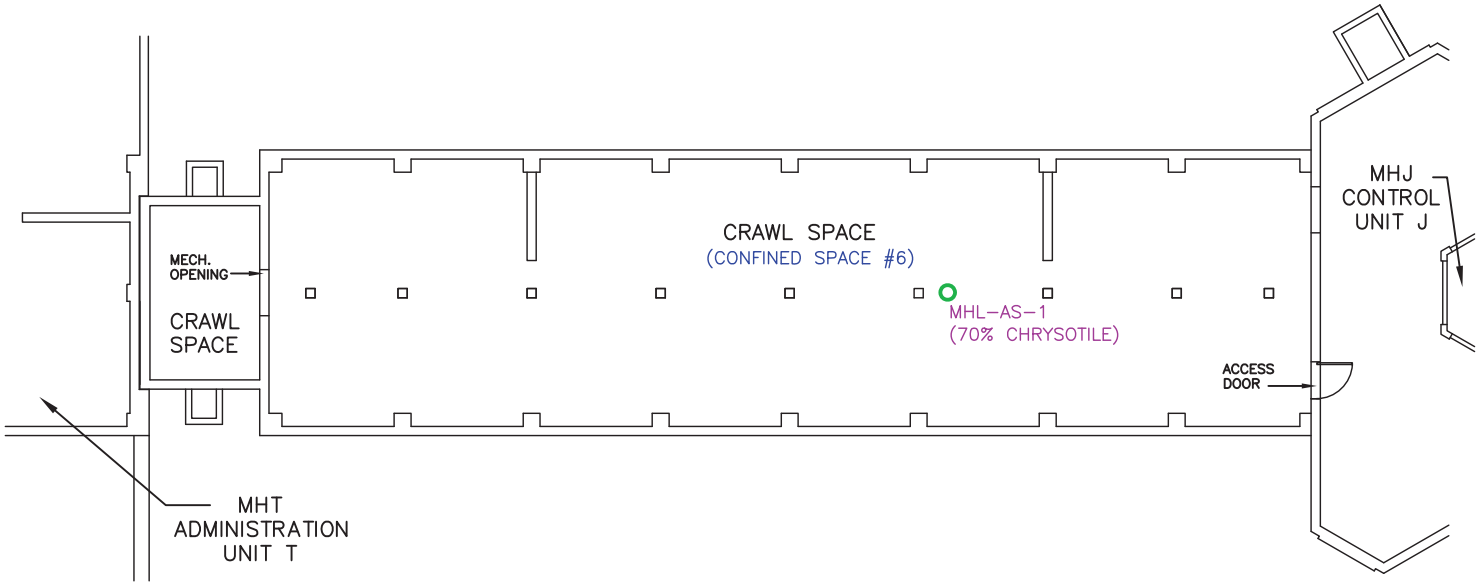
RESULTS:

LAB ID	Sample ID	Description	MDL	Lead (Pb) ug/g
469386	MHK-Pb-1		3	37
469387	MHK-Pb-2		3	112
469388	MHK-Pb-3		3	6020

COMMENT:

PHOTO 1: ASBESTOS CONTAINING MATERIAL INSULATION AT A PIPE HANGER, OBSERVED IN CRAWL SPACE #5 (MHK)

MHL CELL UNIT L



LEGEND

- FLOOR TILE SAMPLE LOCATION
- CEILING TILE SAMPLE LOCATION
- PAINT SAMPLE LOCATION
- WALL OR CEILING SURFACING MATERIAL SAMPLE
- PIPE INSULATION LOCATION [ASBESTOS CONTAINING MATERIAL AS SAMPLED BY THEM (1997) & OBSERVED BY AQUA TERRE]
- PIPE INSULATION SAMPLE LOCATION
- LIGHT WITH ASBESTOS CONTAINING MATERIAL HEAT SHIELD
- LEAD CONTAINING PAINT ON WALL (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON FLOOR (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON CEILING (>0.06%/600ppm)
- ASBESTOS CONTAINING FLOOR TILES
- ASBESTOS CONTAINING CEILING TILES OR SURFACE
- (Pb=921ppm) EXCEEDANCE IN ANALYSED SAMPLE

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED OR FAXED
3. 'ppm': PARTS PER MILLION
4. 'Pb': LEAD

SOURCE(S):
1. PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, MHL CELL UNIT L, BASEMENT FIRE PLAN, JUNE 14, 2001

SCALE 1:250

0 5 10m

BASEMENT PLAN

Public Works
Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics
Services gouvernementaux Canada
Services d'architecture et de genie
Région de l'Ontario

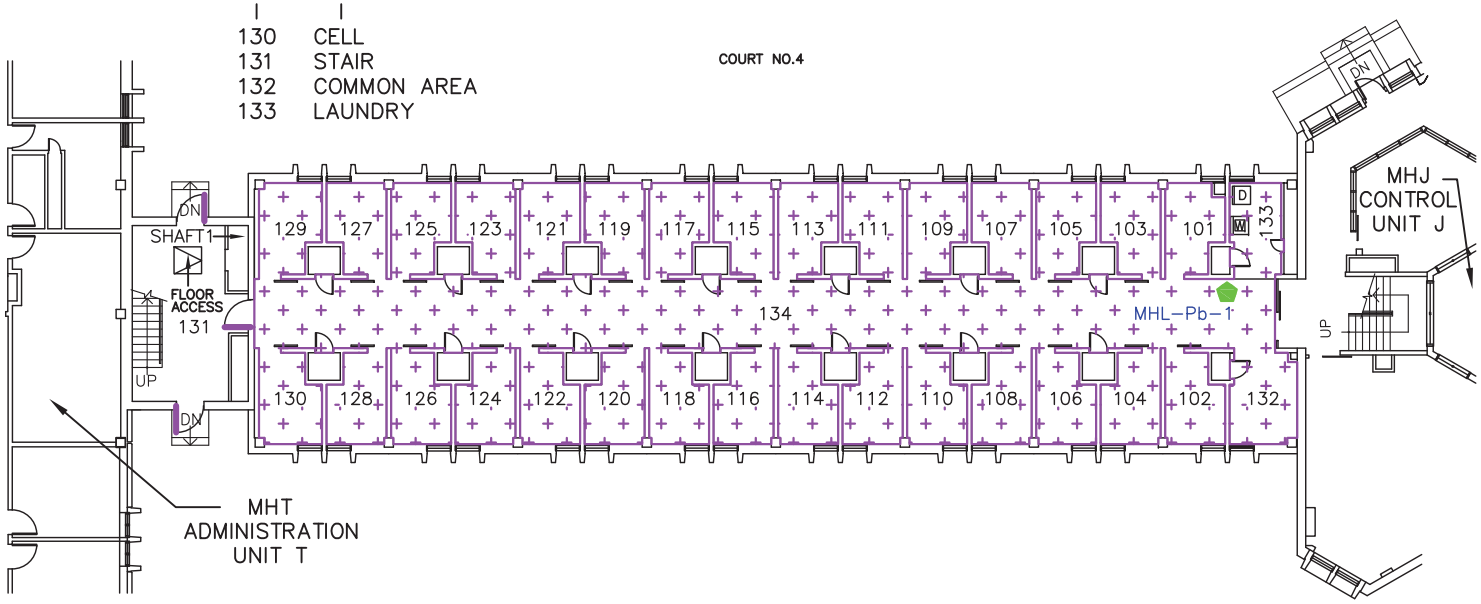
AQUA TERRE

Client/Location: PWGSC MILLHAVEN INSTITUTION BATH, ONTARIO		Title: SAMPLING LOCATIONS – MHL CELL UNIT L (BASEMENT)	
Project No: 06811	Filename: 06811-MHL-BSMT.DWG	Date: 16-AUG-2006	Dwg No: FIGURE MHL-1
Drawn: EM	Verified: MH	Project Manager: MRF	

MHL CELL UNIT L

ROOM INDEX

101	SHOWER
102	CELL
|	|
130	CELL
131	STAIR
132	COMMON AREA
133	LAUNDRY



LEGEND

- FLOOR TILE SAMPLE LOCATION
- CEILING TILE SAMPLE LOCATION
- PAINT SAMPLE LOCATION
- WALL OR CEILING SURFACING MATERIAL SAMPLE
- PIPE INSULATION LOCATION [ASBESTOS CONTAINING MATERIAL AS SAMPLED BY THEM (1997) & OBSERVED BY AQUA TERRE]
- PIPE INSULATION SAMPLE LOCATION
- LIGHT WITH ASBESTOS CONTAINING MATERIAL HEAT SHIELD
- LEAD CONTAINING PAINT ON WALL (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON FLOOR (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON CEILING (>0.06%/600ppm)
- ASBESTOS CONTAINING FLOOR TILES
- ASBESTOS CONTAINING CEILING TILES OR SURFACE
- (Pb=921ppm) EXCEEDANCE IN ANALYSED SAMPLE

NOTE(S):
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3. 'ppm': PARTS PER MILLION
4. 'Pb': LEAD

SOURCE(S):
1. PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, MHL CELL UNIT L, FIRST FLOOR FIRE PLAN, JUNE 14, 2001

SCALE 1:250

0 5 10m

FIRST FLOOR PLAN

Public Works
Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics
Services gouvernementaux Canada
Services d'architecture et de genie
Région de l'Ontario

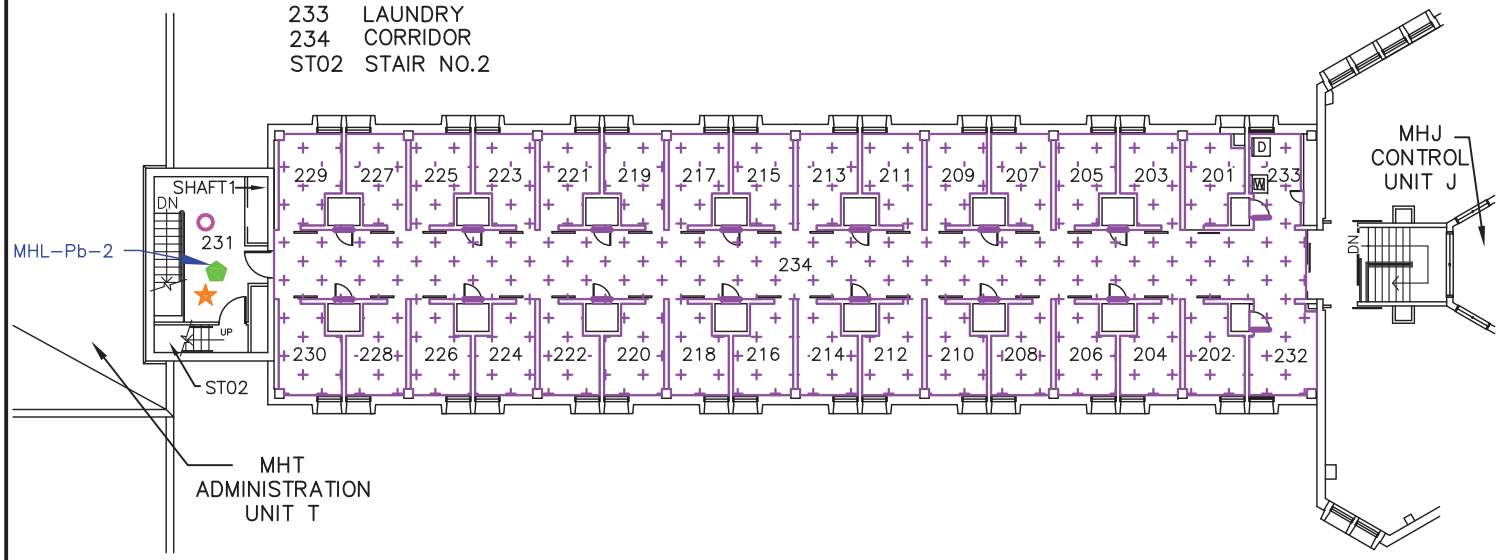
AQUA TERRE

Client/Location: PWGSC MILLHAVEN INSTITUTION BATH, ONTARIO		Title: SAMPLING LOCATIONS – MHL CELL UNIT L (FIRST FLOOR)	
Project No: 06811	Filename: 06811–MHL–1FLR.DWG	Date: 11–JUL–2006	Dwg No: FIGURE MHL–2
Drawn: EM	Verified: MH	Project Manager: MRF	

