



# SPECIFICATIONS

**SOLICITATION #:** 20-58122

**BUILDING:** M-7  
1200 Montreal Road  
Ottawa, Ontario

**PROJECT:** M-7, Women's new Shower

**PROJECT #:** 5863

**Date:** February 2021



# **SPECIFICATION**

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## Construction Tender Form

**Project Identification**    **M-7 Women's New Shower**

**Tender No.:**    **20-58122**

**1.2 Business Name and Address of Tenderer**

**Name** \_\_\_\_\_

**Address** \_\_\_\_\_

\_\_\_\_\_

**Contact Person(Print Name)** \_\_\_\_\_

**Telephone** (\_\_\_\_\_) \_\_\_\_\_    **Fax:** (\_\_\_\_\_) \_\_\_\_\_

**1.3 Offer**

I/We the Tenderer, hereby offer to Her Majesty the Queen in Right of Canada (hereinafter referred to as "Her Majesty") represented by the National Research Council Canada to perform and complete the work for the above named project in accordance with the Plans and Specifications and other Tender Documents, at the place and in the manner set out therein for the Total Tender Amount (to be expressed in numbers only) of: \$\_\_\_\_\_. \_\_\_\_\_  
**in lawful money of Canada (excluding GST/HST)**

The above amount is inclusive of all applicable (\*) Federal, Provincial and Municipal taxes except that in the event of a change in any tax imposed under the Excise Act, the Excise Tax Act, the Old Age Security Act, the Customs Act, the Customs Tariff or any provincial sales tax legislation imposing a retail sales tax on the purchase of tangible personal property incorporated into Real Property, that occurs

- .1        after the date this tender was mailed or delivered, or
- .2        if this tender is revised, after the date of the last revision

the amount of this offer shall be decreased or decreased in the manner provided for in GC22 of the General Conditions of the Contract Documents.

**1.3.1 Offer** (continued)

(\*) For the purpose of this tender, the Goods and Services Tax (GST) is not to be considered as an applicable tax.

In the province of Quebec, the Quebec Sales Tax is not to be included in the tender amount because the Federal Government is exempt from this tax. Tenderers shall make arrangements directly with the provincial Revenue Department to recover any tax they may pay on good and services acquired in the performance of this contract. However, tenderers should include in their tender amount Quebec Sales Tax for which an Input Tax Refund is not available.

**1.4 Acceptance and Entry into Contract**

I/We undertake, within fourteen (14) days of notification of acceptance of my/our offer, to sign a contract for the performance of the work provided I/we are notified, by the Department, of the acceptance of my/our offer within 30 days of the tender closing date.

**1.5 Construction Time**

I/We Agree to complete the work within the time stipulated in the specification from the date of notification of acceptance of my/our offer.

**1.6 Bid Security**

I/We herewith enclose tender security in accordance with Article 5 of the General Instruction to Tenderers.

I/We understand that if a security deposit is furnished as tender security and if I/we refuse to enter into a contract when called upon to do so, my/our security deposit shall be forfeited but the Minister may, if it is in the public interest, waive the right of Her Majesty to forfeit the security deposit.

I/We understand that if the security furnished is not in the approved form as described in Article 5 of the General Instructions to Tenderers, my/our tender is subject to disqualification.

**1.7    Contract Security**

Within fourteen (14) days after receipt of written notification of the acceptance of my/our offer, I/we will furnish contract security in accordance with the Contract Conditions “F” of the Contract Documents.

I/We understand that the contract security referred to herein, if provided in the form of a bill of exchange, will be deposited into the Consolidated Revenue Fund of Canada.

**1.8    Appendices**

This Tender Form includes Appendix No. \_\_\_\_\_N/A\_\_\_\_\_.

**1.9    Addenda**

The Total Tender Amount provides for the Work described in the following Addenda:

NUMBER	DATE	NUMBER	DATE

**(Tenderers shall enter numbers and dates of addenda)**

**1.10    Execution of Tender**

The Tenderer shall refer to Article 2 of the General Instructions to Tenderers.

**SIGNED, ATTESTED TO AND DELIVERED on the \_\_\_\_\_ day of  
\_\_\_\_\_ on behalf of**

\_\_\_\_\_  
(Type or print the business name of the Tenderer)

AUTHORIZED SIGNATORY (IES)

\_\_\_\_\_  
(Signature of Signatory)

\_\_\_\_\_  
(Print name & Title of Signatory)

\_\_\_\_\_  
(Signature of Signatory)

\_\_\_\_\_  
(Print name & Title of Signatory)

**SEAL**

## BUY AND SELL NOTICE

### M-07 Women's Shower

Provide all labour, equipment, tools and accessories required to construct a new women's shower located at M-07, of the National Research Council.

**Complete bid packages will only be accepted via email to:**

**[alain.leroux@nrc-cnrc.gc.ca](mailto:alain.leroux@nrc-cnrc.gc.ca)**

#### 1. 1. GENERAL

Questions regarding any aspect of the project are to be addressed to and answered only by the Departmental Representative (or his designate) or the Contracting Authority.

Any information received other than from the Departmental Representative (or his designate) or the Contracting Authority will be disregarded when awarding the contract and during construction.

Firms intending to submit tenders on this project should obtain tender documents through the Buyandsell.gc.ca TMA services provider. Addenda, when issued, will be available from the Buyandsell.gc.ca TMA service provider. Firms that elect to base their bids on tender documents obtained from other sources do so at their own risk and will be solely responsible to inform the tender calling authority of their intention to bid. Tender packages are not available for distribution on the actual day of tender closing.

#### 2. MANDATORY SITE VISIT

It is mandatory that the bidder attends one of the site visits at the designated date and time. At least one representative from proponents that intend to bid must attend. The site visits will be held on [February 16 and February 17, 2021 at 9:30am](#) Meet **Allan Mackenzie** at Building M-07, Main Entrance, 1200 Montreal Road Ottawa, ON. Bidders who, for any reason, cannot attend one of the specified dates and time will not be given an alternative appointment to view the site and their tenders, therefore, will be considered as non-responsive. **NO EXCEPTIONS WILL BE MADE.**

\* Due to COVID-19, we are taking additional measures to protect you and our employees at the site visits.

- To allow NRC to prepare for the site visits, all proponents are asked to pre-register preferably 48 hours ahead of the job showing and identify their preferred site visit date. Please register by emailing [allan.mackenzie@nrc-cnrc.gc.ca](mailto:allan.mackenzie@nrc-cnrc.gc.ca) . Bidders shall provide contact name, email and phone number of person attending.
  
- At the site visit, to limit contact and risks:
  - o The proponents will sanitize their hands at the hand sanitizing station.

- The proponents will be asked to sign the Attendance Form. It is the responsibility of all proponents to verify information on the Attendance Form.
  - The site visit will proceed with a maximum of four (4) proponents at a time. Each group will have approximately 20 minutes to review the site. The site visit will continue with the next group of four (4) proponents until each one has had a chance to review the site.
  - The site visits could take longer than usual, therefore anticipate a longer meeting duration.
  - Physical distancing: keeping a distance of at least 2 arms-length (approximately 2 metres) from others may not be possible at all times, therefore the use of NRC issued disposable face coverings to reduce the risk of transmission of COVID-19 is mandatory.
  - The proponents shall not impede safe access to and from the facility.
- Depending on the anticipated amount of pre-registration, the NRC may decide to schedule time slots for every group of four (4) proponents. The time slot for your site visit will be confirmed by the NRC Departmental Representative by email upon pre-registration. That time will supersede the site visit meeting time specified above.

Proposals submitted by bidders who have not attended the site visit or failed to submit their identification and contact information at the site visit will be deemed non-responsive

### **3. CLOSING DATE**

Closing date is **March 18<sup>th</sup>, 2021 at 2:00pm.**

### **4. TENDER RESULTS**

Following the Tender closing, the tender results will be sent by email to all Contractors who submitted a tender.

### **5. SECURITY REQUIREMENT FOR CANADIAN CONTRACTORS**

#### **5.1 MANDATORY SECURITY REQUIREMENT:**

This procurement contains a mandatory security requirement as follows:

1. The Contractor must, at all times during the performance of the Contract, hold a valid Designated Organization Screening (DOS), issued by the Canadian Industrial Security Director (CISD), Public Works Government Services Canada.
2. The Contractor personnel requiring access to sensitive work site(s) must EACH hold a valid RELIABILITY STATUS, granted or approved by CISD/PWGSC.
3. The Contractor must comply with the provisions of the:
  - a. Security Requirements Checklist attached at Appendix "D"
  - b. Industrial Security Manual (Latest Edition) available at: <https://www.tpsgc-pwgsc.gc.ca/esc-src/msi-ism/index-eng.html>



## **5.2 VERIFICATION OF SECURITY CLEARANCE AT BID CLOSING**

1. The Bidder must hold a valid Designated Organization Screening (DOS) issued by the Canadian Industrial Security Directorate (CISD), Public Works and Government Services Canada (PWGSC), **TO BE INCLUDED WITH THEIR TENDER OR PROVIDED WITHIN 48 HOURS FROM THE DATE AND TIME OF TENDER CLOSING.** Verifications will be made through CISD to confirm the security clearance status of the Bidder. Failure to comply with this requirement will render the bid non-compliant and no further consideration will be given to the bid.
2. Within 72 hours of tender closing, the General Contractor must name all of his sub-contractors, each of whom must hold a valid **RELIABILITY STATUS**, granted or approved by CISD/PWGSC, or any other Federal Department or Agency along with the names and birthdates or security clearance certificate numbers of all personnel who will be assigned to the project.
3. It is to be noted that any subcontractor required to perform any part of the work during the performance of the subsequent contract must also adhere to the mandatory security requirement of the contract. As well, no personnel without the required level of security will be allowed on site. It will be the responsibility of the successful bidder to ensure that the security requirement is met throughout the performance of the contract. The Crown will not be held liable or accountable for any delays or additional costs associated with the contractor's non-compliance to the mandatory security requirement. Failure to comply with the mandatory security requirement will be grounds for being declared in default of contract.
4. For any enquiries concerning the project security requirement during the bidding period, the Bidder/Tenderer must contact the Security Officer @ 613-993-8956.

## **6. WSIB (WORKPLACE SAFETY AND INSURANCE BOARD)**

All Bidders must provide a valid WSIB certificate with their Tender or prior to contract award.

## **7. OFFICE OF THE PROCUREMENT OMBUDSMAN**

1. Clause for solicitation documents and regret letters for unsuccessful bidders

The Office of the Procurement Ombudsman (OPO) was established by the Government of Canada to provide an independent venue for Canadian bidders to raise complaints regarding the award of federal contracts under \$25,300 for goods and under \$101,100 for services. Should you have any issues or concerns regarding the award of a federal contract below these dollar amounts, contact OPO by e-mail at [boa.opo@boa-opo.gc.ca](mailto:boa.opo@boa-opo.gc.ca), by telephone at 1-866-734-5169, or by web at [www.opo-boa.gc.ca](http://www.opo-boa.gc.ca). For more information about OPO, including the available services, please visit the OPO website.

2. Contract Administration

The parties understand that the Procurement Ombudsman appointed pursuant to Subsection 22.1 (1) of the Department of Public Works and Government Services Act will review a complaint filed by the complainant respecting the administration of the Contract if the requirements of Subsection 22.2(1) of the Department of Public Works and Government Services Act and Sections 15 and 16 of the Procurement Ombudsman Regulations have been met.

To file a complaint, the Office of the Procurement Ombudsman may be contacted by e-mail at [boa.opo@boa-opo.gc.ca](mailto:boa.opo@boa-opo.gc.ca), by telephone at 1-866-734-5169, or by web at [www.opo-boa.gc.ca](http://www.opo-boa.gc.ca).

### 3. Dispute Resolution

The Parties agree to make every reasonable effort, in good faith, to settle amicably all disputes or claims relating to or arising from the Contract, through negotiations between the Parties' representatives authorized to settle. If the Parties do not reach a settlement within 10 working days, each party hereby consents to fully participate in and bear the cost of mediation led by the Procurement Ombudsman pursuant to Subsection 22.1(3)(d) of the Department of Public Work and Government Services Act and Section 23 of the Procurement Ombudsman Regulations.

The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169, by e-mail at [boa.opo@boa-opo.gc.ca](mailto:boa.opo@boa-opo.gc.ca), or by web at [www.opo-boa.gc.ca](http://www.opo-boa.gc.ca).

The Departmental Representative or his designate for this project is: Allan Mackenzie tel: 613 229-1095

Contracting Authority for this project is: [alain.leroux@nrc-cnrc.gc.ca](mailto:alain.leroux@nrc-cnrc.gc.ca)

## INSTRUCTIONS TO BIDDERS

### Article 1 – Receipt of Tender

- 1a) Tender must be received **by email only** not later than the specified tender closing time. Electronic bids received after the indicated closing time - NRC servers received time - will be irrevocably rejected. Bidders are urged to send their proposal sufficient time in advance of the closing time to prevent any technical issues. NRC will not be held responsible for bids sent before closing time but received by the NRC servers after the closing time. Tenders received after this time are invalid and shall not be considered, regardless of any reason for their late arrival.
- 1b) A letter of printed telecommunication from a bidder quoting a price shall not be considered as a valid tender unless a formal tender has been received on the prescribed Tender Form.
- 1c) Bidders may amend their tenders by **email only** provided that such amendments are received not later than the specified tender closing time.
- 1d) Any amendments to the tender which are transmitted by **email only** must be signed and must clearly identify the tenderer.

All such amendments are to be addressed to:  
National Research Council of Canada  
Alain Leroux, Senior Contracting Officer

[alain.leroux@nrc-cnrc.gc.ca](mailto:alain.leroux@nrc-cnrc.gc.ca)

### Article 2 – Tender Form & Qualifications

- 1) All tenders must be submitted on the Construction Tender Form and the tender must be signed in compliance with the following requirements:
  - a) Limited Company: The full names of the Company and the name(s) and status of the authorized signing officer(s) must be printed in the space provided for that purpose. The signature(s) of the authorized officer(s) and the corporate seal must be affixed.
  - b) Partnership: The firm name and the name(s) of the person(s) signing must be printed in the space provided. One or more of the partners must sign in the presence of a witness who must also sign. An adhesive colored seal must be affixed beside each signature.
  - c) Sole Proprietorship: The business name and the name of the sole proprietor must be printed in the space provided. The sole proprietor must sign in the presence of a witness who must also sign. An adhesive coloured seal must be affixed beside each signature.
- 2) Any alterations in the printed part of the Construction Tender Form or failure to provide the information requested therein, may render the tender invalid.
- 3) All space in the Construction Tender Form must be completed and any handwritten or typewritten corrections to the parts so completed must be initialed immediately to the side of the corrections by the person or persons executing the tender on behalf of the the tenderer.

- 4) Tenders must be based on the plans, specifications and tender documents provided.
- 5) A proposal submitted by a bidder who's Board of Directors or proprietor (s) are in majority the same as a former vendor who has declared bankruptcy while performing work for NRC over the last 7-years from the date of issuance of this RFP may be rejected and not eligible for award at NRC's sole discretion. In such case, NRC will advise the ineligible proponent(s).
- 6) A proposal submitted by a bidder who has had a previous contracts cancelled by NRC due to lack of performance within 3 years from the issuance date of this RFP may be rejected and not eligible for award at NRC's sole discretion. In such case, NRC will advise the ineligible proponent (s).
- 7) If there is discrepancy between the English version and the French version of this document and any of the attachments and amendments, the English version will takes precedence.

#### Article 3 - Contract

- 1) The Contractor will be required to sign a contract similar to the Standard Contract Form for Fixed Price Construction Contracts, a blank specimen of which is enclosed in the package for reference purposes.

#### Article 4 – Tender Destination

- 1a) Tenders are to be submitted **by email only**:  
National Research Council Canada

[alain.leroux@nrc-cnrc.gc.ca](mailto:alain.leroux@nrc-cnrc.gc.ca)

Endorsed "Tender for (insert title of work as it appears in the drawings and specifications)" and must bear the name and address of the tenderer.

- 1b) Unless otherwise specified, the only documents required to be submitted with the tender are the Tender form and the Bid Security.

#### Article 5 - Security

- 1a) Bid Security is required and must be submitted in one of the following forms:
  - i) bonds of the Government of Canada, or bonds unconditionally guaranteed as to principal and interest by the Government of Canada; **OR**
  - ii) a bid bond.
- 1b) Regardless of the Bid Security submitted, it should never be more than \$250,000 maximum, calculated at 10% of the first \$250,000 of the tendered price, plus 5% of any amount in excess of \$250,000.

- 1c) Bid Security shall accompany each tender or, if forwarded separately from the tender, shall be provided not later than the specified tender closing time. Bid Security must be available in the ORIGINAL form. PDF of bid bond or E-Bond acceptable. FAILURE TO PROVIDE THE REQUIRED BID SECURITY SHALL INVALIDATE THE TENDER.
- 1d) The successful tenderer is required to provide security within 14 days of receiving notice of tender acceptance. The tenderer must furnish EITHER:
- i) a Security Deposit as described in 1(b) above together with a Labour and Material Payment Bond in the amount of at least 50% of the amount payable under the contract, OR
  - ii) a Performance Bond and a Labour and Material Payment Bond – each in the amount of 50% of the amount payable under the contract.
- 1e) Bonds must be in an approved form and from the companies whose

bonds are acceptable to the Government of Canada. Samples of the approved form of Bid Bond, Performance Bond and Labour and Material Payment Bond and a list of acceptable Bonding Companies may be obtained from the Contracting Officer, National Research Council, Building M-58, Montreal Road, Ottawa, Ontario, K1A 0R6.

#### Article 7 – Sales Tax

- 1) The amount of the tender shall include all taxes as levied under the Excise Act, the Excise Tax Act, the Old Age Security Act, the Customs Act or the Customs Tariff, in force or applicable at the time.
- 1) In Quebec, the Provincial Sales Tax should not be included in the Tender Price as the Federal Government is exempt. Tenderers should contact the Provincial Revenue Minister to recover all taxes paid for goods and services rendered under this contract.

Tenderers must include in their Tender Price the amount of Provincial Sales Tax for which the exemption does not apply.

#### Article 8 – Examination of Site

- 1) All parties tendering shall examine the sites of the proposed work before sending in their tender and make themselves thoroughly acquainted with the same and obtain for themselves any and all information that may be necessary for the proper carrying out of the Contract. No after claim will be allowed or entertained for any work or material that may be requisite and necessary for the proper execution and completion of this Contract with the exception of that provided for under GC 35 in the General Conditions of the General Specification.

#### Article 9 – Discrepancies, Omissions, Etc.

- 1a) Bidders finding discrepancies in, or omissions from, drawings, specifications or other documents, or having any doubt as to the meaning or intent of any part thereof, should at once notify the Engineer who will send written instructions or explanation to all bidders.
- 1b) Neither the Engineer nor the Council will be responsible for oral instructions.

- 1c) Addenda or corrections issued during the time of the bidding shall be covered in the proposal. However, the contract supersedes all communications, negotiations and agreements, either written or oral, relating to the work and made prior to the date of the contract.

Article 10 – No additional Payments for Increased Costs

- 1) The only other adjustments in the contract price allowed are those specified in the General Conditions of the General Specification. The contract price will not be amended for change in freight rates, exchange rates, wage rates or cost of materials, plant or services.

Article 11 – Awards

- 1a) The Council reserves the power and right to reject tenders received from parties who cannot show a reasonable acquaintance with and preparation for the proper performance of the class of work herein specified and shown on plans. Evidence of such competence must be furnished by the tenderers if required to do so.
- 1b) A tenderer may be required to furnish to the Contracting Office, National Research Council of Canada, Building M-58, 1200 Montreal Road, Ottawa, Ontario, K1A 0R6, Canada, unsigned copies of the insurance requirements as covered by the Insurance Conditions of the General Specification.
- 1c) The Council does not bind itself to accept the lowest or any tender.

Article 12 – Harmonized Sales Tax

- 1) The Harmonized Sales Tax (HST) which is now in effect shall be considered an applicable tax for the purpose of this tender. However, the bidder shall NOT include any amount in the bid price for said HST. The successful contractor will indicate on each application for payment as a separate amount the appropriate HST the Owner is legally obliged to pay. This amount will be paid to the Contractor in addition to the amount certified for payment under the Contract in addition to the amount certified for payment under the Contract and will therefore not affect the Contract Price. The Contractor agrees to remit any HST collected or due to Revenue Canada.

## Non-resident contractors

RST guide 804

Published August 2006

ISBN: 1-4249-2007-8 (Print), **1-4249-2009-4 (PDF)**, **1-4249-2008-6 (HTML)**

## Publication Archived

**Notice to the reader: For Retail Sales Tax (RST)** – On July 1, 2010 the 13 per cent Harmonized Sales Tax (HST) took effect in Ontario replacing the existing provincial Retail Sales Tax (RST) and combining it with the federal Goods and Services Tax (GST). As a result, RST provisions described on this page and in other publications ended on June 30, 2010.

Effective July 1, 2010 this publication was archived for RST purposes **only**. Use caution when you refer to it, since it reflects the law in force for RST at the time it was released and may no longer apply.

- The information in this Guide explains the Retail Sales Tax (RST) responsibilities of a non-resident contractor who is awarded a construction contract to perform work in Ontario and their Ontario customers. Please note that this Guide replaces the previous version dated March 2001.

## Non-Resident Contractor Defined

A non-resident contractor is a contractor located outside Ontario who has been awarded a construction contract to perform work in Ontario, and who has not maintained a permanent place of business in Ontario continuously for twelve months immediately prior to signing the contract, or which is not a company incorporated under the laws of Ontario. A construction contract is a contract for the erection, remodelling or repair of a building or other structure on land.

A contractor is a person who is in the business of constructing, altering, repairing or improving real property and includes, but is not limited to,

1. a general contractor and subcontractor,
2. a carpenter, bricklayer, stonemason, electrician, plasterer, plumber, painter, decorator, paver, and bridge builder,
3. a sheet metal, tile and terrazzo, heating, air conditioning, insulation, ventilating, papering, road, roofing and cement contractor, who installs or incorporates items into real property. (See RST [Guide 206 - Real Property and Fixtures](#)).

## Registration and Guarantee Deposit

Non-resident contractors who are awarded a construction contract in Ontario are required to register with the Ministry of Finance (ministry), Centralized Programs Unit and post a guarantee equal to 4 per cent of the total of each Ontario contract. The guarantee can be paid in cash, by certified cheque (payable to the Minister of Finance), letter of credit or by a guarantee bond.

To register with the ministry and to obtain further information on posting a guarantee, contractors should contact the ministry's Centralized Programs Unit, 33 King Street West, PO Box 623, Oshawa, Ontario, L1H 8H7, toll-free 1 866 ONT-TAXS (1 866 668-8297) or fax to 905 435-3617.

Non-resident contractors who sell taxable goods on a supply only basis to Ontario customers, or provide taxable services in Ontario, may obtain a regular Vendor Permit to collect and remit RST on their sales. Non-resident contractors who have been issued a regular Vendor Permit must still register separately with the ministry and post a guarantee if they are awarded a construction contract in Ontario.

## Letter of Compliance

After receiving the guarantee, the ministry mails out two copies of a "letter of compliance" to the contractor certifying the Retail Sales Tax (RST) requirements have been met. Contractors must give a copy of the letter to their customers.

If a copy of the compliance letter is not provided, the customer must withhold 4 per cent of all amounts payable to the non resident contractor and pay the withheld amounts to the Minister of Finance (minister). Details relating to the contract should be sent along with the payments to the Centralized Programs Unit. Customers may give the minister a guarantee bond equal to 4 per cent of the total contract price instead of making the 4 per cent payments.

Note: Customers who do not follow these requirements may be held liable for 4 per cent of all amounts payable to the non resident contractor or any other amount that the Ministry deems to be the RST payable resulting from the performance of the contract.

## Calculation of RST

### ***Fair Value***

RST is payable on the "fair value" of materials, purchased or brought into Ontario, to be used for work performed in Ontario. "Fair value" includes:

- the purchase price in Canadian funds;
- all charges by the supplier for handling and delivery, and
- any federal customs duties and excise taxes paid (but not the federal Goods and Services Tax (GST)).

Contractors are also required to pay RST to Ontario suppliers on the purchase, rental or lease of taxable services, materials, machinery, or equipment.

### ***Machinery and Equipment - Leased***

If machinery or equipment is leased from a supplier outside Ontario and brought into the province, RST is payable on the lease payments for the period the machinery or equipment is in Ontario.

### ***Machinery and Equipment - Owned by Contractor***

If machinery or equipment is owned by the contractor, RST may be calculated in one of the following ways:

- a. If a contractor brings machinery and equipment into Ontario for less than 12 months' use, RST is to be calculated using the following formula:

$$1/36 \times \text{net book value at date of import} \times \text{number of months in Ontario} \times \text{tax rate}$$

For the purpose of this formula, RST is payable for each month or part of a month that the goods are in Ontario. A month is considered 31 consecutive days and a part month is considered more than 12 days. The RST payable is based on the number of days the machinery and equipment are located in Ontario and not the number of days the items are actually used.

Example: Equipment is brought into Ontario on March 28 and taken out on May 8. The items were in the province for 41 days. RST is payable on the first 31 days' temporary stay in Ontario vs. use of the equipment. Since the remainder (10 days) is not considered part of a month, no RST is payable on this portion.



- b. If, at the time the goods are brought into Ontario, it is expected that the machinery or equipment will be in Ontario for more than twelve months, contractors must pay Retail Sales Tax (RST) on the following basis:

net book value at date of import x tax rate

If, at the time of import, the length of time is not known, vendors may use the formula under (a). If they later find it necessary to keep the machinery and equipment in Ontario for more than 12 months, the RST paid under (a) may be deducted from the RST payable under (b).

Using formula (a) or (b) above, contractors will calculate and remit the RST payable on the return that is filed when the contract is finished.

(See Completion of Contract section)

## M a n u f a c t u r i n g   f o r   O w n   U s e

Contractors may need to manufacture items, such as doors and windows, for their construction contracts. Manufacturing is work done in a factory away from a construction site, or in a mobile unit or workshop that is on or near the construction site. Manufacturing occurs when raw materials are changed into manufactured goods for use in real property contracts.

Contractors are considered to be manufacturing contractors if they produce goods:

1. for their own use in real property contracts, and
2. the manufactured cost of the goods is more than \$50,000 a year.

(See RST Guide 401 - Manufacturing Contractors)

## C o n t r a c t s   w i t h   t h e   F e d e r a l   G o v e r n m e n t

Where a non-resident contractor enters into a construction contract with the federal government, for the construction of a building and/or the installation of equipment, the nature of the equipment will determine whether the contract should be let on a tax-included or tax excluded basis.

Contracts for the construction of a building and the installation of equipment that directly services that building (i.e., elevators, escalators, light fixtures, central heating and air conditioning, etc.) should be tendered on a tax -included basis. Contractors are the consumers of the materials used in fulfilling these contracts and must pay or account for RST on the materials used to complete the contracts. There is NO exemption just because the contract is with the federal government.

Contracts for the installation of equipment that becomes a fixture and does not directly service a building (i.e., material handling equipment, production machinery, communication equipment, training equipment) may be tendered on a tax-excluded basis. Contractors engaged in contracts of this nature are permitted to make tax exempt purchases of such equipment by issuing a valid Purchase Exemption Certificate (PEC) to their supplier. Only non-resident contractors who have registered with the ministry and posted a guarantee may issue a PEC.

## E x e m p t i o n s

Contractors may supply and install equipment or materials for certain customers that may be entitled to an exemption from RST (e.g., manufacturers, Indian band councils, farmers and diplomatic organizations). The equipment or materials, when installed, becomes real property if it is permanently attached to land, or a fixture if it is permanently attached to a building or real property structure. Since

contractors are liable for RST, they should contact the ministry to find out if the customer qualifies for exemption before tendering the contract on a tax-excluded basis.

## Status Indians, Indian Bands and Band Councils

Non-resident contractors may purchase building materials exempt from Retail Sales Tax (RST) for certain buildings and structures situated on reserves. The cost of such projects must be paid by the band council, and the buildings must provide a community service for the reserve. Contracts for the construction of an exempt community building project should be made on an RST-excluded basis. Non-resident contractors may purchase the materials exempt from RST by providing suppliers with a valid Purchase Exemption Certificate (PEC). As noted previously, only non-resident contractors who have registered with the ministry and posted a guarantee may issue a PEC. (See RST Guide [204 - Purchase Exemption Certificates](#)).

Non-resident contractors must pay RST on items purchased for incorporation into a building or structure built for individual status Indians on a reserve. (See RST [Guide 808 - Status Indians, Indian Bands and Band Councils](#)).

### Completion of Contract

When a contract is completed, non-resident contractors who were required to post a guarantee must complete a [Non-Resident Contractor Retail Sales Tax Return \[PDF - 92 KB\]](#) that is provided by the ministry.

If a contractor's guarantee was given in cash or by certified cheque, the amount of the deposit can be deducted from the RST liability owed by the contractor. If the liability is greater than the deposit, the amount remaining must be paid by the contractor. If the deposit is more than the liability, the contractor will receive a refund.

If a guarantee bond was posted instead of cash, the bond will be discharged once the RST liability is paid in full.

All returns are subject to audit.

## Legislative References

- Retail Sales Tax Act, Subsections 19(2) and 39(3)(4) and (5)
- Regulation 1012 under the Act, Subsections 15.3(1)(2)(5)(6) and (7)
- Regulation 1013 under the Act, Sections 1 and 3

## For More Information

The information contained in this publication is only a guideline. For more information, please contact the Ontario Ministry of Finance at 1 866 ONT-TAXS (1 866 668-8297) or visit our website at [ontario.ca/finance](http://ontario.ca/finance).

## **Acceptable Bonding Companies**

Published September 2010

The following is a list of insurance companies whose bonds may be accepted as security by the government.

### **1. Canadian Companies**

- ACE INA Insurance
- Allstate Insurance Company of Canada
- Ascentus Insurance Ltd. (Surety only)
- Aviva Insurance Company of Canada
- AXA Insurance (Canada)
- AXA Pacific Insurance Company
- Canadian Northern Shield Insurance Company
- Certas Direct Insurance Company (Surety only)
- Chartis Insurance Company of Canada (formerly AIG Commercial Insurance Company of Canada)
- Chubb Insurance Company of Canada
- Commonwealth Insurance Company
- Co-operators General Insurance Company
- CUMIS General Insurance Company
- The Dominion of Canada General Insurance Company
- Echelon General Insurance Company (Surety only)
- Economical Mutual Insurance Company
- Elite Insurance Company
- Everest Insurance Company of Canada
- Federated Insurance Company of Canada
- Federation Insurance Company of Canada
- Gore Mutual Insurance Company
- Grain Insurance and Guarantee Company
- The Guarantee Company of North America
- Industrial Alliance Pacific General Insurance Corporation
- Intact Insurance Company
- Jevco Insurance Company (Surety only)
- Lombard General Insurance Company of Canada
- Lombard Insurance Company
- Markel Insurance Company of Canada
- The Missisquoi Insurance Company
- The Nordic Insurance Company of Canada
- The North Waterloo Farmers Mutual Insurance Company (Fidelity only)
- Novex Insurance Company (Fidelity only)
- The Personal Insurance Company
- Pilot Insurance Company
- Quebec Assurance Company
- Royal & Sun Alliance Insurance Company of Canada
- Saskatchewan Mutual Insurance Company
- Scottish & York Insurance Co. Limited
- The Sovereign General Insurance Company
- TD General Insurance Company
- Temple Insurance Company
- Traders General Insurance Company

- Travelers Guarantee Company of Canada
- Trisura Guarantee Insurance Company
- The Wawanesa Mutual Insurance Company
- Waterloo Insurance Company
- Western Assurance Company
- Western Surety Company

## 2. Provincial Companies

Surety bonds issued by the following companies may be accepted provided that the contract of suretyship was executed in a province in which the company is licensed to do business as indicated in brackets.

- AXA Boreal Insurance Company (P.E.I., N.B., Que., Ont., Man., B.C.)
- AXA Boreal Insurance Company (P.E.I., N.B., Que., Ont., Man., B.C.)
- ALPHA, Compagnie d'Assurances Inc. (Que.)
- Canada West Insurance Company (Ont., Man., Sask, Alta., B.C., N.W.T.) (Surety only)
- The Canadian Union Assurance Company (Que.)
- La Capitale General Insurance Inc. (Nfld. & Lab., N.S., P.E.I., Que.(Surety only), Man., Sask., Alta., B.C., Nun., N.W.T., Yuk.)
- Coachman Insurance Company (Ont.)
- Continental Casualty Company (Nfld. & Lab., N.S., P.E.I., N.B., Que., Ont., Man., Sask., Alta., B.C., Nun., N.W.T., Yuk.)
- GCAN Insurance Company (Nfld. & Lab., N.S., P.E.I., N.B., Que., Ont., Man., Sask., Alta., B.C., Nun., N.W.T., Yuk.)
- The Insurance Company of Prince Edward Island (N.S., P.E.I., N.B.)
- Kingsway General Insurance Company (N.S., N.B., Que., Ont., Man., Sask., Alta., and B.C.)
- Liberty Mutual Insurance Company (Nfld. & Lab., N.S., P.E.I., N.B., Que., Ont., Man., Sask., Alta., B.C., Nun., N.W.T., Yuk.)
- Manitoba Public Insurance Corporation (Man.)
- Norgroupe Assurance Générales Inc.
- Orleans General Insurance Company (N.B., Que., Ont.)
- Saskatchewan Government Insurance Office (Sask.)
- SGI CANADA Insurance Services Ltd. (Ont., Man., Sask., Alta.)
- L'Unique General Insurance Inc. (Nfld. & Lab., N.S., P.E.I., N.B., Que.(Surety only), Ont.(Surety only), Man., Sask., Alta., B.C.(Surety only), Nun., N.W.T., Yuk.)

## 3. Foreign Companies

- Aspen Insurance UK Limited
- Compagnie Française d'Assurance pour le Commerce Extérieur (Fidelity only)
- Eagle Star Insurance Company Limited
- Ecclesiastical Insurance Office Public Limited Company (Fidelity only)
- Lloyd's Underwriters
- Mitsui Sumitomo Insurance Company, Limited
- NIPPONKOA Insurance Company, Limited
- Sompo Japan Insurance Inc.
- Tokio Marine & Nichido Fire Insurance Co., Ltd.
- XL Insurance Company Limited (Surety only)
- Zurich Insurance Company Ltd

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## Articles of Agreement

Standard Construction Contract – Articles of Agreement  
(23/01/2002)

- A1 Contract Documents
- A2 Date of Completion of Work and Description of Work
- A3 Contract Amount
- A4 Contractor's Address
- A5 Unit Price Table

---

## Articles of Agreement

These Articles of Agreement made in duplicate this      day of      .