MHL CELL UNIT L

ROOM INDEX

201	SHOWER
202	CELL
|	|
230	CELL
231	STAIR
232	COMMON AREA
233	LAUNDRY
234	CORRIDOR
ST02	STAIR NO.2



LEGEND

- FLOOR TILE SAMPLE LOCATION
- CEILING TILE SAMPLE LOCATION
- PAINT SAMPLE LOCATION
- WALL OR CEILING SURFACING MATERIAL SAMPLE
- PIPE INSULATION LOCATION [ASBESTOS CONTAINING MATERIAL AS SAMPLED BY THEM (1997) & OBSERVED BY AQUA TERRE]
- PIPE INSULATION SAMPLE LOCATION
- LIGHT WITH ASBESTOS CONTAINING MATERIAL HEAT SHIELD
- LEAD CONTAINING PAINT ON WALL (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON FLOOR (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON CEILING (>0.06%/600ppm)
- ASBESTOS CONTAINING FLOOR TILES
- ASBESTOS CONTAINING CEILING TILES OR SURFACE
- (Pb=921ppm) EXCEEDANCE IN ANALYSED SAMPLE

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED OR FAXED
3. 'ppm': PARTS PER MILLION
4. 'Pb': LEAD

SOURCE(S):
1. PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, MHL CELL UNIT L, SECOND FLOOR FIRE PLAN, JUNE 14, 2001

SCALE 1:250

0 5 10m

SECOND FLOOR PLAN

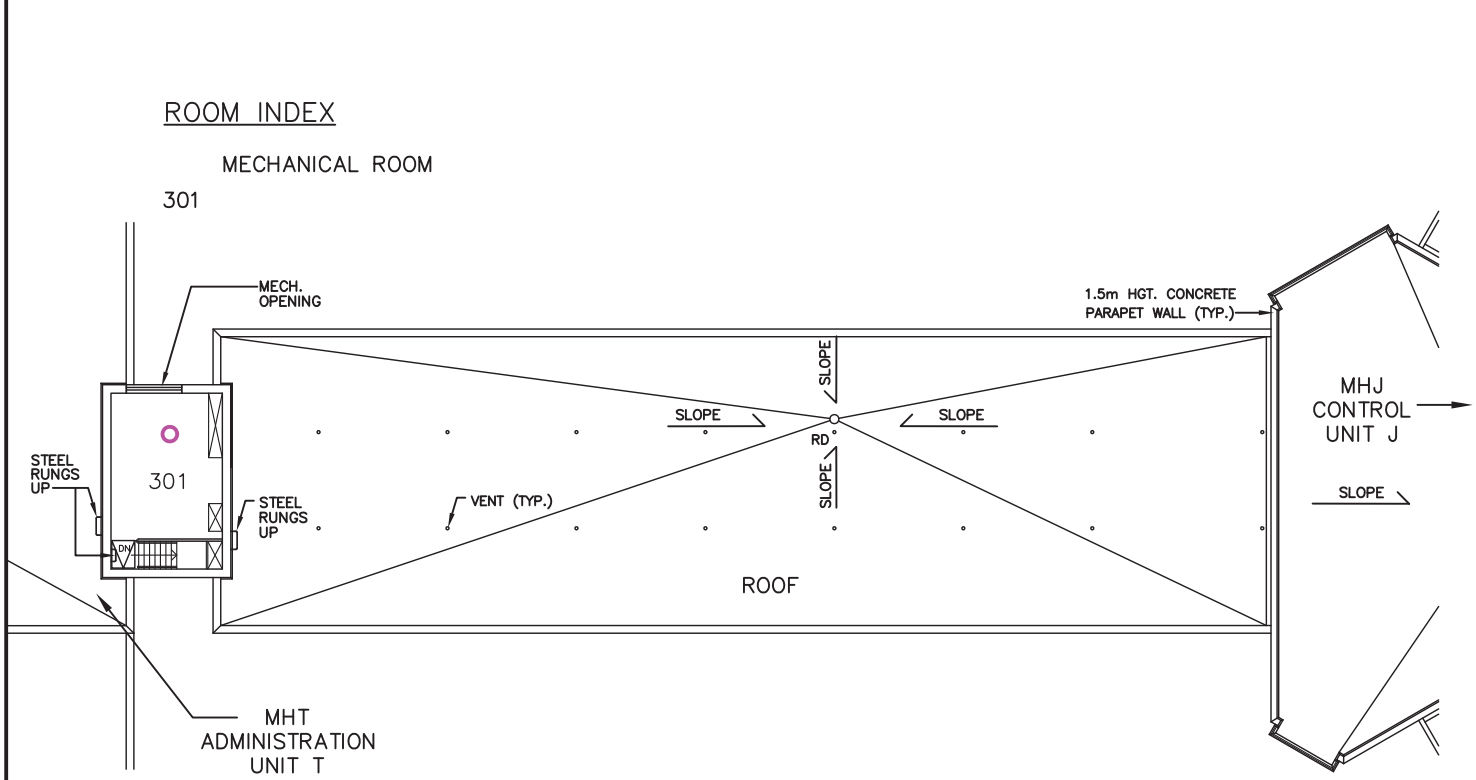
Public Works
Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics
Services gouvernementaux Canada
Services d'architecture et de genie
Région de l'Ontario

AQUA TERRE

Client/Location: PWGSC MILLHAVEN INSTITUTION BATH, ONTARIO		Title: SAMPLING LOCATIONS – MHL CELL UNIT L (SECOND FLOOR)	
Project No: 06811	Filename: 06811–MHL–2FLR.DWG	Date: 11–JUL–2006	Dwg No: FIGURE MHL–3
Drawn: EM	Verified: MH	Project Manager: MRF	

MHL CELL UNIT L



THIRD FLOOR PLAN

LEGEND

- FLOOR TILE SAMPLE LOCATION
- CEILING TILE SAMPLE LOCATION
- PAINT SAMPLE LOCATION
- WALL OR CEILING SURFACING MATERIAL SAMPLE
- PIPE INSULATION LOCATION [ASBESTOS CONTAINING MATERIAL AS SAMPLED BY THEM (1997) & OBSERVED BY AQUA TERRE]
- PIPE INSULATION SAMPLE LOCATION
- LIGHT WITH ASBESTOS CONTAINING MATERIAL HEAT SHIELD
- LEAD CONTAINING PAINT ON WALL (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON FLOOR (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON CEILING (>0.06%/600ppm)
- ASBESTOS CONTAINING FLOOR TILES
- ASBESTOS CONTAINING CEILING TILES OR SURFACE
- (Pb=921ppm) EXCEEDANCE IN ANALYSED SAMPLE

NOTE(S):
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2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED OR FAXED
3. 'ppm': PARTS PER MILLION
4. 'Pb': LEAD

SOURCE(S):
1. PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, MHL CELL UNIT L, THIRD FLOOR FIRE PLAN, JUNE 14, 2001

SCALE 1:250
0 5 10m

Public Works
Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics
Services gouvernementaux Canada
Services d'architecture et de genie
Région de l'Ontario

AQUA TERRE

Client/Location: PWGSC, MILLHAVEN INSTITUTION, BATH, ONTARIO		Title: SAMPLING LOCATIONS – MHL CELL UNIT L (THIRD FLOOR)	
Project No: 06811	Filename: 06811–MHL–3FLR.DWG	Date: 11–JUL–2006	Dwg No: FIGURE MHL–4
Drawn: EM	Verified: MH	Project Manager: MRF	

Company:	Aqua Terre Solutions Inc.	**Report Date:**	10-Jul-06
Contact:	Mr. Mark Foerster	**Analysis Date:**	07-Jul-06
Client Address:	2 Gurdwara Road, Suite 200, Ottawa, ON	**Received Date:**	04-Jul-06
Client Reference:	06-811; Millhaven	**LEX Project Number:**	08061233
Sampling Date:	29-Jun-06	**Number of Analyses:**	2

Analysis Requested **Bulk Asbestos by PLM**

Analysis was performed in accordance with the method EPA/600/R-93/116, Method for the Determination of Asbestos in Bulk Building Materials adopted in Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations - made under the Occupational Health and Safety Act Ontario Regulation 278/05. LEX Scientific Inc. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP 101949) by the National Institute of Standards and Technology for analysis of bulk materials for asbestos.

German Leal, B.Sc.
Laboratory Manager

Jason Cooper, B.Sc.
Analyst

			Fibrous Asbestos Content %		Other Materials Content %
Client Sample:	MHL-AS-1	**Asbestos Detected?**	**Yes**		
LEX Sample:	01.1	**Chrysotile:**	10	**Cellulose:**	None Detected
Layers Analyzed:	Lagging	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Green	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Pipe Insulation	**Other Amphiboles:**	None Detected	**Non Fibers:**	90
		Comments:			

Company: Aqua Terre Solutions Inc. **LEX Project #** 08061233

			Fibrous Asbestos Content %		Other Materials Content %
Client Sample:	MHL-AS-1	**Asbestos Detected?**	Yes		
LEX Sample:	01.2	**Chrysotile:**	70	**Cellulose:**	None Detected
Layers Analyzed:	Insulation	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Pipe Insulation	**Other Amphiboles:**	None Detected	**Non Fibers:**	30
		Comments:			

24. MHR - PASSAGE

24.1 Building Description

The MHR building was constructed in 1969 and contains one floor and a crawl space. The crawl space is classified as a Confined Space. Floor plans MHR-1 (crawlspace), and MHR-2 (first floor) showing the approximate building layout, dimensions, sampling locations and locations and/or areas with ACMs or lead are provided in Appendix 24. The location of this building is shown on site plan Figure 1-2 in Section 1 of this report.

24.2 Survey Findings

The DSHMS in MHR was conducted by Aqua Terre personnel on June 28, 2006. The results of the DSHMS are presented in the subsections of Section 24.2. Recommendations for mitigative measures and construction and removal procedures for the identified designated substances and hazardous materials in this building are presented in Section 40. Laboratory certificates of analysis for asbestos and lead samples are included in Appendix 24.

24.2.1 Asbestos-Containing Materials (ACMs)

One sample was collected from the building for asbestos analysis. The sample (pipe insulation) was submitted for bulk asbestos analysis using the PLM method. Results are presented in Table 24.1. Information for ACMs (if any) observed and previously sampled (THEM, 1997) are also presented in Table 24.1. The room number (where observed), description of material, friability, condition, accessibility, recommended action, asbestos content and estimated quantity (only for ACMs) are also included in Table 24.1. Approximate sampling locations and areal or lateral extent of ACMs (if present) are shown on the floor plans in Appendix 24.

The following ACMs were identified:

- The insulation around pipe elbows in MHR crawlspace contained up to 20 % chrysotile asbestos. A total of 2 ACM containing pipe elbows were observed in the MHR crawlspace.

Table 24.1 Summary of Asbestos Survey, Building MHR

Sample ID	Room Number	Materials	Friable[1]	Condition[2]	Accessibility[3]	Action[4]	Asbestos Content[5]	Estimated Quantity
MHR-AS-1	**Crawlspace (Confined Space 2)**	**Insulation on pipe elbows**	**Yes**	**Good**	**C(concealed)**	7	**(C) 20%**	**2 (6 inch diameter)**

Notes:

1 Friability is assessed as friable or non-friable

2 Condition is rated as good, fair or poor

3 Accessibility is A, B, C(exposed), C(concealed) or D as defined in Section 2.3.1.

4 Action is 1, 2, 3, 4, 5, 6, or 7 as defined in Section 2.3.1.

5 Asbestos Content is Chrysotile (C), Amosite (A) or other Fibre (O) expressed as a percentage.

ND None Detected (for PLM <0.1%; TEM <0.1%)

24.2.2 Lead-Containing Materials

One sample of paint was collected from the building and submitted for laboratory analysis of lead. The results of the analysis for lead are summarized in Table 24.2. The sample identification numbers, room number (where sampled), description, condition, layers, lead content and approximate area (for paint containing greater than 600 ppm of lead) are also included in Table 24.2. Approximate sample locations and areal extent of paint containing greater than 600 ppm of lead are shown in the floor plans in Appendix 24.

Table 24.2 Summary of Lead Paint Survey, Building MHR

Sample ID	Room Number	Colour, Location and Description	Condition[1]	Layers Noted[2]	Lead Content (ppm)	Estimated Quantity (m^2)
MHR-Pb-1	**Crawl Space (Confined Space 2)**	**Red paint on sprinkler pipe**	**Fair with flaking**	**No**	**3430**	**11**

Notes:

1 Condition is rated as good, fair or poor with peeling and/or flaking

2 Layers of paint are noted visually and can only be observed if the layers are different colour

bold Exceeds the Surface Coating Materials Regulations limit of 0.06 % by weight (mg/g), or 600 ppm

The sample of red paint collected from the sprinkler pipes in the crawlspace (MHR-Pb-1) contained 3430 ppm of lead.

The solder on the water supply lines throughout the facility should be considered to contain lead.

Cast iron pipe flanges likely containing leaded packing material (as sampled in building MHH (sample # MHH-Pb-8) and found to contain 91.3% lead) were observed in the crawl space. A total of 10 pipe flanges were observed with a diameter of 4 inches.

24.2.3 Mercury

Fluorescent light bulbs were the only source of mercury observed during Aqua Terre's site inspection of MHR. The fluorescent light bulbs contain between 0.01 to 0.04 g of mercury vapour depending on manufacturer and age (Environment Canada, 2002). The number of fluorescent light fixtures observed during the site visit was approximately 12. Assuming two bulbs per fixture an

estimated 24 fluorescent light bulbs are in-use, indicating that the total amount of mercury in the bulbs at MHR could range from an estimated 0.24 g to 0.96 g.

24.2.4 Silica

Silica is contained in the concrete and concrete blocks observed throughout the interior and exterior of MHR.

24.2.5 Other Designated Substances

During this survey, none of the following designated substances were observed in MHR: acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxide, isocyanates or vinyl chloride.

24.2.6 Polychlorinated Biphenyls (PCBs)

During the environmental audit conducted in 2006 (Aqua Terre, 2006) CSC staff informed Aqua Terre that, although a number of the PCB-containing fluorescent light ballasts had been removed from the facility, an estimated 800 to 1000 light fixtures that are likely PCB-containing still remain throughout the facility. There are an estimated 24 fluorescent light fixtures in MHR. Fixtures in this area could not be inspected since they could not be accessed (due to presence of secure fittings in areas accessible to inmates).

No other sources of PCBs were observed in this building during this survey. During the previous environmental audit (Aqua Terre, 2006), CSC staff informed Aqua Terre that all PCB-containing "wet" transformers had been replaced with non-PCB containing "dry" transformers.

24.2.7 Ozone Depleting Substances (ODSs)

An updated Halocarbon Inventory for the entire institution is provided in Appendix 40. No ODS containing equipment was identified in MHR.

24.2.8 Urea Formaldehyde Foam Insulation (UFFI)

No UFFI was identified in MHR.

24.2.9 Fuel, Oil and/or Waste Oil Storage

No fuel, oil and/or waste oil storage was identified in MHR.

24.2.10 Chemical Storage

No chemicals were observed to be stored in MHR.

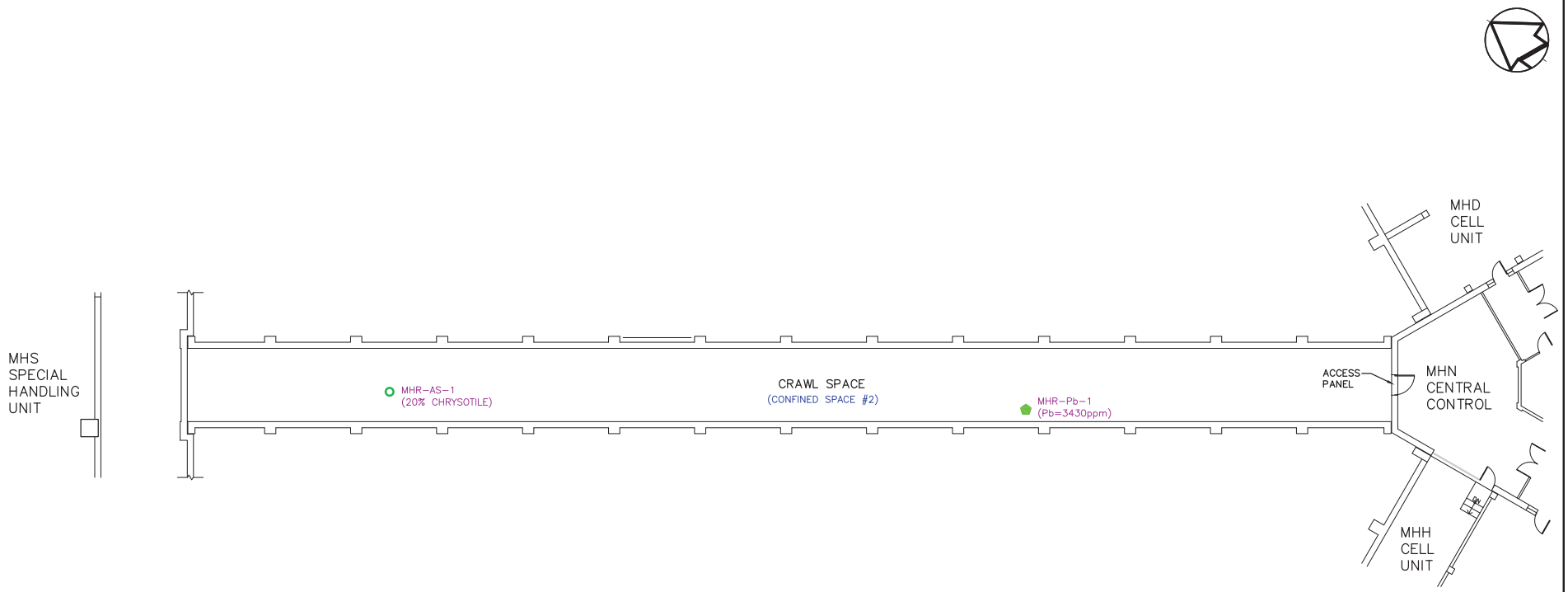
24.2.11 Radioactive Materials

No radioactive materials were observed in MHR.

24.2.12 Mould

No water and/or mould was observed in MHR.

MHR PASSAGE R



LEGEND

- FLOOR TILE SAMPLE LOCATION
- CEILING TILE SAMPLE LOCATION
- PAINT SAMPLE LOCATION
- WALL OR CEILING SURFACING MATERIAL SAMPLE
- ASBESTOS CONTAINING MATERIAL AS SAMPLED BY THEM (1997) & OBSERVED BY AQUA TERRE (2006)
- PIPE INSULATION SAMPLE LOCATION
- LIGHT WITH ASBESTOS CONTAINING MATERIAL HEAT SHIELD
- LEAD CONTAINING PAINT ON WALL (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON FLOOR (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON CEILING (>0.06%/600ppm)
- ASBESTOS CONTAINING FLOOR TILES
- ASBESTOS CONTAINING CEILING TILES OR SURFACE
- (Pb=921ppm) EXCEEDANCE IN ANALYSED SAMPLE

SCALE 1:200

0 4 8m

BASEMENT PLAN

Public Works
Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics
Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

NOTE(S):
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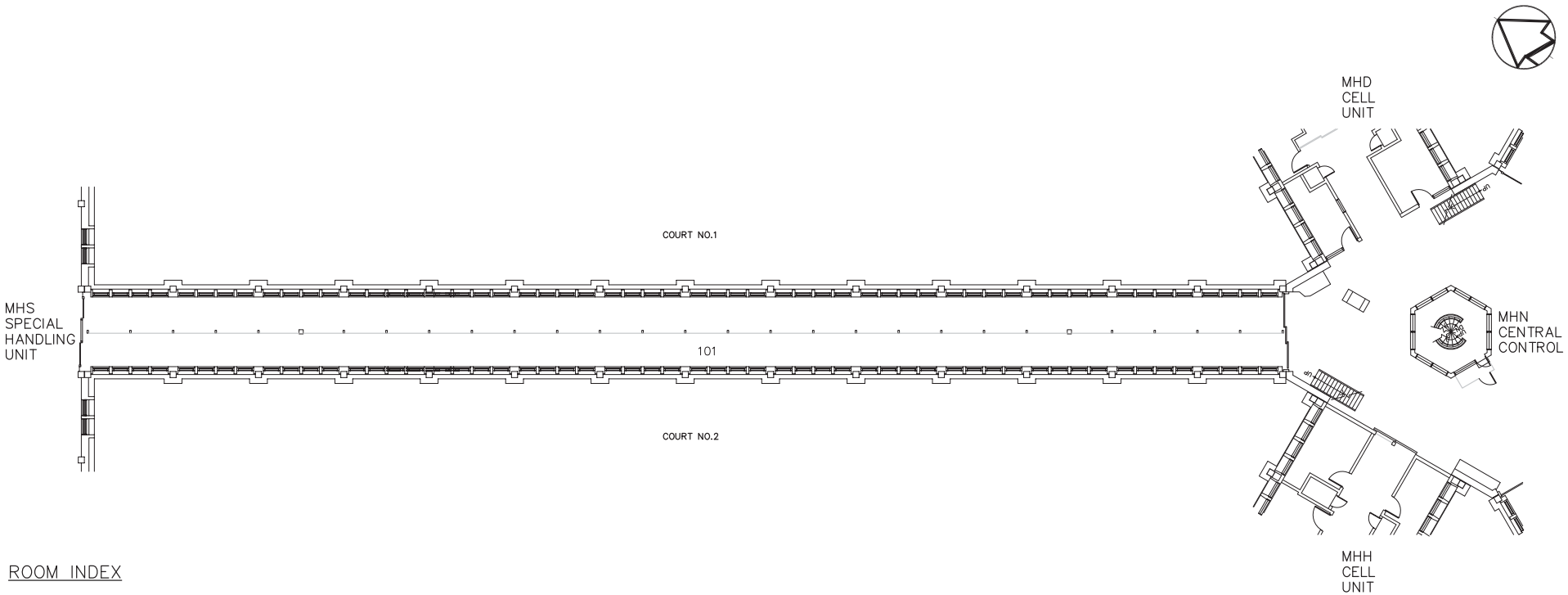
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED OR FAXED
3. 'ppm': PARTS PER MILLION
4. 'Pb': LEAD