Between

**Her Majesty the Queen**, in right of Canada (referred to in the contract documents as “ Her Majesty”) represented by the National Research Council Canada (referred to in the contract documents as the “Council”)

and

(referred to in the contract documents as the “Contractor”)

Witness that in consideration for the mutual promises and obligations contained in the contract, Her Majesty and the Contractor covenant and agree as follows:

A1      Contract Documents

**(23/01/2002)**

1.1      Subject to A1.4 and A1.5, the documents forming the contract between Her Majesty and the Contractor, referred to herein as the contract documents, are

1.1.1    these Articles of Agreement,

1.1.2    the document attached hereto, marked “A” and entitled “Plans and Specifications”, referred to herein as the Plans and Specifications,

1.1.3    the document attached hereto, marked “B” and entitled “Terms of Payment”, referred to herein as the Terms of Payment,

1.1.4    the document attached hereto, marked “C” and entitled “General Conditions”, referred to herein as the General Conditions,

1.1.5    the document attached hereto, marked “D” and entitled “Labour Conditions”, referred to herein as the Labour Conditions,

1.1.6    the document attached hereto, marked “E” and entitled “Insurance Conditions”, referred to herein as the Insurance Conditions,

1.1.7    the document attached hereto, marked “F” and entitled “Contract Security Conditions”, referred to herein as the Contract Security Conditions, and

1.1.8    any amendment or variation of the contract documents that is made in accordance with the General Conditions.

1.1.9    the document entitled Fair Wage Schedules for Federal Construction Contracts referred to herein as Fair Wage Schedules

1.1.10

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## Articles of Agreement

The Council hereby designates \_\_\_\_\_ of \_\_\_\_\_ of the Government of Canada as the Engineer for the purposes of the contract, and for all purposes of or incidental to the contract, the Engineer's address shall be deemed to be:

### 1.2 In the contract

1.3.1 "Fixed Price Arrangement" means that part of the contract that prescribes a lump sum as payment for performance of the work to which it relates; and

1.3.2 "Unit Price Arrangement" means that part of the contract that prescribes the product of a price multiplied by a number of units of measurement of a class as payment for performance of the work to which it relates.

1.3 Any of the provisions of the contract that are expressly stipulated to be applicable only to a Unit Price Arrangement are not applicable to any part of the work to which a Fixed Price Arrangement is applicable.

1.4 Any of the provisions of the contract that are expressly stipulated to be applicable only to a Fixed Price Arrangement are not applicable to any part of the work to which a Unit Price Arrangement is applicable.

### A2 Date of Completion of Work and Description of Work

**(23/01/2002)**

2.1 The contractor shall, between the date of these Articles of Agreement and the \_\_\_\_\_, \_\_\_\_\_, in the careful and workmanlike manner, diligently perform and complete the following work:

which work is more particularly described in the Plans and Specifications.

---

## Articles of Agreement

### A3 Contract Amount

**(23/01/2002)**

- 3.1 Subject to any increase, decrease, deduction, reduction or set-off that may be made under the Contract, Her Majesty shall pay the Contractor at the times and in the manner that is set out or referred to in the Terms of Payment
- 3.1.1 the sum of \_\_\_\_\_ (GST/HST extra), in consideration for the performance of the work or the part thereof that is subject to Fixed Price Arrangement, and
- 3.1.2 a sum that is equal to the aggregate of the products of the number of units of Measurement of each class of labour, plant and material that is set out in a Final Certificate of Measurement referred to in GC44.8 multiplied in each case by the appropriate unit price that is set out in the Unit Price Table in consideration for the performance of the work or the part thereof that is subject to a Unit Price Arrangement.
- 3.2 For the information and guidance of the Contractor and the persons administering the contract on behalf of Her Majesty, but not so as to constitute a warranty, representation or undertaking of any nature by either party, it is estimated that the total amount payable by Her Majesty to the Contractor for the part of the work to which a Unit Price Arrangement is applicable will be approximately \$N/A
- 3.3 A3.1.1 is applicable only to a Fixed Price Arrangement.
- 3.4 A3.1.2 and A3.2 applicable only to a Unit Price Arrangement.

### A4 Contractor's Address

**(23/01/2002)**

- 4.1 For all purposes of or incidental to the contract, the Contractor's address shall be deemed to be:



**Articles of Agreement**

A5 Unit Price Table

(23/01/2002)

5.1 Her Majesty and the Contractor agree that the following table is the Unit Price Table for the purposes of the contract.

Column 1 Item	Column 2 Class of Labour Plant  Or Material	Column 3 Unit of Measurement	Column 4 Estimated Total Quantity	Column 5 Price per Unit	Column 6 Estimated Total Price
		N/A			

5.2 The Unit Price Table that is set out in A5.1 designates the part of the work to which a Unit Price Arrangement is applicable.

5.3 The part of the work that is not designated in the Unit Price Table referred to in A5.2 is the part of the work to which a Fixed Price Arrangement is applicable.

---

**Articles of Agreement**

Signed on behalf of Her Majesty by

\_\_\_\_\_

as Senior Contracting Officer

and \_\_\_\_\_

as \_\_\_\_\_

of the **National Research Council Canada**

on the \_\_\_\_\_

day of \_\_\_\_\_

Signed, sealed and delivered by

\_\_\_\_\_

as \_\_\_\_\_ and  
Position

by \_\_\_\_\_

as \_\_\_\_\_ and  
Position

of

on the \_\_\_\_\_

day of \_\_\_\_\_

**Seal**

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**Appendix A**

Designated substance report

**1. SCOPE OF WORK**

- .1 Work under this contract covers the renovation of the woman's washroom on the ground floor in the Council's Building M7 of the National Research Council.

**2. DRAWINGS**

- .1 The following drawings illustrate the work and form part of the contract documents:

Cover Page: 5863-A00

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Electrical: 5863-E01

5863-E02

**3. COMPLETION**

- .1 Complete all work within 10 week(s) after receipt of notification of acceptance of tender.

**4. GENERAL**

- .1 The word "provide" in this Specification means to supply and install.  
.2 Provide items mentioned in either the drawings or the specification.

**5. SPECIFIED ACCEPTABLE & ALTERNATIVE EQUIPMENT & MATERIALS**

- .1 Materials and equipment scheduled and/or specified on the drawings or in the specifications have been selected to establish a performance and quality standard. In most cases, acceptable manufacturers are stated for any material or equipment specified by manufacturer's name and model number. Contractors may base their tender price on materials and equipment supplied by any of the manufacturers' names as acceptable for the particular material or equipment.  
.2 In addition to the manufacturers specified or named as acceptable, you may propose alternative manufacturers of materials or equipment to the Departmental Representative for acceptance. For a product to be considered as an alternative product substitute, make a written application to the Departmental Representative during the tender period, not later than ten (10) working days before tender closing.

- .3 Certify in writing that the alternative meets all requirements of the specified material or equipment. In addition, it shall be understood that all costs required by or as a result of acceptance or proposed alternatives, will be borne by the Contractor.
- .4 Approval of alternatives will be signified by issue of an Addendum to the Tender Documents.
- .5 Any alternative manufacturers or materials submitted which are incomplete and cannot be evaluated, or are later than ten (10) working days before tender closing date or after the tender period, will not be considered.

**6. MINIMUM STANDARDS**

- .1 Conform to or exceed minimum acceptable standards of the various applicable federal, provincial and municipal codes such as The National Building Code, The National Fire Code, Canadian Plumbing Code, Canadian Electrical Code, Canadian Code for Construction Safety and the Provincial Construction Safety Act.
- .2 Work to conform to referenced standards and codes as reaffirmed or revised to date of specification.

**7. WORKPLACE HAZARDOUS MATERIAL INFORMATION SYSTEM (WHMIS)**

- .1 The General Contractor shall comply with Federal and Provincial legislation regarding the WHMIS. The Contractor's responsibilities include, but are not limited to the following:
  - .1 To ensure that any controlled product brought on site by the Contractor or sub-contractor is labeled;
  - .2 To make available to the workers and the Departmental Representative, Material Safety Data Sheets (MSDS) for these controlled products;
  - .3 To train own workers about WHMIS, and about the controlled products that they use on site;
  - .4 To inform other Contractors, sub-contractors, the Departmental Representative, authorized visitors and outside inspection agency personnel about the presence and use of such products on the site.
  - .5 The site foreman or superintendent must be able to demonstrate, to the satisfaction of the Departmental Representative, that he/she has had WHMIS training and is knowledgeable in its requirements. The Departmental Representative can require replacement of this person if this condition or implementation of WHMIS is not satisfactory

**8. REQUIREMENTS OF BILL 208, SECTION 18(a)**

Under the requirements of Bill 208 of the Ontario Ministry of Labour Occupational Health & Safety Act, the following designated substances may be encountered while performing the work described in these contract documents:

- .1 Acrylonitrile, Isocyanates, Arsenic, Lead, Asbestos, Mercury, Benzene, Silica, Coke Oven Emissions, Vinyl Chloride, and Ethylene Oxide

- .1 It is the responsibility of the General Contractor to ensure that each prospective sub-contractor for this project has received a copy of the above list.

**9. COST BREAKDOWN**

- .1 Submit, for approval by the Departmental Representative, a cost breakdown of tender 72 hours after the contract is awarded.
- .2 Use the approved cost breakdown as the basis for submitting all claims.
- .3 Request Departmental Representative's verbal approval to amount of claim prior to preparing and submitting the claim in its final form.
- .4 Contractor costs associated with compliance with occupational health and safety requirements (Canada Labour Code) related to the Coronavirus/COVID-19 pandemic must be included in the initial bid price. These costs may include, but are not limited to, the provision of additional personal protective equipment (PPE) and social distancing requirements as required to complete the project. Contractor must review and incorporate into initial bid pricing compliance with any Coronavirus/COVID-19 related health and safety guidance issued by the local Medical Officer of Health (applicable in the jurisdiction of the project), the Public Health Agency of Canada, Health Canada and/or the provincial Ministry of Health, as applicable.

**10. SUB-TRADES**

- .1 Submit no later than 72 hours after tender closing, a complete list of sub trades for the Departmental Representative's review.

**11. PERSONNEL SECURITY AND IDENTIFICATION**

- .1 All persons employed by the Contractor, or by any sub-contractor and present on the site must be security cleared in accordance with the requirements of the Section entitled Special Instructions to Tenderers.
- .2 All such persons must wear and keep visible identification badges as issued by the Security Office of NRC.

**12. WORKING HOURS AND SECURITY**

- .1 Normal working hours on the NRC property are from 8:00 a.m. until 4:30 p.m., Monday to Friday inclusive, except statutory holidays.
- .2 At all other times, special written passes are required for access to the building site.
- ⇒ Before scheduling any work outside normal working hours, obtain permission from the Departmental Representative to perform the specific tasks.

- .4 An escort may be required whenever working outside normal hours. Contractor to bear the associated costs.

**13. SCHEDULE**

- .1 The Contractor shall prepare a detailed schedule, fixing the date for commencement and completion of the various parts of the work and update the said schedule. Such schedule shall be made available to the Departmental Representative not later than two weeks after the award of the contract and prior to commencement of any work on site.
- .2 Notify Departmental Representative in writing of any changes in the schedule.

**14. PROJECT MEETINGS**

- .1 Hold regular project meetings at times and locations approved by the Departmental Representative.
- .2 Notify all parties concerned of meetings to ensure proper coordination of work.
- .3 Departmental Representative will set times for project meetings and assumes responsibility for recording and distributing minutes.

**15. SHOP DRAWINGS**

- .1 Submit to Departmental Representative for review, shop drawings, product data and samples specified within 2 week(s) after contract award.
- .2 Submit to Departmental Representative for review a complete list of all shop drawings, product data and samples specified and written confirmation of corresponding delivery dates within one (1) week after shop drawings, product data and samples approval date. This list shall be updated on a 1 week basis and any changes to the list shall be immediately notified in writing to the Departmental Representative.
- .3 Review shop drawings, data sheets and samples prior to submission.
- .4 Submit one (1) electronic copy of all shop drawings and product data and samples for review, unless otherwise specified.
- .5 Review of shop drawings and product data by the Departmental Representative does not relieve the Contractor of the responsibility for errors and omissions and for the conformity with contract documents.

**16. SAMPLES AND MOCK-UPS**

- .1 Submit samples in sizes and quantities as specified.
- .2 Where colour, pattern or texture is criterion, submit full range of samples.
- .3 Construct field samples and mock-ups at locations acceptable to Departmental Representative.

- .4 Reviewed samples or mock-ups will become standards of workmanship and material against which installed work will be checked on the project.

**17. MATERIALS AND WORKMANSHIP**

- .1 Install only new materials on this project unless specifically noted otherwise.
- .2 Only first class workmanship will be accepted, not only with regard to safety, efficiency, durability, but also with regard to neatness of detail and performance.

**18. WORK & MATERIALS SUPPLIED BY OWNER**

- .1 Work and materials not included in this contract are described on drawings and in this specification.
- .2 Deliver to a storage place, as directed by the Departmental Representative, all materials returned to the Owner.
- .3 Unless otherwise specified, accept owner-supplied materials at their storage location and provide all transportation as required.
- .4 General Contractor's duties:
  - .1 Unload at site.
  - .2 Promptly inspect products and report damaged or defective items.
  - .3 Give written notification to the Departmental Representative for items accepted in good order.
  - .4 Handle at site, including uncrating and storage.
  - .5 Repair or replace items damaged on site.
  - .6 Install, connect finished products as specified.

**19. SITE ACCESS**

- .1 Make prior arrangements with the Departmental Representative before starting work or moving materials and equipment on site.
- .2 Obtain approval of Departmental Representative for regular means of access during the construction period.
- .3 Obtain approval of Departmental Representative before temporarily suspending operations on site; before returning to the site and before leaving the site at the end of the job.
- .4 Provide and maintain access to site.
- .5 Build and maintain temporary roads and provide snow removal during period of work.
- .6 Provide snow clearing and removal as required during the contract period.



- .7 Make good any damage and clean up dirt, debris, etc., resulting from Contractor's use of existing roads.

**20. USE OF SITE**

- .1 Restrict operations on the site to the areas approved by the Departmental Representative
- .2 Locate all temporary structures, equipment, storage, etc., to the designated areas.
- .3 Restrict parking to the designated areas.

**21. ACCEPTANCE OF SITE**

- .1 Inspect the site before commencing work, review any unexpected conditions with the Departmental Representative.
- .2 Commencement of work will imply acceptance of existing conditions.

**22. SITE OFFICE & TELEPHONE**

- .1 Contractor to erect a temporary site office at his own expense.
- .2 Install and maintain a telephone, if necessary.
- .3 Use of NRC phones is not permitted unless in the case of an emergency.

**23. SANITARY FACILITIES**

- .1 Obtain permission from the Departmental Representative to use the existing washroom facilities in the building or Provide sanitary facilities, and bear all associated costs.

**24. TEMPORARY SERVICES**

- .1 A source of temporary power will be made available in the area. Bear all costs to make connections to the power source and perform distribution on site.
- .2 Provide all load centres, breakers, conduit, wiring, disconnects, extension cords, transformers, as required from the source of power.
- .3 Power is to be used only for power tools, lighting, controls, motors, and not for space heating.
- .4 A source of temporary water will be made available if required.
- .5 Bear all costs associated with distributing the water to the required locations.
- .6 Comply with NRC requirements when connecting to existing systems in accordance with the articles entitled "Co-operation" and "Service Interruptions" of this section.

**25. DOCUMENTS REQUIRED AT WORK SITE**

- .1 The Contractor shall keep on the site, one (1) up-to-date copy of all contract documents, including specifications, drawings, addenda, shop drawings, change notices, schedule and any reports or bulletins pertaining to the work, in good order, available to the Departmental Representative and to his / her representatives at all times.
- .2 At least one (1) copy of specifications and drawings shall be marked by the Contractor to show all work "As Built" and shall be provided to the Departmental Representative with the Application for Payment and for the Final Certificate of Completion.

**26. CO-OPERATION**

- .1 Co-operate with NRC staff in order to keep disruption of normal research work to an absolute minimum.
- .2 Work out in advance, a schedule for all work which might disrupt normal work in the building.
- .3 Have schedule approved by the Departmental Representative.
- .4 Notify the Departmental Representative in writing, 72 hours prior to any intended interruption of facilities, areas, corridors, mechanical or electrical services and obtain requisite permission.

**27. PROTECTION AND WARNING NOTICES**

- .1 Provide all materials required to protect existing equipment.
- .2 Erect dust barriers to prevent dust and debris from spreading through the building.
- .3 Place dust protection in the form of cover sheets over equipment and furniture and tape these sheets to floors, to ensure no dust infiltration.
- .4 Repair or replace any and all damage to Owner's property caused during construction, at no cost to the Owner and to the satisfaction of the Departmental Representative.
- .5 Protect the buildings, roads, lawns, services, etc. from damage which might occur as a result of this work.
- .6 Plan and co-ordinate the work to protect the buildings from the leakage of water, dust, etc.
- .7 Ensure that all doors, windows, etc., that could allow transfer of dust, noise, fumes, etc., to other areas of the building are kept closed.
- .8 Be responsible for security of all areas affected by the work under the Contract until acceptance by NRC. Take all necessary precautions to prevent entry to the work area by unauthorized persons and guard against theft, fire and damage by any cause. Secure working area at the end of each day's work and be responsible for same.

- .9 Provide and maintain adequate safety barricades around the work sites to protect NRC personnel and the public from injury during the construction.
- .10 Post warnings, in all instances where possible injury could occur such as Work Overhead, Hard Hat Areas, etc. or as required by the Departmental Representative.
- .11 Provide temporary protective enclosures over building entrances and exits to protect pedestrians. All enclosures to be structurally sound against weather and falling debris.

**28. BILINGUALISM**

- .1 Ensure that all signs, notices, etc. are posted in both official languages.
- .2 Ensure that all identification of services called for by under this contract are bilingual.

**29. LAYOUT OF WORK**

- .1 Location of equipment, fixtures, outlets and openings indicated on drawings 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 the manufacturer's recommendations for safety, access and maintenance.
- .3 Employ competent person to lay out work in accordance with the contract documents.

**30. DISCREPANCIES & INTERFERENCES**

- .1 Prior to the start of the work, examine drawings and specifications. Report at once to the Departmental Representative, any defects, discrepancies, omissions or interferences affecting the work.
- .2 Contractor to immediately inform the Departmental Representative in writing, of any discrepancies between the plans and the physical conditions so the Departmental Representative may promptly verify same.
- .3 Any work done after such a discovery, until authorized, is at the Contractor's risk.
- .4 Where minor interferences as determined by the Departmental Representative are encountered on the job and they have not been pointed out on the original tender or on the plans and specifications, provide offsets, bends or reroute the services to suit job conditions at no extra cost.
- .5 Arrange all work so as not to interfere in any way with other work being carried out.

**31. MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

- .2 Notify the Departmental Representative in writing of any conflict between these specifications and manufacturer's instruction. Departmental Representative will designate which document is to be followed.

**32. TEMPORARY HEATING AND VENTILATING**

- .1 Bear the costs of temporary heat and ventilation during construction including costs of installation, fuel, operation, maintenance, and removal of equipment.
- .2 Use of direct-fired heaters discharging waste products into the work areas will not be permitted unless prior approval is given by the Departmental Representative.
- .3 Furnish and install 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 Reduce moisture condensation on surfaces to an acceptable level.
  - .4 Provide ambient temperature and humidity levels for storage, installation and curing of materials.
  - .5 Provide adequate ventilation to meet health regulations for a safe working environment.
- .4 Maintain minimum temperature of 10°C (50°F) or higher where specified as soon as finishing work is commenced and maintain until acceptance by the Departmental Representative.
  - .1 Maintain ambient temperature and humidity levels as required for comfort of NRC personnel.
- .5 Prevent hazardous or unhealthy accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction including also, storage areas and sanitary facilities.
  - .1 Dispose of exhaust materials in a manner that will not result in a harmful or unhealthy exposure to persons.
- .6 Maintain strict supervision of operation of temporary heating and ventilating equipment.
  - .1 Enforce conformance with applicable codes and standards.
  - .2 Comply with instructions of the Departmental Representative including provision of full-time watchman services when directed.
  - .3 Enforce safe practices.
  - .4 Vent direct-fired combustion units to outside.
- .7 Submit tenders assuming existing or new equipment and systems will not be used for temporary heating and ventilating.
- .8 After award of contract, Departmental Representative may permit use of the permanent system providing agreement can be reached on:
  - .1 Conditions of use, special equipment, protection, maintenance, and replacement of filters.

- .2 Methods of ensuring that heating medium will not be wasted and in the case of steam, agreement on what is to be done with the condensate.
- .3 Saving on contract price.
- .4 Provisions relating to guarantees on equipment.

**33. CONNECTIONS TO AND INTERRUPTIONS TO EXISTING SERVICES**

- .1 Where work involves breaking into or connecting to existing services, carry out work at times and in the manner agreed to by the Departmental Representative and by authorities having jurisdiction, with minimum disruption to NRC Personnel and vehicular traffic and minimum service interruption. Do not operate any NRC equipment or plant.
- .2 Before commencing work, establish location and extent of service lines in area of work and notify Departmental Representative of findings.
- .3 Submit a schedule to and obtain approval from the Departmental Representative for any shut-down or closure of active service or facility; allow minimum 72 hours notice. Adhere to approved schedule and provide notice to the Departmental Representative.
- .4 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .5 Provide detours, bridges, alternate feeds, etc., as required to minimize disruptions.
- .6 Protect existing services as required and immediately make repairs if damage occurs.
- .7 Remove any abandoned service lines as indicated on the contract documents and as approved by the Departmental Representative; cap or otherwise seal lines at cut-off points. Record and provide a copy to the Departmental Representative of locations of maintained, re-routed and abandoned service lines.

**34. CUTTING AND PATCHING**

- .1 Cut existing surfaces as required to accommodate new work.
- .2 Remove all items as shown or specified.
- .3 Patch and make good with identical materials, the surfaces that have been disturbed, cut or damaged, to the satisfaction of the Departmental Representative.
- .4 Where new pipes pass through existing construction, core drill an opening. Size openings to leave 12mm (1/2") clearance around the pipes or pipe insulation. Do not drill or cut any surface without the approval of the Departmental Representative.
- .5 Obtain written approval of the Departmental Representative before cutting openings through existing or new structural members.
- .6 Seal all openings where cables, conduits or pipes pass through walls with an acoustic sealant conforming to CAN/CGSB-19.21-M87.

- .7 Where cables, conduits and pipes pass through fire rated walls and floors, pack space between with compressed glass fibres and seal with fire stop caulking in accordance with CAN/CGSB-19.13-M87 AND NBC 3.1.7.

**35. FASTENING DEVICES**

- .1 Do not use explosive actuated tools, without first obtaining permission from the Departmental Representative.
- .2 Comply with the requirements of CSA A-166 (Safety Code for Explosive Actuated Tools).
- .3 Do not use any kind of impact or percussion tool without first obtaining permission from the Departmental Representative.

**36. OVERLOADING**

- .1 Ensure that no part of the building or work is subjected to a load which will endanger safety or cause permanent deformation or structural damage.

**37. DRAINAGE**

- .1 Provide temporary drainage and pumping as required to keep excavations and site free of water.

**38. ENCLOSURE OF STRUCTURES**

- .1 Construct and maintain all temporary enclosures as required to protect foundations, sub-soil, concrete, masonry, etc., from frost penetration or damage.
- .2 Maintain in place until all chances of damage are over and proper curing has taken place.
- .3 Provide temporary weather tight enclosures for exterior openings until permanent sash and glazing and exterior doors are installed.
- .4 Provide lockable enclosures as required to maintain the security of NRC facilities and be responsible for the same.
- .5 Provide keys to NRC security personnel when required.
- .6 Lay out the work carefully and accurately and verify all dimensions and be responsible for them. Locate and preserve general reference points.
- .7 Throughout the course of construction, keep continuously acquainted with field conditions, and the work being developed by all trades involved in the project. Maintain an awareness of responsibility to avoid space conflict with other trades.
- .8 Conceal all services, piping, wiring, ductwork, etc., in floors, walls or ceilings except where indicated otherwise.

**39. STORAGE**

- .1 Provide storage as required to protect all tools, materials, etc., from damage or theft and be responsible for the same.
- .2 Do not store flammable or explosive materials on site without the authorization of the Departmental Representative.

**40. GENERAL REVIEW**

- .1 Periodic review of the Contractor's work by the Departmental Representative does not relieve the Contractor of the responsibility of making the work in accordance with contract documents. Contractor shall carry out his own quality control to ensure that the construction work is in accordance with contract documents.
- .2 Inform the Departmental Representative of any impediments to the installation and obtain his / her approval for actual location.

**41. INSPECTION OF BURIED OR CONCEALED SERVICES**

- .1 Prior to concealing any services that are installed, ensure that all inspection bodies concerned, including NRC, have inspected the work and have witnessed all tests. Failure to do so may result in exposing the services again at the Contractor's expense.

**42. TESTING**

- .1 On completion, or as required by local authority inspectors and/or Departmental Representative during progress of work and before any services are covered up and flushing is complete, test all installations in the presence of the Departmental Representative.
- .2 Obtain and hand to the Departmental Representative all acceptance certificates or test reports from authority having jurisdiction. The project will be considered incomplete without the same.

**43. PARTIAL OCCUPANCY**

- .1 NRC may request partial occupancy of the facility if the contract extends beyond the expected completion date.
- .2 Do not restrict access to the building, routes, and services.
- .3 Do not encumber the site with materials or equipment.

**44. DISPOSAL OF WASTES**

- .1 Dispose of waste materials including volatiles, safely off NRC property. Refer to the section entitled "General and Fire Safety Requirements" included as part of this specification.

**45. CLEAN-UP DURING CONSTRUCTION**

- .1 On a daily basis, maintain project site and adjacent area of campus including roofs, free from debris and waste materials.
- .2 Provide on-site dump containers for collection of waste materials and rubbish.

**46. FINAL CLEAN-UP**

- .1 Upon completion do a final clean-up to the satisfaction of the Departmental Representative.
- .2 Clean all new surfaces, lights, existing surfaces affected by this work, replace filters, etc.
- .3 Clean all resilient flooring and prepare to receive protective finish. Protective finish applied by NRC.

**47. WARRANTY AND RECTIFICATION OF DEFECTS IN WORK**

- .1 Refer to General Conditions "C", section GC32.
- .2 Ensure that all manufacturers' guarantees and warranties are issued in the name of the **General Contractor** and the National Research Council.

**48. MAINTENANCE MANUALS**

- .1 Provide two (2) bilingual copies of maintenance manuals or two (2) English and two (2) French maintenance manuals and one (1) electronic copy of same immediately upon completion of the work and prior to release of holdbacks.
- .2 Manuals to be neatly bound in hard cover loose leaf binders.
- .3 Manuals to include operating and maintenance instructions, all guarantees and warranties, shop drawings, technical data, etc., for the material and apparatus supplied under this contract.

**END OF SECTION**



## 1. GENERAL CONSTRUCTION SAFETY REQUIREMENTS

- .1 The Contractor shall take all necessary steps to protect personnel (workers, visitors, general public, etc.) and property from any harm during the course of the contract.
- .2 The Contractor shall be solely responsible for the construction safety of both its employees and those of its sub-contractors at the work site, and for initiating, maintaining and supervising safety precautions, programs and procedures in connection with the performance of the work.
- .3 The Contractor shall comply with all Federal, Provincial and Municipal safety codes and regulations and the Occupational Health and Safety Act and the Workplace Safety and Insurance Board. In the event of any conflict between any provisions in legislation or codes, the most stringent provisions shall apply.
- .4 Periodic review of the Contractor's work by the Departmental Representative, using the criteria of the contract documents, does not relieve the Contractor of his safety responsibilities in carrying out the work in accordance with the contract documents. The Contractor shall consult with the Departmental Representative to ensure that this responsibility is carried out.
- .5 The Contractor shall ensure that only competent personnel are permitted to work on site. Throughout the term of the contract, any person will be removed from the site who is not observing or complying with the safety requirements.
- .6 All equipment shall be in safe operating condition and appropriate to the task.
- .7 Following a project and site hazard assessment, the Contractor shall develop a Site Specific Safety Plan based on the following minimum requirements. Site Specific Safety Plans must also be robust enough to address any abnormal occurrences, such as, but not limited to: pandemics (COVID-19 or a similar), fire, flooding, inclimate weather or other environmental anomalies.
  - .1 Provide a safety board mounted in a visible location on the project site, with the following information included thereon:
    - .1 Notice of Project.
    - .2 Site specific Safety Policy.
    - .3 Copy of Ontario Health and Safety Act.
    - .4 Building Schematic showing emergency exits.
    - .5 Building emergency procedures.
    - .6 Contact list for NRC, Contractor and all involved sub-contractors.
    - .7 Any related MSDS sheets.
    - .8 NRC Emergency phone number.
- .8 The Contractor shall provide competent personnel to implement its safety program and those of any Health and Safety Act legislation applicable at this project location, and to ensure they are being complied with.

- .9 The Contractor shall provide safety orientation to all its employees as well as those of any sub-contractors under its jurisdiction.
- .10 The Departmental Representative will monitor to ensure that safety requirements are met and that safety records are properly kept and maintained. Continued disregard for safety standards can cause the contract to be cancelled and the Contractor or sub-contractors removed from the site.
- .11 The Contractor will report to the Departmental Representative and jurisdictional authorities, any accident or incident involving Contractor or NRC personnel or the public and/or property arising from the Contractor's execution of the work.
- .12 If entry to a laboratory is required as part of the work of the Contractor, a safety orientation shall be provided to all his employees as well as those of any sub-contractors regarding lab safety requirements and procedures, as provided by the Researcher or the Departmental Representative.

## **2. FIRE SAFETY REQUIREMENTS**

### **.1 Authorities**

1. The Fire Commissioner of Canada (FC) is the authority for fire safety at NRC.
2. For the purpose of this document, "Departmental Representative" will be deemed as the NRC person in charge of the project and who will enforce these Fire Safety Requirements.
3. Comply with the following standards as published by the Office of the Fire Commissioner of Canada:
  - a. Standard No. 301 - June 1982 "Standard for Construction Operations";
  - b. Standard No. 302 - June 1982 "Standard for Welding and Cutting".

### **.2 Smoking**

- .1 Smoking is prohibited inside all NRC buildings, as well as roof areas.
- .2 Obey all "NO SMOKING" signs on NRC premises.

### **.3 Hot Work**

- .1 Prior to commencement of any "Hot Work" involving welding, soldering, burning, heating, use of torches or salamanders or any open flame, obtain a Hot Work Permit from the Departmental Representative.
- .2 Prior to commencement of "Hot Work", review the area of hot work with the Departmental Representative to determine the level of fire safety precautions to be taken.

**.4 Reporting Fires**

- .1 Know the exact location of the nearest Fire Alarm Pull Station and telephone, including the emergency phone number.
- .2 REPORT immediately, all fire incidents as follows:
  1. Activate nearest fire alarm pull station; and
  2. Telephone the following emergency phone number as appropriate:

**FROM AN NRC PHONE                      333**  
**FROM ANY OTHER PHONE              (613) 993-2411**

3. When reporting a fire by phone, give the location of fire, building number and be prepared to verify location.
4. The person activating fire alarm pull station must remain at a safe distance from the scene of the fire but readily available to provide information and direction to the Fire Department personnel.

**.5 Interior and Exterior Fire protection & Alarm Systems**

- .1 DO NOT OBSTRUCT OR SHUT OFF FIRE PROTECTION EQUIPMENT OR SYSTEMS, INCLUDING BUT NOT LIMITED TO FIRE ALARM SYSTEMS, SMOKE/HEAT DETECTORS, SPRINKLER SYSTEM, PULL STATIONS, EMERGENCY CALL BUTTONS AND PA SYSTEMS, WITHOUT AUTHORIZATION FROM THE DEPARTMENTAL REPRESENTATIVE.
- .2 WHEN ANY FIRE PROTECTION EQUIPMENT IS TEMPORARILY SHUT DOWN, ALTERNATIVE MEASURES AS PRESCRIBED BY THE DEPARTMENTAL REPRESENTATIVE SHALL BE TAKEN TO ENSURE THAT FIRE PROTECTION IS MAINTAINED.
- .3 DO NOT LEAVE FIRE PROTECTION OR ALARM SYSTEMS INACTIVE AT THE END OF A WORKING DAY WITHOUT NOTIFICATION AND AUTHORISATION FROM THE DEPARTMENTAL REPRESENTATIVE. THE DEPARTMENTAL REPRESENTATIVE WILL ADVISE THE (FPO) OF THE DETAILS OF ANY SUCH EVENT.
- .4 DO NOT USE FIRE HYDRANTS, STANDPIPES AND HOSE SYSTEMS FOR OTHER THAN FIRE FIGHTING PURPOSES UNLESS AUTHORISED BY DEPARTMENTAL REPRESENTATIVE.

**.6 Fire Extinguishers**

- .1 Provide a minimum of 1-20 lb. ABC Dry Chemical Fire Extinguisher at each hot work or open flame location.
- .2 Provide fire extinguishers for hot asphalt and roofing operations as follows:
  1. Kettle area - 1-20 lb. ABC Dry Chemical; and
  2. Roof - 1-20 lb. ABC Dry Chemical at each open flame location.

- .3 Provide fire extinguishers equipped as below:
  1. Pinned and sealed;
  2. With a pressure gauge; and
  3. With an extinguisher tag signed by a fire extinguisher servicing company.
- .4 Carbon Dioxide (CO<sub>2</sub>) extinguishers will not be considered as substitutes for the above.