SOURCE(S):
1. PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, MHR PASSAGE R, BASEMENT FIRE PLAN, JUNE 14, 2001

AQUA TERRE

Client/Location: PWGSC, MILLHAVEN INSTITUTION, BATH, ONTARIO		Title: SAMPLING LOCATIONS – MHR PASSAGE R (BASEMENT)	
Project No: 06811	Filename: 06811–MHR–BSMT.DWG	Date: 20–JUL–2006	Dwg No: FIGURE MHR–1
Drawn: EM	Verified: KE	Project Manager: MRF	

MHR PASSAGE R



ROOM INDEX

101 DIVIDED CORRIDOR

LEGEND

- FLOOR TILE SAMPLE LOCATION
- CEILING TILE SAMPLE LOCATION
- PAINT SAMPLE LOCATION
- WALL OR CEILING SURFACING MATERIAL SAMPLE
- ASBESTOS CONTAINING MATERIAL AS SAMPLED BY THEM (1997) & OBSERVED BY AQUA TERRE (2006)
- PIPE INSULATION SAMPLE LOCATION
- LIGHT WITH ASBESTOS CONTAINING MATERIAL HEAT SHIELD
- LEAD CONTAINING PAINT ON WALL (>0.06%/600ppm)
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- LEAD CONTAINING PAINT ON CEILING (>0.06%/600ppm)
- ASBESTOS CONTAINING FLOOR TILES
- ASBESTOS CONTAINING CEILING TILES OR SURFACE
- (Pb=921ppm) EXCEEDANCE IN ANALYSED SAMPLE

SCALE 1:200

0 4 8m

FIRST FLOOR PLAN

Public Works
Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics
Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED OR FAXED
3. 'ppm': PARTS PER MILLION
4. 'Pb': LEAD

SOURCE(S):
1. PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, MHR PASSAGE R, FIRST FLOOR FIRE PLAN, JUNE 14, 2001

AQUA TERRE

Client/Location: PWGSC MILLHAVEN INSTITUTION BATH, ONTARIO		Title: SAMPLING LOCATIONS – MHR PASSAGE R (FIRST FLOOR)	
Project No: 06811	Filename: 06811–MHR–1FLR.DWG	Date: 14–JUL–2006	Dwg No: FIGURE MHR–2
Drawn: EM	Verified: KE	Project Manager: MRF	

Company:	Aqua Terre Solutions Inc.	**Report Date:**	10-Jul-06
Contact:	Mr. Mark Foerster	**Analysis Date:**	07-Jul-06
Client Address:	2 Gurdwara Road, Suite 200, Ottawa, ON	**Received Date:**	04-Jul-06
Client Reference:	06-811; Millhaven	**LEX Project Number:**	08061229
Sampling Date:	28-Jun-06	**Number of Analyses:**	1

Analysis Requested **Bulk Asbestos by PLM**

Analysis was performed in accordance with the method EPA/600/R-93/116, Method for the Determination of Asbestos in Bulk Building Materials adopted in Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations - made under the Occupational Health and Safety Act Ontario Regulation 278/05. LEX Scientific Inc. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP 101949) by the National Institute of Standards and Technology for analysis of bulk materials for asbestos.

German Leal, B.Sc.
Laboratory Manager

Jason Cooper, B.Sc.
Analyst

			Fibrous Asbestos Content %		Other Materials Content %
Client Sample:	MHR-AS-1	**Asbestos Detected?**	Yes		
LEX Sample:	01	**Chrysotile:**	20	**Cellulose:**	None Detected
Layers Analyzed:	Sample homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Grey	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Parging / Insulation	**Other Amphiboles:**	None Detected	**Non Fibers:**	80
		Comments:			

ACCUTEST LABORATORIES LTD.

Report of Analysis

Client: Aqua Terre Solutions Inc.

2 Gurdwara Rd., Suite 200
Nepean, ON
K2E 1A2

Report Number: 2613835
Date Reported: 2006-07-06
Date Submitted: 2006-06-30
Project: 06-811

Attention: Mr. Mark Foerster

P.O. Number: 260233
Matrix Paint Chips

METHOD: Analysis was performed on an Aqua-Regia digest of the sample material.

RESULTS:

LAB ID	Sample ID	Description	MDL	Lead (Pb) ug/g
474248	MHR-Pb-1		3	3430

COMMENT:

28. MHT - ADMINISTRATION UNIT

28.1 Building Description

The MHT building was constructed in 1969 and contains one main floor and a basement. Floor plans MHT-1 (basement) and MHT-2 (first floor) showing the approximate building layout, dimensions, sampling locations and locations and/or areas with ACMs or lead are provided in Appendix 28. As noted in the floor plans, the majority of the basement is classified as a Confined Space. The location of this building is shown on site plan Figure 1-2 in Section 1 of this report.

28.2 Survey Findings

The DSHMS in MHT was conducted by Aqua Terre personnel on May 29-31, 2006. The results of the DSHMS are presented in the subsections of Section 28.2. Recommendations for mitigative measures and construction and removal procedures for the identified designated substances and hazardous materials in this building, and the facility as a whole are provided in Section 40. Laboratory certificates of analysis for asbestos and lead samples are provided in Appendix 28. Selected photographs showing areas of concern are also provided in Appendix 28.

28.2.1 Asbestos-Containing Materials (ACMs)

A total of sixteen (16) samples were collected from MHT for bulk asbestos analysis using the PLM and/or the TEM (Chatfield) method. Two of the collected samples were not submitted for analysis as one was identical to a previously sampled ceiling tile (THEM, 1997) and one was observed to be composed of fibreglass upon further inspection. Floor tile samples and the matrix of vinyl sheet flooring or linoleum flooring samples were submitted for bulk asbestos analysis using the TEM (Chatfield) method. All other samples (ceiling tiles, drywall, joint compound and the membrane portion of vinyl or linoleum sheet flooring) were submitted for bulk asbestos analysis using the PLM method. Results are presented in Table 28.1. The sample identification numbers, room number (where sampled and/or observed), description of material, friability, condition, accessibility, recommended action, asbestos content and estimated quantity (only for ACMs) are also included in Table 28.1. Information for ACMs observed and previously sampled (THEM, 1997) is also included in Table 28.1. Approximate sampling locations and areal or lateral extent of ACMs (if present) are shown on the floor plans in Appendix 28.

The following ACMs were identified:

- The vinyl floor tile in room 133 (described as beige with long stripes) contained between 2.5 and 5% chrysotile asbestos. These floor tiles were also identified in rooms 105, 129, 126, 127, 128 and 167 and were all in good condition.

- The fissured ceiling tiles (1 foot by 1 foot) previously sampled by THEM (1997) and found to contain 2% amosite asbestos were observed in rooms 125 (sample collected but not analysed), 106, 124, 133, 146, 150 and 159. The ceiling tiles were generally in good condition.

- Insulated pipe elbows were observed in the washroom of T-control (room 105/ST01), room 153, 138, Shaft 2, in B01 (basement) and in two of the crawl spaces (confined space #16 and #8). The insulation around these elbows was previously sampled by THEM and found to contain up to 60% chrysotile asbestos. A total of 105 elbows were observed.

- Insulated pipe lengths containing asbestos were observed in confined space #7 and #8. This insulation was previously sampled by THEM and found to contain 10% chrysotile asbestos and 15% amosite asbestos. A length of 8 m was observed in confined space #7 and a length of 4 m was observed in confined space #8.

- Light heat shields were observed in room 108 and the bathroom in T-control (105) and are presumed to be the same as previously sampled by THEM. The light heat shield previously sampled contained 60% chrysotile asbestos (THEM, 1997). Aqua Terre observed only two of these light heat shields in MHT.

- Parging material used on concrete equipment bases was previously sampled by THEM and found to contain between 20 and 30% chrysotile asbestos. This parging material was observed by Aqua Terre on equipment bases in rooms 153 and B01. The parging material is approximately 5 cm wide around the edge of the concrete equipment bases.

Table 28.1 Summary of Asbestos Survey, Building MHT

Sample ID	Room Number	Materials	Friable[1]	Condition[2]	Accessibility[3]	Action[4]	Asbestos Content[5]	Estimated Quantity
MHT-AS-1	139	Vinyl coated ceiling tile, white, 2'x4'	Friable	Good	C(exposed)	none	ND	-
MHT-AS-2	140	Vinyl sheet flooring, blue	Non-friable	Good	A	none	ND	-
MHT-AS-3	134	Drywall joint compound	Friable	Good	A	none	ND	-
MHT-AS-4	**133 Also in 105 129 126 127 128 167**	**Vinyl floor tile, beige with long stripes, 1'x1'**	**Non-friable**	**Good**	**A**	**7**	**(C) 2.5-5%**	**90 m²**
MHT-AS-5	138	Ceiling tile, white flecked, 2'x4'	Friable	Good	C(exposed)	none	ND	-
MHT-AS-6	**125 Also in 106 124 133 146 150 159**	**Ceiling tile, white fissured, 1'x1' as sampled by THEM**	**Friable**	**Good (generally)**	**C(exposed)**	**7**	**(A) 2% (THEM, 1997)**	**94 m²**
MHT-AS-7	125	Fire rated gypsom board	Friable	Good	A	none	ND	-
MHT-AS-8	124	Vinyl floor tile, off white flecked, 1'x1'	Non-friable	Good	A	none	ND	-
MHT-AS-9	123	Acoustic matting - further inspection suggested fibreglass composition	-	-	-	-	Not Submitted	-
MHT-AS-10	120	Vinyl coated drywall	Friable	Good	A	none	ND	-

Sample ID	Room Number	Materials	Friable[1]	Condition[2]	Accessibility[3]	Action[4]	Asbestos Content[5]	Estimated Quantity
MHT-AS-11	113	Pink vinyl sheet flooring	Non-friable	Good	A	none	ND	-
MHT-AS-12	113	Ceiling tiles, white flecked , 2'x2'	Friable	Good	C(exposed)	none	ND	-
MHT-AS-13	171	Linoleum flooring, beige (tile pattern)	Non-friable	Good	A	none	ND	-
MHT-AS-14	143	Vinyl floor tile, blue, 1'x1'	Non-friable	Good	A	none	ND	-
MHT-AS-15	161	Vinyl floor tile, white and grey flecked, 1'x1'	Non-friable	Good	A	none	ND	-
MHT-AS-16	107	Vinyl floor tile, grey speckled, 2'x2'	Non-friable	Good	A	none	ND	-
Not Sampled	**105 (ST01)**	**Insulation around pipe elbows, as sampled by THEM**	**Friable**	**Fair (7) Poor (1)**	**A**	**5/6 3**	**(C) 30-40% (THEM, 1997)**	**8 (2.5-inch diameter)**
Not Sampled	**153**	**Insulation around pipe elbows, as sampled by THEM**	**Friable**	**Good**	**C(exposed)**	**7**	**(C) 30-40% (THEM, 1997)**	**8 (3.5-inch diameter)**
Not Sampled	**138 & Shaft 2**	**Insulation around pipe elbows, as sampled by THEM**	**Friable**	**Good**	**C(exposed)**	**7**	**(C) 30-40% (THEM, 1997)**	**2 (2.5-inch diameter)**
Not Sampled	**B01**	**Insulation around pipe elbows, as sampled by THEM**	**Friable**	**Good**	**C(exposed)**	**7**	**(C) 30-60% (THEM, 1997)**	**20 (2.5-3.5-inch diameter) 28 (4-6.5-inch diameter)**