## **.7 Roofing Operations**

- .1 Kettles:
  - .1 Arrange for the location of asphalt kettles and material storage with the Departmental Representative before moving on site. Do not locate kettles on any roof or structure and keep them at least 10m (30 feet) away from a building.
  - .2 Equip kettles with two (2) thermometers or gauges in good working order; a hand held and a kettle-mounted model.
  - .3 Do not operate kettles at temperatures in excess of 232°C (450°F).
  - .4 Maintain continuous supervision while kettles are in operation and provide metal covers for the kettles to smother any flames in case of fire. Provide fire extinguishers as required in article 2.6.
  - .5 Demonstrate container capacities to Departmental Representative prior to start of work.
  - .6 Store materials a minimum of 6m (20 feet) from the kettle.
- .2 Mops:
  - .1 Use only glass fibre roofing mops.
  - .2 Remove used mops from the roof site at the end of each working day.
- .3 Torch Applied Systems:
  - .1 DO NOT USE TORCHES NEXT TO WALLS.
  - .2 DO NOT TORCH MEMBRANES TO EXPOSED WOOD OR CAVITY.
  - .3 Provide a Fire Watch as required by article 2.9 of this section.
- .4 Store all combustible roofing materials at least 3m (10 feet) away from any structure.
- .5 Keep compressed gas cylinders a minimum of 6m (20 feet) away from the kettle, protected from mechanical damage and secured in an upright position.

## **.8 Welding / Grinding Operations**

- .1 Contractor to provide fire blankets, portable fume extraction devices, screens or similar equipment to prevent exposure to welding flash, or sparks from grinding.

## **.9 Fire Watch**

- .1 Provide a fire watch for a minimum of one hour after the termination of any hot work operation.
- .2 For temporary heating, refer to General Instructions Section 00 010 00.
- .3 Equip fire watch personnel with fire extinguishers as required by article 2.6.

**.10 Obstruction of access/egress routes-roadways, halls, doors, or elevators**

- .1 Advise the Departmental Representative in advance of any work that would impede the response of Fire Department personnel and their apparatus. This includes violation of minimum overhead clearance, erection of barricades and the digging of trenches.
- .2 Building exit routes must not be obstructed in any way without special permission from the Departmental Representative, who will ensure that adequate alternative routes are maintained.
- .3 The Departmental Representative will advise the FPO of any obstruction that may warrant advanced planning and communication to ensure the safety of building occupants and the effectiveness of the Fire Department.

**.11 Rubbish and Waste Materials**

- .1 Keep rubbish and waste materials to a minimum and a minimum distance of 6m (20 feet) from any kettle or torches.
- .2 Do not burn rubbish on site.
- .3 Rubbish Containers:
  - .1 Consult with the Departmental Representative to determine an acceptable safe location for any containers and the arrangement of chutes etc. prior to bringing the containers on site.
  - .2 Do not overfill the containers and keep area around the perimeter free and clear of any debris.
- .4 Storage:
  - .1 Exercise extreme care when storing combustible waste materials in work areas. Ensure maximum possible cleanliness, ventilation and that all safety standards are adhered to when storing any combustible materials.
  - .2 Deposit greasy or oily rags or materials subject to spontaneous combustion in CSA or ULC approved receptacles and remove at the end of the work day or shift, or as directed.

**.12 Flammable Liquids**

- .1 The handling, storage and use of flammable liquids is governed by the current National Fire Code of Canada.
- .2 Flammable Liquids such as gasoline, kerosene and naphtha may be kept for ready use in quantities not exceeding 45 litres (10 imp gal), provided they are stored in approved safety cans bearing the ULC seal of approval and kept away from buildings, stockpiled combustible materials etc. Storage of quantities of flammable liquids exceeding 45 litres (10 imp gal) for work purposes, require the permission of the Departmental Representative.
- .3 Flammable liquids are not to be left on any roof areas after normal working hours.
- .4 Transfer of flammable liquids is prohibited within buildings.
- .5 Do not transfer flammable liquids in the vicinity of open flames or any type of heat producing device.
- .6 Do not use flammable liquids having a flash point below 38°C (100°F) such as naphtha or gasoline as solvents or cleaning agents.
- .7 Store flammable waste liquids for disposal in approved container located in a safe, ventilated area. Waste flammable liquids are to be removed from the site on a regular basis.
- .8 Where flammable liquids, such as lacquers or urethane are used, ensure proper ventilation and eliminate all sources of ignition. Inform the Departmental Representative prior to, and at the cessation of such work.

**3. QUESTIONS OR CLARIFICATIONS**

- .1 Direct any questions or clarification on Fire or General Safety, in addition to the above requirements, to the Departmental Representative.

**END OF SECTION**

**Part 1 GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 011000 - General Instructions Ontario

**1.2 ADMINISTRATIVE**

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

**1.3 SHOP DRAWINGS AND PRODUCT DATA**

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.

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- .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 week 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 in writing of revisions other than those requested.
  - .7 Accompany submissions with transmittal letter, containing:
    - .1 Date.
    - .2 Project title and number.
    - .3 Contractor's name and address.
    - .4 Identification and quantity of each shop drawing, product data and sample.
    - .5 Other pertinent data.
  - .8 Submissions include:
    - .1 Date and revision dates.
    - .2 Project title and number.
    - .3 Name and address of:
      - .1 Subcontractor.
      - .2 Supplier.
      - .3 Manufacturer.
    - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
    - .5 Details of appropriate portions of Work as applicable:
      - .1 Fabrication.
      - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
      - .3 Setting or erection details.
      - .4 Capacities.
      - .5 Performance characteristics.
      - .6 Standards.
      - .7 Operating weight.
      - .8 Wiring diagrams.
      - .9 Single line and schematic diagrams.
      - .10 Relationship to adjacent work.



- .9 After Departmental Representative's review, distribute copies.
- .10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
  - .2 Testing must have been within [3] years of date of contract award for project.
- .13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
  - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit electronic copies of manufacturer's 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.
- .15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Submit electronic copies 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.
- .20 The review of shop drawings by National Research Council Canada (NRC) is for sole purpose of ascertaining conformance with general concept.

- .1 This review shall not mean that NRC 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.

#### **1.4 SAMPLES**

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

#### **1.5 MOCK-UPS**

- .1 Construct field mock-ups at locations acceptable to Departmental Representative.
- .2 Reviewed mock-ups will become standards of workmanship and material against which installed work will be checked on the project.

**END OF SECTION**

**Part 1 GENERAL**

**1.1 Protection**

- .1 Protect existing items designated to remain and materials designated for salvage. In event of damage, immediately replace such items or make repairs to approval of Departmental Representative and at no additional cost to Departmental Representative.

**Part 2 PRODUCTS**

**2.1 N/A**

**Part 3 EXECUTION**

**3.1 Preparation**

- .1 Inspect site and verify with Departmental Representative items designated for removal and items to be preserved.
- .2 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.

**3.2 Removal**

- .1 Remove items indicated.
- .2 Do not disturb adjacent items designated to remain in place.

**3.3 Salvage**

- .1 Carefully dismantle items containing materials directed or indicated for salvage. Store salvaged materials at locations directed or indicated.

**3.4 Disposal of Material**

- .1 Dispose of materials not designated for salvage or re-use in work, off-site.

**3.5 Restoration**

- .1 Upon completion of work, remove debris, trim surfaces and leave work site clean.

- .2 Reinstatement areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.

**END OF SECTION**

**Part 1            GENERAL**

**1.1                Scope of Work**

- .1    Provide interior protection prior to demolition work.
- .2    Protection to be constructed in such a fashion so as to afford security, dust and weather resistance.
- .3    Barriers to be constructed continuously on the interior perimeter.

**Part 2            PRODUCTS**

**2.1                Materials**

- .1    12mm x 1220mm x 2440mm wood sheathing.
- .2    92mm metal studding.
- .3    38x89mm spruce wood, construction grade studding.
- .4    6 mil. polyethylene.
- .5    Vinyl reinforced tarps.
- .6    Zipper closure, heavy duty, 75mm, self-adhesive zipper.

**2.2                Erection**

- .1    Construct a solid barrier in all locations where window, modifications are to occur.
- .2    Construct barriers full height and line with polyethylene to ensure dust and water tightness.
- .3    Have a mock-up assembly approved by the Departmental Representative prior to proceeding with the erection.

**Part 3            SECONDARY PROTECTION**

**3.1                Dust Walls**

- .1    As the work progresses and after all structural work and wall framing have been completed, remove the temporary interior protection walls and construct a 6 mill polyethylene dust wall in its place, to allow finish work to proceed.

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- .2 Install wood sheathing in the new window openings temporarily until the new glazing units have been received.
  - .3 Inspect walls on a regular basis to ensure integrity of the assembly and to avoid dust and water infiltration to the interior of the building.
  - .4 Remove interior protections only when approved by the Departmental Representative.

**Part 4 REINSTATEMENTS**

**4.1 Finishes**

- .1 Reinstall the interior finishes affected by this work to the satisfaction of the Departmental Representative.

**END OF SECTION**

**Part 1            GENERAL**

**1.1                Source Quality Control**

- .1        Identify lumber and plywood by grade stamp of an agency certified by Canadian Lumber Standards Administration Board and in accordance with applicable CSA standards.

**1.2                PRODUCTS**

**1.3                Lumber Material**

- .1        Except as indicated or specified otherwise lumber shall be softwood, S4S, moisture content (MC) not greater than 19% at time of installation, in accordance with following standards:
  - .2        CSA O141-91.
  - .3        NLGA Standard Grading Rules for Canadian Lumber.
  - .4        Furring, blocking, nailing strips, grounds, rough bucks:
  - .5        Use S2S or S4S material.
  - .6        Board sizes: C or D species, utility grade.
  - .7        Dimension sizes: C or D species, utility grade.
  - .8        Plywood, exterior quality, GIS to CSA O121-M1978.

**1.4                Fastenings & Hardware**

- .1        In accordance with Part 9 of NBC 1977 as supplemented by following requirement except where specific type is indicated.
- .2        Nails, spikes and staples to NBC 9.23.3 except:
- .3        Use common spiral nails and spiral spikes except where indicated otherwise.
- .4        Use hot galvanized finish steel for exterior work, interior high humidity areas and for pressure treated lumber except where indicated otherwise.
- .5        Bolt, nut, washer, screw and pin type fasteners: with hot-dip galvanized finish to CSA G164-M92 for exterior work, interior high humidity areas and for pressure treated lumber.

- .6 Use surface fastenings of following types, except where specific type is indicated.
  - .1 To hollow masonry, plaster and panel surfaces use toggle bolt.
  - .2 To solid masonry and concrete use expansion shield with lag screw, jute fibre or lead plug with wood screw.
  - .3 To structural steel use bolts through drilled hole, or welded stud-bolts or power driven self-drilling screws.
  - .4 Submit alternate fasteners for Engineer's approval.

## **Part 2 EXECUTION**

### **2.1 Furring & Blocking**

- .1 Install furring and blocking as required to space-out and support surface applied materials or other work as indicated.
- .2 Align and plumb faces of furring and blocking to tolerance of 1:600.

### **2.2 Nailers**

- .1 Install wood nailers as indicated.
- .2 Except where indicated otherwise use material at least 40 mm (1-1/2") thick secured with 10 mm (3/8") bolts located within 300 mm (1 ft.) from ends of members and uniformly spaced at 1200 mm (4 ft.) between.
- .3 Countersink bolts where necessary to provide clearance for other work.

**END OF SECTION**



**Part 1            General**

**1.1                RELATED SECTIONS**

- .1            Section 07 90 00 – Sealant.

**1.2                REFERENCES**

- .1            American National Standards Institute (ANSI)
  - .1            ANSI A208.1-2009, Particleboard.
- .2            Architectural Woodwork Institute (AWI) and Architectural Woodwork Manufacturers Association of Canada (AWMAC).
  - .1            Architectural Woodwork Standards 2016 edition.
- .3            Canadian Standards Association (CSA)
  - .1            CSA O112.5-Series-M-1977(2016), Urea Resin Adhesives for Wood (Room- and High-Temperature Curing).
  - .2            CSA O151-M09, Canadian Softwood Plywood.
  - .3            CSA O153-M1980 (R2008), Poplar Plywood
- .4            National Lumber Grades Authority (NLGA)
  - .1            Standard Grading Rules for Canadian Lumber 2010.

**1.3                QUALITY ASSURANCE**

- .1            Work of this section shall be performed by a custom wood casework fabricator with a minimum of 5 years of documented and acceptable experience in the fabrication and installation of institutional casework.
- .2            The Consultant may visit the fabrication plant at various stages in the fabrication process to review of the materials, quality and progress of the Work of this section and to ensure that casework is being fabricated in accordance with the specifications.
- .3            Coordinate visits to fabrication plant with Consultant to review fabrication of mockup, and fabrication of casework to be installed.

**1.4                SHOP DRAWINGS**

- .1            Submit shop drawings in accordance with submittal procedures of Section 013300 - Submittal Procedures.
- .2            Include complete dimensioned plans and elevations
- .3            Indicate details of construction, profiles, jointing, fastening and other related details.
  - .1            Scales: profiles full size, details 1/2 full size.
- .4            Indicate materials, thicknesses, finishes and hardware.

- .5 Indicate locations of service outlets in casework, typical and special installation conditions, and all connections, attachments, anchorage and location of exposed fastenings.
  - .1 Indicate locations of joints in countertops.
- .6 Indicate governing dimensions to be established before fabricating items which are to accommodate or abut appliances, equipment and other materials.
- .7 Coordinate openings in casework with dimensions of built in equipment and systems.
  - .1 Show built-in equipment and systems of other trades and Owner supplied items in casework shop drawings.
  - .2 Obtain coordination information from affected trades and Other Contractors.
- .8 Indicate critical field dimensions verified and established by field measurement.
  - .1 No extra payment will be made by the Owner for Contractor's failure to verify and coordinate millwork fabrication with field dimensions of existing construction and new Work.
- .9 Do not commence fabrication of casework until all shop drawings, samples and other submittals have been reviewed and accepted by the Consultant.

## **1.5 SAMPLES**

- .1 Submit samples in accordance with submittal procedures of Section 013300 - Submittal Procedures.
- .2 Submit duplicate samples of each material proposed for use in fabrication of cabinets, including hardware, veneers, cores, trim, finishes, accessories: sample size 300 mm x 300 mm or 300 mm long unless specified otherwise, except manufacturer's standard samples.
- .3 Submit duplicate colour samples of laminated plastic for colour selection.
- .4 Submit duplicate samples of laminated plastic joints, edging, cutouts and postformed profiles.
- .5 Provide complete product information for all products specified, details of finishing procedures and materials, including finish manufacturer's name and complete product information, certification to specified standards and grades.

## **1.6 JOB CONDITIONS**

- .1 Where units are required to be fitted neatly into finished walls or openings, fabrication from drawing information shall be supplemented with actual job site conditions and measurements.
- .2 Examine the drawings, specifications and the site to ascertain fabrication and installation procedures so that the Work may be completed with a minimum of job site cutting and fitting.

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**1.7 DELIVERY, STORAGE, AND HANDLING**

- .1 Cover finished surfaces with heavy kraft paper or put in cartons during shipment. Protect installed surfaces by approved means. Do not remove protection until immediately before final inspection.
- .2 Protect casework against dampness and damage during and after delivery.
- .3 Store casework in ventilated areas, protected from extreme changes of temperature or humidity.
- .4 All units or components that are cracked, bent, chipped, scratched or otherwise unsuitable for installation shall be replaced by the Contractor with new units or components at no additional cost to the Owner.

**1.8 WARRANTY**

- .1 Contractor hereby warrants that custom wood casework has been fabricated and installed as specified, in accordance with the General Conditions of the Contract Documents, but for two years.
- .2 Warranty shall cover replacing and re-finishing to make good any defects caused by faulty workmanship or defective materials.

**Part 2 Products**

**2.1 LUMBER MATERIALS**

- .1 Softwood lumber: unless specified otherwise, S4S, moisture content range 5-9%, with average 7% or less in accordance with following standards:
  - .1 CAN/CSA-O141.
  - .2 NLGA Standard Grading Rules for Canadian Lumber.
  - .3 AWMAC Custom grade, moisture content as specified.
- .2 Machine stress-rated lumber is acceptable for all purposes.
- .3 Hardwood lumber in accordance with following standards:
  - .1 Maple, birch or cherry species as indicated, Selects and Better, in accordance with National Hardwood Lumber Association (NHLA), and requirements of AWMAC Custom grade specifications;
  - .2 S4S unless specified otherwise, moisture content range 5-9%, with average 7% or less;
  - .3 National Hardwood Lumber Association (NHLA);
  - .4 AWI/AWMAC custom grade.

**2.2 PLASTIC LAMINATE**

- .1 Consultant will select plastic laminates from the full range of colour and pattern manufactured by the following manufacturers:
  - .1 Nevamar.

- .2 Formica.
- .3 Arborite.
- .4 WillsonArt.
- .5 Provide plastic laminate in colour, pattern and finish selected by NRC Departmental Representative from manufacturer's complete range.
- .6 Allow for one colour scheme, with each scheme including four (4) colours.
- .2 Plastic laminate for exposed and semi-exposed horizontal flatwork: to NEMA LD3 Grade HGS, 1.2 mm thick.
- .3 Plastic laminate for exposed and semi-exposed vertical flatwork: to NEMA LD3 Grade VGS, 0.7 mm thick.
- .4 Laminated plastic for postforming countertop work: to NEMA LD3 Grade HGP, 1 mm thick.
- .5 Laminated plastic backing sheet: to NEMA LD3 BKL grade, supplied by same manufacturer as facing sheet; white, 0.5 mm thick.
- .6 Adhesives:
  - .1 For shop lamination: urea resin adhesive to CSA 0112.5-M1977.
  - .2 Test for acceptable VOC emissions in accordance with ASTM D2369 and ASTM D2832.
    - .1 Acceptable materials: ECP-44.
- .7 Sealer: Water-resistant sealer or glue acceptable to laminate manufacturer.
- .8 Low Pressure Decorative Laminate (LPDL): thermofused melamine to AWMAC/AWI requirements.
  - .1 High wear resistant thermofused melamine: equal or exceed 400 cycles (Minimum standard for HPL abrasion test).
  - .2 Provide balancing sheet.

## **2.3 FASTENERS**

- .1 Nails and staples: to CSA B111.
- .2 Wood screws: chromium plated steel, type and size to suit application and substrate.
- .3 Splines: as per fabricator recommendation.

## **2.4 SEALANT**

- .1 Sealant: Silicone sanitary sealant in accordance with Section 07 92 00.
  - .1 Casework and countertop perimeter: clear colour.
  - .2 Edges of cutouts: white.

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**2.5 CASEWORK FABRICATION - COUNTERTOP**

- .1 For purposes of applied finishes, the exposed, semi-exposed and concealed surfaces and edges in the final assembly shall be as defined in the specified AWMAC/AWI standard, except where specified otherwise.
- .2 Apply balancing finish to concealed surfaces including underside of countertops.

**2.6 EDGE TREATMENT**

- .1 Apply 3 mm PVC edge banding minimum thick to the following edge surfaces:
  - .1 exposed edges of gables;
  - .2 edges of plastic laminate countertops.
- .2 Prepare edges and apply PVC edge banding in accordance with manufacturer's instructions.

**2.7 CASEWORK FABRICATION**

- .1 Set nails and countersink screws apply plain wood filler to indentations, sand smooth and leave ready to receive finish.
- .2 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.
- .3 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.
- .4 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.
- .5 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .6 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 3000mm. Keep joints 600 mm from sink cutouts.

**2.8 PLASTIC LAMINATE FABRICATION**

- .1 Comply with CAN3-A172-M79, Appendix 'A' regarding pre-conditioning, fabricating and installing decorative laminate work.
- .2 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .3 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths to longest possible continuous sheet length.
- .4 Form shaped profiles and bends as indicated, using postforming grade laminate installed in accordance with laminate manufacturer's instructions.
- .5 Offset joints in plastic laminate facing from joints in core.

- .6 Adhere laminated plastic over entire surface. Make corners with hairline joints. Use full sized laminate sheets. Make joints only where approved. Slightly bevel arrises.
- .7 Fill and seal joints in horizontal surfaces to match adjacent plastic laminate.
- .8 Provide plastic laminate liner sheet on concealed side of unrestrained assemblies, including panelling.

### **Part 3 Execution**

#### **3.1 INSTALLATION**

- .1 Do architectural woodwork installation to AWI/AWMAC Architectural Woodwork Quality Standards custom grade, except where specified otherwise.
- .2 Install prefinished millwork at locations shown on drawings. Position accurately, level, plumb straight.
- .3 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.
- .4 Make allowances around perimeter where fixed objects pass through or project into laminated plastic casework to permit normal movement without restriction.
- .5 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant.
- .6 Apply water resistant building paper over wood framing members in contact with masonry or cementitious construction.
- .7 Fit hardware accurately and securely in accordance with manufacturer's written instructions.

#### **3.2 SEALER FOR CUTOUTS**

- .1 Where plumbing fixtures are installed in countertops, provide gasket or sealant between rims or bases of sinks and other fixtures to prevent water penetration between fixture and plastic laminate countertops.
- .2 Apply white silicone sealer to edges of all cutouts in countertops containing plumbing. Sealer shall effectively seal the applied laminates and the core against water penetration.

#### **3.3 CLEANING AND TOUCHUP**

- .1 Clean cabinet work, inside cupboards and drawers and outside surfaces.
- .2 Clean casework of soil marks, dust, fingerprints and other surface disfigurements.
- .3 Touch up wood finishes in accordance with finish manufacturer's instructions.

- 
- .4 Fill, finish and touch-up nail and screw holes resulting from installation or field assembly, to match adjacent finish.
  - .5 Refinish and touch-up surfaces and edges scratched, abraded, dented, marred or otherwise damaged as a result of delivery, storage, handling or installation.
  - .6 Clean all exposed and semi-exposed surfaces prior to final examination.
  - .7 Touch up wood finishes in accordance with finish manufacturer's instructions
  - .8 Replace items of casework, hardware or solid wood which are scratched, dented or otherwise damaged, to conform to specification.
  - .9 Remove excess glue from surfaces.

### **3.4 PROTECTION**

- .1 Protect cabinet work from damage until final inspection.

**END OF SECTION**

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**Part 1            GENERAL    N/A**

**Part 2            PRODUCTS**

**2.1                Insulation**

- .1        Sound batt insulation: fabricated from friction fit batts, mineral fibre, 76 mm (3") and 63mm (2 ½") thickness (thickness to fill stud cavity).
- .2        Acoustical fire batt insulation: fabricated from friction fit batts, mineral fibre, (thickness to fill stud cavity).

**Part 3            EXECUTION**

**3.1                Workmanship**

- .1        Install insulation after building substrate materials are dry.
- .2        Install insulation to maintain continuity of acoustic insulation in wall construction.
- .3        Install insulation on top of ceiling installation at partitions as noted on drawings.
- .4        Fit insulation closely around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
- .5        Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .6        Offset both vertical and horizontal joints in multiple layer applications.
- .7        Do not enclose insulation until it has been inspected and approved by Departmental Representative.

**END OF SECTION**



**Part 1 GENERAL**

**1.1 RELATED REQUIREMENTS**

- .1 Division 22 – Plumbing.
- .2 Division 23 – Heating, Ventilating and Air Conditioning.
- .3 Division 26 – Electrical.

**1.2 REFERENCES**

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .2 Underwriter's Laboratories of Canada (ULC)
  - .1 ULC-S115-1995, Fire Tests of Fire stop Systems.

**1.3 DEFINITIONS**

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

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 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.
- .2 Shop Drawings:
  - .1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.
  - .2 Construction details should accurately reflect actual job conditions.
- .3 Quality assurance submittals:
  - .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.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

## **1.5 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Installer: company specializing in fire stopping installations, with 5 years experience, approved by manufacturer.
- .2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Departmental Representative.
- .3 Verify project requirements.
- .4 Review installation and substrate conditions.
- .5 Co-ordination with other building subtrades.
- .6 Review manufacturer's installation instructions and warranty requirements.
- .7 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 Twice during progress of Work at 25% and 60% complete.
  - .3 Upon completion of Work, after cleaning is carried out.

## **1.6 DELIVERY, STORAGE AND HANDLING**

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

## **Part 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
- .2 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.
- .3 Fire stop system rating: 2 hours.
- .4 Service penetration assemblies: systems tested to CAN-ULC-S115.
- .5 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
- .6 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .7 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .8 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .9 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .10 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .11 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.
- .12 Sealants for vertical joints: non-sagging.

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**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.
- .2 Ensure that substrates and surfaces are clean, dry and frost free.
- .3 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .4 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .5 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.
- .4 Mechanical pipe insulation: certified fire stop system component.
  - .1 Ensure pipe insulation installation precedes fire stopping.

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

### **3.7 SCHEDULE**

Fire stop and smoke seal at:

- .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
- .2 Edge of floor slabs at curtain wall and precast concrete panels.
- .3 Top of fire-resistance rated masonry and gypsum board partitions.
- .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
- .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.

- .7 Openings and sleeves installed for future use through fire separations.
- .8 Around mechanical and electrical assemblies penetrating fire separations.
- .9 Rigid ducts: greater than 129 cm<sup>2</sup>: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

**END OF SECTION**

**Part 1            GENERAL**

- .1     One manufacturer's product only to be used throughout.
- .2     Sealant must be approved by Departmental Representative as acceptable product.
- .3     Colours of all sealants to be selected by the Departmental Representative prior to proceeding.

**Part 2            PRODUCTS**

**2.1            Materials**

- .1     Type 1-Multi-purpose sealant: Acrylic latex one part: to CAN/CGSB-19.17., approved by Departmental Representative.
- .2     Type 2-Acoustic sealant: Synthetic Rubber Sealant, "Tremco Acoustical Sealant" or equivalent approved by Departmental Representative.
- .3     Type 3-Single Component Silicone: "Tremco Spectrum 1" or equivalent approved by Departmental Representative.
- .4     Preformed compressible and non-compressible back-up materials:
  - .1     Polyethylene, urethane, neoprene or vinyl foam:
    - .1     Extruded: closed cell foam backer rod.
    - .2     Size: oversize to 30%.
  - .2     Bond breaker tape:
    - .1     Polyethylene bond breaker tape that does not bond to sealant.
- .5     Primers: sealant manufacturer's type.
- .6     Cleaners: as recommended by sealant manufacturers.
- .7     Sealant Colour: to Departmental Representatives selection from standard colour range.

**2.2            Sealant Selection**

- .1     Type-1; Perimeters of interior door frames.
- .2     Type-2; At base along bottom track of partitions.
- .3     Type-3; Perimeter of built-in architectural woodwork.
- .4     Type-3; Junction of plastic laminate kick plate, casework gables and flooring.

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**Part 3 EXECUTION**

**3.1 Preparation**

- .1 Ensure all materials which will bear sealant on their surfaces are clean and free from foreign material which would affect bonding.
- .2 Permit concrete and mortar to cure fully before sealing.
- .3 Prime joint sides in accordance with manufacturer's directions.
- .4 Mask adjacent surfaces to prevent contamination by sealant. Remove mask immediately after joints completed.
- .5 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .6 Ensure joint surfaces are dry and frost free.

**3.2 Backup Material**

- .1 Apply bond breaker tape where required to manufacturer's instructions.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30%

**3.3 Application**

- .1 Sealant:
  - .1 Apply sealant in accordance with manufacturer's written instructions.
  - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
  - .3 Apply sealant in continuous beads.
  - .4 Apply sealant using gun with proper size nozzle.
  - .5 Use sufficient pressure to fill voids and joints solid.
  - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
  - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
  - .8 Remove excess compound promptly as work progresses and upon completion.
- .2 Curing:
  - .1 Cure sealants in accordance with sealant manufacturer's instructions.
  - .2 Do not cover up sealants until proper curing has taken place.

**3.4 Cleaning**

- .1 Leave Work area clean at end of each day.
  - .1 Clean adjacent surfaces immediately.



- .2 Remove excess and droppings, using recommended cleaners as work progresses.
- .3 Remove masking tape after initial set of sealant.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 07 92 10 Joint Sealing: Caulking of joints between frames and other building components.
- .2 Section 08 71 00 Finish Hardware: Supply of finish hardware, including sound-stripping and mounting heights.
- .3 Section 09 22 16 Non-Structural Metal Framing: Building frames into steel stud walls
- .4 Section 09 91 00 Painting: Paint systems for interior hollow metal doors and frames.

**1.2 REFERENCES**

- .1 American Society for Testing and Materials (ASTM International)
  - .1 ASTM A924M-14 Standard Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process.
  - .2 ASTM A653/A653M-13 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .3 ASTM B29-03(2009) Standard Specification for Refined Lead.
  - .4 ASTM B749-03(2009) Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.
- .2 Canadian Standards Association (CSA International)
  - .1 G40.20-13/G40.21-13 General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.
  - .2 CSA W5913 Welded Steel Construction (Metal Arc Welding) (Metric Version).
- .3 Canadian Steel Door Manufacturers' Association, (CSDMA).
  - .1 CSDMA Specifications for Commercial Steel Doors and Frames 2009.
  - .2 CSDMA Fire Labelling Guide 2009
  - .3 CSDMA Guide Specification for Installation and Storage of Hollow Metal Doors and Frames
- .4 National Fire Protection Association (NFPA)
  - .1 NFPA 80-2013, Standard for Fire Doors and Other Opening Protectives
- .5 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN4-S104-M80(R1985), Fire Tests of Door Assemblies.
  - .2 CAN4-S105-M85(R1992), Fire Door Frames Meeting the Performance Required by CAN4-S104.
- .6 CAN/ULC-S702-09, Thermal Insulation, Mineral Fibre, for Buildings.

### **1.3 DEFINITIONS**

- .1 Opening sizes shall be defined as follows:
  - .1 Width: Widths of openings shall be measured from inside to inside of frame jamb rabbets. (Referred to as "frame rabbet width" or "nominal door width")
  - .2 Height: Heights of openings shall be measured from the finished floor (exclusive of floor coverings) to the head rabbet of the frame. (Referred to as "frame rabbet height" or "nominal door height")
  - .3 Door Sizes: Doors shall be sized so as to fit the above openings and allow a 3 mm (0.125") nominal clearance at jambs and head of frame. A clearance of 19 mm (0.75") maximum shall be allowed between the bottom of the door and the finished floor (exclusive of floor coverings).
  - .4 Tolerances: Doors and frame product shall be manufactured and installed in accordance with the CSDMA's, "Recommended Dimensional Standards for Commercial Steel Doors and Frames".

### **1.4 SHOP DRAWINGS**

- .1 Submit shop drawings in accordance with submittal procedures of Section 01 00 10.
- .2 Indicate each type of door, frame, including CSDMA classification, steel type, fire rating, construction type, finishes and core.
- .3 Indicate material thicknesses, mortises, reinforcements, location of exposed fasteners, openings (glazed, paneled or louvred), arrangement of hardware.
- .4 Indicate each type frame material, CSDMA duty grade classification, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing firerating finishes.
- .5 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.
- .6 Submit test and NRC Departmental Representativeing data and installation instructions for radiation shielding doors:

### **1.5 SAMPLES**

- .1 Submit samples in accordance with submittal procedures of Section 01 00 10.

### **1.6 FIRE PROTECTION REQUIREMENTS**

- .1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104M for ratings specified or indicated.
- .2 Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled. Test products in strict conformance with CAN4-S104 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

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**1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Handle and store doors in accordance with CSDMA Guide Specification.
- .2 Inspect materials upon receipt and report all discrepancies, deficiencies and damages in writing to the supplier.
- .3 Note all damages incurred during shipping on carrier's Bill of Lading.
- .4 Store frame materials on planks, protected from weather and damage.
- .5 Remove doors from wrappings or coverings upon delivery and store in vertical position, spaced with blocking to permit air circulation between doors.

**1.8 WARRANTY**

- .1 Provide warranty on materials and workmanship in accordance with the General Conditions of the Contract.
  - .1 Materials warranty form shall be Canadian Steel Door and Frame Manufacturer's Standard Warranty for Steel Doors and Frames.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Steel sheet: Commercial grade steel to ASTM A653 CS, Type B, and ASTM A924, hot-dip galvanized, wipe coated, known commercially as "Colourbond", "Satincoat", or "Galvaneal".
  - .1 Provide steel sheet thickness for component parts as specified or, in the absence of specification, in accordance with table 1 of CSDFMA specifications for heavy duty doors and medium duty frames.
  - .2 Coating weight for interior doors and frames: ZF75.
- .2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to match door.

**2.2 DOOR CORE MATERIALS**

- .1 Fiberglass: Loose batt type, density 24 kg/m<sup>3</sup> minimum, conforming to CAN/ULC-S702.

**2.3 ADHESIVES**

- .1 Steel components: heat resistant, spray grade, epoxy resin based, low viscosity, contact cement.
- .2 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

**2.4 PRIMER**

- .1 Touch-up prime CAN/CGSB-1.181.

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**2.5 PAINT**

- .1 Touch up damaged galvanizing with rust-inhibitive primer.
- .2 Field paint steel doors and frames in accordance with Section 09 91 00 Painting.
  - .1 Protect sound strips from paint.
  - .2 Provide final finish free of scratches or other blemishes.

**2.6 ACCESSORIES**

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Metallic paste filler: to manufacturer's standard.
- .3 Fire labels: metal riveted.
- .4 Sealant: in accordance with Section 07 92 10.

**2.7 FRAME FABRICATION GENERAL**

- .1 Fabricate frames in accordance with CSDMA specifications for heavy duty grade.
- .2 Provide all frames assembled and welded construction. Slip-on frames only allowed at existing openings to receive new frames.
- .3 Fabricate frames to profiles and maximum face sizes as indicated.
- .4 Interior frames: welded for new partitions, slip-on type construction for existing partitions.
  - .1 Medium duty: 1.6 mm thickness.
- .5 Blank, reinforce, drill and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .6 Protect mortised cutouts with steel guard boxes.
- .7 Prepare frame for door silencers, 3 for single door, 2 at head for double door.
- .8 Manufacturer's nameplates on frames and screens are not permitted.
- .9 Conceal fastenings except where exposed fastenings are indicated.
- .10 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

**2.8 FRAME ANCHORAGE**

- .1 Provide appropriate anchorage to floor and wall construction.
- .2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.

- .3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.
- .4 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jamb and intermediate at 660 mm o.c. maximum.