Sample ID	Room Number	Materials	Friable[1]	Condition[2]	Accessibility[3]	Action[4]	Asbestos Content[5]	Estimated Quantity
Not Sampled	Confined Space #16	Insulation around pipe elbows, as sampled by THEM	Friable	Good	C(concealed)	7	(C) 30-60% (THEM, 1997)	35 (2-inch diameter), 1 (4-inch diameter)
Not Sampled	Confined Space #8	Insulation around pipe elbows, as sampled by THEM	Friable	Good (2) Poor (1)	C(concealed)	74	(C) 30-60% (THEM, 1997)	3 (2-4-inch diameter)
Not Sampled	Confined Space #7	Insulation around pipe length, as sampled by THEM	Friable	Good	C(concealed)	7	(C) 10% (A) 15% (THEM, 1997)	8 m (8-inch diameter)
Not Sampled	Confined Space #8	Insulation around pipe length, as sampled by THEM	Friable	Good	C(concealed)	7	(C) 10% (A) 15% (THEM, 1997)	4 m (8-inch diameter)
Not Sampled	ST01 & 108	Light heat shield, as sampled by THEM	Friable	Good	C(exposed)	7	(C) 60% (THEM, 1997)	2
Not Sampled	153 & B01	Parging material on concrete equipment base, as sampled by THEM	Friable	Good	A	7	(C) 20-30% (THEM, 1997)	<2 m^2 (5 bases)

Notes:

1 Friability is assessed as friable or non-friable

2 Condition is rated as good, fair or poor

3 Accessibility is A, B, C(exposed), C(concealed) or D as defined in Section 2.3.1.

4 Action is 1, 2, 3, 4, 5, 6 or 7 as defined in Section 2.3.1.

5 Asbestos Content is Chrysotile (C), Amosite (A) or Other Fibre (O) expressed as a percentage

ND None Detected (for PLM <0.1%; TEM <0.1%)

28.2.2 Lead-Containing Materials

Twenty-three samples of paint were collected from the building and submitted for laboratory analysis of lead. A summary of the lead paint survey is provided in Table 28.2. The sample identification numbers, room number (where sampled), description, condition, layers, lead content and approximate area (for paint containing greater than 600 ppm of lead) are also included in Table 28.2. Approximate sample locations and areal extent of paint containing greater than 600 ppm of lead are shown in the floor plans in Appendix 28.

Table 28.2 Summary of Lead Paint Survey, Building MHT

Sample ID	Room Number	Colour, Location and Description	Condition[1]	Layers Noted[2]	Lead Content (ppm)	Estimated Quantity (m^2)
MHT-Pb-1	139	Medium teal, paint on concrete walls and trim throughout MHT	Good	yes	184	-
MHT-Pb-2	**139 Also in 137, 140**	**Light yellow, sub layer to MHT-Pb-1**	**Good**	**yes**	**726**	**169**
MHT-Pb-3	140	Dark teal on bulkheads and doors in MHT	Good	yes	25	-
MHT-Pb-4	139	Light teal, on concrete walls throughout MHT	Good	yes	243	-
MHT-Pb-5	137	Powder blue on tool board, also observed in Room 143	Good	no	226	-
MHT-Pb-6	140	Red, on fire cabinet (containing hose), throughout MHT	Good	no	26	-
MHT-Pb-7	140	Dark grey, on door frames	Good	no	15	-
MHT-Pb-8	136	Pale yellow on walls	Fair	yes	16	-
MHT-Pb-9	**136 Also in 132A, 135, 138, 153, 163-165**	**Peach (undercoat to Pb-8) on walls**	**Fair to Good**	**yes**	**932**	**107**
MHT-Pb-10	129	Black paint on concrete walls (bottom runner), also observed on doors and gates	Good	yes	19	-
MHT-Pb-11	B01	Green on pipes and pump	Good	no	553	-
MHT-Pb-12	B01	Yellow on pipes and fan unit	Good	no	156	-

Sample ID	Room Number	Colour, Location and Description	Condition[1]	Layers Noted[2]	Lead Content (ppm)	Estimated Quantity (m^2)
MHT-Pb-13	**B01**	**Grey ceiling paint (on concrete)**	**Fair**	**no**	**1320**	**140**
MHT-Pb-14	125	Light pink on metal frame of phone booths and on concrete walls	Good	no	56	-
MHT-Pb-15	125	Black on metal frame of phone booths	Good	no	9	-
MHT-Pb-16	125	Beige paint on concrete walls	Good	no	142	-
MHT-Pb-17	124	Dark brown paint on concrete (3 blocks)	Good	no	22	-
MHT-Pb-18	113	White paint in Rooms 113&115	Good	no	4	-
MHT-Pb-19	175	Rose paint on vinyl clad drywall	Good	no	60	-
MHT-Pb-20	175	Dusty blue on door	Good	no	38	-
MHT-Pb-21	175	Navy blue on door frame	Good	no	95	-
MHT-Pb-22	167	Mint green paint on concrete walls	Good	no	449	-
MHT-Pb-23	**105**	**Magenta paint on doors and gates**	**Fair**	**no**	**921**	**33.2**

Notes:

1 Condition is rated as good, fair or poor with peeling and/or flaking

2 Layers of paint are noted visually and can only be observed if the layers are different colour

bold Exceeds the Surface Coating Materials Regulations limit of 0.06 % by weight (mg/g), or 600 ppm

Analytical results indicated that four of the paint samples contained concentrations of lead above 600 ppm. The yellow sub-layer sampled in room 139 contains 726 ppm of lead and was observed in good condition. This yellow sub layer is presumed to be contained in Rooms 140 and 137 however it may also be present in other areas of MHT (although not observed by Aqua Terre). Should this yellow sub-layer be observed in other areas of MHT, it should be assumed to contain lead in concentrations above 600 ppm.

The peach undercoat sampled in room 136 was found to contain 932 ppm of lead and was also observed in rooms 153 (as a top coat), 164, 165 and 166. The peach paint was in good condition except in room 136 where water damage was causing the paint to peel. The peach paint was observed in an area approximately 107 m^2. The grey ceiling paint sampled in the basement (B01) was found to contain 1320 ppm of lead. The magenta paint sampled from the doors and gates in room 105 (T-control) was found to contain 921 ppm of lead. The magenta paint was in fair condition as some was peeling off the gates. The area covered by the gates and doors is estimated to be 33 m^2.

Cast iron pipe flanges likely containing leaded packing material (as sampled in building MHH and found to contain 91.3% lead) were observed in the basement (B01) and in confined space #8. A total of 79 pipe flanges were observed ranging in diameter from 3 to 8 inches.

One lead-sealed battery was observed in room 126. This battery was mounted on the wall as a power supply for an emergency light.

No other sources of lead such as lead pipe or lead wiring were identified in accessible areas during the survey by Aqua Terre. Lead-containing solder may be present in water lines throughout the building.

28.2.3 Mercury

Two mercury-containing thermostats were observed in room 188. Each mercury thermostat likely contains 3 g of mercury.

Although several fixtures still exist, no high intensity discharge mercury vapour lamps were found in use in this building.

Fluorescent light bulbs contain between 0.01 to 0.04 g of mercury vapour depending on manufacturer and age (Environment Canada, 2002). The number of fluorescent light fixtures observed by Aqua Terre in MHT was approximately 300. Assuming two bulbs per fixture, an estimated 600 fluorescent light bulbs are contained in MHT, indicating that the total amount of mercury in the bulbs at MHS could range from an estimated 3 g to 12 g.

28.2.4 Silica

Silica is contained in the concrete and concrete blocks observed throughout the interior and exterior of MHT.

28.2.5 Other Designated Substances

During this survey, none of the following designated substances were observed in MHT: acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxide, isocyanates or vinyl chloride.

28.2.6 Polychlorinated Biphenyls (PCBs)

During the environmental audit conducted in 2006 (Aqua Terre 2006) CSC staff informed Aqua Terre that, although a number of the PCB-containing fluorescent light ballasts had been removed from the facility, an estimated 800-1000 light fixtures that are likely PCB-containing still remain throughout the facility. There are an estimated 300 fluorescent light fixtures in MHT. Aqua Terre inspected 17 ballasts as summarized in Table 28.3.

Table 28.3 Summary of Inspected Fluorescent Light Ballasts, Building MHT

Room Number	Manufacturer	Condition	PCB containing
103	Ideal	good	No
111	Advance Electronics	good	No
113	Advance Electronics	good	No
120	Westinghouse Coolescent	good	Likely (could not identify date stamp)
124	Westinghouse Coolescent	good	Yes (date stamp August 1969)
B01	EBT	good	No
134	EBT	good	No
137	Ultramizer	good	No
105	Philips	good	No
162	CGE Gold Label (model 17A 240TW)	poor (leaking)	Likely (could not identify date stamp)
162	CGE Gold Label (model 17A 240TW)	good	Likely (date stamp "9701" indicates 1979)
148	Universal (catalogue #446-LR-TCP)	good	Yes (date stamped "1 75")
150	Westinghouse Coolescent	good	No
169	Philips	good	No
154	Philips	good	No
164	Philips	good	No
172	EBT	good	No

No other sources of PCBs were observed in this building during this survey. During the previous environmental audit (Aqua Terre, 2006), CSC staff informed Aqua Terre that all PCB-containing "wet" transformers had been replaced with non-PCB-containing "dry" transformers.

28.2.7 Ozone Depleting Substances (ODSs)

An updated Halocarbon Inventory for the entire institution is provided in Appendix 40. A summary of the ODS containing equipment observed in MHT is provided in Table 28.4.

Table 28.4 Halocarbon Inventory, Building MHT

Room Number	Equipment Type	Manufacturer	Model #	Serial #	Refrigerant	Amount[1] (kg)
B01	Air Drier	Johnson Controls	a-4210-3	na	R12	13 oz
132	AC	Daisy	SAC5250	203060900335	R22	0.34
140	Water Cooler	Tem SRITE	WR-10	FB32122	illegible	illegible
137	Refrigerator	Coldmatic	RSL40GC	95556126I	R22	12oz
B01	Chiller	Trane	CCUAO 252MB51CF5C4B321 CE	L81H27676	R22	see outside unit
113	Refrigerator	Kenmore	55132-3Q	695273	R12	0.135
120	Refrigerator	Kenmore	illegible	illegible	R12	7oz
102	Water Fountain	Aquarius	DP134a-1	illegible	R12	5.8oz
103	Bar Fridge	Danby	d55	80200259	R12	1.9oz
175	Bar Fridge	Danby	dcr050wey-7	1198090021001660	R134a	2.1oz
121	Water Cooler	Super	ylr1-5-d26 wcd1000	200124657		
174	Bar Fridge	Danby	dcr-382wy	ga082266	R134a	2oz
143	Bar Fridge	Canadian Tire	bc-110	96200775	R12	2.1oz
144	Bar Fridge	Sanyo	sr-172w	990205981	R134a	2.3oz
167	Bar Fridge	Diplomat	do97-8	c0705282	R12	0.1
147	Bar Fridge	Danby	dcr29we	k9307164	R12	2.65oz
162	Water Cooler	Temprite	VTA12	740358865	R12	8.5 oz
196	Bar Fridge	Dat Corp	datsr16w	illegible	R12	1.94oz
151	Bar Fridge	Danby	dcr054w	1101050021001140	R134a	1.34oz
168	Bar Fridge	Danby	dcr79we4b	4039272	R12	2.11
179	Bar Fridge	Danby	dcr050wey-7	1197100021000240	R134a	2.12 oz
181	Bar Fridge	Danby	dcr66	10400060	R12	0.055
200	Bar Fridge	Danby	dcr050wey-7	1198080021000980	R134a	2.12 oz
194	Bar Fridge	Danby	dcr050wey-7	1197060021001340	R134a	2.12 oz
188	Refrigerator	Danby	d730	26031	R12	6.4 oz
105	Bar Fridge	Danby	dcr66	illegible	R12	0.055
157	Bar Fridge	Danby	dcr79we4b	j4039396	R12	2.11
roof top	AC	Carrier	50TJ-005-101Qe	2597G21650	R22	2.1
roof top	AC	Liebert Corps	D015-0010	B45167A9	illegible	illegible
roof top	AC	Liebert Corps	CSL-065Y	3070135	illegible	illegible
yard (for basement chiller)	AC	Trane	CAUBC2551A12	1381J03811	R22	12.7

Room Number	Equipment Type	Manufacturer	Model #	Serial #	Refrigerant	Amount[1] (kg)
officers (roof top)	AC	Carrier	50TJ-005-101Qe	1596G30367	R22	4.4
roof top	AC	York	D2CE060A58C	NEXM124025	R22	4.03
roof top	AC	Lennox	CHA16-060-1Y	5603L 01880	R22	3.37

Notes:

[1] Amount of refrigerant recorded in kg unless specified otherwise

28.2.8 Urea Formaldehyde Foam Insulation (UFFI)

No UFFI was identified in MHT.

28.2.9 Fuel, Oil and/or Waste Oil Storage

No fuel, oil and/or waste oil storage were identified in MHT.

28.2.10 Chemical Storage

A variety of chemicals in the form of cleaning compounds were observed in the janitor's closets (Rooms 134 and 152). These cleaners included glass cleaners, floor sealers, strippers, finishers, pine cleaner, disinfectant, spill absorbent and insecticide. In room 134, *Comet* cleaner was stored beside a rust remover with which it is incompatible. There were also relatively small amounts of flammable materials in both janitor's closets. An uncapped pail (20 L) of *Swish PM23* ultra alkaline cleaner concentrate as well as a 4 L container of C3 refrigeration oil was observed in the basement (B01).

There was an incomplete MSDS binder in the hallway outside of Room 152 that contained many out-of-date MSDSs. No inventory of chemical compounds was observed in either area. The rooms also contained several unlabelled containers.

28.2.11 Radioactive Materials

No radioactive materials were observed in MHT.

28.2.12 Mould

Water damage, musty odours and/or mould growth were observed/detected in rooms 105, 112, 113, 120, 124, 129, 131, 132, 136, 153, 164, 172, 174, 175, 188, 194 and in the basement crawl spaces (confined spaces #7 and #16). Many of these observations were the result of condensation arising from an inadequate amount of insulation between pipes and ceiling tiles.

Dead birds were observed in confined spaces #8 and #16.

Solutions for a Working World

Company:	Aqua Terre Solutions Inc.	**Report Date:**	08-Jun-06
Contact:	Mr. Mark Foerster	**Analysis Date:**	05-Jun-06
Client Address:	2 Gurdwara Road, Suite 200, Ottawa, ON	**Received Date:**	31-May-06
Client Reference:	06-811	**LEX Project Number:**	08060971
Sampling Date:		**Number of Analyses:**	30

Analysis Requested **Bulk Asbestos by PLM**

Analysis was performed in accordance with the method EPA/600/R-93/116, Method for the Determination of Asbestos in Bulk Building Materials adopted in Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations - made under the Occupational Health and Safety Act Ontario Regulation 278/05. LEX Scientific Inc. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP 101949) by the National Institute of Standards and Technology for analysis of bulk materials for asbestos.

German Leal, B.Sc.
Laboratory Manager

Jason Cooper, B.Sc.
Analyst

				Fibrous Asbestos Content %	Other Materials Content %	
Client Sample:	MHT-AS-1	**Asbestos Detected?**	**No**			
LEX Sample:	01	**Chrysotile:**	None Detected		**Cellulose:**	50
Layers Analyzed:	Ceiling tile	**Amosite:**	None Detected		**MMVF:**	30
Colour:	Grey	**Crocidolite:**	None Detected		**OtherFibers:**	None Detected
Description:	Fibreboard ceiling tile	**Other Amphiboles:**	None Detected		**Non Fibers:**	20
		Comments:				

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibers: Fiberglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst _____

			Fibrous Asbestos Content %		Other Materials Content %
Client Sample:	MHT-AS-2	**Asbestos Detected?**	**No**		
LEX Sample:	02	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Membrane	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**OtherFibers:**	90
Description:	Jute Membrane (Floor sheet backing)	**Other Amphiboles:**	None Detected	**Non Fibers:**	10
		Comments:			
Client Sample:	MHT-AS-3	**Asbestos Detected?**	**No**		
LEX Sample:	03	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Yellow/White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Joint compound	**Other Amphiboles:**	None Detected	**Non Fibers:**	100
		Comments:			
Client Sample:	MHT-AS-1	**Asbestos Detected?**	**No**		
LEX Sample:	04	**Chrysotile:**	None Detected	**Cellulose:**	50
Layers Analyzed:	Ceiling tile	**Amosite:**	None Detected	**MMVF:**	40
Colour:	Grey	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Fibreboard ceiling tile	**Other Amphiboles:**	None Detected	**Non Fibers:**	10
		Comments:			
Client Sample:	MHT-AS-1	**Asbestos Detected?**	**No**		
LEX Sample:	05	**Chrysotile:**	None Detected	**Cellulose:**	40
Layers Analyzed:	Ceiling tile	**Amosite:**	None Detected	**MMVF:**	50
Colour:	Grey	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Fibreboard ceiling tile	**Other Amphiboles:**	None Detected	**Non Fibers:**	10
		Comments:			
Client Sample:	MHT-AS-2	**Asbestos Detected?**	**No**		
LEX Sample:	06	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Membrane	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**OtherFibers:**	95
Description:	Jute Membrane (Floor sheet backing)	**Other Amphiboles:**	None Detected	**Non Fibers:**	5
		Comments:			

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibers: Fiberglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst _____

			Fibrous Asbestos Content %		Other Materials Content %
Client Sample:	MHT-AS-2	**Asbestos Detected?**	**No**		
LEX Sample:	07	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Membrane	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**OtherFibers:**	100
Description:	Jute Membrane (Floor sheet backing)	**Other Amphiboles:**	None Detected	**Non Fibers:**	None Detected
		Comments:			
Client Sample:	MHT-AS-3	**Asbestos Detected?**	**No**		
LEX Sample:	08	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Yellow/White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Joint compound	**Other Amphiboles:**	None Detected	**Non Fibers:**	100
		Comments:			
Client Sample:	MHT-AS-3	**Asbestos Detected?**	**No**		
LEX Sample:	09	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Yellow/White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Joint compound	**Other Amphiboles:**	None Detected	**Non Fibers:**	100
		Comments:			
Client Sample:	MHT-AS-5	**Asbestos Detected?**	**No**		
LEX Sample:	10	**Chrysotile:**	None Detected	**Cellulose:**	60
Layers Analyzed:	Sample homogenized	**Amosite:**	None Detected	**MMVF:**	30
Colour:	Grey/White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Fibreboard ceiling tile	**Other Amphiboles:**	None Detected	**Non Fibers:**	10
		Comments:			
Client Sample:	MHT-AS-5	**Asbestos Detected?**	**No**		
LEX Sample:	11	**Chrysotile:**	None Detected	**Cellulose:**	60
Layers Analyzed:	Sample homogenized	**Amosite:**	None Detected	**MMVF:**	30
Colour:	Grey/White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Fibreboard ceiling tile	**Other Amphiboles:**	None Detected	**Non Fibers:**	10
		Comments:			

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibers: Fiberglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst _____

			Fibrous Asbestos Content %		Other Materials Content %
Client Sample:	MHT-AS-5	**Asbestos Detected?**	No		
LEX Sample:	12	**Chrysotile:**	None Detected	**Cellulose:**	60
Layers Analyzed:	Sample homogenized	**Amosite:**	None Detected	**MMVF:**	20
Colour:	Grey/White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Fibreboard ceiling tile	**Other Amphiboles:**	None Detected	**Non Fibers:**	20
		Comments:			
Client Sample:	MHT-AS-7	**Asbestos Detected?**	No		
LEX Sample:	13.1	**Chrysotile:**	None Detected	**Cellulose:**	10
Layers Analyzed:	Gypsum	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Grey	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Gypsum Board	**Other Amphiboles:**	None Detected	**Non Fibers:**	90
		Comments:			
Client Sample:	MHT-AS-7	**Asbestos Detected?**	No		
LEX Sample:	13.2	**Chrysotile:**	None Detected	**Cellulose:**	100
Layers Analyzed:	Paper	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Gypsum Board	**Other Amphiboles:**	None Detected	**Non Fibers:**	None Detected
		Comments:			
Client Sample:	MHT-AS-7	**Asbestos Detected?**	No		
LEX Sample:	14.1	**Chrysotile:**	None Detected	**Cellulose:**	10
Layers Analyzed:	Gypsum	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Grey	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Gypsum Board	**Other Amphiboles:**	None Detected	**Non Fibers:**	90
		Comments:			
Client Sample:	MHT-AS-7	**Asbestos Detected?**	No		
LEX Sample:	14.2	**Chrysotile:**	None Detected	**Cellulose:**	100
Layers Analyzed:	Paper	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Gypsum Board	**Other Amphiboles:**	None Detected	**Non Fibers:**	None Detected
		Comments:			

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibers: Fiberglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst _____

			Fibrous Asbestos Content %		Other Materials Content %
Client Sample:	MHT-AS-7	**Asbestos Detected?**	**No**		
LEX Sample:	15.1	**Chrysotile:**	None Detected	**Cellulose:**	10
Layers Analyzed:	Gypsum	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Grey	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Gypsum Board	**Other Amphiboles:**	None Detected	**Non Fibers:**	90
		Comments:			
Client Sample:	MHT-AS-7	**Asbestos Detected?**	**No**		
LEX Sample:	15.2	**Chrysotile:**	None Detected	**Cellulose:**	100
Layers Analyzed:	Paper	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Gypsum Board	**Other Amphiboles:**	None Detected	**Non Fibers:**	None Detected
		Comments:			
Client Sample:	MHT-AS-10	**Asbestos Detected?**	**No**		
LEX Sample:	16.1	**Chrysotile:**	None Detected	**Cellulose:**	10
Layers Analyzed:	Gypsum	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Drywall	**Other Amphiboles:**	None Detected	**Non Fibers:**	90
		Comments:			
Client Sample:	MHT-AS-10	**Asbestos Detected?**	**No**		
LEX Sample:	16.2	**Chrysotile:**	None Detected	**Cellulose:**	100
Layers Analyzed:	Paper	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Drywall	**Other Amphiboles:**	None Detected	**Non Fibers:**	None Detected
		Comments:			
Client Sample:	MHT-AS-10	**Asbestos Detected?**	**No**		
LEX Sample:	17.1	**Chrysotile:**	None Detected	**Cellulose:**	5
Layers Analyzed:	Gypsum	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Drywall	**Other Amphiboles:**	None Detected	**Non Fibers:**	95
		Comments:			

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibers: Fiberglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst _____