## **2.9 FRAMES: WELDED TYPE**

- .1 Welding in accordance with CSA W59.
- .2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
- .3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.
- .4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
- .5 Securely attach floor anchors to inside of each jamb profile.
- .6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

## **2.10 DOOR FABRICATION TYPES**

- .1 Doors: swing type, flush, 45 mm thick, with provision for glass and/or louvre openings as indicated.
- .2 Interior door construction shall be laminated insulated core construction.
- .3 Provide all interior hollow steel doors as medium-duty doors fabricated in accordance with CSDFMA Recommended Selection and Usage Guide except as follows:
  - .1 Provide heavy-duty doors in accordance with CSDFMA recommendations at the following locations:
    - .1 Existing mechanical room (Door 210).
    - .2 New shaft opening (Door 221).
    - .3 Existing IT closet (Door 220).
  - .4 Fabricate doors with longitudinal edges locked seamed only, locked seamed and adhesive assisted, tack- or continuously-welded in accordance with CSDFMA recommendations, except as follows:
    - .1 Seams: visible except seamless as follows:

## **2.11 DOOR FABRICATION DETAILS**

- .1 Doors shall be mortised, blanked, reinforced, drilled and tapped at the factory for templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware supplier.

- .2 Factory prepare holes 12.7 mm diameter and larger shall be factory prepared, except mounting and through-bolt holes to be drilled on site at time of hardware installation. Factory prepare holes less than 12.7 mm diameter only when required for the function of the device (for knob, lever, cylinder, thumb or turn pieces) or when these holes over-lap function holes.
- .3 Reinforce doors only where required for surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges, or non-templated hardware. Drilling and tapping is by others, on site, at time of installation.
- .4 Provide inverted, recessed, welded steel channels at top and bottom of doors.
- .5 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
- .6 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in strict conformance with CAN4-S104 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.
- .7 Manufacturer's nameplates on doors are not permitted.
- .8 For fire-rated doors, provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
  - .1 Hinge side: 1.0 mm.
  - .2 Latchside and head: 1.5 mm.
  - .3 Finished floor, top of carpet: 13 mm.

### **Part 3 Execution**

#### **3.1 INSTALLATION GENERAL**

- .1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.
- .2 Install doors and frames to CSDMA Installation Guide.

#### **3.2 FRAME INSTALLATION**

- .1 Set frames plumb, square, level and at correct elevation.
- .2 Secure anchorages and connections to adjacent construction.
- .3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.
- .4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

- .5 Caulk perimeter of frames between frame and adjacent material.

### **3.3 DOOR INSTALLATION**

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 10 Door Hardware.
- .2 Adjust operable parts for correct function.
- .3 Install louvres.

### **3.4 FINISH REPAIRS**

- .1 Touch up with primer finishes damaged during installation.
- .2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

**END OF SECTION**



**Part 1            GENERAL**

**1.1            Reference Standards**

- .1        Standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame manufacturer's Association.

**1.2            Hardware List**

- .1        Submit hardware schedule for Departmental Representative's approval.
- .2        Indicate hardware proposed, including make, model, material, function, finish and other pertinent information.

**1.3            Maintenance**

- .1        Provide maintenance data, parts lists, and manufacturer's instruction for each type door closers, locksets, door holders and fire exit hardware for incorporation into maintenance manual.

**1.4            Maintenance Materials**

- .1        Supply two sets of wrenches for door closers, locksets and fire exit hardware.

**1.5            Hardware Requirements**

- .1        NRC has a bonded locksmith for our keying system on standing contract. See contract coordinator for information.
- .2        Contractor will be responsible to have all cylinders keyed by NRC bonded locksmith on standing offer contract.
- .3        Contractor will be responsible to carry all associated costs for cylinders and keying of same with NRC bonded standing offer locksmith.

**Part 2            PRODUCTS**

**2.1            Hardware Items**

- .1        Only door closers, locksets and latchsets and items listed below.
- .2        Use one manufacturer's products only for all similar items.

## 2.2 Door Hardware Standards

- .1 Hinges:
  - .1 Dorex 114.3mm x 101.6mm x 179 454 NRP X C15.
- .2 Latching devices: ANSI/BHMA Commercial Grade 1 Hardware.
  - .1 Lockset "Yale" AU-5307LN x 626, keyed on approach side
  - .2 Storeroom "Yale" AU-5305LN x 626, keyed on approach side
- .3 Cylinders:
  - .1 Medeco, keyed to NRC key plan M19CA5 by Lister Lock.
  - .2 Contractor to carry all costs associated with keying of doors.
- .4 Door Closer: Standard duty:
  - .1 "LCN" 4040XP Rw/Pa-AL (regular arm/parallel arm bracket)
    - .1 Include integral overhead stop.
- .5 Exit Devices:
  - .1 Von Duprin Exit Device 98L-NL 3' length, 630 finish.
- .6 Door Bottom Seal:
  - .1 Heavy duty, door seal of extruded aluminum frame and closed cell neoprene weather seal, closed ends,
  - .2 Adjustable with automatic retract mechanism when door is open.
  - .3 "K.N. Crowder" CT-52 (semi-mortised)
- .7 Perimeter Acoustical Gasket:
  - .1 Head and Jamb Seal:
    - .1 Extruded aluminum frame and hollow closed cell neoprene insert, clear anodized finish.
    - .2 "K.N. Crowder" W15 Heavy Duty.
- .8 Door Holder:
  - .1 "Hager" Kick Down Door Holder 270C. S1-sprayed aluminum finish.
- .9 Kick plates:
  - .1 To be adhered to both sides of door.
  - .2 Thickness: 2.0 mm, 630 stainless steel.
  - .3 Height: 200mm.
  - .4 Width: to suit each door.
  - .5 "Hager", Door Protection Plate 200S.

- .10 Door Stop:
  - .1 Wall Mounted Door Stop:
    - .1 “Hagar” 255S, cast brass, rubber bumper X 626. Install above baseboard
- .11 Above hardware is standard NRC requirements unless specified or listed on drawings to be otherwise.

### **2.3 Fastenings**

- .1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .2 Exposed fastening devices to match finish of hardware.
- .3 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.
- .4 Use fasteners compatible with material through which they pass.

## **Part 3 EXECUTION**

### **3.1 Installation**

- .1 Furnish door and frame manufacturer with complete instructions and templates for preparation of their work to receive hardware.
- .2 Furnish manufacturer's instructions for proper installation of each hardware component.
- .3 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .4 Sound gasket stripping shall not be installed until final coat of paint has been applied to door and frame and is completely dry
- .5 Only tradesmen competent in the installation of Finish Hardware shall be used for this purpose. The installer shall adjust, clean, and make good all installations of Finish Hardware to the satisfaction of the Engineer.

**3.2 Schedule**

- .1 D02 - Hardware Package #1
  - .1 (3) Hinge
  - .2 (1) Latch Device, Store Room
  - .3 (1) Door Closure
  - .4 (1) Panic Bar/Exist Device
  - .5 (1) Door stop
  - .6 (1) Door Bottom Seal
  - .7 (1) Perimeter Acoustical Gasket
  - .8 (2) Kick plates
  - .9 (1) Door holder
  
- .2 D01 - Hardware Package #2
  - .1 (3) Hinge
  - .2 (1) Latch Device (with occupancy indicator)
  - .3 (1) Door Closure
  - .4 (1) Door stop
  - .5 (2) Kick plates
  - .6 (1) Door holder
  
- .3 D03 - Hardware package #3
  - .1 (1) Door stop
  - .2 (2) Kick plates
  - .3 (1) Door holder

**END OF SECTION**

**Part 1 GENERAL**

**Part 2 PRODUCTS**

**2.1 Materials**

- .1 Non-loadbearing channel stud framing: to ASTM C645-83; 38mm (1-5/8"), 64mm (2-1/2"), 92mm (3-5/8") stud sizes as indicated on drawings; roll formed from 1.0mm (20 gauge) electrogalvanized steel sheet; for screw attachment of gypsum board. Knock-out service holes at 460 mm (1'-6") centres.
- .2 Floor and ceiling tracks: to ASTM C645-92b; in widths to suit stud sizes, 32 mm (1-1/4") flange height.
- .3 Metal channel stiffener: 38 x 20mm (1-1/2" x 3/4") size, 1.52 mm (16 gauge) thick cold rolled steel, coated with rust inhibitive coating.
- .4 Acoustical sealant: to CAN/CGSB-19.21-M87.
- .5 Insulating strip: rubberized, moisture resistant 3 mm (1/8") thick cork strip, 12 mm (1/2") wide, with self sticking adhesive on one face, lengths as required.

**Part 3 EXECUTION**

**3.1 Erection**

- .1 Align partition tracks at floor and ceiling and secure at 600 mm (2'-0") OC maximum.
- .2 Place studs vertically at 600mm (24") OC, or as indicated on drawings and not more than 50 mm (2") from abutting walls and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
- .3 Erect metal studding to tolerance of 1:1000.
- .4 Attach studs to bottom using screws.
- .5 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
- .6 Co-ordinate erection of studs with installation of door frames and special supports or anchorage for work specified in other Sections.
- .7 Provide wood blocking secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, and base and upper cabinets, attached to steel stud partitions.
- .8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, using column clips or other approved means of fastening placed alongside frame anchor clips.
- .9 Erect track at head of door openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with

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- manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.
- .10 Install steel studs or furring channel between studs for attaching electrical and other boxes.
  - .11 Extend partitions to ceiling height except where noted otherwise on drawings.
  - .11 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use slotted deflection track.
  - .12 Install continuous insulating strips to isolate studs from uninsulated surfaces.
  - .13 Install two continuous beads of acoustical sealant behind studs and tracks around perimeter of sound control partitions.

**END OF SECTION**

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**Part 1 GENERAL**

**1.1 Reference Standards**

- .1 Do work in accordance with CAN/CSA-A82.31-M91 except where specified otherwise.

**Part 2 PRODUCTS**

**2.1 Gypsum Board**

- .1 Moisture resistant: CAN/CSA A82.27-M91 16mm (5/8") x 1200 mm (4'-0") wide x maximum practical length, edges tapered with round edge (at perimeter and non-demountable partition walls).
- .2 Fire rated – Type “X”: CAN/CSA A82.27-M91 16mm (5/8") x 1200 mm (4'-0") wide x maximum practical length, edges tapered with round edge (at perimeter and non-demountable partition walls).

**2.2 Fastenings and Adhesives**

- .1 Nails, screws and staples: CAN/CSA- A82.31-M91.
- .2 Laminating compound: to CAN/CSA-A82.31-M91, asbestos-free.
- .3 Stud adhesive: to CAN/CGSB-71.25.

**2.3 Accessories**

- .1 Casing beads, corner beads: 0.5 mm (0.02") base thickness commercial grade sheet steel with Z275 zinc finish to ASTM A525-91b, perforated flanges; one piece length per location.
- .2 Control Joints Beads, V-configuration, galvanized steel meets or exceeds requirements of ASTM A-653, continuous, to suit gypsum board thickness as indicated on drawings.
- .1 Designed for movement of up to 6mm.
- .3 Acoustic sealant: to CAN/CGSB-19.21-M87.
- .4 Sealants acceptable for use on this project must be listed on CGSB Qualified Products List issued by CGSB Qualification Panel for joint sealants.
- .5 Insulating strip: rubberized, moisture resistant, 3 mm (1/8") thick closed cell neoprene strip, 12 mm (1/2") wide, with self sticking permanent adhesive on one face; lengths as required.
- .6 Joint compound: to CAN/CSA-A82.31-M91, asbestos-free.
- .7 Access doors:

- .1 Non-rated access doors, 16 ga door, 18 ga mounting frame, door flush to frame, rounded safety corners, continuous concealed hinge, screwdriver operated cam latch, paintable steel.
  - .1 Acceptable product and manufacturer MIFAB, Universal Access Door series, or approved equal.

### **Part 3 EXECUTION**

#### **3.1 Gypsum Board Application**

- .1 Do not apply gypsum board until bucks, anchors, blocking, electrical and mechanical work are approved.
- .2 Apply single layer gypsum board as indicated to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm (1'-0") oc.
- .3 Arrange square edge gypsum board symmetrical about openings and wall areas, with butt joints, battens over joints. Utilize concealed installation clips to support boards in field of gypsum board panels and secure panels to back up components with screws that will not be exposed to view when installation is complete.
- .4 Install battens and continuous backing clips at all joints in square edge gypsum board and at vertical edges and top edge of square edge gypsum board installation.

#### **3.2 Wall mounted deflection bead Installation Instructions**

- .1 Leave gypsum board 13mm short of ceiling.
- .2 Fill void with the specified caulking material.
- .3 Cut the bead to length and dry fit creating a seal between gasket and ceiling.
- .4 Spray a liberal coat of 847 Adhesive to inside of mud leg and wall surface where trim is to be installed.
- .5 Fit trim applying firm even pressure
- .6 Staple through mud leg at 200mm centres
- .7 Set the trim with approved compound

#### **3.3 Sound Attenuation Blanket**

- .1 Sound insulation as noted under Section 072000 Insulation.

**END OF SECTION**



**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 09 25 00 Gypsum Board: Wall repairs at surfaces to receive resilient base.

**1.2 REFERENCES**

- .1 American Society for Testing and Materials (ASTM International)
  - .1 ASTM F1861-08 Specification for Resilient Wall Base.

**1.3 PRODUCT DATA**

- .1 Submit manufacturer's product literature describing specified products, including their technical and physical properties.
  - .1 Include manufacturer's certificate of mix formulation compliance, including certification that products contain no more than 0.5% asbestos.
  - .2 Include WHMIS and Material Safety Data Sheets.

**1.4 SAMPLES**

- .1 Submit samples in accordance with Section 013300 - Submittal Procedures.
- .2 Submit duplicate 300 x 300 mm sample pieces of sheet material, 300 mm long base.

**1.5 QUALITY ASSURANCE**

- .1 Installer shall have five (5) years of documented experience installing resilient base products.
- .2 Provide proof of experience at request of Departmental Representative.

**1.6 MOCKUP**

- .1 Include resilient base and accessories in mockups specified for each floor covering product specified, in accordance with requirements of Section 013300 - Submittal Procedures.
- .2 Accepted mockup may form part of finished Work.

**1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver and store packaged materials in original containers with manufacturer's seals and labels intact.
- .2 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness. Store rolled goods on end.
- .3 Store materials on site for site conditioning at temperatures between 18oC and 24oC for at least 48 hours immediately before installation.
- .4 Protect from intense or direct sunlight until installation is complete and adhesives are fully cured.

## **1.8 CLOSEOUT SUBMITTALS**

- .1 Provide maintenance data for resilient base and adhesives for incorporation into manual specified in Section 013300 - Submittal Procedures.

## **1.9 EXTRA MATERIALS**

- .1 Provide 5% of each colour, pattern and type of resilient base material required for project for maintenance use.
- .2 Extra materials to be in one piece and from same production run as installed materials.
- .3 Clearly identify each resilient base product and each container of adhesive.
- .4 Deliver to Departmental Representative, upon completion of the work of this section.
- .5 Store where directed by Departmental Representative.

## **1.10 ENVIRONMENTAL REQUIREMENTS**

- .1 Maintain air temperature and structural base temperature at resilient base installation area above 20oC for 48 hours before, during and 48 hours after installation.
- .2 Protect materials from intense or direct sunlight during storage and until installation is complete and adhesives are fully cured.

## **Part 2 Products**

### **2.1 RESILIENT WALL BASE**

- .1 Resilient base: to ASTM F1861, Type TS or TP, rubber, Style B-cove minimum for resilient floor, in maximum length, 3 mm thick, 150 mm high, of colour selected by Departmental Representative from manufacturer's standard range.
  - .1 Acceptable products and manufacturers:
    - .1 Pinnacle Rubber Base by Roppe,
    - .2 Traditional Wall Base by Johnsonite.
    - .3 Equivalent products from Amtico, Armstrong.
  - .2 Allow for one colour to be selected by Departmental Representative from manufacturer's full range.

### **2.2 RESILIENT BASE COLOUR SCHEDULE**

- .1 Allow for one colour per functional area for each type of resilient base specified, selected from manufacturer's full range.

### **2.3 RESILIENT BASE INSTALLATION ACCESSORIES**

- .1 Primers and adhesives: of types recommended by resilient products manufacturer for specific material on applicable substrate, above, on or below grade.
- .2 Adhesives for contoured resilient wall base: as recommended by manufacturer.
  - .1 Porous substrate: Johnsonite #960 Acrylic Cove Base Adhesive.
  - .2 Non-porous substrate: Johnsonite #945 Contact Bond Adhesive.
  - .3 Double sided tape adhesive for all substrates: Johnsonite Power Tape.

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**Part 3 Execution**

**3.1 SITE VERIFICATION OF CONDITIONS**

- .1 Inspect areas and surfaces to receive new resilient base and report conditions detrimental to performance of the Work and satisfactory installation in writing to the Departmental Representative.
- .2 Ensure that surfaces to receive base have been repaired under Section 09 25 00 and are sound, dry, clean and smooth.
- .3 Do not proceed with the work until detrimental conditions have been corrected.

**3.2 RESILIENT BASE APPLICATION**

- .1 Lay out base to keep number of joints at minimum.
- .2 Clean substrate and prime with one coat of adhesive.
- .3 Apply adhesive to back of base.
- .4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.
- .5 Install straight and level to variation of 1:1000.
- .6 Scribe and fit to door frames and other obstructions.
- .7 Cope internal corners.
- .8 Form external corners from resilient base as follows:
  - .1 Bend the base and flip the toe to stretch it.
  - .2 Reverse the bend and shave a strip 6 mm wide to a depth  $\frac{1}{4}$  the thickness of the base from the back of the base at corner location.
  - .3 Apply hot melt or solvent-based adhesive to outside corners, minimum 100 mm back from corner.
  - .4 Install base.
- .9 Use toeless type base where floor finish will be carpet, coved type elsewhere.
- .10 Heat weld base joints in accordance with manufacturer's printed instructions.

**3.3 APPLICATION – CONTOURED RESILIENT TRIM**

- .1 Lay out base to keep number of joints at minimum.
  - .1 Space joints in resilient base at maximum length available.
- .2 Set base in adhesive tightly by using 3 kg hand roller, against wall and floor surfaces.

Apply adhesive uniformly at both top and bottom of base.
- .3 Install straight and level to variation of 1:1000.
- .4 Scribe and fit to door frames and other obstructions.
- .5 Running joints to be diagonal or scarf joints.
- .6 Miter inside and outside corners using compound miter saw.
- .7 Jointing tolerances:
  - .1 AWI Premium grade:
    - .1 Maximum gap width: 0.65 mm.

- .2 Maximum gap length: 30% of joint length.

**3.4 CLEANING**

- .1 Remove excess adhesive from floor, base and wall surfaces without damage.
- .2 Clean, seal and wax floor and base surface to flooring manufacturer's printed instructions.

**3.5 PROTECTION**

- .1 Prohibit traffic for 24 hours after installation.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1            Section 09 65 13 Resilient Base and Accessories: Resilient base.

**1.2                REFERENCES**

- .1            American Society for Testing and Materials (ASTM International)
  - .1            ASTM F1066-13 Standard Specification for Vinyl Composition Floor Tile

**1.3                PRODUCT DATA**

- .1            Submit manufacturer's product literature describing specified products, including their technical and physical properties.
  - .1            Include manufacturer's certificate of mix formulation compliance, including certification that products contain no more than 0.5% asbestos.
  - .2            Include WHMIS and Material Safety Data Sheets.

**1.4                SAMPLES**

- .1            Submit samples in accordance with Section 013300 - Submittal Procedures.
- .2            Submit selection and verification samples for range of colours, pattern and textures as requested by Departmental Representative.
- .3            Submit triplicate of each floor covering tile colour selected, pattern and texture specified, in size specified.
- .4            Submit triplicate feature strips, edge strips, transition strips for each typical transition, minimum 300 mm long.

**1.5                QUALITY ASSURANCE**

- .1            Flooring installer shall have five (5) years of documented experience installing resilient tile flooring.
- .2            Provide proof of experience at request of Departmental Representative.

**1.6                SUBFLOOR CONDITIONS**

- .1            Prior to commencement of floor installation work, conduct bond tests as follows:
  - .1            Conduct bond tests as recommended by flooring manufacturer to ensure that bond between flooring products and substrate meets manufacturer's requirements.
- .2            Test procedures and results shall be recorded and submitted to Departmental Representative prior to commencement of flooring installation.
- .3            Do not proceed with the work until detrimental conditions have been corrected, test results are consistent with flooring manufacturer's requirements.

- .4 Commencement of the installation shall be deemed to be acceptance of the conditions. After commencement of the work the Contractor shall be fully responsible for its satisfactory performance in accordance with the specifications.

## **1.7 MOCKUP**

- .1 Provide mockup of typical room for each floor covering product specified, in accordance with Section 013300 - Submittal Procedures.
- .2 Include floor pattern as directed by Departmental Representative.
- .3 Allow 48 hours for review of mockup by Departmental Representative.
- .4 Accepted mockup may form part of finished Work.

## **1.8 CLOSEOUT SUBMITTALS**

- .1 Provide maintenance data for resilient flooring, base and adhesive for incorporation into manual specified for closeout procedures in Section 011000 - General Instructions.

## **1.9 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver and store packaged materials in original containers with manufacturer's seals and labels intact. Indicate batch and sequence numbers on labels.
- .2 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness. Do not stack tile boxes more than four high.
- .3 Maintain temperature of store room at a minimum of 20°C for at least 48 hours immediately before installation.

## **1.10 EXTRA MATERIALS**

- .1 Provide one unopened boxes of each colour, pattern and type flooring material required for this project for maintenance use.
- .2 Extra materials to be from same production run as installed materials.
- .3 Clearly identify each container of floor tile and each container of adhesive.
- .4 Deliver to Departmental Representative, upon completion of the work of this section.
- .5 Store where directed by Departmental Representative.

## **Part 2 Products**

### **2.1 RESILIENT TILE PRODUCTS (RT)**

- .1 All resilient tile flooring materials shall be the products of the same single manufacturer.
- .2 Slip Retardant Flooring Tile: 3.2 mm thick tile to ASTM F1066, class 2 through pattern.

- .1 Acceptable Product: Safety zone tile as manufactured by Armstrong. Or approved equivalent.

- .1 Color: 57001 - Shale Gray

## 2.2 INSTALLATION ACCESSORIES

- .1 Adhesive: Type as tile recommended by tile manufacturer for substrate condition.
- .2 Primers: waterproof, type recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.
- .3 Sub-floor filler and leveller to ASTM F710, moisture-, mildew-, and alkali-resistant material, with 3000 psi compressive strength when cured:
  - .1 2 part latex-type filler requiring no water and packaged separately in correctly proportioned units as recommended by flooring manufacturer for use with their product.
- .4 Recessed vinyl stair nosing: 76.2mm tread depth with ribbed surface, 50.8 hinged square nose configuration, 7.94mm tread depth, under cut for 3.18 material.
  - .1 Manufactured from a homogeneous polyvinyl chloride composition combined with high quality additives and colorants to meet the performance requirements of ASTM F-2169 Standard Specification for resilient Stair Treads, Type TV, Class 1 and 2, Group 1 and 2.
  - .2 Slip resistant.
  - .3 Colour: Black.
  - .4 Acceptable Product: Vinyl Nosing, RCN-XX-B as manufactured by Tarkett.
- .5 Vinyl Riser: 2mm thick material.
  - .1 Risers are formulated from a homogeneous polyvinyl chloride composition combined with high quality additives and colorants designed specifically to meet the performance and dimensional requirements of ASTM F-1861-98, Type TV, Group 1 (solid) Standard Specification for Resilient Wall Base.
  - .2 Colour : Black
  - .3 Height: to be determined on site
  - .4 Acceptable Product: 2mm vinyl riser as manufactured by Tarkett.
- .6 Reducer and transition strips: resilient wedge profile transition of thermoplastic rubber compound, 457 mm wide from 0 to thickness to suit transition.
  - .1 Acceptable product: Subfloor Leveller as manufactured by Roppe.
- .7 Transition and edge strips: purpose made solid vinyl strip, tapered profile, dimensions to provide flush meeting with adjacent surfaces, color to be selected by Departmental Representative from manufacturer's standard range.
  - .1 Provide "J" or "T" profiles as necessary to protect edges at transitions.
  - .2 Tapered vinyl or rubber edging, profile and thickness to suit flooring condition, with lip to extend under floor finishes, shoulder flush with top of adjacent floor finish. Colour selected by Departmental Representative from manufacturer's full range.

## 2.3 UNDERLAYMENT

1. APA Trademarked Plywood or Equivalent Agency Certified Plywood rated as suitable underlayment for resilient floor coverings such as tile or sheet vinyl. It should have an Exterior or Exposure 1 exposure durability classification and a fully sanded face. APA plywood underlayment grades recommended for areas to be covered with resilient non-textile flooring are A-C, B-C, C-C Plugged, or C-C Plugged EXT when marked “sanded face.” Also, Marine EXT or sanded plywood grades (A-C, B-C, A-D, or B-D) marked “Plugged Crossbands Under Face,” “Plugged Crossbands (or Core),” “Plugged Inner Plies,” or “Meets Underlayment Requirements.”

## 2.4 UNDERLAYMENT REQUIREMENTS

- .1 Underlayments for resilient floors must:
  - .1 Be structurally sound
  - .2 Be designed for resilient flooring underlayment purposes
  - .3 Have panels smooth enough so that texture or graining will not show through the finished flooring
  - .4 Resist dents and punctures from concentrated loads
  - .5 Be free of any substance that may stain vinyl such as edge patching compounds, marking inks, paints, solvents, adhesives, dye, etc
  - .6 Be installed in strict accordance with the board manufacturer’s recommendations

## 2.5 UNDERLAYMENT INSTALATION

- .1 Armstrong Flooring suggests the panels be lightly butted and not filled or flashed, unless the manufacturer specifically recommends filling the joints.
- .2 Differences in the thickness of wood panels should be corrected by sanding.
- .3 All wood product panels will change in size with changes in water content. Since panels received from the mill generally have very low moisture content compared to the interior of the building and the structural subfloor, allow the panels to condition to the job site per the panel manufacturer’s recommendations. This will minimize the chance of tunnels or ridges over the underlayment joints.
- .4 Some construction adhesives used to glue subfloors and underlayments can stain resilient flooring. Solvent vapors can distort some flooring. Do not use adhesives to install underlayments unless you know they will not stain the resilient flooring. You assume responsibility for their use.

## 2.6 UNDERLAYMENT PREPERATION

- .1 Check panels for sources of discoloration such as contamination from paint, varnish, stain overspray or spills, plumbing sealers, asphalt, heater fuel, markers, or potential staining agents such as wood or bark not visible on the surface, edge sealers, logo markings, printed nail patterns, and synthetic patches.
- .2 Wood subfloors - Surface Cleaning: Make subfloor free from dust, dirt, grease, and all foreign materials.



1. Remove old adhesive.
2. Cover adhesive, oil or wax residue with an appropriate underlayment. If the residue is tacky, place a layer of felt or polyethylene sheeting over it to prevent a cracking sound when walking on the floor.
3. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring.

## **Part 3 Execution**

### **3.1 SITE VERIFICATION OF CONDITIONS**

- .1 Inspect areas and surfaces to receive new resilient tile flooring and report conditions detrimental to performance of the Work and satisfactory installation in writing to the Departmental Representative.
- .2 Ensure that surfaces to receive tile are:
  - .1 Flat within the tolerances of 12 mm in 3 000 mm;
  - .2 dry clean and smooth;
  - .3 free from paint, varnish, existing adhesive residue, wax, oil and other deleterious substances.
- .3 Prior to commencement of floor installation work, conduct bond and moisture emission tests as specified.
- .4 Do not proceed with the work until detrimental conditions have been corrected.
- .5 Commencement of the installation shall be deemed to be acceptance of the conditions. After commencement of the work the Contractor shall be fully responsible for its satisfactory performance in accordance with the specifications.

### **3.2 SUB-FLOOR TREATMENT**

- .1 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- .2 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.
- .3 Remove or treat old adhesives to prevent residual, old flooring adhesives from bleeding through to new flooring and/or interfering with the bonding of new adhesives.
- .4 Prime and seal concrete sub-floor to flooring manufacturer's printed instructions.

### **3.3 SUB-FLOOR TRANSITION LEVELLER**

- .1 Provide pre-fabricated resilient subfloor leveller at all transitions between resilient tile flooring and adjacent flooring types where elevation difference is 12.7 mm or less.
- .2 Trim width of leveller to suit difference in elevation.

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**3.4 TILE APPLICATION**

- .1 Provide a high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to the outside. Do not let contaminated air recirculate through a zoned or whole building air distribution system.
- .2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
- .3 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.
- .4 Lay tiles with bottom surface securely bonded to substrate and top surface left smooth, clean and free from imperfections. Fit tiles so each unit is in contact with contiguous tiles and joints are in proper alignment. Make neat tight joints where exposed edges about other surfaces.
- .5 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.
- .6 As installation progresses, and after installation, roll flooring in 2 directions including resilient tile with 45 kg minimum roller to ensure full adhesion.
- .7 Cut tile and fit neatly around fixed objects.
- .8 Cut feature strips and floor markings to shapes, sizes and profiles as shown on drawings. Carefully scribe into positions in field. Fit joints tightly.
- .9 Install feature strips at door jambs between rooms with different colours or patterns, as directed by Departmental Representative. Provide in full depth of jamb unless indicated otherwise.
- .10 Install flooring in pan type floor access covers. Maintain floor pattern.
- .11 Continue flooring through areas to receive movable type partitions and demountable partitions without interrupting floor pattern.
- .12 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.
- .13 Install edge reducer strips at unprotected or exposed edges where flooring terminates. Securely bond to subfloor in straight true line.
- .14 Install reducer and transition strips between floor areas which do not meet flush with each other. Securely bond to subfloor in straight true line.
- .15 Continue flooring over areas which will be under built-in furniture, wood and metal casework and equipment.

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**3.5 CLEANING**

- .1 Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.
  - .1 Remove visible adhesive and other surface blemishes using cleaning methods recommended by floor manufacturer.
  - .2 Sweep and vacuum floor after installation.
  - .3 Do not wash floor until after time period recommended by flooring manufacturer.
  - .4 Damp mop flooring to remove black marks and soil.

**3.6 INITIAL MAINTENANCE**

- .1 Do not wax or seal floor. NRC will wax floor.

**3.7 PROTECTION OF FINISHED WORK**

- .1 Protect new floors from traffic, deterioration and damage at all times until final inspection.
- .2 Prohibit traffic on floor for 48 hours after installation.

**END OF SECTION**

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**Part 1            General**

**1.1                SUMMARY**

- .1        Work of this Section includes surface preparation and paint finishes for all new and previously painted exposed and semi-concealed surfaces within the area under contract for which a paint formula is specified.
  - .1        Semi-concealed areas include inside of light troughs and valences, behind grilles, and projecting edges above and below sight lines.
  - .2        Moisture testing of substrates.
  - .3        Provision of safe and adequate ventilation as required where toxic and/or volatile/flammable materials are being used over and above temporary ventilation supplied by others.
- .2        Re-painting previously painted surfaces also includes:
  - .1        Material and installation of site applied paint finishes painting pre-existing painted surfaces.
  - .2        Surface preparation of substrates as required for acceptance of paint, including cleaning, small crack repair, patching, caulking, and making good surfaces and areas to limits defined under MPI Repainting Maintenance Manual requirements.
  - .3        Specific pre-treatments noted herein or specified in the MPI Repainting Maintenance Manual.
  - .4        Sealing/touch-up, spot priming, and/or full priming surfaces for repainting in accordance with MPI Repainting Maintenance Manual requirements.

**1.2                REFERENCES**

- .1        Environmental Protection Agency (EPA)
  - .1        EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).
- .2        Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1        Material Safety Data Sheets (MSDS).
- .3        Master Painters Institute (MPI)
  - .1        MPI Architectural Painting Specifications Manual, 2005.
  - .2        MPI Maintenance Repainting Manual 2004
- .4        Current National Fire Code of Canada

**1.3                PERFORMANCE REQUIREMENTS**

- .1        Unless specified otherwise, provide materials and perform the work in accordance with the MPI Premium grade requirements for each system specified.

**1.4                QUALITY ASSURANCE**

- .1        Qualifications and Experience:

- .1 Painting Subcontractor shall have a minimum of five years proven satisfactory experience. Submit list of last three comparable jobs including, job name and location, specifying authority, and project manager.
- .2 Journeymen shall be qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
- .3 Apprentices shall work under direct supervision of qualified trades person in accordance with trade regulations.
- .2 Pre-Installation Meeting:
  - .1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations.
    - .1 Verify project requirements.
    - .2 Review installation and substrate conditions.
    - .3 Coordination with other building subtrades.
    - .4 Review manufacturer's installation instructions and warranty requirements.
- .3 Retain purchase orders, invoices and other documents to prove conformance with specification requirements when requested by Departmental Representative.

## **1.5 SCHEDULING**

- .1 Submit work schedule for various stages of painting to Departmental Representative for review. Submit schedule minimum of 10 Working Days in advance of proposed operations.
- .2 Paint occupied facilities in accordance with approved schedule.
- .3 Obtain written authorization from Departmental Representative for changes in work schedule.
- .4 Schedule painting operations to prevent disruption of occupants.

## **1.6 SUBMITTALS**

- .1 Submittals in accordance with submittal procedures of Section 01 10 00.
- .2 Product Data:
  - .1 Submit product data and instructions for each paint and coating product to be used prior to ordering materials. Do not order materials until list has been accepted.
  - .2 Submit product data for the use and application of paint thinner.
  - .3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 10 00 – General Instructions. Indicate VOCs during application and curing.
- .3 Samples:
  - .1 Submit full range colour sample chips for review and selection. Indicate where colour availability is restricted.

- .2 Prepare samples with stepped application of finish system showing each separate coat, including primers and block fillers.
- .3 Submit duplicate 200 x 300 mm sample panels of each paint, stain, clear coating, and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
  - .1 3 mm plate steel for finishes over primed ferrous metal surfaces.
  - .2 3 mm wipe-coat galvanized plate steel for finishes over wipe-coated galvanized metal surfaces such as hollow metal doors and frames.
  - .3 3 mm galvanized plate steel for finishes over galvanized metal surfaces other than hollow metal doors and frames.
  - .4 13 mm birch plywood for finishes over wood surfaces.
  - .5 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
  - .6 13 mm gypsum board of each type specified for finishes over each type of gypsum board specified and other smooth surfaces.
- .4 Include list of material and application for each coat of each sample. Label each sample as to location and application.
- .5 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
- .4 Test reports and Certificates:
  - .1 Submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
    - .1 Lead, cadmium and chromium: presence of and amounts.
    - .2 Mercury: presence of and amounts.
    - .3 Organochlorines and PCBs: presence of and amounts.
  - .2 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Closeout Submittals:
  - .1 Submit maintenance data for incorporation into manual specified in Section 01 10 00 - General Instructions include following:
    - .1 Product name, type and use.
    - .2 Manufacturer's product number.
    - .3 Colour numbers.
    - .4 MPI Environmentally Friendly classification system rating.

## 1.7 **MOCK-UPS:**

- .1 Construct mock-ups in accordance with quality assurance requirements of Section 013300 - Submittal Procedures.
  - .1 Provide 3 000 mm x 3 000 mm mock-up.
  - .2 Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements of each interior finish system listed, with specified paint or coating showing selected colours, gloss/sheen, textures.

- .3 Mock-up will be used:
  - .1 To judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.
- .4 Locate where directed where indicated.
- .5 Allow 24 hours for inspection of mock-up before proceeding with work.
- .6 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may not remain as part of finished work. Remove mock-up and dispose of materials when no longer required and when directed by Departmental Representative.

## **1.8 DELIVERY, STORAGE AND HANDLING**

- .1 Pack, ship, handle and unload materials in accordance with manufacturer's written instructions.
- .2 Acceptance at Site:
  - .1 Identify products and materials with labels indicating:
    - .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 Storage and Protection:
  - .1 Provide and maintain dry, temperature controlled, secure storage.
  - .2 Store materials and supplies away from heat generating devices.
  - .3 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
- .5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
- .6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.
- .7 Remove paint materials from storage only in quantities required for same day use.
- .8 Fire Safety Requirements:
  - .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to each 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 National Fire Code of Canada requirements.

## **1.9 SITE CONDITIONS**

- .1 Heating, Ventilation and Lighting:
  - .1 Provide continuous ventilation for seven days after completion of application of paint.
  - .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 Provide minimum lighting level of 323 Lux (30 foot candles) on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
  - .1 Perform painting work when maximum moisture content of the substrate is below:
    - .1 12% for concrete, concrete masonry, clay masonry.
    - .2 15% for wood.
    - .3 12% for plaster and gypsum board.
  - .2 Test for moisture using calibrated electronic Tramex type moisture meter. Test concrete floors for moisture using "cover patch test".
  - .3 Allow new concrete and masonry to cure minimum of 28 days.
  - .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions:
  - .1 Apply paint finish 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 to adequately prepared surfaces and to surfaces within moisture limits.
  - .3 Apply paint when previous coat of paint is dry or adequately cured.

## **1.10 WARNING:**

- .1 **DO NOT USE SPRAY EQUIPMENT:** Only paint brush and roller will be accepted on this project.

## **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 Provide paint materials for paint systems from single manufacturer.
- .3 Acceptable Paint: Sherwin Williams or approved equal.



## 2.2 COLOURS

- .1 Submit proposed Colour Schedule to Departmental Representative for review..
- .2 Colour schedule:
  - .1 P1: Sherwin Williams, Elder White, SW 7014.
  - .2 P2: Sherwin Williams, Gauntlet Grey, SW 7019.
  - .3 P3:

## 2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Departmental Representative for tinting of painting materials on site.
  - .1 For re-painting, the first coat in a two coat (Premium) repaint system shall be tinted slightly lighter colour than top coat to show visible difference between coats.
  - .2 For painting new surfaces, the second coat in three coat system shall be tinted slightly lighter colour than top coat to show visible difference between coats.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.
- .4 Thin paint for spraying in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.
- .5 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 is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

- .2 Gloss level ratings of painted surfaces as indicated and as noted on Finish Schedule.

## 2.5 INTERIOR PAINTING AND RE-PAINTING SYSTEMS

- .1 Electrical backer boards.

- .1 INT 6.4P – Intumescent fire retardant alkyd coating, gloss level 1 (flat) finish, ULC listed.
- .2 Plaster and gypsum board walls: gypsum wallboard and textured finishes:
  - .1 INT 9.2B - High performance architectural latex, gloss level 4.
- .3 Plaster and gypsum board ceilings, soffits and bulkheads:
  - .1 INT 9.2B - High performance architectural latex, gloss level 1.
- .4 Doors and Frames surface apply:
  - .1 INT 9.2B - High performance architectural latex, gloss level 5 (semi-gloss) finish.
- .5 Concrete horizontal surfaces: Ceiling:
  - .1 One coat primer-sealer
  - .2 Two finish coats latex floor enamel, gloss level 5.

### **Part 3 Execution**

#### **3.1 GENERAL**

- .1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- .2 Perform preparation and operations for interior re-painting of existing surfaces in accordance with MPI Maintenance Repainting Manual requirements except where otherwise specified.
- .3 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

#### **3.2 EXAMINATION**

- .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.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .3 Maximum moisture content as follows:
  - .1 Stucco, plaster and gypsum board: 12%.
  - .2 Concrete: 12%.
  - .3 Clay and Concrete Block/Brick: 12 %.
  - .4 Wood: 15%.

### **3.3 INSPECTION REQUIREMENTS FOR RE-PAINTING WORK**

- .1 Inspect existing interior surfaces requiring repainting and notify Departmental Representative in writing of defects or problems, prior to commencing repainting work, or after surface preparation if unseen substrate damage is discovered.
- .2 Assume responsibility for preparation of surfaces with assessed degree of surface degradation up to and including DSD-2 as defined in MPI Maintenance Repainting Manual.
- .3 Where an assessed degree of surface degradation of DSD-0 to DSD-2 before preparation of surfaces for repainting is revealed to be DSD-3 or DSD-4 after preparation, notify Departmental Representative Do not begin repainting until Departmental Representative issues instruction.

### **3.4 PREPARATION**

- .1 Protection:
  - .1 Protect existing building surfaces and adjacent structures from paint splatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore 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 Protect passing pedestrians, building occupants and general public in and about the building.
- .2 Surface Preparation:
  - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
  - .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
  - .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.
- .3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
  - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
  - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
  - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
  - .4 Allow surfaces to drain completely and allow to dry thoroughly.

- .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
- .6 Use trigger operated spray nozzles for water hoses.
- .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.
- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .5 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .6 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes blowing with clean dry compressed air or vacuum cleaning.
- .7 Touch up of shop primers with primer as specified.
- .8 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

### 3.5

#### APPLICATION

- .1 Apply paint by brush, roller, air sprayer, or airless sprayer. Conform to manufacturer's application instructions, including spreading rates, unless specified otherwise. Method of application shall be approved by Departmental Representative prior to commencement of work.
- .2 Brush and Roller Application:
  - .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
  - .2 Work paint into cracks, crevices and corners.
  - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint 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 free of roller tracking and heavy stipple.
  - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray application is not permitted for standard paint products.
- .4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.
- .5 Apply each coat of paint in a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

- .6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .7 Sand and dust between coats to remove visible defects.
- .8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .9 Finish inside of cupboards and cabinets as specified for outside surfaces.
- .10 Finish closets and alcoves as specified for adjoining rooms.
- .11 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

### **3.6 SITE TOLERANCES**

- .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface when viewed using final lighting source.
- .2 Floors and ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
- .3 Final coat shall exhibit uniformity of colour and uniformity of sheen across full surface area.

### **3.7 FIELD QUALITY CONTROL**

- .1 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
- .2 Cooperate with inspection and provide access to areas of work.
- .3 Retain purchase orders, invoices and other documents to prove conformance with specified requirements when requested by Departmental Representative.

### **3.8 RESTORATION**

- .1 Clean and re-install 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 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

**END OF SECTION**

**Part 1            GENERAL**

**1.1                Shop Drawings**

- .1        Submit shop drawings in accordance with Section 013300 - Submittal Procedures.
- .2        Clearly indicate fabrication details, plans, elevations, hardware, and installation details.

**Part 2            PRODUCTS**

**2.1                Materials**

- .1        Sheet steel: commercial grade, stretcher levelled sheet steel to ASTM A526/A526M-90 with Z275 zinc coating to ASTM A525M-91b.
- .2        Minimum base steel thickness:
  - .1            Panels and doors: 0.8 mm (20 gau.).
  - .2            Pilasters: 1.0 mm (18 gau.).
  - .3            Reinforcement: 3.0 mm (1/8").
- .3        Stainless steel sheet: to ASTM A666-92 type 304 with No. 4 finish.
- .4        Pilaster shoe: 0.8 mm (20 gau.) stainless steel, 75mm (3") high.
- .5        Attachment: stainless steel tamperproof type screws and bolts.
- .6        Hardware:
  - .1            Hinges: concealed heavy duty chrome plated non-ferrous casting, adjustable door-open angle.
  - .2            Latch set: built-in, combination latch, door stop, keeper and bumper chrome plated non-ferrous casting or extrusion.
  - .3            Wall and connecting brackets: anodized aluminum extrusion or casting.
  - .4            Coat hook: combination hook and door bumper, chrome plated non-ferrous casting. Vinyl reinforced tarps.

## **2.2 Fabrication**

- .1 Doors and panels: 25 mm (1") thick, two sheet steel faces pressure bonded to honeycomb core, 600 mm wide x 1473 mm (2'-0" x 4'-10") high.
- .2 Pilasters: 32 mm (1-1/4") thick, constructed same as door, to sizes indicated.
- .3 Headrails: 25 x 40 mm (1" x 1-1/2").
- .4 Pilaster shoes: 75 mm (3") high, die formed stainless steel.
- .5 Provide formed and closed edges for doors, panels and pilasters. Mitre and weld corners and grind smooth.
- .6 Provide internal reinforcement at areas of attached hardware and fittings. Temporarily mark location of reinforcement for tissue holders.
- .7 Provide 0.8 mm (20 gau.) thick type 316 stainless steel protective shields on urinal side of toilet partition panels next to urinals. Make protective shields 600 mm wide x 800 mm high (2'-0" x 2'-8") with top of shield 1200 mm (4'-0") above finished floor. Fasten with stainless steel screws.

## **2.3 Shop Finishing**

- .1 Clean, degrease and neutralize steel components with phosphate or chromate treatment.
- .2 Spray apply primer to CAN/CGSB-1.81-M90, 1 coat.
- .3 Spray apply finish enamel to CAN/CGSB-1.88-92, type 2 gloss, 1 coat and bake to smooth, hard finish.
- .4 Finish: doors and pilaster/panels same colour as selected from manufacturer's standard colour by the Departmental Representative.

## **Part 3 EXECUTION**

### **3.1 Partition Erection**

- .1 Install partitions secure, plumb and square.
- .2 Leave 12 mm (1/2") space between wall and panel or end pilaster.
- .3 Attach fixing brackets securely to masonry/ concrete surfaces using screws and shields: to hollow walls using bolts and toggle type anchors.
- .4 Attach panel and pilaster to brackets with through type sleeve bolt and nut.

- .5 Provide for adjustment of floor variations with screw jack through steel saddles made integral with pilaster. Conceal floor fixings with stainless steel shoes.
- .6 Equip each door with hinges, latch set, and coat hook. Adjust and align hardware for easy, proper function. Set door open position at 30° to front, opening inward.
- .7 Make good baked enamel surfaces damaged during shipment or installation.

**END OF SECTION**



**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 09 22 16 Non-Structural Metal Framing: Sheet metal support for wall and corner guards.

**1.2 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM A167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - .2 ASTM B456-11, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
  - .3 ASTM A653/A653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .4 ASTM A924/A924M-10a, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-12.5-M86, Mirrors, Silvered.
- .3 Canadian Standards Association (CSA)
  - .1 CAN/CSA-B651-12 Accessible Design for the Built Environment.
  - .2 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.

**1.3 SHOP DRAWINGS**

- .1 Submit shop drawings in accordance with Section 013300 - Submittal Procedures.
- .2 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars, shower seats.

**1.4 SAMPLES**

- .1 Submit samples in accordance with Section 013300 - Submittal Procedures.
- .2 Samples will be returned for inclusion into work.

**1.5 PRODUCTS INSTALLED BUT NOT SUPPLIED BY THIS SECTION**

- .1 Soap dispenser (SD): Supplied by Owner with installation by Contractor.
- .2 Toilet tissue dispenser (TTD): Supplied by Owner with installation by Contractor.
- .3 Paper towel dispenser (PTD): Supplied by Owner with installation by Contractor.
- .4 Sanitary napkin disposal (SND): Supplied by Owner with installation by Contractor.

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**1.6 CLOSEOUT SUBMITTALS**

- .1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in closeout submittal requirements of Division 01.
- .2 Include three (3) copies of list of accessories requiring particular supply, including the names and addresses of local distributors of required supplies.
- .3 Submit three sets of the following items of manufacturer's literature:
  - .1 Technical data sheets for each item used for the project.
  - .2 Service and parts manuals and schedules.
  - .3 Name of local representative to be contacted in the event of need of field service or consultation.

**1.7 EXTRA MATERIALS**

- .1 Provide special tools required for accessing, assembly/disassembly or removal for toilet and bath accessories in accordance with closeout procedures of Division 01.
- .2 Deliver special tools to Owner.

**1.8 WARRANTY**

- .1 Provide a warranty for mirrors in accordance with General Conditions of the Contract, but for five (5) years.

**Part 2 Products**

**2.1 GENERAL**

- .1 Provide accessories as indicated, and including options specified. Model numbers may not reflect all options required.
- .2 Provide stainless steel collars to accommodate semi-recessed mounting of units whose depth exceeds the wall cavity depth.

**2.2 ACCEPTABLE PRODUCTS AND MANUFACTURERS**

- .1 Products are listed in specification with named manufacturer as basis of design. Corresponding equal products from other manufacturers are acceptable, subject to the review and acceptance by Consultant for conformity with requirements.
- .2 In the event of dispute provide specified products.
- .3 Provide products for the work of this Section from a single manufacturer and keyed alike.

**2.3 MATERIALS**

- .1 Galvanized sheet steel: commercial quality to ASTM A526M with ZF001 designation zinc coating, minimum thickness 22 gauge.

- .2 Stainless steel sheet metal: to ASTM A167, Type 304, No. 4 satin finish, minimum thickness 18 gauge, unless specified otherwise.
  - .1 Arrange stainless steel sheet so that grain of finish runs vertically in the finished installation.
- .3 Stainless steel tubing: Type 304, commercial grade, seamless welded, No. 4 satin finish, except where specified otherwise.
- .4 Chrome and nickel plating: to ASTM B456, polished finish except where specified otherwise.
- .5 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.
- .6 Lettering for identification of washroom accessories and operation instructions: silk-screened using international symbols unless otherwise specified.
- .7 Manufacturer's or brand names on face of units not acceptable.
- .8 Sheet steel: to ASTM A653/A653M with ZF001 designation zinc coating.

## 2.4 ACCESSORIES AND FIXTURES

- .1 Mirror:
  - .1 Fixed Mirror (FM):
    - .1 Frame: 18-8, heavy-gauge stainless steel, 19 x 19mm angle with satin finish. One-piece, roll-formed construction forms continuous integral stiffener on all sides. Bevel design on front of angle holds frame tightly against mirror. Corners of mirror frame are heliarc welded, ground and polish smooth. Galvanized steel back is fastened to frame with concealed screws and equipped with integral horizontal hanging brackets near the top and bottom of the mirror for hanging the mirror and to prevent the mirror from pulling away from the wall. Locking devices secure mirror to concealed wall hanger.
    - .2 Mirror: No. 1 quality, 1/4" (6mm) select float glass (standard glass): selected for silvering, electrolytically copper-plated by the galvanic process, and guaranteed for 15 years against silver spoilage. All edges protected by plastic filler strips; back is protected by full-size, shock-absorbing, water-resistant, nonabrasive, 5mm thick polyethylene padding.
    - .3 Concealed Wall Hanger: Galvanized steel construction. Incorporates upper and lower support members, which engage lower backplate louvers to keep bottom of mirror against wall.
    - .4 Size: 610mm (W) X 915mm (H).
    - .5 Acceptable product and manufacturer Bobrick B-290-2436, or approved equal.
  - .2 Coat hook (CH): Satin finish stainless steel. Flange 50 x 50mm; hook is 40 mm high x 20 mm high. Projects 40 mm from wall.
    - .1 Acceptable product: Bobrick model B-76717, or approved equal.

- .3 Semi-recessed waste receptacle (WR): Type 304 Stainless steel all welded construction, satin finish, curved front and radiused corners on formed one-piece seamless removable front panel; waste receptacle liner with bag holder.
  - .1 Acceptable product: Bobrick model B-43644, or approved equal.
- .4 Shelf (SF):
  - .1 18-gauge (1.2mm), type 304 stainless steel, satin finish.
  - .2 405mm long x 125mm wide, 19mm return edge; front edge is hemmed for safety.
  - .3 Brackets are 16-gauge.
  - .4 Acceptable product: Bobrick model B-295 x 16, or approved equal.
- .5 Bench:
  - .1 Water-resistant, ivory colored, 8mm thick solid phenolic.
  - .2 Frame and mounting bracket are type 304 stainless steel and self-locking mechanism.
  - .3 Supports up to 227 kg when properly installed. Seat 560mm wide, projects 400mm from wall.
  - .4 Acceptable product: Bobrick model B5192, or approved equal.
- .6 Shower: 4-piece Multi-Piece Shower system with solid core, reinforced pan
  - .1 Acceptable product: Bestbath model 4LBS4834FB.V2 Left, or approved equal.
    - .1 Drain Location: Left
  - .2 Molded, four-piece gelcoat/ fiberglass shower module
  - .3 “Subway Tile” wall finish, white (standard)
  - .4 Provide flange trim kit for full perimeter of walls (match “Subway Tile” wall finish, white (standard))
  - .5 Accessories:
    - .1 Mixing valve, pressure balanced, lever handle, pre-plumbed tree to supply elbow
    - .2 Soap dish
    - .3 Grab bars
    - .4 No-caulk brass drain
  - .6 Designed and manufacture in compliance with the following standards and codes:
    - .1 A.N.S.I Z124.2 Standards for plastic showers
    - .2 I.P.C. International Plumbing Code
    - .3 U.P.C Uniform Plumbing Code

## 2.5

### FABRICATION

- .1 Fabricate accessories true, square, rigid, free from distortion and defects detrimental to appearance and performance.

- .2 Visible joints, where permitted, shall be straight, accurate, hairline butt joints. Corner joints shall be mitred.
- .3 Weld and grind joints of fabricated components flush and smooth. Exposed welded joints shall not be visible to the unassisted eye. Use mechanical fasteners only where approved.
- .4 Wherever possible form exposed surfaces from one sheet of stock, free of joints.
- .5 Brake form sheet metal work with 1/16 inch radius bends.
- .6 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- .7 Back paint components where contact is made with building finishes, cementitious materials and dissimilar metals to prevent electrolysis.
- .8 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CSA G164-M1981.
- .9 Shop assemble components and package complete with anchors and fittings.
- .10 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.
- .11 Provide steel anchor plates and components for installation on studding and building framing.

## **2.6 FASTENERS**

- .1 Provide all anchors and fasteners necessary for complete installation of each item.
- .2 Provide fasteners of non-corrosive metal, compatible with adjacent materials as follows:
  - .1 Chemical anchor bolts in hollow masonry.
  - .2 Expansion shields in solid masonry or concrete.
  - .3 Toggle bolts in hollow construction.
- .3 Provide exposed fasteners, where permitted, finished to match adjacent surface finish and countersunk flush with surrounding surface.
- .4 Where accessories are to be mounted to sheet metal, provide minimum 1/8 inch thick full size metal back-up plate drilled and tapped to receive machine screws
  - .1 Exposed plate shall be finished to match adjacent sheet metal surface.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Install fixtures, accessories and other components in accordance with manufacturer's instructions and as specified.
- .2 Refer to manufacturer's instructions for shower installation guidelines

- .3 Coordinate installation with adjacent construction to achieve required edge conditions. Install fully-recessed, frameless accessories flush with finished wall surface.
- .4 Install and secure accessories rigidly in place as follows:
  - .1 Stud walls: install steel back-plate to stud framing prior to plaster or drywall finish.
    - .1 Where specified, provide plate with threaded studs or plugs.
  - .2 Hollow masonry units or existing plaster/drywall: use toggle bolts drilled into cell/wall cavity.
  - .3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.
  - .4 Toilet/shower compartments: use male/female through bolts.
- .5 Use tamper proof screws/bolts for fasteners.
- .6 Fill units with necessary supplies shortly before final acceptance of building.
- .7 Install mirrors in accordance with Section 08 80 50 - Glazing.

### **3.2 LOCATION AND QUANTITY**

- .1 Determine quantities from drawings.
- .2 Locate accessories as indicated. Exact locations will be determined on site.

**END OF SECTION**

**Part 1           General**

**1.1               RELATED WORK SPECIFIED ELSEWHERE**

- .1           Common Work Results - Electrical Section 26 05 00

**1.2               REFERENCES**

- .1           Canadian Standards Association (CSA)
  - .1           CSA C22.6 No. 46-M1988 (R2011), Electric Air-Heaters.
- .2           Underwriters' Laboratories
  - .1           UL 1042 (2009), Electric Baseboard Heating Equipment.

**1.3               MATERIALS**

- .1           Provide only new equipment and materials, without blemish or defect, bearing Canadian Standards Association or Authorized Electrical Inspection Department labels, and subject to the approval of the NRC Departmental Representative.
- .2           After a contract is awarded, utilize alternative methods and/or materials only after receiving the NRC Departmental Representative's approval.

**1.4               SHOP DRAWINGS AND PRODUCT DATA**

- .1           Submit shop drawings and product data in accordance with Section 01 10 00.

**Part 2           Products**

**2.1               Wall Mounted Heater**

- .1           120V, single phase, wattage as shown on drawing.
- .2           White in colour.
- .3           Complete with thermostat.
- .4           Standard of acceptance: Reznor EHL series or approved equal.

**Part 3           Execution**

**3.1               INSTALLATION**

- .1           Install in location shown on drawing.

**END OF SECTION**

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**1 REFERENCES**

- .1 Perform all work to meet or exceed the requirements of the Canadian Electrical Code, CSA Standard C22.1 - (latest edition).
- .2 Consider CSA Electrical Bulletins in force at time of tender submission, while not identified and specified by number in this Division, to be forming part of related CSA Part II standard.
- .3 Do overhead and underground systems in accordance with CSA C22.3 except where specified otherwise.
- .4 Where requirements of this specification exceed those of above mentioned standards, this specification shall govern.
- .5 Notify the NRC Departmental Representative as soon as possible when requested to connect equipment supplied by NRC which is not CSA approved.
- .6 Refer to Sections 01 10 00 & 01 35 30.

**2 PERMITS AND FEES**

- .1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.
- .2 Pay all fees required for the performance of the work.

**3 START-UP**

- .1 Instruct the NRC Departmental Representative and operating personnel in the operation, care and maintenance of equipment supplied under this contract.

**4 INSPECTION AND FEES**

- .1 Furnish a Certificate of Acceptance from the Authorized Electrical Inspection Department on completion of work.
- .2 Request and obtain Special Inspection approval from the Authorized Electrical Inspection Department for any non-CSA approved control panels or other equipment fabricated by the contractor as part of this contract.
- .3 Pay all fees required for inspections.

**5 OPERATION & MAINTENANCE (O&M) MANUALS**

- .1 O&M manuals to include but not limited to
  - .1 Letter of warranty
  - .2 ESA inspection certificate
  - .3 Fire alarm ventilation report
  - .4 Updated panel schedule c/w circuit breaker size



- .5 Shop drawings
- .6 As-builts
- .7 Load balancing report
- .8 Mechanical equipment start up reports
- .9 Seismic review letter
- .2 Refer to 00 10 00 for additional information.

## **6 FINISHES**

- .1 Shop finish metal enclosure surfaces by removal of rust and scale, cleaning, application of rust resistant primer inside and outside, and at least two coats of finish enamel.
  - .1 Outdoor electrical equipment "equipment green" finish to EEMAC Y1-1-1955.
  - .2 Indoor switchgear and distribution enclosures light grey to EEMAC 2Y-1-1958.
- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

## **7 ACOUSTICAL PERFORMANCE**

- .1 In general provide equipment producing minimal sound levels in accordance with the best and latest practices established by the electrical industry.
- .2 Do not install any device or equipment containing a magnetic flux path metallic core, such as gas discharge lamp ballasts, dimmers, solenoids, etc., which are found to produce a noise level exceeding that of comparable available equipment.

## **8 EQUIPMENT IDENTIFICATION**

- .1 Identify with 3mm (1/8") Brother, P-Touch non-smearing tape, or an alternate approved by the NRC Departmental Representative, all electrical outlets shown on drawings and/or mentioned in the specifications. These are the lighting switches, exit signs, recessed and surface mounted receptacles such as those in offices and service rooms and used to plug in office equipment, telecommunication equipment or small portable tools. Indicate only the source of power (Ex. for a receptacle fed from panel L32 circuit #1: "L32-1").
- .2 P-Touch label to be:
  - .1 Black letters on a white background for normal power circuits.
  - .2 Black letters on a yellow background for emergency power circuits.
  - .3 White letters on a red background for fire alarm device.
- .3 Light fixtures are the only exceptions for electrical equipment identification (except as noted in 7.13 below). They are not to be identified.
- .4 Identify with lamicaid nameplates all electrical equipment shown on the drawings and/or mentioned in the specification such as motor control centers, switchgear, splitters, fused switches, isolation switches, motor starting switches, starters, panelboards, transformers, high voltage cables, industrial type receptacles, junction boxes, control panels, etc., regardless of whether or not the electrical equipment was furnished under this section of the specification.

- .5 Coordinate names of equipment and systems with other Divisions to ensure that names and numbers match.
- .6 Wording on lamicoïd nameplates to be approved by the NRC Departmental Representative prior to fabrication.
- .7 Provide two sets of lamicoïd nameplates for each piece of equipment; one in English and one in French.
- .8 Lamicoïd nameplates shall identify the equipment, the voltage characteristics and the power source for the equipment. Example: A new 120/240 volt single phase circuit breaker panelboard, L16, is fed from panelboard LD1 circuit 10.

"PANEL L16  
120/240 V  
FED FROM LD1-10"

PANNEAU L16  
120/240 V  
ALIMENTE PAR LD1-10
- .9 Provide warning labels for equipment fed from two or more sources - "DANGER MULTIPLE POWER FEED" black letters on a yellow background. These labels are available from NRC's Facilities Maintenance group in building M-19.
- .10 Lamicoïd nameplates shall be rigid lamicoïd, minimum 1.5 mm (1/16") thick with:
  - .1 Black letters engraved on a white background for normal power circuits.
  - .2 Black letters engraved on a yellow background for emergency power circuits.
  - .3 White letters engraved on a red background for fire alarm equipment.
- .11 For all interior lamicoïd nameplates, mount nameplates using two-sided tape.
- .12 For all exterior lamicoïd nameplates, mount nameplates using self-tapping 2.3 mm (3/32") dia. slot head screws - two per nameplate for nameplates under 75 mm (3") in height and a minimum of 4 for larger nameplates. Holes in lamicoïd nameplates to be 3.7 mm (3/16") diameter to allow for expansion of lamicoïd due to exterior conditions.
  - .1 No drilling is to be done on live equipment.
  - .2 Metal filings from drilling are to be vacuumed from the enclosure interiors.
- .13 All lamicoïd nameplates shall have a minimum border of 3 mm (1/8"). Characters shall be 9 mm (3/8") in size unless otherwise specified.
- .14 Identify lighting fixtures which are connected to emergency power with a label "EMERGENCY LIGHTING/ÉCLAIRAGE D'URGENCE", black letters on a yellow background. These labels are available from NRC's Facilities Maintenance group in building M-19.
- .15 Provide neatly typed updated circuit directories in a plastic holder on the inside door of new panelboards.
- .16 Carefully update panelboard circuit directories whenever adding, deleting, or modifying existing circuitry.

- .17 Identify molded case breaker with lamicoïd nameplate.

**9 WIRING IDENTIFICATION**

- .1 Unless otherwise specified, identify wiring with permanent indelible identifying markings, using either numbered or coloured plastic tapes on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.

**10 CONDUIT AND CABLE IDENTIFICATION**

- .1 All new conduits to be factory painted, colour-coded EMT, type as follows:
- .1 Fire alarm – red conduit
  - .2 Emergency power circuits – yellow conduit
  - .3 Voice/data – blue conduit
  - .4 Gas detection system – purple conduit
  - .5 Building Automation system – orange conduit
  - .6 Other base building low voltage control system – white conduit
  - .7 Security system – green conduit
  - .8 Research center control system – black conduit
- .2 Apply paint to the covers of junction boxes and condulets of existing conduits as follows:
- .1 Fire alarm – red
  - .2 Emergency power circuits – yellow
  - .3 Voice/data – blue
  - .4 Gas detection system – purple
  - .5 Building Automation system – orange
  - .6 Other base building low voltage control system - white
  - .7 Security system – green
  - .8 Research center control system - black
- .3 For system running with cable, half-lap wrap with dedicated coloured PVC tape to 100 mm width, tape every 5 m and both sides where cable penetrates a wall.
- .4 All other systems to follow site instruction from NRC departmental representative.

**11 MANUFACTURER'S & APPROVALS LABELS**

- .1 Ensure that manufacturer's registration plates are properly affixed to all apparatus showing the size, name of equipment, serial number, and all information usually provided, including voltage, cycle, phase and the name and address of the manufacturer.
- .2 Do not paint over registration plates or approval labels. Leave openings through insulation for viewing the plates. Contractor's or sub-contractor's nameplate not acceptable.

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**12                    WARNING SIGNS AND PROTECTION**

- .1     Provide warning signs, as specified or to meet requirements of Authorized Electrical Inspection Department and NRC Departmental Representative.
- .2     Accept the responsibility to protect those working on the project from any physical danger due to exposed live equipment such as panel mains, outlet wiring, etc. Shield and mark all live parts with the appropriate voltage. Caution notices shall be worded in both English and French.

**13                    LOAD BALANCE**

- .1     Measure phase current to new panelboards with normal loads operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes, and revise panelboard schedules.
- .2     Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

**14                    MOTOR ROTATION**

- .1     For new motors, ensure that motor rotation matches the requirements of the driven equipment.
- .2     For existing motors, check rotation before making wiring changes in order to ensure correct rotation upon completion of the job.

**15                    GROUNDING**

- .1     Thoroughly ground all electrical equipment, cabinets, metal supporting frames, ventilating ducts and other apparatus where grounding is required in accordance with the requirements of the latest edition of the Canadian Electrical Code Part 1, C.S.A. C22.1 and corresponding Provincial and Municipal regulations. Do not depend upon conduits to provide the ground circuits.
- .2     Run separate green insulated stranded copper grounding conductors in all electrical conduits including those feeding toggle switches and receptacles.

**16                    TESTS**

- .1     Provide any materials, equipment and labour required and make such tests deemed necessary to show proper execution of this work, in the presence of the NRC Departmental Representative.
- .2     Correct any defects or deficiencies discovered in the work in an approved manner at no additional expense to the Owner.
- .3     Megger all branch circuits and feeders using a 600V tester for 240V circuits and a 1000V tester for 600V circuits. If the resistance to ground is less than permitted by Table 24 of the Code, consider such circuits defective and do not energize.
- .4     The final approval of insulation between conductors and ground, and the efficiency of the grounding system is left to the discretion of the local Electrical Inspection Department.

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**17 COORDINATION OF PROTECTIVE DEVICES**

- .1 Ensure circuit protective devices such as overcurrent trips, fuses, are installed to values and settings as indicated on the Drawings.

**18 WORK ON LIVE EQUIPMENT & PANELS**

- .1 NRC requires that work be performed on non-energized equipment, installation, conductors and power panels. For purposes of quotation assume that all work is to be done after normal working hours and that equipment, installation, conductors and power panels are to be de-energized when worked upon.
- .2 Coordinate all shutdowns with the NRC departmental representative. High voltage (more than 1KV) grounding must be provided by certified electrician.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED WORK SPECIFIED ELSEWHERE**

- .1 Common Work Results - Electrical Section 26 05 00

**1.2 MATERIALS**

- .1 Provide only new equipment and materials, without blemish or defect, bearing Canadian Standards Association or Authorized Electrical Inspection Department labels, and subject to the approval of the NRC Departmental Representative.
- .2 After a contract is awarded, utilize alternative methods and/or materials only after receiving the NRC Departmental Representative's approval.

**Part 2 Products**

**2.1 BUILDING WIRES AND GENERAL REQUIREMENTS**

- .1 Conductor material for branch circuit wiring and grounding:
  - .1 Stranded copper.
  - .2 Neutral wire: continuous throughout its length without breaks.
  - .3 Separate insulated green grounding conductors in all electrical conduits.
  - .4 All wire and cable insulation shall meet the C.S.A. Standards for the types and services hereinafter specified. Colours as per section 4-036 of Electrical Code.
  - .5 Unless otherwise specified, use wire and cable types as follows:
    - .1 Type R90 XLPE cross-link polyethylene stranded for applications using wires sized No. 8 and larger.
    - .2 Type T90 stranded for applications using wires sized No. 10 and smaller.
    - .3 For fire alarm wiring refer to Section 283100.
    - .4 Approved heat resistant wire for wiring through and at lighting and heating fixtures. Where insulation types are shown on the drawings other types shall not be used unless the specification is more restrictive.
  - .6 Use stranded wire no smaller than No. 12 AWG for lighting and power and no smaller than No. 16 AWG for control wiring.
  - .7 Conductors shall be soft copper properly refined and tinned having a minimum conductivity of 98%.

**Part 3 Execution**

**3.1 BUILDING WIRES**

- .1 Install building wires as follows:
  - .1 Make joints, taps and splices in approved boxes with solderless connectors. Joints and/or splices are not acceptable inside a panelboard.
  - .2 Ensure the lugs accommodate all the strands of the conductor.

- .3 Replace any wire or cable showing evidence of mechanical injury.
- .4 Use No. 10 AWG for branch circuit wiring extending more than 30 m (100 ft.) to farthest outlet from panel.
- .5 Circuit numbers indicated on the drawing are intended as a guide for the proper connection of multi-wire circuits at the panel.
- .6 Take care to keep the conductors free from twisting.
- .7 Use an approved lubricant for pulling in conduit.
- .8 Leave sufficient slack on all runs to permit proper splicing and connection of electrical devices.
- .9 Branch circuit wiring of 120 volt applications to be multi-wire utilizing common neutrals. Under no condition shall any switch break a neutral conductor.
- .10 Provide and install an approved fire- retardant wrap or coating for PVC jacketed cables installed in a grouped configuration of two or more.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED WORK SPECIFIED ELSEWHERE**

- .1        Common Work Results - Electrical Section 26 05 00

**1.2                MATERIALS**

- .1        Provide only new equipment and materials, without blemish or defect, bearing Canadian Standards Association or Authorized Electrical Inspection Department labels, and subject to the approval of the NRC Departmental Representative.
- .2        After a contract is awarded, utilize alternative methods and/or materials only after receiving the NRC Departmental Representative's approval.