			Fibrous Asbestos Content %		Other Materials Content %
Client Sample:	MHT-AS-10	**Asbestos Detected?**	No		
LEX Sample:	17.2	**Chrysotile:**	None Detected	**Cellulose:**	100
Layers Analyzed:	Paper	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Drywall	**Other Amphiboles:**	None Detected	**Non Fibers:**	None Detected
		Comments:			
Client Sample:	MHT-AS-10	**Asbestos Detected?**	No		
LEX Sample:	18.1	**Chrysotile:**	None Detected	**Cellulose:**	5
Layers Analyzed:	Gypsum	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Drywall	**Other Amphiboles:**	None Detected	**Non Fibers:**	95
		Comments:			
Client Sample:	MHT-AS-10	**Asbestos Detected?**	No		
LEX Sample:	18.2	**Chrysotile:**	None Detected	**Cellulose:**	100
Layers Analyzed:	Paper	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Drywall	**Other Amphiboles:**	None Detected	**Non Fibers:**	None Detected
		Comments:			
Client Sample:	MHT-AS-11	**Asbestos Detected?**	No		
LEX Sample:	19	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Membrane	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Yellow	**Crocidolite:**	None Detected	**OtherFibers:**	90
Description:	Floor Tile Backing	**Other Amphiboles:**	None Detected	**Non Fibers:**	10
		Comments:			
Client Sample:	MHT-AS-11	**Asbestos Detected?**	No		
LEX Sample:	20	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Membrane	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Yellow	**Crocidolite:**	None Detected	**OtherFibers:**	80
Description:	Floor Tile Backing	**Other Amphiboles:**	None Detected	**Non Fibers:**	20
		Comments:			

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibers: Fiberglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst _____

			Fibrous Asbestos Content %		Other Materials Content %
Client Sample:	MHT-AS-11	**Asbestos Detected?**	**No**		
LEX Sample:	21	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Membrane	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Yellow	**Crocidolite:**	None Detected	**OtherFibers:**	90
Description:	Floor Tile Backing	**Other Amphiboles:**	None Detected	**Non Fibers:**	10
		Comments:			
Client Sample:	MHT-AS-12	**Asbestos Detected?**	**No**		
LEX Sample:	22	**Chrysotile:**	None Detected	**Cellulose:**	60
Layers Analyzed:	Sample homogenized	**Amosite:**	None Detected	**MMVF:**	10
Colour:	Grey/White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Flecked Fibreboard Ceiling Tile	**Other Amphiboles:**	None Detected	**Non Fibers:**	30
		Comments:			
Client Sample:	MHT-AS-12	**Asbestos Detected?**	**No**		
LEX Sample:	23	**Chrysotile:**	None Detected	**Cellulose:**	60
Layers Analyzed:	Sample homogenized	**Amosite:**	None Detected	**MMVF:**	10
Colour:	Grey/White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Flecked Fibreboard Ceiling Tile	**Other Amphiboles:**	None Detected	**Non Fibers:**	30
		Comments:			
Client Sample:	MHT-AS-12	**Asbestos Detected?**	**No**		
LEX Sample:	24	**Chrysotile:**	None Detected	**Cellulose:**	70
Layers Analyzed:	Sample homogenized	**Amosite:**	None Detected	**MMVF:**	10
Colour:	Grey/White	**Crocidolite:**	None Detected	**OtherFibers:**	None Detected
Description:	Flecked Fibreboard Ceiling Tile	**Other Amphiboles:**	None Detected	**Non Fibers:**	20
		Comments:			

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibers: Fiberglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst _____

EMSL Analytical, Inc.
107 Haddon Ave., Westmont, NJ 08108
Phone: (856) 858-4800 Fax: (856) 858-4960 Email: westmontasblab@EMSL.com

Attn: **Natalija Njegus**
Lex Scientific
2 Quebec Street
Suite 204
Guelph, Ontario, Canada N1H-2T3

Fax: Phone: (519) 824-7082
Project: **11060972/06-811**

Customer ID: LEXS50
Customer PO: G0690
Received: 06/01/06 9:50 AM
EMSL Order: 040610832

EMSL Proj:
Analysis Date: 6/6/2006
Report Date: 6/6/2006

Asbestos Analysis of Bulk Materials via Transmission Electron Microscopy. Chatfield Method (rev 2)

SAMPLE ID	COLOR	MATRIX MATERIAL	NON-ASBESTOS FIBERS	RANGE	ASBESTOS TYPE	AVG	
MHT-AS-2A *040610832-0001*	Blue	100.0%	ND		ND		
MHT-AS-2B *040610832-0002*	Blue	100.0%	ND		ND		
MHT-AS-2C *040610832-0003*	Blue	100.0%	ND		ND		
MHT-AS-4A *040610832-0004*	Beige	96.2%		2.5-5.0%	Chrysotile	3.8%	
MHT-AS-4B *040610832-0005*	Blue	%					Not Analyzed
MHT-AS-4C *040610832-0006*	Blue	%					Not Analyzed
MHT-AS-8A *040610832-0007*	Beige	100.0%	ND		ND		
MHT-AS-8B *040610832-0008*	Beige	100.0%	ND		ND		
MHT-AS-8C *040610832-0009*	Beige	100.0%	ND		ND		
MHT-AS-11A *040610832-0010*	Beige	100.0%	ND		ND		
MHT-AS-11B *040610832-0011*	Beige	100.0%	ND		ND		

Analyst(s)
Steve Siegel (30)

Stephen Siegel, CIH
or other approved signatory

EMSL Analytical, Inc.
107 Haddon Ave., Westmont, NJ 08108
Phone: (856) 858-4800 Fax: (856) 858-4960 Email: westmontasblab@EMSL.com

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2 Quebec Street
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Guelph, Ontario, Canada N1H-2T3

Fax: Phone: (519) 824-7082
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Received: 06/01/06 9:50 AM
EMSL Order: 040610832

EMSL Proj:
Analysis Date: 6/6/2006
Report Date: 6/6/2006

Asbestos Analysis of Bulk Materials via Transmission Electron Microscopy. Chatfield Method (rev 2)

SAMPLE ID	COLOR	MATRIX MATERIAL	NON-ASBESTOS FIBERS	RANGE	ASBESTOS TYPE	AVG
MHT-AS-11C *040610832-0012*	Beige	100.0%	ND		ND	
MHT-AS-13A *040610832-0013*	Beige	100.0%	ND		ND	
MHT-AS-13B *040610832-0014*	Beige	100.0%	ND		ND	
MHT-AS-13C *040610832-0015*	Beige	100.0%	ND		ND	
MHT-AS-14A *040610832-0016*	Blue	100.0%	ND		ND	
MHT-AS-14B *040610832-0017*	Blue	100.0%	ND		ND	
MHT-AS-14C *040610832-0018*	Blue	100.0%	ND		ND	
MHT-AS-15A *040610832-0019*	White	100.0%	ND		ND	
MHT-AS-15B *040610832-0020*	White	100.0%	ND		ND	
MHT-AS-15C *040610832-0021*	White	100.0%	ND		ND	
MHT-AS-16A *040610832-0022*	Gray	100.0%	ND		ND	

Analyst(s)
Steve Siegel (30)

Stephen Siegel, CIH
or other approved signatory

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Received: 06/01/06 9:50 AM
EMSL Order: 040610832

EMSL Proj:
Analysis Date: 6/6/2006
Report Date: 6/6/2006

Asbestos Analysis of Bulk Materials via Transmission Electron Microscopy. Chatfield Method (rev 2)

SAMPLE ID	COLOR	MATRIX MATERIAL	NON-ASBESTOS FIBERS	RANGE	ASBESTOS TYPE	AVG
MHT-AS-16B *040610832-0023*	Gray	100.0%	ND		ND	
MHT-AS-16C *040610832-0024*	Gray	100.0%	ND		ND	
MHR3-AS-1A *040610832-0025*	White	100.0%	ND		ND	
MHR3-AS-1B *040610832-0026*	White	100.0%	ND		ND	
MHR3-AS-1C *040610832-0027*	White	100.0%	ND		ND	
MHFVU-AS-1A *040610832-0028*	Beige	100.0%	ND		ND	
MHFVU-AS-1B *040610832-0029*	Beige	100.0%	ND		ND	
MHFVU-AS-1C *040610832-0030*	Beige	100.0%	ND		ND	

Analyst(s)
Steve Siegel (30)

Stephen Siegel, CIH
or other approved signatory

THIS IS THE LAST PAGE OF THE REPORT.

ACCUTEST LABORATORIES LTD.

Report of Analysis

Client: Aqua Terre Solutions Inc.

2 Gurdwara Rd., Suite 200
Nepean, ON
K2E 1A2

Report Number: 2611506
Date Reported: 2006-06-09
Date Submitted: 2006-06-05
Project: 06-811

Attention: Mr. Mark Foerster

P.O. Number: 260233
Matrix Paint Chips

METHOD: Analysis was performed on an Aqua-Regia digest of the sample material.

RESULTS:

LAB ID	Sample ID	Description	MDL	Lead (Pb) ug/g
467551	MHT-PB-1		3	184
467552	MHT-PB-2		3	726
467553	MHT-PB-3		3	25
467554	MHT-PB-4		3	243
467555	MHT-PB-5		3	226
467556	MHT-PB-6		3	26
467557	MHT-PB-7		3	15
467558	MHT-PB-8		3	16
467559	MHT-PB-9		3	932
467560	MHT-PB-10		3	19
467561	MHT-PB-11		3	553
467562	MHT-PB-12		3	156
467563	MHT-PB-13		3	1320
467564	MHT-PB-14		3	56
467565	MHT-PB-15		3	9
467566	MHT-PB-16		3	142
467567	MHT-PB-17		3	22
467568	MHT-PB-18		3	4
467569	MHT-PB-19		3	60
467570	MHT-PB-20		3	38

COMMENT:

Approval: _____

ACCUTEST LABORATORIES LTD.

Report of Analysis

Client: Aqua Terre Solutions Inc.

2 Gurdwara Rd., Suite 200
Nepean, ON
K2E 1A2

Attention: Mr. Mark Foerster

Report Number: 2611507
Date Reported: 2006-06-09
Date Submitted: 2006-06-05
Project: 06-811

P.O. Number: 260233
Matrix Paint Chips

METHOD: Analysis was performed on an Aqua-Regia digest of the sample material.