**Part 2            Products**

**2.1                WIRE AND BOX CONNECTORS**

- .1        Pressure type wire connectors sized to fit conductors.

**2.2                WIRING TERMINATIONS**

- .1        Provide first grade wire and cable connectors suitable for the service on which they are used and install them in accordance with the latest trade practice.
- .2        Provide high quality extruded copper-free aluminium (0.4% or less) connectors for single and multi conductor cable. Steel and then zinc plated connectors for multi conductor cables.
- .3        When used in hazardous area, connectors should be certified for such location in Class, Division and Group.
- .4        For large conductor sizes, use bolted or compression solderless type connectors.
- .5        Use high temperature connectors and insulation on all connections of high temperature conductors.
- .6        Where connector types are called for on the drawings or in the specification, do not use other types.
- .7        Lugs, terminals, screws used for termination of wiring to be suitable for copper conductors.



**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Install stress cones, terminations, and splices in accordance with manufacturer's instructions.
- .2 Bond and ground as required [to CSA C22.2No.41].

**END OF SECTION**

**Part 1 General**

**1.1 RELATED WORK SPECIFIED ELSEWHERE**

- .1 Common Work Results - Electrical Section 26 05 00

**1.2 MATERIALS**

- .1 Provide only new equipment and materials, without blemish or defect, bearing Canadian Standards Association or Authorized Electrical Inspection Department labels, and subject to the approval of the NRC Departmental Representative.
- .2 After a contract is awarded, utilize alternative methods and/or materials only after receiving the NRC Departmental Representative's approval.

**Part 2 Products**

**2.1 FITTINGS**

- .1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.
- .2 Steel coupling for EMT.
- .3 Fittings for liquid-tight flexible conduits shall be liquid-tight connectors.
- .4 Provide expansion couplings for all conduits running in slabs through expansion joints. These shall be the type approved for use in concrete with a bonding conductor.
- .5 Factory bends are not permitted to be modified. Ensure conduit bends other than factory bends are made with an approved bender. Making offsets and other bends by cutting and rejoining factory bends are not permitted.

**2.2 OUTLET BOXES**

- .1 Size boxes in accordance with CSA-C22.
- .2 Unless otherwise specified, provide galvanized steel outlet boxes at least 40mm (1-1/2") deep, single or ganged style, of proper size to accommodate devices used and shall be equipped with covers as necessary of the type designed for the specified fittings. Pull boxes shall be steel and shall be galvanized or painted to prevent rusting. For lighting fixture outlets, use 100mm (4") octagon boxes.
- .3 Equip with plaster rings for flush mounting devices in finished walls.
- .4 Blank cover plates for boxes without wiring devices.
- .5 Equip with centre fixture studs for light fixtures.
- .6 Use cast boxes where indicated and for surface mounted wiring. In areas above hung ceilings where appearance is not significant, pressed steel surface boxes may be used.

- .7 Supply all outlet boxes and pull boxes sized according to code requirements unless specified otherwise on the drawings.

### **2.3 SUPPORT HARDWARE**

- .1 Use 10mm (3/8") threaded rod for suspended unistrut and conduit.
- .2 Unless otherwise specified, use 41mm x 41mm (1-5/8" x 1-5/8") galvanized steel unistrut for conduit support systems.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Install outlet boxes as follows:
- .1 Support boxes independently of connecting conduits.
  - .2 Make necessary mounting adjustments to the outlet to match interior finish.
  - .3 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of construction material.
  - .4 Where more than one conduit enters a switch or receptacle box on the same side, provide a 100mm (4") minimum square box with a suitable plaster ring.
  - .5 Location and appearance to be to the NRC Departmental Representative's approval.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED WORK SPECIFIED ELSEWHERE**

- .1 Common Work Results - Electrical Section 26 05 00

**1.2 MATERIALS**

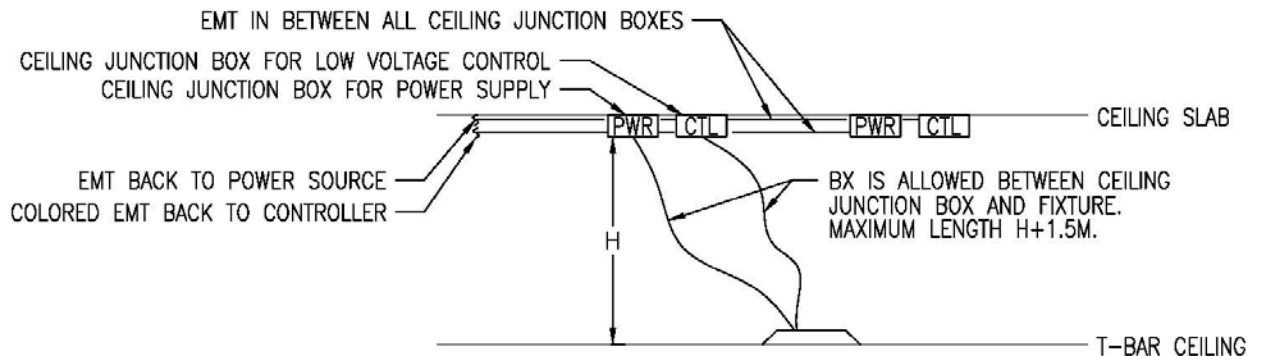
- .1 Provide only new equipment and materials, without blemish or defect, bearing Canadian Standards Association or Authorized Electrical Inspection Department labels, and subject to the approval of the NRC Departmental Representative.
- .2 After a contract is awarded, utilize alternative methods and/or materials only after receiving the NRC Departmental Representative's approval.

**Part 2 Products**

**2.1 RACEWAYS**

- .1 General:
  - .1 Unless otherwise noted, all wires to run inside raceways, either in ceiling space, open space or surface mounted.
- .2 Conduit:
  - .1 Each length of conduit to be new and bear the CSA Stamp of Approval.
  - .2 Conduit, unless otherwise noted, to be EMT, no smaller than 16mm (1/2").
  - .3 Conduit to be coloured as required for systems described in section 260500.9.
- .3 Bushings and Connectors:
  - .1 Insulated type, with the insulation an integral part of the fitting.
- .4 Conduit Fastening:
  - .1 One hole malleable iron straps to secure surface conduits. Two hole straps for conduits larger than 50mm (2").
  - .2 Beam clamps to secure conduits to exposed steel work.
  - .3 Channel type supports for two or more conduits.
- .5 Pull Cord:
  - .1 Polypropylene cord in empty conduit.
- .6 Unless specifically called for on the drawings, do not use flexible conduits but it is recognized that there may be applications where this material will be useful, such as equipment connections, etc. In such cases, obtain permission for its use from the NRC Departmental Representative. For tender purposes, assume that flexible conduits will not be permitted unless specifically called for on the drawings or equipment specifications. All flexible conduits for vapour-tight applications shall be liquid-tight flexible conduits (seal-tight).

- .7 Provide expansion couplings for all conduits running in slabs through expansion joints. These shall be the type approved for use in concrete with a bonding conductor.
- .8 Use AC90 (BX) cable **only** under the following conditions:
  - .1 Wiring from a junction box to a recessed device, such as lighting fixture, sensor, speaker, BAS control device, etc. in suspended ceilings. Cable length not to exceed straight run from junction box to device plus 1.5 m (5'), or
  - .2 Wiring switches or receptacles in existing or new hollow gypsum partitions, vertical runs only with cable length not to exceed 3.5m (12'), or
  - .3 When specifically called for on drawings or approved in writing by departmental representative.
  - .4 AC90 shall not be used in insulated walls or masonry walls.
  - .5 Only AC90 cable of No. 12 AWG will be accepted for 120V AC circuits.
  - .6 Sample diagram shown as below:



## 2.2 SUPPORT HARDWARE

- .1 Use 10mm (3/8") threaded rod for suspended unistrut and conduit.
- .2 Unless otherwise specified, use 41mm x 41mm (1-5/8" x 1-5/8") galvanized steel unistrut for conduit support systems.

## Part 3 Execution

### 3.1 RACEWAYS

- .1 Install raceways as follows:
  - .1 Rigidly supported.
  - .2 Workmanlike manner.
  - .3 Maintain maximum headroom.
  - .4 Concealed in finished area.
  - .5 Surface-mounted in open area.
  - .6 Do not pass conduits through structural members except as indicated.
  - .7 Parallel to or at right angles to the building lines.

- .8 Thoroughly ream all conduits at ends and terminate with appropriate locknuts and bushings.
- .9 Cause minimum interference in spaces through which they pass.
- .10 Plug or cap conduit during construction to protect from dust, dirt or water.
- .11 Unless specifically indicated on drawings or with the permission of the NRC Departmental Representative, do not cast conduits in concrete.
- .12 Dry conduits out before installing wire.
- .13 Mechanically bend conduit of any size. Bend conduit cold.
- .14 Do not cut or modify prefabricated bends.
- .15 PVC conduit as indicated.
- .16 Function and appearance to be to the NRC Departmental Representative's approval.
- .17 Seal conduit and cable openings in fire- rated walls and floors with an approved fire stop material.
- .18 Seal conduit and cable openings in exterior walls with a weatherproof silicone sealant.
- .19 Paint exposed conduits and boxes to match existing wall / ceiling except the colored EMT specified in 260500.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED WORK**

- .1 Motors and controls to Sections 26 22 19, 26 29 03 & 26 29 10.

**1.2 MATERIALS**

- .1 Provide only new equipment and materials, without blemish or defect, bearing Canadian Standards Association or Authorized Electrical Inspection Department labels, and subject to the approval of the NRC Departmental Representative.
- .2 After a contract is awarded, utilize alternative methods and/or materials only after receiving the NRC Departmental Representative's approval.

**1.3 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 10 00.

**1.4 IDENTIFICATION**

- .1 Identification as per Section 26 05 00.

**Part 2 Products**

**2.1 WIRING DEVICES**

- .1 Switches:
  - .1 Specification grade, shallow body, designed to withstand high inductive fluorescent loads CSA C22.2 No. 55.
  - .2 Number of poles as indicated.
  - .3 Captive mounting screws, quiet safe mechanical action with rust-proofed mounting strap and silver alloy contact points.
  - .4 Toggle actuated, colour white unless otherwise indicated.
  - .5 Brass screw terminals rated 20 AMP at 125 volt.
  - .6 Standard of acceptance: Hubbell, Leviton.
- .2 LED occupancy sensor (wall mounted):
  - .1 120V, suitable for use with installed light fixture.
  - .2 Rated for 600W LED.
  - .3 Can be set to Manual-ON/Automatic-OFF or Auto-ON/Auto-OFF.
  - .4 Adjustable delayed-OFF time.
  - .5 Suitable for use in "3-way" configuration where indicated.
  - .6 Fire year warranty.
  - .7 Standard of acceptance: Hubbell, Leviton, Philips or equivalent approved by NRC Departmental Representative.

- .3 LED occupancy sensor (ceiling mounted):
  - .1 120V, suitable for use with installed light fixture.
  - .2 360° coverage pattern.
  - .3 No minimum load requirements.
  - .4 Adjustable delayed-OFF time.
  - .5 No field calibration or sensitivity adjustments required.
  - .6 Fire year warranty.
  - .7 Standard of acceptance: Philips LRM2377 or equivalent approved by NRC Departmental Representative.
- .4 Receptacles:
  - .1 Duplex type, CSA type 5-15R, 125 volt, 15A, U ground, specification grade with the following features:
    - .1 Flush type with parallel blade slots.
    - .2 Double-wiping contacts.
    - .3 Double-grounding terminals.
    - .4 Break-off feature for separate feeds.
    - .5 One piece body, colour white unless otherwise indicated.
  - .2 Special receptacles with ampacity and voltage as indicated.
  - .3 Receptacles of one manufacturer throughout the project.
- .5 Cover Plates:
  - .1 Cover plates for wiring devices.
  - .2 Smooth white plastic for wiring devices mounted in flush-mounted outlet box.
  - .3 Sheet metal cover plates for wiring devices mounted in surface-mounted outlet box.
  - .4 Multi-outlet covers as indicated.
- .6 Splitters, Junction Boxes & Cabinets:
  - .1 Sheet metal enclosure, welded corners and formed cover, provided as required.
  - .2 Splitter to be 3 phase, 4 wires, minimum 225A, voltage as indicated. Refer to drawing for quantity of the lugs. Allow minimum two extra lugs for future use, size to match the maximum rating of the existing wire.

### **Part 3 Execution**

#### **3.1 LOCATION OF OUTLETS**

- .1 The number and general location of outlets for lighting, power, telephones, etc., are to be as shown on the drawings. Install all outlets accurately and uniformly with respect to building details. When centering outlets, make allowance for overhead pipes, ducts, etc. and for variations in wall or ceiling finish, window trim, etc. Reinstall incorrectly installed outlets at no cost to the Owner. Make field power and control connections as indicated.



- .2 The location of all outlets as shown on the plans are approximate and are subject to change, up to 3m (10') without extra cost or credit provided the information is given prior to the installation of the outlet.
- .3 Unless otherwise specified, locate light switches on latch side of doors. Determine the direction of all door swings from the architectural drawings or on site, not from the electrical drawings.
- .4 Locate roof top maintenance receptacle within 7.5m of the rooftop electrical equipment.

### 3.2 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 indicated verify before proceeding with installation.
- .3 Generally, locate outlets as follows: (except those otherwise shown on the drawings):
  - .1 Local switches 1.2m (3'-11") to centreline.
  - .2 Wall receptacles 400mm (1'-4") to centreline.
  - .3 Clock receptacles 2.4m (8'-0") to centreline.
  - .4 Lighting panels 1.8m (6'-0") to top.
  - .5 Telephone and data communications outlet 400mm (1'-4") to centreline.
  - .6 Fan coil speed control switch 1.2m (3'-11") to centreline.
  - .7 Roof top maintenance receptacle: 750mm above the finished roof.

### 3.3 WIRING DEVICES

- .1 Install wiring devices as follows:
  - .1 Where more than one local device is shown at one location, they are to be set under one cover plate.
  - .2 Install single throw switches with handle in "up" position when switch closed.
  - .3 Devices in gang type outlet box when more than one device is required in one location.
  - .4 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
  - .5 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.
  - .6 Install metal barriers where required.
  - .7 Remove insulation carefully from ends of conductors and connect wiring as required.
  - .8 Bond and ground as required.

### 3.4 SPLITTERS AND DEVICES

- .1 Installation of splitters, junction boxes, pull boxes & cabinets as follows:

- .1 Mount plumb, true and square to the building lines.
- .2 Install in inconspicuous but accessible locations.
- .3 Install pull boxes so as not to exceed 30 m (100') of conduit run between boxes or as indicated.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED WORK SPECIFIED ELSEWHERE**

- .1 Common Work Results - Electrical Section 26 05 00

**1.2 MATERIALS**

- .1 Provide only new equipment and materials, without blemish or defect, bearing Canadian Standards Association or Authorized Electrical Inspection Department labels, and subject to the approval of the NRC Departmental Representative.
- .2 After a contract is awarded, utilize alternative methods and/or materials only after receiving the NRC Departmental Representative's approval.

**1.3 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 10 00.
- .2 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by NRC Departmental Representative.

**Part 2 Products**

**2.1 FINISHES**

- .1 Baked enamel finish.
  - .1 Metal surfaces of luminaire housing and reflectors finished with high gloss powder coated baked enamel applied after fabrication to give smooth uniform appearance, free from pinholes or defects.

**2.2 METAL SURFACES**

- .1 Metal surfaces to be minimum 20 gauge steel.

**2.3 LIGHT CONTROL DEVICES**

- .1 All luminaire lenses to be injection moulded clear virgin acrylic unless otherwise noted.

**2.4 LUMINAIRES**

- .1 LED
  - .1 120V, 1140-1220mm long, LED linear strip, suitable for surface or suspended mounting.
  - .2 5-year warranty.
  - .3 Suitable for dimming
  - .4 Rated to deliver L70 performance for 100,000 hours.
  - .5 3500k colour temperature, minimum 3000 lumen output.
  - .6 Standard of acceptance: Philips Fluxstream FSS-4-30L-835-UNV.

- .2 LED Pot light
  - .1 120V, 180mm round shape, surface mounted. Rated for wet location.
  - .2 5-year warranty.
  - .3 3500k colour temperature, 82 CRI, minimum 1500 lumen output.
  - .4 Standard of acceptance: Philips S7-R-80-35K.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Supply and install all lighting fixtures complete with lamps, switches, supports, etc., to provide a complete working lighting system.
- .2 Locate and install luminaires as indicated.

**3.2 LUMINAIRE SUPPORTS**

- .1 For suspended ceiling installations support each luminaire, including exit lights and pot lights, independently of the ceiling support system with separate chains at each end. No. 80 steel sash chain minimum.
- .2 Unless otherwise specified support fluorescent luminaires mounted in continuous rows once every 3.6 m (12').

**3.3 WIRING**

- .1 Connect luminaires to lighting circuits directly for exit fixtures and exterior floodlights.

**3.4 LUMINAIRE ALIGNMENT**

- .1 Align luminaires mounted in continuous rows to form a straight uninterrupted line.
- .2 Align luminaires mounted individually parallel or perpendicular to building grid lines as shown on drawing.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop drawings:
  - .1 Drawings to show:
    - .1 Mounting arrangements.
    - .2 Operating and maintenance clearances.
  - .2 Drawings and product data accompanied by:
    - .1 Detailed drawings of bases, supports, and anchor bolts.
    - .2 Acoustical sound power data, where applicable.
    - .3 Points of operation on performance curves.
    - .4 Manufacturer to certify current model production.
    - .5 Certification of compliance to applicable codes.
  - .3 In addition to transmittal letter referred to in Section 00 10 00 – General Instructions: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

### **1.3 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 00 10 00 – General Instructions.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.
  - .1 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
  - .2 Operation data to include:
    - .1 Control schematics for systems including environmental controls.
    - .2 Description of systems and their controls.
    - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
    - .4 Operation instruction for systems and component.
    - .5 Description of actions to be taken in event of equipment failure.
    - .6 Valves schedule and flow diagram.
    - .7 Colour coding chart.

- .3 Maintenance data to include:
  - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
  - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .4 Performance data to include:
  - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
  - .2 Equipment performance verification test results.
  - .3 Special performance data as specified.
  - .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
- .5 Approvals:
  - .1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
  - .2 Make changes as required and re-submit as directed by Departmental Representative.
- .6 Additional data:
  - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .7 Site records:
  - .1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
  - .2 Transfer information to reproducibles, revising reproducibles to show work as actually installed.
  - .3 Use different colour waterproof ink for each service.
  - .4 Make available for reference purposes and inspection.
- .8 As-Built drawings:
  - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
  - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
  - .3 Submit to Departmental Representative for approval and make corrections as directed.
  - .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
  - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .9 Submit copies of as-built drawings for inclusion in final TAB report.

#### **1.4 MAINTENANCE MATERIAL SUBMITTALS**

- .1 Submit in accordance with Section 00 10 00 – General Instructions.
- .2 Furnish spare parts as follows:
  - .1 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.
- .3 Provide one set of special tools required to service equipment as recommended by manufacturers.
- .4 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 00 10 00 – General Instructions and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 00 10 00 – General Instructions.
- .5 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 00 10 00 – General Instructions.

### **PART 2 - PRODUCTS**

#### **2.1 NOT USED**

- .1 Not used.

### **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 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.

### **3.2 PAINTING REPAIRS AND RESTORATION**

- .1 Do painting in accordance with Section 09 91 00 – Painting.
- .2 Prime and touch up marred finished paintwork to match original.
- .3 Restore to new condition, finishes which have been damaged.

### **3.3 SYSTEM CLEANING**

- .1 Clean interior and exterior of all system. Vacuum interior of ductwork.

### **3.4 DEMONSTRATION**

- .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Trial usage to apply to following equipment and systems:
  - .1 Exhaust system.
- .3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .5 Instruction duration time requirements as specified in appropriate sections.
- .6 Departmental Representative will record these demonstrations on video tape for future reference.

### **3.5 CLEANING**

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



in accordance with Section 00 10 00 – General Instructions.

- .3 Waste Management: separate waste materials for reuse in accordance with Section 00 10 00 – General Instructions.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### **3.6 PROTECTION**

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.

### **1.2 REFERENCES**

- .1 National Fire Prevention Association (NFPA)
  - .1 NFPA 13-2007, Standard for the Installation of Sprinkler Systems.
  - .2 NFPA 25-2008, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and data sheets, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
  - .2 Indicate:
    - .1 Materials.
    - .2 Finishes.
    - .3 Method of anchorage
    - .4 Number of anchors.
    - .5 Supports.
    - .6 Reinforcement.
    - .7 Assembly details.
    - .8 Accessories.
- .4 Test reports:
  - .1 Submit certified test reports for wet pipe fire protection sprinkler systems from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
- .5 Certificates:
  - .1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .6 Manufacturers' Instructions:

- .1 Provide manufacturer's installation instructions.
- .7 Field Quality Control Submittals:
  - .1 Manufacturer's Field Reports: manufacturer's field reports specified.

#### 1.4 CLOSEOUT SUBMITTALS

- .1 Provide operation, maintenance and engineering data for incorporation into manual specified in Section 00 10 00 – General Instructions in accordance with ANSI/NFPA 20.
- .2 Manufacturer's Catalog Data, including specific model, type, and size for:
  - .1 Pipe and fittings.
  - .2 Sprinkler heads.
  - .3 Pipe hangers and supports.
- .3 Drawings:
  - .1 Sprinkler heads and piping system layout.
    - .1 Prepare 760mm by 1050mm detail working drawings of system layout in accordance with NFPA 13, "Working Drawings (Plans)".
    - .2 Show data essential for proper installation of each system.
    - .3 Show details, plan view, elevations, and sections of systems supply and piping.
    - .4 Show piping schematic of systems supply, devices, valves, pipe, and fittings.
- .4 Field Test Reports:
  - .1 Preliminary tests on piping system.
- .5 Records:
  - .1 As-built drawings of each system.
    - .1 After completion, but before final acceptance, submit complete set of as-built drawings of each system for record purposes.
    - .2 Submit 760mm by 1050mm drawings on reproducible Mylar film with title block similar to full size contract drawings.
- .6 Operation and Maintenance Manuals:
  - .1 Provide detailed hydraulic calculations including summary sheet, and Contractors Material and Test Certificate for aboveground piping and other documentation for incorporation into manual in accordance with NFPA 13.

#### 1.5 QUALITY ASSURANCE

- .1 Qualifications:
  - .1 Installer: company or person specializing in wet sprinkler systems with documented experience.
- .2 Supply grooved joint couplings, fittings, valves, grooving tools and specialties from a single manufacturer. Use date stamped castings for coupling housings, fittings, valve bodies, for quality assurance and traceability.

## 1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 00 10 00 – General Instructions and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
  - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Storage and Protection:
  - .1 Store materials indoors.
  - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
- .4 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Section 00 10 00 – General Instructions.

## PART 2 - PRODUCTS

### 2.1 DESIGN REQUIREMENTS

- .1 Design automatic wet pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13, by pipe schedules for light hazard occupancy.
- .2 Include with each system materials and accessories to provide a complete system and ready for use.
- .3 Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed shop drawings.
- .4 Locate sprinkler heads in consistent pattern with lights and air supply diffusers.
- .5 Devices and equipment for fire protection service: ULC approved for use in wet pipe sprinkler systems.
- .6 Design systems for earthquake protection for buildings in seismic zones 3 and 4, and only essential and high risk buildings in seismic zone 2.
- .7 Location of Sprinkler Heads:
  - .1 Locate heads in relation to ceiling and spacing of sprinkler heads not to exceed that permitted by NFPA 13 for light hazard occupancy.
  - .2 Uniformly space sprinklers on branch.
- .8 Water Distribution:
  - .1 Make distribution uniform throughout the area in which sprinkler heads will open.

## 2.2 ABOVE GROUND PIPING SYSTEMS

- .1 Provide fittings for changes in direction of piping and for connections.
  - .1 Make changes in piping sizes through tapered reducing pipe fittings, bushings will not be permitted.
- .2 Perform welding in shop; field welding will not be permitted.

## 2.3 PIPE, FITTINGS AND VALVES

- .1 Pipe:
  - .1 Ferrous: to NFPA 13.
- .2 Fittings and joints to NFPA 13:
  - .1 Ferrous: screwed, welded, flanged or roll grooved.
    - .1 Grooved joints designed with two ductile iron housing segments, pressure responsive gasket, and zinc-electroplated steel bolts and nuts. Cast with offsetting angle-pattern bolt pads for rigidity and visual pad-to-pad offset contact.
  - .2 Provide welded, threaded, grooved-end type fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.
  - .3 Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into pipe when pressure is applied will not be permitted.
  - .4 Rubber gasketed grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.
  - .5 Fittings: ULC approved for use in wet pipe sprinkler systems.
  - .6 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.
  - .7 Side outlet tees using rubber gasketed fittings are not permitted.
  - .8 Sprinkler pipe and fittings: metal.
- .3 Pipe hangers:
  - .1 ULC listed for fire protection services in accordance with NFPA.

## 2.4 SPRINKLER HEADS

- .1 General: to NFPA 13 and ULC listed for fire services.
- .2 Sprinkler Head Type:
  - .1 Type A: upright bronze.
  - .2 Type C: pendant chrome glass bulb type.
- .3 Provide nominal 1.2 cm orifice sprinkler heads.
  - .1 Release element of each head to be of intermediate temperature rating or higher as suitable for specific application.
  - .2 Provide quick-response sprinkler heads.

## **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 datasheet.

### **3.2 INSTALLATION**

- .1 Install, inspect and test to acceptance in accordance with NFPA 13 and NFPA 25.

### **3.3 PIPE INSTALLATION**

- .1 Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings.
- .2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.
- .3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.
- .4 Inspect piping before placing into position.

### **3.4 CONNECTIONS TO EXISTING WATER SUPPLY SYSTEMS**

- .1 Notify Contracting Officer in writing at least 15 days prior to connection date.
- .2 Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure.
- .3 Bolt sleeves around main piping.
- .4 Bolt valve to branch connection. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, without interruption of service.
- .5 Furnish materials required to make connections into existing water supply systems, and perform other incidental labour as required.

### **3.5 FIELD PAINTING**

- .1 Clean, pretreat, prime, and paint new systems including piping, hangers, supports, miscellaneous metalwork, and accessories.

- .2 Apply coatings to clean, dry surfaces, using clean brushes.
- .3 Clean surfaces to remove dust, dirt, rust, and loose mill scale.
- .4 Immediately after cleaning, provide metal surfaces with 1 coat of pretreatment primer applied to minimum dry film thickness of 0.3 ml, and one coat of zinc chromate primer applied to minimum dry film thickness of 1.0 ml.
- .5 Shield sprinkler heads with protective covering while painting is in progress.
- .6 Upon completion of painting, remove protective covering from sprinkler heads.
- .7 Remove sprinkler heads which have been painted and replace with new sprinkler heads.
- .8 Provide primed surfaces with following:
  - .1 Piping in Finished Areas:
    - .1 Provide primed surfaces with 2 coats of paint to match adjacent surfaces.
    - .2 Provide valves and operating accessories with 1 coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil.
    - .3 Provide piping with 50 mm wide red enamel bands spaced at maximum of 6 m intervals throughout piping systems.

### 3.6 FIELD QUALITY CONTROL

- .1 Site Test, Inspection:
  - .1 Perform test to determine compliance with specified requirements in presence of Departmental Representative.
  - .2 Test, inspect, and approve piping before covering or concealing.
  - .3 Preliminary Tests:
    - .1 Hydrostatically test each system at 200 psig for a 2 hour period with no leakage or reduction in pressure.
    - .2 Flush piping with potable water in accordance with NFPA 13.
    - .3 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.
    - .4 Test alarms and other devices.
    - .5 Test water flow alarms by flowing water through inspector's test connection. When tests have been completed and corrections made, submit signed and dated certificate in accordance with NFPA 13.
  - .4 Formal Tests and Inspections:
    - .1 Do not submit request for formal test and inspection until preliminary test and corrections are completed and approved.
    - .2 Submit written request for formal inspection at least 15 days prior to inspection date.
    - .3 Repeat required tests as directed.
    - .4 Correct defects and make additional tests until systems comply with contract requirements.
    - .5 Furnish appliances, equipment, instruments, connecting devices, and personnel for tests.
    - .6 Departmental Representative will witness formal tests and approve

- systems before they are accepted.
- .5 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.

### **3.7 CLEANING**

- .1 Clean in accordance with Section 00 10 00 – General Instructions.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse in accordance with Section 00 10 00 – General Instructions.

**END OF SECTION**



## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.
- .2 Section 23 05 05 - Installation of Pipework.

### **1.2 REFERENCES**

American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)

- .1 ANSI/ASME B16.15-06, Cast Bronze Threaded Fittings, Classes 125 and 250.
  - .2 ANSI/ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.
  - .3 ANSI/ASME B16.22-01, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  - .4 ANSI/ASME B16.24-01, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- .2 ASTM International Inc.
- .1 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .2 ASTM B88M-05, Standard Specification for Seamless Copper Water Tube (Metric).
- .3 American National Standards Institute/American Water Works Association (ANSI)/(AWWA)
- .1 ANSI/AWWA C111/A21.11-07, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .4 Department of Justice Canada (Jus)
- .1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).
- .6 National Research Council (NRC)/Institute for Research in Construction
- .1 NRCC 38728, National Plumbing Code of Canada (NPC) - 2015.
- .7 Transport Canada (TC)
- .1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

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

- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

#### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Section 00 10 00 – General Instructions.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.

### **PART 2 - PRODUCTS**

#### **2.1 PIPING**

- .1 Domestic hot, cold and recirculation systems, within building.
  - .1 Above ground: copper tube, hard drawn, type K, L: to ASTM B88M.

#### **2.2 FITTINGS**

- .1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.
- .2 Cast bronze threaded fittings, Class 125: to ANSI/ASME B16.15.
- .3 Cast copper, solder type: to ANSI/ASME B16.18.
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .5 NPS 1 ½ and smaller: wrought copper to ANSI/ASME B16.22, cast copper to ANSI/ASME B16.18; with 301 stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380kPa.

#### **2.3 JOINTS**

- .1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.
- .2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
- .3 Solder: 95/5 tin copper alloy.
- .4 Teflon tape: for threaded joints.

- .5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM gasket.
- .6 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

## **2.4 BALL VALVES**

- .1 NPS 2 and under, screwed:
  - .1 Class 150.
  - .2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle.
- .2 NPS 2 and under, soldered:
  - .1 To ANSI/ASME B16.18, Class 150.
  - .2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors.

## **PART 3 - EXECUTION**

### **3.1 APPLICATION**

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

### **3.2 INSTALLATION**

- .1 Install in accordance with NPC and local authority having jurisdiction.
- .2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.
- .3 Assemble piping using fittings manufactured to ANSI standards.
- .4 Install DCW piping below and away from HWS and other hot piping so as to maintain temperature of cold water as low as possible.
- .5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

### **3.3 VALVES**

- .1 Isolate equipment, fixtures and branches with ball valves.

### **3.4 PRESSURE TESTS**

- .1 Conform to requirements of Section 21 05 01 - Common Work Results for HVAC.
- .2 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

### **3.5 FLUSHING AND CLEANING**

- .1 Flush entire system for 8 h. Ensure outlets flushed for 2 hours. Let stand for 24 hours, then draw one sample off longest run. Submit to testing laboratory to verify that system is clean copper to Federal] potable water guidelines. Let system flush for additional 2 hours, then draw off another sample for testing.

### **3.6 PRE-START-UP INSPECTIONS**

- .1 Systems to be complete, prior to flushing, testing and start-up.
- .2 Verify that system can be completely drained.
- .3 Ensure that air chambers, expansion compensators are installed properly.

### **3.7 DISINFECTION**

- .1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction.
- .2 Upon completion, provide laboratory test reports on water quality for Departmental Representative approval.

### **3.8 START-UP**

- .1 Timing: start up after:
  - .1 Pressure tests have been completed.
  - .2 Disinfection procedures have been completed.
  - .3 Certificate of static completion has been issued.
- .2 Provide continuous supervision during start-up.
- .3 Start-up procedures:
  - .1 Establish circulation and ensure that air is eliminated.
  - .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
  - .3 Check control, limit, safety devices for normal and safe operation.
- .4 Rectify start-up deficiencies.

### 3.9 PERFORMANCE VERIFICATION

- .1 Scheduling:
  - .1 Verify system performance after pressure and leakage tests and disinfection are completed, and Certificate of Completion has been issued by authority having jurisdiction.
- .2 Procedures:
  - .1 Verify compliance with safety and health requirements.
  - .2 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.
  - .3 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.
- .3 Reports:
  - .1 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

### 3.10 OPERATION REQUIREMENTS

- .1 Co-ordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products with Section 23 05 05 - Installation of Pipework.

### 3.11 CLEANING

- .1 Clean in accordance with Section 00 10 00 – General Instructions.
- .2 Waste Management: separate waste materials for reuse in accordance with Section 00 10 00 – General Instructions.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.
- .2 Section 23 05 05 - Installation of Pipework.

### **1.2 REFERENCES**

- .1 ASTM International Inc.
  - .1 ASTM B 32-08, Standard Specification for Solder Metal.
  - .2 ASTM B 306-02, Standard Specification for Copper Drainage Tube (DWV).
- .2 Canadian Standards Association (CSA International).
  - .1 CSA B67-1972(R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
  - .2 CAN/CSA-B70-06, Cast Iron Soil Pipe, Fittings and Means of Joining.
  - .3 CAN/CSA-B125.3-05, Plumbing Fittings.
- .2 Green Seal Environmental Standards (GSES)
  - .1 Standard GS-36-00, Commercial Adhesives.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and datasheets for adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle in accordance with Section 00 10 00 – General Instructions.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Section 00 10 00 – General Instructions.

## **PART 2 - PRODUCTS**

## 2.1 SUSTAINABLE MATERIAL

- .1 Adhesives and Sealants:
  - .1 Maximum VOC limit 250 g/L to GSES GS-36.

## 2.2 COPPER TUBE AND FITTINGS

- .1 Above ground sanitary and vent Type DWV to: ASTM B306.
  - .1 Fittings.
    - .1 Cast brass: to CAN/CSA-B125.3.
    - .2 Wrought copper: to CAN/CSA-B125.3.
  - .2 Solder: tin-lead, 50:50, type 50A, to ASTM B32.

## 2.3 CAST IRON PIPING AND FITTINGS

- .1 Above ground sanitary and vent: to CAN/CSA-B70.
  - .1 Joints:
    - .1 Hub and spigot:
      - .1 Caulking lead: to CSA B67.
    - .2 Mechanical joints:
      - .1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

## PART 3 - EXECUTION

### 3.1 APPLICATION

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

### 3.2 INSTALLATION

- .1 In accordance with Section 23 05 05 - Installation of Pipework.
- .2 Install in accordance with National Plumbing Code and local authority having jurisdiction.

### 3.3 TESTING

- .1 Hydraulically test to verify grades and freedom from obstructions.

### **3.4 PERFORMANCE VERIFICATION**

- .1 Cleanouts:
  - .1 Ensure accessible and that access doors are correctly located.
  - .2 Open, cover with linseed oil and re-seal.
  - .3 Verify that cleanout rods can probe as far as the next cleanout, at least.
- .2 Test to ensure traps are fully and permanently primed.
- .3 Ensure that fixtures are properly anchored, connected to system and effectively vented.
- .4 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

### **3.5 CLEANING**

- .1 Clean in accordance with Section 00 10 00 – General Instructions.
- .2 Waste Management: separate waste materials for reuse in accordance with Section 00 10 00 – General Instructions.

**END OF SECTION**



**Part 1 General**

**1.1 SUMMARY**

- .1 Section Includes:
  - .1 Materials and installation for plumbing specialties and accessories.

**1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM).
  - .1 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
  - .2 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
- .2 American Water Works Association (AWWA).
  - .1 AWWA C700, Cold Water Meters-Displacement Type, Bronze Main Case.
  - .2 AWWA C701, Cold Water Meters-Turbine Type for Customer Service.
  - .3 AWWA C702-1, Cold Water Meters-Compound Type.
- .3 Canadian Standards Association (CSA International).
  - .1 CSA-B64 Series, Backflow Preventers and Vacuum Breakers.
  - .2 CSA-B79, Floor, Area and Shower Drains, and Cleanouts for Residential Construction.
  - .3 CSA-B356, Water Pressure Reducing Valves for Domestic Water Supply Systems.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .5 Plumbing and Drainage Institute (PDI).
  - .1 PDI-G101, Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
  - .2 PDI-WH201, Water Hammer Arresters Standard.

**1.3 SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.
  - .2 Indicate dimensions, construction details and materials for specified items.
- .2 Shop Drawings:
  - .1 Submit shop drawings to indicate, materials, finishes, method of anchorage, number of anchors, dimensions, color, construction and assembly details.

- .3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .4 Instructions: submit manufacturer's installation instructions.
- .5 Manufacturers' Field Reports: manufacturers' field reports specified.

## **Part 2 Products**

### **2.1 FLOOR DRAINS**

- .1 Type 1, cast iron with integral seepage pan and clamping collar, adjustable heat and nickel bronze strainer, round with 127mm (5in) standard diameter. Coordinate grid and drain model with floor covering, refer to architectural. Install waterless inline drain trap seal to stop drain odors and bugs.

### **2.2 CLEANOUTS**

- .1 Line cleanout: in cast iron pipe with bolted neoprene gasketed cover secured to body with brass bolts, with full size pipe opening. Access shall be made by round stainless steel plate and slotted flat head stainless steel screws.

### **2.3 WATER HAMMER ARRESTORS**

- .1 Stainless steel construction, piston type: Normal operating pressure 35 to 250 PSIG. Spike pressure 1,500 PSIG.

### **2.4 ACCESS DOORS**

- .1 General: 14 GA. (1.7mm) steel, rust resistant, continuous concealed hinge, with positive and self-opening screwdriver operated lock. Doors in tile walls shall be stainless steel and shall suit tile pattern. All other panels shall be prime painted steel. Unless otherwise stated all panel to be 16"x16".

### **2.5 VACUUM BREAKERS**

- .1 Breakers: to CSA-B64 Series, vacuum breaker hose connection.

### **2.6 PIPE ESCUTCHEON**

- .1 Chrome plated brass solid type with set screws.
- .2 Outside diameter shall cover opening or sleeve.

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**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 data sheet.

**3.2 INSTALLATION**

- .1 Install in accordance with latest version of National Plumbing Code of Canada.
- .2 Install in accordance with manufacturer's instructions and as specified.

**3.3 ACCESS DOORS**

- .1 Supply access doors to give access to all valves, cleanouts, strainers, duct access doors, and other similar mechanical work which may need maintenance or repair but which is concealed in inaccessible construction, except as otherwise specified herein or on the drawings.
- .2 Locate access doors in walls and partitions to the Engineer's approval, and arrange mechanical work to suit.
- .3 Group piping and ductwork to ensure the minimum number of access doors is required. Access doors will be installed by the trades responsible for the particular type of construction in which the doors are required.
- .4 Access doors shall be, wherever possible, of a standard size for all applications. Confirm exact dimensions prior to ordering.

**3.4 CLEANOUTS**

- .1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as indicated.

**3.5 INSTALLATION OF PIPE ESCUTCHEON**

- .1 On pipes passing through walls, partitions, floors and ceilings in finished areas.
- .2 Install the plates so that they are tight against the building surface concerned, and ensure that the plates completely cover pipe sleeves and/or openings.
- .3 Where sleeve extends above finished floor, escutcheons or plates shall cover sleeve extension

**3.6 TRAP SEAL PRIMERS**

- .1 Install for all new floor drains.

### 3.7 START-UP

- .1 Timing: start-up only after:
  - .1 Pressure tests have been completed.
  - .2 Disinfection procedures have been completed.
  - .3 Certificate of static completion has been issued.
- .2 Provide continuous supervision during start-up of all equipment.

### 3.8 TESTING AND ADJUSTING

- .1 General:
  - .1 Contractor shall be responsible to verify that all equipment operates as per manufacturer specification to the satisfaction of NRC.
  - .2 Contractor shall be responsible to train NRC staff in the use of all equipment. Exact training schedule to be coordinated with NRC.
- .2 Timing:
  - .1 After start-up deficiencies rectified.
  - .2 After certificate of completion has been issued by authority having jurisdiction.
- .3 Application tolerances:
  - .1 Pressure at fixtures: +/- 20 kPa.
  - .2 Flow rate at fixtures: +/- 20%.
- .4 Adjustments:
  - .1 Verify that flow rate and pressure meet design criteria.
  - .2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.
- .5 Floor drains:
  - .1 Verify operation of trap seal primer.
  - .2 Check operations of flushing features.
  - .3 Check security, accessibility, removeability of strainer.
  - .4 Clean out baskets.
- .6 Access doors:
  - .1 Verify size and location relative to items to be accessed.
- .7 Cleanouts:
  - .1 Verify covers are gas-tight, secure, yet readily removable.
- .8 Water hammer arrestors:
  - .1 Verify proper installation of correct type of water hammer arrester.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.

### **1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.
  - .2 CAN/CSA-B125.3-05, Plumbing Fittings.
  - .3 CAN/CSA-B651-04, Accessible Design for the Built Environment.
- .2 Green Seal Environmental Standards (GSES)
  - .1 Standard GS-36-00, Commercial Adhesives.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and datasheets for washroom fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Indicate fixtures and trim:
  - .1 Dimensions, construction details, roughing-in dimensions.
  - .2 Factory-set water consumption per flush at recommended pressure.
  - .3 For water closets: minimum pressure required for flushing.

### **1.4 CLOSEOUT SUBMITTALS**

- .1 Provide operation and maintenance data for washroom fixtures, for incorporation into manual specified in Section 00 10 00 – General Instructions.
- .2 Include:
  - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
  - .2 Details of operation, servicing, maintenance.
  - .3 List of recommended spare parts.

## 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle in accordance with Section 00 10 00 – General Instructions.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse of pallets, crates, padding and packaging materials in accordance with Section 00 10 00 – General Instructions.

## PART 2 - PRODUCTS

### 2.1 SUSTAINABLE MATERIAL

- .1 Adhesives and sealants: maximum VOC limit 250 g/L to GSES GS-36.

### 2.2 MANUFACTURED UNITS

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.
- .3 Exposed plumbing brass to be chrome plated.
- .4 Number, locations: as indicated on drawings.
- .5 Fixtures in any one location to be product of one manufacturer and of same type.
- .6 Trim in any one location to be product of one manufacturer and of same type.
- .7 Water closets:
  - .1 WC-1: Floor mounted, flush valve.
    - .1 Floor mount elongated rear outlet flushometer valve toilet.
    - .2 Vitreous china
    - .3 High Efficiency, Low Consumption. Operated in the range of 4.2Lpf to 6.0Lpf (1.1gpf to 1.5gpf).
    - .4 Permanent EverClean surface inhibits the growth of stain- and odor-causing bacteria, mold, and mildew on the surface.
    - .5 419mm (16-1/2in) rim height for accessible application.
    - .6 Condensation channel
    - .7 Powerful direct-fed siphon jet action
    - .8 Fully gazed 54mm (2-1/8in) trapway.
    - .9 38mm (1-1/2in) inlet spud.
    - .10 4 bolt caps.
    - .11 Color: white
    - .12 Nominal Dimensions: 752 x 356 x 419mm (29-5/8in x 14in x 16-1/2in).
    - .13 Meets or exceeds the following specifications: ASME A112.19.2 / CSA

- b45.1 FOR Vitreous China Fixtures.
- .14 Seat: Heavy duty open front less cover with EverClean surface.
  - .15 Acceptable Model: American Standard Model Priolo FloWise 16-1/2in Height Elongated Flushometer Toilet, or approved equivalent.
- .8 Water Closet Flush Valves:
- .1 Flush valve: exposed, sensor operated Selectronic Toilet Flush valve for floor-mounted top spud bowls (38mm (1-1/2in). CR-P2 lithium battery powered. 6.0Lpf/1.28gpf. Battery life: 192,000 cycle. Equipped with fully mechanical manual override button that can flush the valve without power. Acceptable Model: American Standard 6065121.002.
- .9 Washroom Lavatories:
- .1 L-1: counter-top.
    - .1 Vitreous china, self-rimming, front overflow, faucet deck, center hole only.
    - .2 Nominal dimensions: 521mmx448mm (20-1/2in x17-5/8in)
    - .3 Bow sizes: 422mm (16-5/8in) wide, 279mm (11in) front to back, 143mm (5-5/8in) deep.
    - .4 Colour: White
    - .5 Meets or exceeds the following specifications: ASME A112.19.2M for Vitreous China Fixtures. CAN/CSA B45 Series.
    - .6 Acceptable Model: American Standard 0346001.020 or approved equivalent.
- .10 Washroom Lavatory Electronic Trim:
- .1 Electronic faucet:
    - .1 Electronic sensor fitted single block washbasin mixer tap activates the water flow whenever hands are detected under the tap and automatically shuts off the flow when they are removed.
    - .2 1.9lpm using a built-in flow limiter. High quality anti-limescale aerator. Anti water-hammer effect system.
    - .3 Electricity supply: 6V CRP2 type lithium battery built into the tap body.
    - .4 Material and color finish: injected molded metal body and cover.
    - .5 Safety: adjustable maximum temperature limiter, automatic solenoid shut-off if the water flows more than 30 seconds, if the battery is low, or if the sensor is deteriorated.
    - .6 Acceptable Model: Presto 55252 or equivalent.
- .11 Fixture piping:
- .1 Hot and cold water supplies to fixtures:
    - .1 Chrome plated flexible supply pipes with handwheel stop, reducers, escutcheon.
  - .2 Waste:
    - .1 Brass P trap with clean out on fixtures not having integral trap.
    - .2 Chrome plated in exposed places.
  - .3 Grid drain shall be of brass construction with 32mm overflow, to ASME A112.18.1 and CAN/CSA B125.2



## **PART 3 - EXECUTION**

### **3.1 APPLICATION**

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

### **3.2 INSTALLATION**

- .1 Mounting heights:
  - .1 Standard: to manufacturer's recommendations and as indicated

### **3.3 ADJUSTING**

- .1 Conform to water conservation requirements specified this section.
- .2 Adjustments:
  - .1 Adjust water flow rate to design flow rates.
  - .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
  - .3 Adjust flush valves to suit actual site conditions.
  - .4 Set controls of automatic flush valves for WCs to prevent unnecessary flush cycles.
- .3 Checks:
  - .1 Water closets: flushing action.
  - .2 Aerators: operation, cleanliness.
  - .3 Vacuum breakers: operation under all conditions.
- .4 Thermostatic controls:
  - .1 Verify temperature settings, operation of control, limit and safety controls.

### **3.4 CLEANING**

- .1 Clean in accordance with Section 00 10 00 – General Instructions.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: in accordance with Section 00 10 00 – General Instructions.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.

### **1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.
  - .2 CAN/CSA-B125.3-05, Plumbing Fittings.
  - .3 CAN/CSA-B651-04, Accessible Design for the Built Environment.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

### **1.4 CLOSEOUT SUBMITTALS**

- .1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in Section 00 10 00 – General Instructions.
- .2 Include:
  - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
  - .2 Details of operation, servicing, maintenance.
  - .3 List of recommended spare parts.

### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle in accordance with Section 00 10 00 – General Instructions.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: as per Section 00 10 00 – General Instructions.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURED UNITS

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.
- .3 Exposed plumbing brass to be chrome plated.
- .4 Number, locations: architectural drawings to govern.
- .5 Fixtures in any one location to be product of one manufacturer and of same type.
- .6 Trim in any one location to be product of one manufacturer and of same type.
- .7 Individual shower stall showerhead.
  - .1 SH-1: individual showerhead.
    - .1 Chrome plated brass, non-clog, with adjustable spray, ball joint, standard chrome plated bent arm and escutcheon. Limit maximum flow rate to 9.5 l/minute at 550 kPa.
    - .2 Barrier free, stainless steel, electronic, sensor proximity type, activated by infra-red.
      - .1 Sensor: waterproof, with impact-resistant, anti-scratch coated plastic lens, sensitivity adjustable from 100 mm to 450 mm.
      - .2 Water conservation: 3 minute maximum run time.
      - .3 Controls: interchangeable receptacles for stainless steel sheathed sensor and modular plug-type solenoid connections, single 24 VAC, slow-closing commercial solenoid for 860 kPa, 85 degrees C.
      - .4 Transformer: 120/24 VCA, Class 2, UL and CSA listed, hardwire type, sized for up to 8 solenoids.
      - .5 Equipped with manual override button.
  - .2 Shower supply valve:
    - .1 Pressure-balanced-actuated element, volume control, 40 degrees C maximum setting, strainer and check-stops on each inlet, dial or lever handle.
  - .3 Cabinet: refer to architectural drawings and specifications.
- .8 Fixture piping:
  - .1 Hot and cold water supplies to each fixture.
    - .1 Chrome plated flexible supply pipes each with handwheel stop, reducers, escutcheon.
  - .2 Waste:
    - .1 Brass P trap with cleanout on each fixture not having integral trap.
    - .2 Chrome plated in all exposed places.

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## **PART 3 - EXECUTION**

### **3.1 APPLICATION**

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

### **3.2 INSTALLATION**

- .1 Mounting heights:
  - .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.

### **3.3 ADJUSTING**

- .1 Conform to water conservation requirements specified this section.
- .2 Adjustments:
  - .1 Adjust water flow rate to design flow rates.
  - .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
- .3 Checks:
  - .1 Aerators: operation, cleanliness.
  - .2 Vacuum breakers: operation under all conditions.
- .4 Thermostatic controls:
  - .1 Verify temperature settings, operation of control, limit and safety controls.

### **3.4 CLEANING**

- .1 Clean in accordance with Section 00 10 00 – General Instructions.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials as per Section 00 10 00 – General Instructions.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.

### **1.2 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA B139-04, Installation Code for Oil Burning Equipment.
- .3 Green Seal Environmental Standards (GSES)
  - .1 Standard GS-11-2008, 2nd Edition, Environmental Standard for Paints and Coatings.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 00 10 00 –General Instructions.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature, specifications and datasheets for piping and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 00 10 00 – General Instructions and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
  - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Section 00 10 00 – General Instructions.

## **PART 2 - PRODUCTS**

## 2.1 MATERIAL

- .1 Paint: zinc-rich to CAN/CGSB-1.181.
  - .1 Primer: maximum VOC limit 250g/L to Standard GS-11.
  - .2 Paints: maximum VOC limit 150g/L to Standard GS-11.
- .2 Sealants:
  - .1 Sealants: maximum VOC limit to GSES GS-36.
- .3 Sealants: maximum VOC limit to GSES GS-36.
- .4 Adhesives: maximum VOC limit to GSES GS-36.
- .5 Fire Stopping: in accordance with Section 07 84 00 - Fire Stopping.

## PART 3 - EXECUTION

### 3.1 APPLICATION

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

### 3.2 CONNECTIONS TO EQUIPMENT

- .1 In accordance with manufacturer's instructions unless otherwise indicated.
- .2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.
- .3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

### 3.3 CLEARANCES

- .1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer and National Fire Code of Canada.
- .2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer without interrupting operation of other system, equipment, components.

### 3.4 DRAINS

- .1 Install piping with grade in direction of flow except as indicated.
- .2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.
- .3 Pipe each drain valve discharge separately to above floor drain.
  - .1 Discharge to be visible.
- .4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

### 3.5 AIR VENTS

- .1 Install air vents at high points in piping systems.
- .2 Install isolating valve at each automatic air valve.
- .3 Install drain piping to approved location and terminate where discharge is visible.

### 3.6 DIELECTRIC COUPLINGS

- .1 General: compatible with system, to suit pressure rating of system.
- .2 Locations: where dissimilar metals are joined.
- .3 NPS 2 and under: isolating unions or bronze valves.

### 3.7 PIPEWORK INSTALLATION

- .1 Screwed fittings jointed with Teflon tape.
- .2 Protect openings against entry of foreign material.
- .3 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.
- .4 Assemble piping using fittings manufactured to ANSI standards.
- .5 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main.
  - .1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.
- .6 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

- .7 Install concealed pipework to minimize furring space, maximize headroom, conserve space.
- .8 Slope piping, except where indicated, in direction of flow for positive drainage and venting.
- .9 Install, except where indicated, to permit separate thermal insulation of each pipe.
- .10 Group piping wherever possible.
- .11 Ream pipes, remove scale and other foreign material before assembly.
- .12 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- .13 Provide for thermal expansion as indicated.

### **3.8 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK**

- .1 Advise Departmental Representative 48hours minimum prior to performance of pressure tests.
- .2 Pipework: test as specified in relevant sections of heating, ventilating and air conditioning work.
- .3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant mechanical sections.
- .4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.
- .5 Conduct tests in presence of Departmental Representative.
- .6 Pay costs for repairs or replacement, retesting, and making good. Departmental Representative to determine whether repair or replacement is appropriate.
- .7 Insulate or conceal work only after approval and certification of tests by Departmental Representative.

### **3.9 EXISTING SYSTEMS**

- .1 Connect into existing piping systems at times approved by Departmental Representative.
- .2 Request written approval by Departmental Representative 10 days minimum, prior to commencement of work.

### **3.10 CLEANING**

- .1 Clean in accordance with Section 00 10 00 – General Instructions.



- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse in accordance with Section 00 10 00 – General Instructions.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.
- .2 Section 23 05 48 – Vibration and Supports for HVAC Piping and Equipment.

### **1.2 REFERENCES**

- .1 American Society of Mechanical Engineers (ASME)
  - .1 ASME B31.1-07, Power Piping.
- .2 ASTM International
  - .1 ASTM A 125-1996(2007), Standard Specification for Steel Springs, Helical, Heat-Treated.
  - .2 ASTM A563-07a, Standard Specification for Carbon and Alloy Steel Nuts.
- .3 Factory Mutual (FM)
- .4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
  - .1 MSS SP 58-2002, Pipe Hangers and Supports - Materials, Design and Manufacture.
  - .2 MSS SP 69-2003, Pipe Hangers and Supports - Selection and Application.
- .5 Underwriter's Laboratories of Canada (ULC)

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Submit shop drawings for:
    - .1 Bases, hangers and supports.
    - .2 Connections to equipment and structure.
    - .3 Structural assemblies.
- .4 Certificates:
  - .1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

- .5 Manufacturers' Instructions:
  - .1 Provide manufacturer's installation instructions.
    - .1 Departmental Representative will make available 1 copy of systems supplier's installation instructions.

#### **1.4 CLOSEOUT SUBMITTALS**

- .1 Provide maintenance data for incorporation into manual specified in Section 00 10 00 – General Instructions.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 00 10 00 – General Instructions and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
  - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Section 00 10 00 – General Instructions.

### **PART 2 - PRODUCTS**

#### **2.1 SYSTEM DESCRIPTION**

- .1 Design Requirements:
  - .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
  - .2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP 58.
  - .3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
  - .4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
  - .5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP 58.
- .2 Performance Requirements:
  - .1 Design supports and hangers to withstand seismic events as specified Section 23 05 48 – Vibration and Supports for HVAC Piping and Equipment.

## 2.2 GENERAL

- .1 Fabricate hangers, supports and sway braces in accordance with MSS SP 58 and ANSI B31.1.
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

## 2.3 PIPE HANGERS

- .1 Finishes:
  - .1 Pipe hangers and supports: galvanized after manufacture.
  - .2 Use electro-plating galvanizing process or hot dipped galvanizing process.
  - .3 Ensure steel hangers in contact with copper piping are copper plated.
- .2 Upper attachment structural: suspension from lower flange of I-Beam:
  - .1 Cold piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.
    - .1 Rod: 9 mm UL listed, 13 mm FM approved.
  - .2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed, FM approved, to MSS-SP 58 and MSS-SP 69.
- .3 Upper attachment structural: suspension from upper flange of I-Beam:
  - .1 Cold piping NPS 2 maximum: ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed, FM approved, to MSS SP 69.
  - .2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut UL listed, FM approved.
- .4 Upper attachment to concrete:
  - .1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
  - .2 Concrete inserts: wedge shaped body with knockout protector plate, UL listed, FM approved, to MSS SP 69.
- .5 Shop and field-fabricated assemblies:
  - .1 Trapeze hanger assemblies: to ASME B31.1 and MSS SP 58.
  - .2 Steel brackets: to ASME B31.1 and MSS SP 58.
  - .3 Sway braces for seismic restraint systems: to Section 23 05 48.
- .6 Hanger rods: threaded rod material to MSS SP 58:
  - .1 Ensure that hanger rods are subject to tensile loading only.
  - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
  - .3 Do not use 22mm or 28mm rod.
- .7 Pipe attachments: material to MSS SP 58:

- .1 Attachments for steel piping: carbon steel galvanized.
- .2 Attachments for copper piping: copper plated black steel.
- .3 Use insulation shields for hot pipework.
- .4 Oversize pipe hangers and supports.
  
- .8 Adjustable clevis: material to MSS SP 69, UL listed, FM approved, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
  - .1 Ensure "U" has hole in bottom for rivetting to insulation shields.
  
- .9 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP 69.
  
- .10 U-bolts: carbon steel to MSS SP 69 with 2 nuts at each end to ASTM A563.
  - .1 Finishes for steel pipework: galvanized.
  - .2 Finishes for copper, glass, brass or aluminum pipework: galvanized, with formed portion plastic coated.
  
- .11 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP 69.

## 2.4 INSULATION PROTECTION SHIELDS

- .1 Insulated cold piping:
  - .1 64 kg/m<sup>3</sup> density insulation plus insulation protection shield to: MSS SP 69, galvanized sheet carbon steel. Length designed for maximum 3 m span.
  
- .2 Insulated hot piping:
  - .1 Curved plate 300 mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP 69.

## 2.5 CONSTANT SUPPORT SPRING HANGERS

- .1 Springs: alloy steel to ASTM A125, shot peened, magnetic particle inspected, with +/-5% spring rate tolerance, tested for free height, spring rate, loaded height and provided with Certified Mill Test Report (CMTR).
  
- .2 Load adjustability: 10% minimum adjustability each side of calibrated load. Adjustment without special tools. Adjustments not to affect travel capabilities.
  
- .3 Provide upper and lower factory set travel stops.
  
- .4 Provide load adjustment scale for field adjustments.
  
- .5 Total travel to be actual travel + 20%. Difference between total travel and actual travel 25 mm minimum.
  
- .6 Individually calibrated scales on each side of support calibrated prior to shipment, complete with calibration record.

## 2.6 VARIABLE SUPPORT SPRING HANGERS

- .1 Vertical movement: 13 mm minimum, 50 mm maximum, use single spring pre-compressed variable spring hangers.
- .2 Vertical movement greater than 50 mm: use double spring pre-compressed variable spring hanger with 2 springs in series in single casing.
- .3 Variable spring hanger complete with factory calibrated travel stops.
- .4 Steel alloy springs: to ASTM A125, shot peened, magnetic particle inspected, with +/-5 % spring rate tolerance, tested for free height, spring rate, loaded height and provided with CMTR.

## 2.7 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

- .1 Provide templates to ensure accurate location of anchor bolts.

## 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 datasheet.

### 3.2 INSTALLATION

- .1 Install in accordance with:
  - .1 Manufacturer's instructions and recommendations.
- .2 Clevis plates:
  - .1 Attach to concrete with 4 minimum concrete inserts, one at each corner.
- .3 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.
- .4 Use approved constant support type hangers where:
  - .1 Vertical movement of pipework is 13 mm or more,
  - .2 Transfer of load to adjacent hangers or connected equipment is not permitted.
- .5 Use variable support spring hangers where:
  - .1 Transfer of load to adjacent piping or to connected equipment is not critical.
  - .2 Variation in supporting effect does not exceed 25 % of total load.

### 3.3 HANGER SPACING

- .1 Plumbing piping: to Canadian Plumbing Code.
- .2 Fire protection: to applicable fire code.

### 3.4 HANGER INSTALLATION

- .1 Install hanger so that rod is vertical under operating conditions.
- .2 Adjust hangers to equalize load.
- .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

### 3.5 HORIZONTAL MOVEMENT

- .1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
- .2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

### 3.6 FINAL ADJUSTMENT

- .1 Adjust hangers and supports:
  - .1 Ensure that rod is vertical under operating conditions.
  - .2 Equalize loads.
- .2 Adjustable clevis:
  - .1 Tighten hanger load nut securely to ensure proper hanger performance.
  - .2 Tighten upper nut after adjustment.
- .3 C-clamps:
  - .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
- .4 Beam clamps:
  - .1 Hammer jaw firmly against underside of beam.

### 3.7 CLEANING

- .1 Clean in accordance with Section 00 10 00 – General Instructions.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse in accordance with Section 00 10 00 – General Instructions.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.

### **1.2 REFERENCES**

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .2 National Fire Protection Association (NFPA)
  - .1 NFPA 13-2002, Standard for the Installation of Sprinkler Systems.
- .3 National Building Code of Canada (NBC) – 2015.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals: in accordance with Section 00 10 00 – General Instructions.
  - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 00 10 00 – General Instructions. Include product characteristics, performance criteria, and limitations.
    - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 00 10 00 – General Instructions.
- .2 Submit shop drawings in accordance with Section 00 10 00 – General Instructions.
  - .1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
  - .2 Provide separate shop drawings for each isolated system complete with performance and product data.
  - .3 Provide detailed drawings of seismic control measures for equipment and piping.

### **1.4 DELIVERY, STORAGE, AND HANDLING**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle in accordance with Section 00 10 00 – General Instructions.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Waste Management and Disposal:
  - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse in accordance with Section 00 10 00 – General Instructions.



## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- .1 Size and shape of bases type and performance of vibration isolation as indicated.

### **2.2 ELASTOMERIC PADS**

- .1 Type EP1 - neoprene waffle or ribbed; 9mm minimum thick; 50 durometer; maximum loading 350 kPa.
- .2 Type EP2 - rubber waffle or ribbed; 9mm minimum thick; 30 durometer natural rubber; maximum loading 415 kPa.
- .3 Type EP3 - neoprene-steel-neoprene; 9mm minimum thick neoprene bonded to 1.71mm steel plate; 50 durometer neoprene, waffle or ribbed; holes sleeved with isolation washers; maximum loading 350 kPa.
- .4 Type EP4 - rubber-steel-rubber; 9mm minimum thick rubber bonded to 1.71mm steel plate; 30 durometer natural rubber, waffle or ribbed; holes sleeved with isolation washers; maximum loading 415 kPa.

### **2.3 ELASTOMERIC MOUNTS**

- .1 Type M1 - colour coded; neoprene in shear; maximum durometer of 60; threaded insert and two bolt-down holes; ribbed top and bottom surfaces.

### **2.4 SPRINGS**

- .1 Design stable springs: ratio of lateral to axial stiffness is equal to or greater than 1.2 times ratio of static deflection to working height. Select for 50% travel beyond rated load. Units complete with levelling devices.
- .2 Ratio of height when loaded to diameter of spring between 0.8 to 1.0.
- .3 Cadmium plate for outdoor installations.
- .4 Colour code springs.

### **2.5 SPRING MOUNT**

- .1 Zinc or cadmium plated hardware; housings coated with rust resistant paint.

- .2 Type M2 - stable open spring: support on bonded 6mm minimum thick ribbed neoprene or rubber friction and acoustic pad.
- .3 Type M3 - stable open spring: 6mm minimum thick ribbed neoprene or rubber friction and acoustic pad, bonded under isolator and on isolator top plate; levelling bolt for rigidly mounting to equipment.
- .4 Type M4 - restrained stable open spring: supported on bonded 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad; built-in resilient limit stops, removable spacer plates.
- .5 Type M5 - enclosed spring mounts with snubbers for isolation up to 950 kg maximum.

## 2.6 HANGERS

- .1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30 degrees arc without metal to metal contact.
- .2 Type H1 - neoprene - in-shear, moulded with rod isolation bushing which passes through hanger box.
- .3 Type H2 - stable spring, elastomeric washer, cup with moulded isolation bushing which passes through hanger box.
- .4 Type H3 - stable spring, elastomeric element, cup with moulded isolation bushing which passes through hanger box.
- .5 Type H4 - stable spring, elastomeric element with precompression washer and nut [with deflection indicator].

## 2.7 SEISMIC CONTROL MEASURES

- .1 General:
  - .1 Following systems and/or equipment to remain operational during and after earthquakes:
    - .1 Fire protection system.
    - .2 Exhaust system (including ductwork and exhaust fan).
  - .2 Seismic control systems to work in every direction.
  - .3 Fasteners and attachment points to resist same maximum load as seismic restraint.
  - .4 Drilled or power driven anchors and fasteners not permitted.
  - .5 No equipment, equipment supports or mounts to fail before failure of structure.
  - .6 Supports of cast iron or threaded pipe not permitted.
  - .7 Seismic control measures not to interfere with integrity of firestopping.
- .2 Static equipment:
  - .1 Anchor equipment to equipment supports. Anchor equipment supports to structure.

- .2 Suspended equipment:
  - .1 Use one or more of following methods:
    - .1 Install tight to structure.
    - .2 Cross brace in every direction.
    - .3 Brace back to structure.
    - .4 Cable restraint system.
  - .3 Seismic restraints:
    - .1 Cushioning action gentle and steady.
    - .2 Never reach metal-like stiffness.
- .3 Vibration isolated equipment:
  - .1 Seismic control measures not to jeopardize noise and vibration isolation systems. Provide 6 to 9 mm clearance during normal operation of equipment and systems between seismic restraint and equipment.
  - .2 Incorporate seismic restraints into vibration isolation system to resist complete isolator unloading.
- .4 Piping systems:
  - .1 Fire protection systems: to NFPA 13.
  - .2 Piping systems: hangers longer than 300 mm; brace at each hanger.
  - .3 Compatible with requirements for anchoring and guiding of piping systems.
- .5 Bracing methods:
  - .1 Approved by Departmental Representative.
  - .2 Structural angles or channels.
  - .3 Cable restraint system incorporating grommets, shackles and other hardware to ensure alignment of restraints and to avoid bending of cables at connection points. Incorporate neoprene into cable connections to reduce shock loads.

## **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 datasheet.

### **3.2 INSTALLATION**

- .1 Seismic control measures to meet requirements of NBC.
- .2 Install vibration isolation equipment in accordance with manufacturers instructions and adjust mountings to level equipment.
- .3 Ensure ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not

transmit vibrations.

### **3.3 FIELD QUALITY CONTROL**

- .1 Manufacturer's Field Services:
  - .1 Arrange with manufacturer's representative to review work of this Section and submit written reports to verify compliance with Contract Documents.
  - .2 Manufacturer's Field Services: consisting of product use recommendations and periodic site visits to review installation, scheduled as follows:
    - .1 After delivery and storage of Products.
    - .2 After preparatory work is complete but before installation commences.
    - .3 Twice during the installation, at 25% and 60% completion stages.
    - .4 Upon completion of installation.
  - .3 Submit manufacturer's reports to Departmental Representative within 3 days of manufacturer representative's review.
  - .4 Make adjustments and corrections in accordance with written report.

### **3.4 CLEANING**

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

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.

### **1.2 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-24.3-92, Identification of Piping Systems.
- .2 National Fire Protection Association (NFPA)
  - .1 NFPA 13-2002, Standard for the Installation of Sprinkler Systems.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Product Data:
  - .1 Submittals: in accordance with Section 00 10 00 – General Instructions.
  - .2 Product data to include paint colour chips, other products specified in this section.

### **1.4 DELIVERY, STORAGE, AND HANDLING**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle in accordance with Section 00 10 00 – General Instructions.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Waste Management and Disposal:
  - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse in accordance with Section 00 10 00 – General Instructions.
  - .2 Dispose of unused paint, coating material at official hazardous material collections site approved by Departmental Representative.
  - .3 Do not dispose of unused paint, coating material into sewer system, into streams, lakes, onto ground or in locations where it will pose health or environmental hazard.