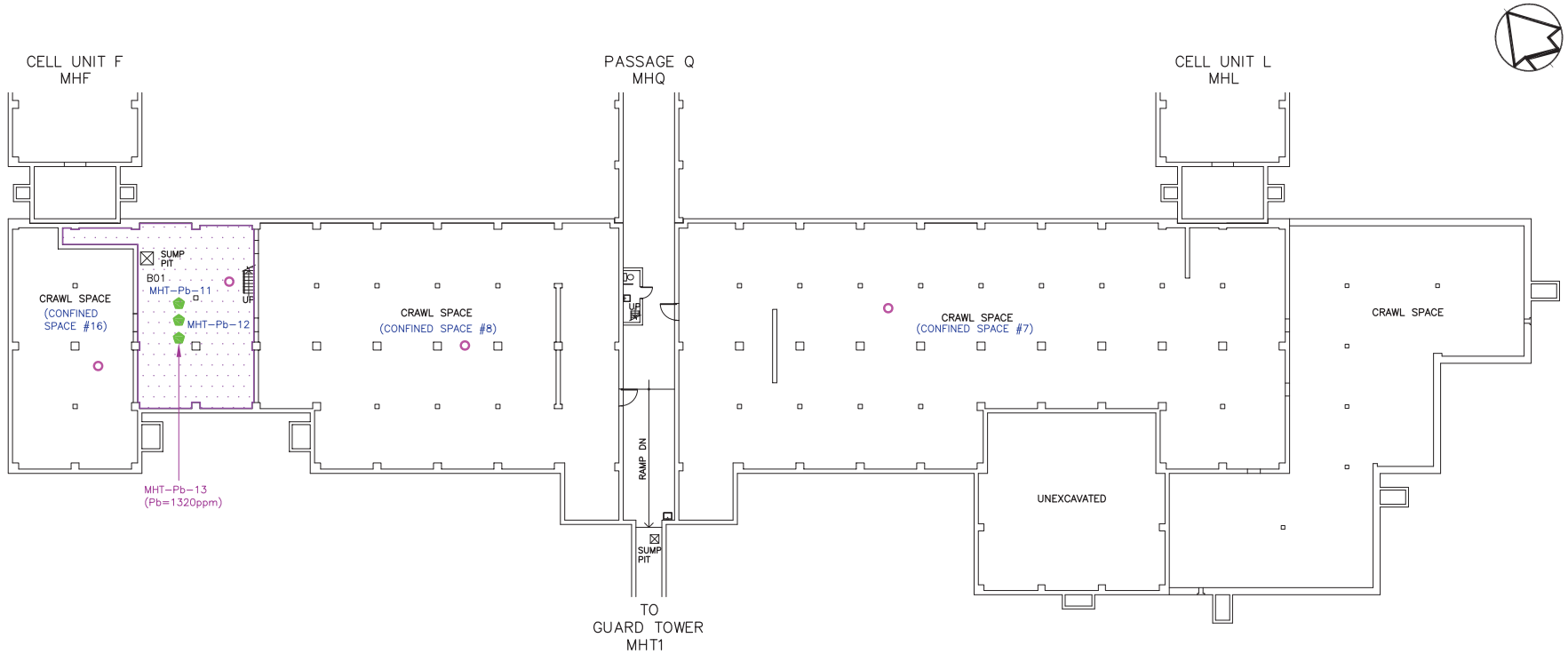
RESULTS:

LAB ID	Sample ID	Description	MDL	Lead (Pb) ug/g
467571	MHT-PB-21		3	95
467572	MHT-PB-22		3	449
467573	MHT-PB-23		3	921
467574	MHR3-PB-1		3	93
467575	MHOFT-PB-1		3	49
467576	MHOFT-PB-2		3	31
467577	MHOFT-PB-3		3	62
467578	MHOFT-PB-4		3	38
467579	MHOFT-PB-5		3	95
467580	MHOFT-PB-6		3	130

COMMENT:

Approval: _____

MHT ADMINISTRATIVE UNIT



ROOM INDEX

B01 MECHANICAL ROOM

LEGEND

- FLOOR TILE SAMPLE LOCATION
- CEILING TILE SAMPLE LOCATION
- PAINT SAMPLE LOCATION
- WALL OR CEILING SURFACING MATERIAL SAMPLE
- ASBESTOS CONTAINING MATERIAL AS SAMPLED BY THEM (1997) & OBSERVED BY AQUA TERRE (2006)
- PIPE INSULATION SAMPLE LOCATION
- LIGHT WITH ASBESTOS CONTAINING MATERIAL HEAT SHIELD
- LEAD CONTAINING PAINT ON WALL (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON FLOOR (>0.06%/600ppm)
- LEAD CONTAINING PAINT ON CEILING (>0.06%/600ppm)
- ASBESTOS CONTAINING FLOOR TILES
- ASBESTOS CONTAINING CEILING TILES OR SURFACE
- (Pb=921ppm) EXCEEDANCE IN ANALYSED SAMPLE

BASEMENT PLAN

SCALE 1:300
0 5 10m

Public Works
Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics
Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

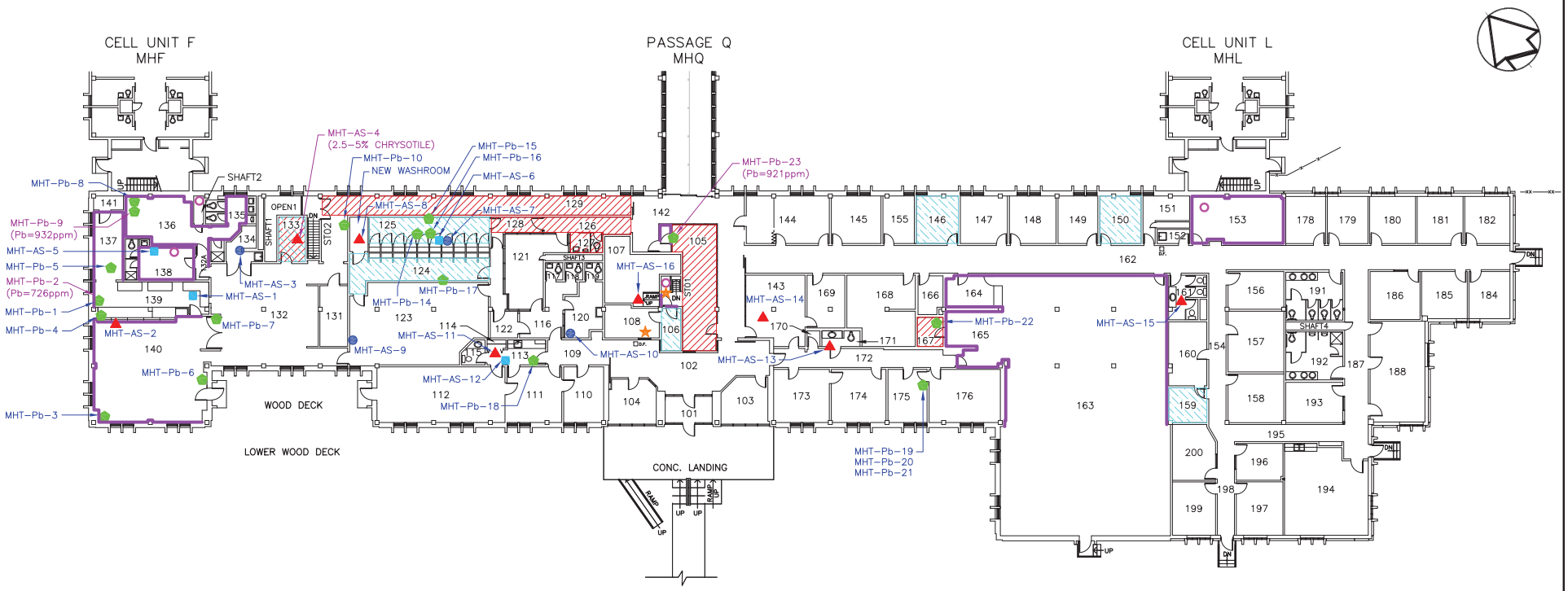
NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED OR FAXED
3. 'ppm': PARTS PER MILLION
4. 'Pb': LEAD

SOURCE(S):
1. PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, MHT ADMINISTRATIVE UNIT, BASEMENT FIRE PLAN, JUNE 14, 2001

AQUA TERRE

Client/Location: PWGSC, MILLHAVEN INSTITUTION, BATH, ONTARIO		Title: SAMPLING LOCATIONS – MHT ADMINISTRATIVE UNIT (BASEMENT)	
Project No: 06811	Filename: 06811–MHT–BSMT2.DWG	Date: 28–JUL–2006	Dwg No: FIGURE MHT–1
Drawn: EM	Verified: KE	Project Manager: MRF	

MHT ADMINISTRATIVE UNIT



ROOM INDEX

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102	LOBBY	122	VISITORS ENTRY	141	STORAGE	161	FEMALE WASHROOM	182	CHIEF SENTENCE MGMT.
103	OFFICE	123	OPEN VISIT AREA	142	CORRIDOR	162	CORRIDOR	184	SENTENCE MGMT. ASSISTANT
104	CITIZEN'S ADVISORY COMMITTEE	124	VISITOR CLOSED VISIT	143	DUTY OFFICE	163	CENTRAL RECORDS	185	SENTENCE MGMT. ASSOCIATE
105	T CONTROL POST	125	INMATE CLOSED VISIT	144	INFORMATICS RETRIEVAL UNIT	164	RECEPTION AREA	186	CLERK, EXCHANGE OF SERVICES
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111	WARDEN SECRETARY/DEPUTY WARDEN	132	STAFF LOUNGE	150	PAROLE OFFICER MAU	170	STORAGE	194	BOARDROOM
112	BOARDROOM/DEPUTY WARDEN	132A	CORRIDOR	151	STORAGE	171	WASHROOM	195	CORRIDOR
113	KITCHENETTE	133	TELEPHONE ROOM	152	JANITOR'S CLOSET	172	CORRIDOR	196	INFOMATICS TECHNICIAN
114	CLOSET	134	JANITOR'S CLOSET	153	MECHANICAL EQUIPMENT	173	EXEC. ASSISTANT TO WARDEN	197	CHIEF ADMIN. SERVICES
115	WASHROOM	135	MALE WASHROOM	154	CORRIDOR	174	COMMISSIONING OFFICER	198	CORRIDOR
116	VISITORS CHECK	136	MEN'S LOCKER ROOM	155	INFOMATICS	175	ASSISTANT TO AWMS	199	CHIEF INFOMATICS
117	MALE WASHROOM	137	KITCHEN/STORAGE	156	USGE/EAP	176	ASSISTANT WARDEN MGMT. SERVICES	200	INFOMATICS TECHNICIAN
118	FEMALE WASHROOM	138	FEMALE WASHROOM	157	SECURITY OFFICE	178	CLERK, LEAVE & EXTRA DUTY		
119	STAFF WASHROOM	139	KITCHEN	158	C.C.O.	179	ASSISTANT H.R.		
120	SR. V & C OFFICER			159	S.M.O. WORKSHOP	180	CHIEF H.R. MGMT.		

ST01 STAIR NO 1
ST02 STAIR NO 2

LEGEND

- FLOOR TILE SAMPLE LOCATION
- CEILING TILE SAMPLE LOCATION
- PAINT SAMPLE LOCATION
- WALL OR CEILING SURFACING MATERIAL SAMPLE
- ASBESTOS CONTAINING MATERIAL AS SAMPLED BY THEM (1997) & OBSERVED BY AQUA TERRE (2006)
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- ASBESTOS CONTAINING FLOOR TILES
- ASBESTOS CONTAINING CEILING TILES OR SURFACE
- (Pb=921ppm) EXCEEDANCE IN ANALYSED SAMPLE

FIRST FLOOR PLAN

SCALE 1:300
0 5 10m

Public Works Government Services Canada
Architectural and Engineering Services Ontario Region

Travaux publics Services gouvernementaux Canada
Services d'architecture et de génie Région de l'Ontario

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PHOTOCOPIED OR FAXED
3. 'ppm': PARTS PER MILLION
4. 'Pb': LEAD

SOURCE(S):
1. PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, MHT ADMINISTRATIVE UNIT, FIRST FLOOR FIRE PLAN, JUNE 14, 2001

AQUA TERRE

Client/Location: PWGSC MILLHAVEN INSTITUTION BATH, ONTARIO		Title: SAMPLING LOCATIONS – MHT ADMINISTRATIVE UNIT (FIRST FLOOR)	
Project No: 06811	Filename: 06811-MHT-1FLR.DWG	Date: 17-AUG-2006	Dwg No: FIGURE MHT-2
Drawn: EM	Verified: KE	Project Manager: MRF	