## **PART 2 - PRODUCTS**

## 2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

- .1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.
- .2 Lettering and numbers raised or recessed.
- .3 Information to include, as appropriate:
  - .1 Equipment: manufacturer's name, model, size, serial number, capacity.
  - .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

## 2.2 SYSTEM NAMEPLATES

- .1 Colours:
  - .1 Hazardous: red letters, white background.
  - .2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).
- .2 Construction:
  - .1 3 mm thick laminated plastic or white anodized aluminum, matte finish, with square corners, letters accurately aligned and machine engraved into core.
- .3 Sizes:
  - .1 Conform to following table:

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

- .2 Use maximum of 25 letters/numbers per line.
- .4 Locations:
  - .1 Terminal cabinets, control panels: use size # 5.
  - .2 Equipment in Mechanical Rooms: use size # 9.

## 2.3 EXISTING IDENTIFICATION SYSTEMS

- .1 Apply existing identification system to new work.
- .2 Where existing identification system does not cover for new work, use identification

system specified this section.

- .3 Before starting work, obtain written approval of identification system from Departmental Representative.

## 2.4 PIPING SYSTEMS GOVERNED BY CODES

- .1 Identification:
  - .1 Sprinklers: to NFPA 13.

## 2.5 IDENTIFICATION OF PIPING SYSTEMS

- .1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.
- .2 Pictograms:
  - .1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.
- .3 Legend:
  - .1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.
- .4 Arrows showing direction of flow:
  - .1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.
  - .2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.
  - .3 Use double-headed arrows where flow is reversible.
- .5 Extent of background colour marking:
  - .1 To full circumference of pipe or insulation.
  - .2 Length to accommodate pictogram, full length of legend and arrows.
- .6 Materials for background colour marking, legend, arrows:
  - .1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.
  - .2 Other pipes: pressure sensitive plastic-coated cloth with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.
- .7 Colours and Legends:
  - .1 Where not listed, obtain direction from Departmental Representative.
  - .2 Colours for legends, arrows: to following table:

Background colour:	Legend, arrows:
Yellow	BLACK
Green	WHITE
Red	WHITE

.3 Background colour marking and legends for piping systems:

Contents	Background colour marking	Legend
Domestic hot water supply	Green	DOM. HW SUPPLY
Domestic cold water supply	Green	DOM. CWS
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT
Sprinklers	Red	SPRINKLERS

## 2.6 IDENTIFICATION DUCTWORK SYSTEMS

- .1 50 mm high stencilled letters and directional arrows 150 mm long x 50 mm high.
- .2 Colours: back, or coordinated with base colour to ensure strong contrast.

## 2.7 CONTROLS COMPONENTS IDENTIFICATION

- .1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.
- .2 Inscriptions to include function and (where appropriate) fail-safe position.

## 2.8 LANGUAGE

- .1 Identification in English and French.
- .2 Use one nameplate and label for both languages.

## 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 datasheet.

### 3.2 TIMING

- .1 Provide identification only after painting specified Section 09 91 00 - Painting has been completed.



### 3.3 INSTALLATION

- .1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
- .2 Provide ULC and CSA registration plates as required by respective agency.

### 3.4 NAMEPLATES

- .1 Locations:
  - .1 In conspicuous location to facilitate easy reading and identification from operating floor.
- .2 Standoffs:
  - .1 Provide for nameplates on hot and/or insulated surfaces.
- .3 Protection:
  - .1 Do not paint, insulate or cover.

### 3.5 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

- .1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
- .2 Adjacent to each change in direction.
- .3 At least once in each small room through which piping or ductwork passes.
- .4 On both sides of visual obstruction or where run is difficult to follow.
- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.
- .7 At beginning and end points of each run and at each piece of equipment in run.
- .8 At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .9 Identification easily and accurately readable from usual operating areas and from access points.
  - .1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

### **3.6 CLEANING**

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

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 SUMMARY**

- .1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.
- .2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

### **1.2 QUALIFICATIONS OF TAB PERSONNEL**

- .1 Submit names of personnel to perform TAB to Departmental Representative within 90 days of award of contract.
- .2 Provide documentation confirming qualifications, successful experience.
- .3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:
  - .1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1-2002.
  - .2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems-1998.
  - .3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing-2002.
- .4 Recommendations and suggested practices contained in the TAB Standard: mandatory.
- .5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.
- .6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.
- .7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.
- .8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
  - .1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.
  - .2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

### **1.3 PURPOSE OF TAB**

- .1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads
- .2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.
- .3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

### **1.4 EXCEPTIONS**

- .1 TAB of systems and equipment regulated by codes, standards to satisfaction of authority having jurisdiction.

### **1.5 CO-ORDINATION**

- .1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.
- .2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

### **1.6 PRE-TAB REVIEW**

- .1 Review contract documents before project construction is started and confirm in writing to Departmental Representative adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.
- .2 Review specified standards and report to Departmental Representative in writing proposed procedures which vary from standard.
- .3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

### **1.7 START-UP**

- .1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.
- .2 Follow special start-up procedures specified elsewhere in Division 23.

## 1.8 OPERATION OF SYSTEMS DURING TAB

- .1 Operate systems for length of time required for TAB and as required by Departmental Representative for verification of TAB reports.

## 1.9 START OF TAB

- .1 Notify Departmental Representative 7 days prior to start of TAB.
- .2 Start TAB when building is essentially completed, including:
- .3 Installation of ceilings, doors, windows, other construction affecting TAB.
- .4 Application of weatherstripping, sealing, and caulking.
- .5 Pressure, leakage, other tests specified elsewhere Division 23.
- .6 Provisions for TAB installed and operational.
- .7 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
  - .1 Proper thermal overload protection in place for electrical equipment.
  - .2 Air systems:
    - .1 Duct systems clean.
    - .2 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
    - .3 Correct fan rotation.
    - .4 Fire, volume control dampers installed and open.
    - .5 Access doors, installed, closed.
    - .6 Outlets installed, volume control dampers open.

## 1.10 APPLICATION TOLERANCES

- .1 Do TAB to following tolerances of design values:
  - .1 HVAC systems: plus 5%, minus 5%.

## 1.11 ACCURACY TOLERANCES

- .1 Measured values accurate to within plus or minus 2% of actual values.

## 1.12 INSTRUMENTS

- .1 Prior to TAB, submit to Departmental Representative list of instruments used together with serial numbers.
- .2 Calibrate in accordance with requirements of most stringent of referenced standard for

either applicable system or HVAC system.

- .3 Calibrate within 3 months of TAB. Provide certificate of calibration to Departmental Representative.

### **1.13 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit, prior to commencement of TAB:
- .2 Proposed methodology and procedures for performing TAB if different from referenced standard.

### **1.14 PRELIMINARY TAB REPORT**

- .1 Submit for checking and approval of Departmental Representative, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
  - .1 Details of instruments used.
  - .2 Details of TAB procedures employed.
  - .3 Calculations procedures.
  - .4 Summaries.

### **1.15 TAB REPORT**

- .1 Format in accordance with referenced standard.
- .2 TAB report to show results in SI units and to include:
  - .1 Project record drawings.
  - .2 System schematics.
- .3 Submit 2 copies of TAB Report to Departmental Representative for verification and approval, in English in D-ring binders, complete with index tabs.

### **1.16 VERIFICATION**

- .1 Reported results subject to verification by Departmental Representative.
- .2 Provide personnel and instrumentation to verify up to 100% of reported results.
- .3 Number and location of verified results as directed by Departmental Representative.
- .4 Pay costs to repeat TAB as required to satisfaction of Departmental Representative.

### **1.17 SETTINGS**

- .1 After TAB is completed to satisfaction of Departmental Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required

settings.

- .2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

### **1.18 COMPLETION OF TAB**

- .1 TAB considered complete when final TAB Report received and approved by Departmental Representative.

### **1.19 AIR SYSTEMS**

- .1 Standard: TAB to most stringent of TAB standards of AABC, NEBB.
- .2 Do TAB of following systems, equipment, components, controls:
  - .1 Exhaust system.
- .3 Qualifications: personnel performing TAB qualified to standards of AABC or NEBB.
- .4 Quality assurance: perform TAB under direction of supervisor qualified to standards of AABC or NEBB.
- .5 Measurements: to include as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.
- .6 Locations of equipment measurements: to include as appropriate:
  - .1 Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.
  - .2 At controllers, controlled device.
- .7 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

## **PART 2 - PRODUCTS**

### **2.1 NOT USED**

- .1 Not used.

## **PART 3 - EXECUTION**

**3.1 NOT USED**

.1 Not used.

**END OF SECTION**



## PART 1 - GENERAL

### 1.1 RELATED REQUIREMENTS

- .1 Section 21 05 01 – Common Work Results for HVAC.
- .2 Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

### 1.2 REFERENCES

- .1 Definitions:
  - .1 For purposes of this section:
    - .1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.
    - .2 "EXPOSED" - means "not concealed" as previously defined.
    - .3 Insulation systems - insulation material, fasteners, jackets, and other accessories.
  - .2 TIAC Codes:
    - .1 CRD: Code Round Ductwork,
    - .2 CRF: Code Rectangular Finish.
- .2 Reference Standards:
  - .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
    - .1 ANSI/ASHRAE/IESNA 90.1-04, SI; Energy Standard for Buildings except Low-Rise Residential Buildings.
  - .2 ASTM International Inc.
    - .1 ASTM C 335-05ae1, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.
    - .2 ASTM C 612-04e1, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
  - .3 Canadian General Standards Board (CGSB)
    - .1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
  - .4 Green Seal Environmental Standards (GSES)
    - .1 Standard GS-36-00, Commercial Adhesives.
  - .5 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (2005).
  - .6 Underwriters Laboratories of Canada (ULC)
    - .1 CAN/ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and datasheets for duct insulation, and include product characteristics, performance criteria, physical size, finish and limitations.
    - .1 Description of equipment giving manufacturer's name, type, model, year and capacity.
    - .2 Details of operation, servicing and maintenance.
    - .3 Recommended spare parts list.
  - .3 Manufacturers' Instructions:
    - .1 Provide manufacture's written duct insulation jointing recommendations and special handling criteria, installation sequence, cleaning procedures.

### 1.4 QUALITY ASSURANCE

- .1 Qualifications:
  - .1 Installer: specialist in performing work of this section, and have at least 3 years successful experience in this size and type of project, qualified to standards and member of TIAC.

### 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle in accordance with Section 00 10 00 – General Instructions.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address and ULC markings.
- .3 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Section 00 10 00 – General Instructions.

## PART 2 - PRODUCTS

### 2.1 FIRE AND SMOKE RATING

- .1 To CAN/ULC-S102:
  - .1 Maximum flame spread rating: 25.
  - .2 Maximum smoke developed rating: 50.

## 2.2 INSULATION

- .1 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.
- .2 TIAC Code C-1: Rigid mineral fibre board to ASTM C612, without factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).

## 2.3 ACCESSORIES

- .1 Contact adhesive: quick-setting
  - .1 Maximum VOC limit 250g/L to GSES GS-36.

## PART 3 - EXECUTION

### 3.1 APPLICATION

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

### 3.2 PRE-INSTALLATION REQUIREMENTS

- .1 Pressure test ductwork systems complete, witness and certify.
- .2 Ensure surfaces are clean, dry, free from foreign material.

### 3.3 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturers instructions and as indicated.
- .3 Hangers and supports in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
  - .1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

### 3.4 DUCTWORK INSULATION SCHEDULE

- .1 Insulation types and thicknesses: conform to following table:

	TIAC Code	Vapour Retarder	Thickness (mm)
Exhaust ducts exposed in space being served	none		
Exhaust ductwork – 3m from exhaust fan	C-1	no	25

### **3.5 CLEANING**

- .1 Clean in accordance with Section 00 10 00 – General Instructions.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse in accordance with Section 00 10 00 – General Instructions.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.

### **1.2 REFERENCES**

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  - .1 ASHRAE Standard 90.1-01, Energy Standard for Buildings except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C 335-04, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
  - .2 ASTM C 547-2003, Mineral Fiber Pipe Insulation.
  - .3 ASTM C 921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .5 Manufacturer's Trade Associations
  - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).
- .6 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-03, Surface Burning Characteristics of Building Materials and Assemblies.

### **1.3 DEFINITIONS**

- .1 For purposes of this section:
  - .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
  - .2 "EXPOSED" - will mean "not concealed" as specified.
- .2 TIAC ss:
  - .1 CRF: Code Rectangular Finish.
  - .2 CPF: Code Piping Finish.

#### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals: in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 00 10 00 – General Instructions. Include product characteristics, performance criteria, and limitations.
    - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).
- .3 Shop Drawings:
  - .1 Submit shop drawings in accordance with Section 00 10 00 – General Instructions.

#### **1.5 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project, qualified to standards and member of TIAC.

#### **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 00 10 00 – General Instructions.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .3 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Storage and Protection:
  - .1 Protect from weather, construction traffic.
  - .2 Protect against damage.
  - .3 Store at temperatures and conditions required by manufacturer.
- .3 Waste Management and Disposal:
  - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse in accordance with Section 00 10 00 – General Instructions.

#### **PART 2 - PRODUCTS**

## 2.1 FIRE AND SMOKE RATING

- .1 In accordance with CAN/ULC-S102.
  - .1 Maximum flame spread rating: 25.
  - .2 Maximum smoke developed rating: 50.

## 2.2 INSULATION

- .1 Mineral fibre specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C 335.
- .3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.
  - .1 Mineral fibre: to CAN/ULC-S702, ASTM C 547.
  - .2 Maximum "k" factor: to CAN/ULC-S702.
- .4 TIAC Code C-2: mineral fibre blanket faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).
  - .1 Mineral fibre: to CAN/ULC-S702, ASTM C 547.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: to CAN/ULC-S702, ASTM C 547.

## 2.3 INSULATION SECUREMENT

- .1 Tape: self-adhesive, aluminum, plain, 50 mm wide minimum.
- .2 Contact adhesive: quick setting.
- .3 Canvas adhesive: washable.

## 2.4 VAPOUR RETARDER LAP ADHESIVE

- .1 Water based, fire retardant type, compatible with insulation.

## 2.5 INDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.

## 2.6 JACKETS

- .1 Canvas:
  - .1 220 gm/m<sup>2</sup> cotton, plain weave, treated with dilute fire retardant lagging adhesive

- to ASTM C 921.
- .2 Lagging adhesive: compatible with insulation.

## **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 datasheet.

### **3.2 PRE-INSTALLATION REQUIREMENT**

- .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.
- .2 Surfaces clean, dry, free from foreign material.

### **3.3 INSTALLATION**

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturers instructions and this specification.
- .3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
- .4 Supports, Hangers:
  - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

### **3.4 PIPING INSULATION SCHEDULES**

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 TIAC Code: A-1.
  - .1 Securements: Tape at 300 mm on centre.
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code 1501-H.
- .3 TIAC Code: C-2 with vapour retarder jacket.
  - .1 Insulation securements: Tape at 300 mm on centre.
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C.



- .4 Thickness of insulation as listed in following table.  
 .1 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp degrees C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)				
			to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8 & over
Domestic HWS	N/A	A-1	25	25	38	38	38
Domestic CWS with vapour retarder	N/A	C-2	25	25	25	25	25
Steam	N/A	A-1	38	50	65	75	90
Condensate Return	N/A	A-1	25	38	38	38	38
Horizontal sanitary drains from water closets, provided with flush valve	N/A	C-2	25	25	25	25	25
Traps and drains where there is risk of condensation on the piping	N/A	C-2	25	25	25	25	25

- .5 Finishes:  
 .1 Exposed indoors: canvas jacket.  
 .2 Exposed in mechanical rooms: canvas jacket.  
 .3 Concealed, indoors: canvas on valves, fittings. No further finish.  
 .4 Installation: to appropriate TIAC code CRF/1 through CPF/5.

### 3.5 CLEANING

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

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.
- .2 Section 23 05 05 - Installation of Pipework.

### **1.2 REFERENCES**

- .1 American National Standards Institute (ANSI) / American Society of Mechanical Engineers (ASME)
  - .1 ASME B16.3-06, Malleable Iron Threaded Fittings: Classes 150 and 300.
- .2 ASTM International Inc.
  - .1 ASTM A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature and datasheets for pipes and include product characteristics, performance criteria, physical size, finish and limitations.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle in accordance with Section 00 10 00 – General Instructions.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse of pallets, crates, padding and packaging materials in accordance with Section 00 10 00 – General Instructions.

## **PART 2 - PRODUCTS**

### **2.1 STEAM AND CONDENSATE PIPE**

- .1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:

## **2.2 PIPE JOINTS**

- .1 NPS 2 and under: screwed fittings with PTFE tape or lead-free dope.
- .2 Pipe thread: taper.

## **2.3 FITTINGS**

- .1 Screwed fittings: malleable iron to ASME B16.3, Class 150.

## **PART 3 - EXECUTION**

### **3.1 APPLICATION**

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

### **3.2 PIPING**

- .1 Install pipework in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified below.

### **3.3 CLEANING**

- .1 Clean in accordance with Section 00 10 00 – General Instructions.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse in accordance with Section 00 10 00 – General Instructions.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.
- .2 Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment

### **1.2 REFERENCES**

- .1 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- .2 ASTM International
  - .1 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .3 Green Seal Environmental Standards (GS)
  - .1 GS-36-11, Standard for Adhesives for Commercial Use.
- .4 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
  - .1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2005.
  - .2 SMACNA HVAC Air Duct Leakage Test Manual, 2012.
- .5 IAQ Guideline for Occupied Buildings Under Construction 2007.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for metal ducts and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Test and Evaluation Reports:
  - .1 Certification of Ratings:
    - .1 Catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

### **1.4 DELIVERY, STORAGE AND HANDLING**

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

packaging, labelled with manufacturer's name and address.

- .3 Storage and Handling Requirements:
  - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect metal ducts from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 00 10 00 – General Instructions.
- .5 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 00 10 00 – General Instructions.

## PART 2 - PRODUCTS

### 2.1 SEAL CLASSIFICATION

- .1 Classification as follows:

Maximum Pressure Pa	SMACNA Seal Class
500	C
250	C
125	C

- .2 Seal classification:
  - .1 Class C: transverse joints and connections made air tight with gaskets, sealant, tape or combination thereof. Longitudinal seams unsealed.
  - .2 Unsealed seams and joints.

### 2.2 SEALANT

- .1 Sustainability Characteristics:
  - .1 Adhesives and sealants: VOC limit 250 g/L maximum to GS-36.
- .2 Sealant: oil resistant, water borne, polymer type flame resistant duct sealant. Temperature range of minus 30 degrees C to plus 93 degrees C.

### 2.3 TAPE

- .1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm wide.

## 2.4 DUCT LEAKAGE

- .1 In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

## 2.5 FITTINGS

- .1 Fabrication: to SMACNA.
- .2 Radiused elbows:
  - .1 Rectangular: standard radius, centreline radius: 1.5 times width of duct.
  - .2 Round: smooth radius, centreline radius: 1.5 times diameter.
- .3 Mitred elbows, rectangular:
  - .1 To 400 mm: with single thickness turning vanes.
- .4 Branches:
  - .1 Rectangular main and branch: with radius on branch 1.5 times width of duct, 45 degrees entry on branch.
  - .2 Round main and branch: enter main duct at 45 degrees with conical connection.
- .5 Transitions:
  - .1 Diverging: 20 degrees maximum included angle.
  - .2 Converging: 30 degrees maximum included angle.
- .6 Offsets:
  - .1 Full radiused elbows.

## 2.6 GALVANIZED STEEL

- .1 Lock forming quality: to ASTM A653/A653M, Z90 zinc coating.
- .2 Thickness, fabrication and reinforcement: to SMACNA.
- .3 Joints: to SMACNA.

## 2.7 HANGERS AND SUPPORTS

- .1 Hangers and Supports: in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
  - .1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.
    - .1 Maximum size duct supported by strap hanger: 500.
  - .2 Hanger configuration: to SMACNA.
  - .3 Hangers: galvanized steel angle with galvanized steel rods to SMACNA, following table:

Duct Size (mm)	Angle Size (mm)	Rod Size (mm)
up to 750	25 x 25 x 3	6
751 to 1050	40 x 40 x 3	6
1051 to 1500	40 x 40 x 3	10
1501 to 2100	50 x 50 x 3	10
2101 to 2400	50 x 50 x 5	10
2401 and over	50 x 50 x 6	10

- .4 Upper hanger attachments:
  - .1 For concrete: manufactured concrete inserts.
  - .2 For steel joist: manufactured joist clamp, steel plate washer.
  - .3 For steel beams: manufactured beam clamps:

## **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 metal duct 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.

### **3.2 GENERAL**

- .1 Do work in accordance with SMACNA.
- .2 Do not break continuity of insulation vapour barrier with hangers or rods.
- .3 Support risers in accordance with SMACNA.
- .4 Install breakaway joints in ductwork on sides of fire separation.

### **3.3 HANGERS**

- .1 Strap hangers: install in accordance with SMACNA.
- .2 Angle hangers: complete with locking nuts and washers.
- .3 Hanger spacing: in accordance with SMACNA, as follows:

Duct Size (mm)	Spacing (mm)
to 1500	3000
1501 and over	2500

### 3.4 SEALING AND TAPING

- .1 Apply sealant in accordance with SMACNA.
- .2 Bed tape in sealant and recoat with minimum of 1 coat of sealant to manufacturers recommendations.

### 3.5 CLEANING

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

**END OF SECTION**



## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.

### **1.2 REFERENCES**

- .1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
  - .1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible, 2005.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for air duct accessories and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Indicate:
    - .1 Duct access doors.

### **1.4 DELIVERY, STORAGE AND HANDLING**

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

## **PART 2- PRODUCTS**

### **2.1 GENERAL**

- .1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

## 2.2 ACCESS DOORS IN DUCTS

- .1 Non-Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.
- .2 Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.
- .3 Gaskets: neoprene.
- .4 Hardware:
  - .1 Up to 300 x 300 mm: two sash locks complete with safety chain.

## 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 air duct accessories 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.

### 3.2 INSTALLATION

- .1 Access Doors and Viewing Panels:
  - .1 Size:
    - .1 Adequate for viewing of fire damper.
  - .2 Locations:
    - .1 Fire dampers.

### 3.3 CLEANING

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

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.
- .2 Section 23 33 00 - Air Duct Accessories.

### **1.2 REFERENCES**

- .1 National Fire Protection Association (NFPA)
  - .1 90A-12, Standard for the Installation of Air Conditioning and Ventilating Systems.
- .2 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S112-10, Standard Test Method of Fire Test of Fire Damper Assemblies.
  - .2 CAN/ULC-S112.2-07, Standard Method of Fire Test of Ceiling Fire Stop Flap Assemblies.
  - .3 ULC-S505-1974, Standard for Fusible Links for Fire Protection Service.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for fire dampers and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Indicate the following:
    - .1 Fire dampers.
    - .2 Fusible links.
    - .3 Design details of break-away joints.
- .3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

### **1.4 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 00 10 00 – General Instructions.
- .2 Operation and Maintenance Data: submit operation and maintenance data for fire dampers for incorporation into manual.

## 1.5 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Materials:
  - .1 Submit maintenance materials in accordance with Section 00 10 00 – General Instructions.
  - .2 Provide:
    - .1 6 fusible links of each type.

## 1.6 DELIVERY, STORAGE AND HANDLING

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

## PART 2 - PRODUCTS

### 2.1 FIRE DAMPERS

- .1 Fire dampers: arrangement Type A, listed and bear label of ULC, meet requirements of NFPA 90A and authorities having jurisdiction. Fire damper assemblies fire tested in accordance with CAN/ULC-S112.
- .2 Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.
  - .1 Fire dampers: 1-1/2 hour fire rated unless otherwise indicated.
  - .2 Fire dampers: automatic operating type and have dynamic rating suitable for maximum air velocity and pressure differential to which it will be subjected.
- .3 Top hinged: curtain type fire damper.
- .4 Fusible link actuated, weighted to close and lock in closed position when released or having negator-spring-closing operator for multi-leaf type or roll door type in horizontal position with vertical air flow.
- .5 40 x 40 x 3 mm retaining angle iron frame, on full perimeter of fire damper. Single side

- angle installation.
- .6 Equip fire dampers with steel sleeve or frame installed disruption ductwork or impair damper operation.
  - .7 Equip sleeves or frames with perimeter mounting angles attached on one side of wall or floor opening. Construct ductwork in fire-rated floor-ceiling or roof-ceiling assembly systems with air ducts that pierce ceiling to conform with ULC.
  - .8 Design and construct dampers to not reduce duct or air transfer opening cross-sectional area.
  - .9 Dampers shall be installed so that the centerline of the damper depth or thickness is located in the centerline of the wall, partition or floor slab depth or thickness.
  - .10 Unless otherwise indicated, the installation details given in SMACNA Install Fire Damp HVAC and in manufacturer's instructions for fire dampers shall be followed.

## **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 fire and smoke damper 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.

### **3.2 INSTALLATION**

- .1 Install in accordance with NFPA 90A and in accordance with conditions of ULC listing.
- .2 Maintain integrity of fire separation.
- .3 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.
- .4 Install access door adjacent to each damper. See Section 23 33 00 - Air Duct Accessories.
- .5 Co-ordinate with installer of fire stopping.
- .6 Ensure access doors/panels, fusible links, damper operators are easily observed and accessible.
- .7 Install break-away joints of approved design on each side of fire separation.

### **3.3 CLEANING**

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

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.
- .2 Section 23 05 48 – Vibrations and Seismic Controls for HVAC Piping and Equipment.

### **1.2 REFERENCES**

- .1 American National Standards Institute/Air Movement and Control Association (ANSI/AMCA)
  - .1 ANSI/AMCA Standard 99-2010, Standards Handbook.
  - .2 ANSI/AMCA Standard 210-2007/( ANSI/ASHRAE 51-07), Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
  - .3 ANSI/AMCA Standard 300-2008, Reverberant Room Method for Sound Testing of Fans.
  - .4 ANSI/AMCA Standard 301-1990, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for wall exhausters and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Include:
    - .1 Fan performance curves showing specified point of operation.
    - .2 Sound rating data.

### **1.4 MAINTENANCE MATERIAL SUBMITTALS**

- .1 Extra Materials:
  - .1 Submit in accordance with Section 00 10 00 – General Instructions.
    - .1 Furnish list of individual manufacturer's recommended spare parts for equipment, include:
      - .1 Bearings and seals.
      - .2 Addresses of suppliers.
      - .3 List of specialized tools necessary for adjusting, repairing or replacing.

## 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 00 10 00 – General Instructions and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect wall exhausters from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 00 10 00 – General Instructions.
- .5 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 00 10 00 – General Instructions.

## PART 2 - PRODUCTS

### 2.1 WALL EXHAUSTERS

- .1 Direct-driven, centrifugal wall ventilator: centrifugal fan unit, configured for horizontal flow.
- .2 Fan capacities, characteristics, and configuration: refer to drawing schedule.
- .3 AMCA Compliance:
  - .1 Provide unit that bear the AMCA-Certified Ratings Seal.
- .2 Motor mount assemblies: provide motor mount assemblies fabricated of heavy gauge galvanized steel.
- .3 Wheel: centrifugal, aluminum backward inclined type, containing matching inlet venturi.
  - .1 Statically and dynamically balance wheel.
- .4 Housing: bolt on type. Heavy gauge spun aluminum construction of shroud, top cover, and motor bands. Roll edge beads.
  - .1 Provide galvanized steel wire bird screens.
- .5 Mounting base: one-piece, weather-tight construction, pre-punched mounting holes for attachment. Fabricate of galvanized steel and include flange to mate with fan unit inlet flange.
  - .1 Provide electrical metal tubing (EMT) conduit into motor compartment, with



watertight fitting.

- .6 Motors:
  - .1 Provide electronically commutated motor with permanently lubricated ball bearings.
  - .2 Motor size as indicated on drawing schedule.
  - .3 Speed control: provide for 0-10VDC connection, to continuously adjust between minimum and maximum motor speeds.
- .7 Electrical data: for voltage and amperage, refer to schedule drawing.
- .8 Enclosure type: Open, Drip Proof (ODP). Provide thermal overload protection.
- .9 Provide non-fused disconnect switch, NEMA 4X. Ship disconnect switch loose for field mounting and wiring.
- .10 Finish: galvanized mill finish internal parts, and uncoated external aluminum and galvanized steel part exposed to weather.
- .11 Accessories:
  - .1 Backdraft damper, automatic, parallel-blade type, Adjust backdraft damper to close when fan is not running.
    - .1 Fabricate frame from galvanized steel.
    - .2 Fabricate blades from aluminum, mill finish, with vinyl edge seals.
  - .2 Aluminum wire insect screen.

## **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 roof and wall exhauster 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.

### **3.2 INSTALLATION**

- .1 Install in accordance with manufacturer's instructions.

### **3.3 ANCHOR BOLTS AND TEMPLATES**

- .1 Size anchor bolts to withstand seismic acceleration and velocity forces as specified in Section 23 05 48 – Vibrations and Seismic Controls for HVAC Piping and Equipment.

### **3.4 CLEANING**

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

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 21 05 01 – Common Work Results for HVAC.

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for grilles and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Indicate following:
    - .1 Capacity.
    - .2 Noise criteria.
    - .3 Pressure drop.

### **1.3 MAINTENANCE MATERIAL SUBMITTALS**

- .1 Extra Materials:
  - .1 Provide maintenance materials in accordance with Section 00 10 00 – General Instructions.
  - .2 Include:
    - .1 Keys for volume control adjustment.
    - .2 Keys for air flow pattern adjustment.

### **1.4 DELIVERY, STORAGE AND HANDLING**

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

with Section 00 10 00 – General Instructions.

## **PART 2 - PRODUCTS**

### **2.1 SYSTEM DESCRIPTION**

- .1 Performance Requirements:
  - .1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards.

### **2.2 GENERAL**

- .1 To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity, as indicated.
- .2 Frames:
  - .1 Full perimeter gaskets.
  - .2 Plaster frames where set into plaster or gypsum board, and as specified.
  - .3 Concealed fasteners.
- .3 Concealed manual volume control damper operators.
- .4 Color: as directed by Departmental Representative.

### **2.3 MANUFACTURED UNITS**

- .1 Grilles, registers and diffusers of same generic type, products of one manufacturer.

### **2.4 RETURN AND EXHAUST GRILLES AND REGISTERS**

- .1 General: with opposed blade dampers. Steel, 19 mm border, single 0 degrees deflection, horizontal face bars.

## **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 diffuser, register and grille 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.

### **3.2 INSTALLATION**

- .1 Install in accordance with manufacturers instructions.
- .2 Install with flat head, oval head, stainless steel, cadmium plated screws in countersunk holes where fastenings are visible.

### **3.3 CLEANING**

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

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 REFERENCES**

- .1 American National Standards Institute (ANSI)/The Instrumentation, Systems and Automation Society (ISA).
  - .1 ANSI/ISA 5.5-1985, Graphic Symbols for Process Displays.
- .2 American National Standards Institute (ANSI)/ Institute of Electrical and Electronics Engineers (IEEE).
  - .1 ANSI/IEEE 260.1-1993, American National Standard Letter Symbols Units of Measurement (SI Units, Customary Inch-Pound Units, and Certain Other Units).
- .3 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).
  - .1 ASHRAE STD 135-R2001, BACNET - Data Communication Protocol for Building Automation and Control Network.
- .4 Canadian Standards Association (CSA International).
  - .1 CAN/CSA-Z234.1-89(R1995), Canadian Metric Practice Guide.
- .5 Consumer Electronics Association (CEA).
  - .1 CEA-709.1-B-2002, Control Network Protocol Specification.
- .6 Department of Justice Canada (Jus).
  - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
  - .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .7 Electrical and Electronic Manufacturers Association (EEMAC).
  - .1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.
- .8 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .9 Transport Canada (TC).
  - .1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

### **1.2 DESIGNATED CONTRACTOR**

- .1 Hire the services of Ainsworth to complete the work of all EMCS sections.

### **1.3 ACRONYMS AND ABBREVIATIONS**

- .1 Acronyms used in EMCS:
  - .1 AEL - Average Effectiveness Level.
  - .2 AI - Analog Input.

- .3 AIT - Agreement on International Trade.
- .4 AO - Analog Output.
- .5 BACnet - Building Automation and Control Network.
- .6 BC(s) - Building Controller(s).
- .7 BECC - Building Environmental Control Center.
- .8 CAD - Computer Aided Design.
- .9 CDL - Control Description Logic.
- .10 CDS - Control Design Schematic.
- .11 COSV - Change of State or Value.
- .12 CPU - Central Processing Unit.
- .13 DI - Digital Input.
- .14 DO - Digital Output.
- .15 DP - Differential Pressure.
- .16 ECU - Equipment Control Unit.
- .17 EMCS - Energy Monitoring and Control System.
- .18 HVAC - Heating, Ventilation, Air Conditioning.
- .19 IDE - Interface Device Equipment.
- .20 I/O - Input/Output.
- .21 ISA - Industry Standard Architecture.
- .22 LAN - Local Area Network.
- .23 LCU - Local Control Unit.
- .24 MCU - Master Control Unit.
- .25 NAFTA - North American Free Trade Agreement.
- .26 NC - Normally Closed.
- .27 NO - Normally Open.
- .28 OS - Operating System.
- .29 O&M - Operation and Maintenance.
- .30 OWS - Operator Work Station.
- .31 PC - Personal Computer.
- .32 PCI - Peripheral Control Interface.
- .33 PCMCIA - Personal Computer Micro-Card Interface Adapter.
- .34 PID - Proportional, Integral and Derivative.
- .35 RAM - Random Access Memory.
- .36 SP - Static Pressure.
- .37 ROM - Read Only Memory.
- .38 TCU - Terminal Control Unit.
- .39 USB - Universal Serial Bus.
- .40 UPS - Uninterruptible Power Supply.
- .41 VAV - Variable Air Volume.

## 1.4 DEFINITIONS

- .1 Point: may be logical or physical.
  - .1 Logical points: values calculated by system such as setpoints, totals, counts, derived corrections and may include, but not limited to result of and statements in CDL's.
  - .2 Physical points: inputs or outputs which have hardware wired to controllers which are measuring physical properties, or providing status conditions of

contacts or relays which provide interaction with related equipment (stop, start) and valve or damper actuators.

- .2 Point Name: composed of two parts, point identifier and point expansion.
  - .1 Point identifier: comprised of three descriptors, "area" descriptor, "system" descriptor and "point" descriptor, for which database to provide 25 character field for each point identifier. "System" is system that point is located on.
    - .1 Area descriptor: building or part of building where point is located.
    - .2 System descriptor: system that point is located on.
    - .3 Point descriptor: physical or logical point description. For point identifier "area", "system" and "point" will be shortforms or acronyms. Database must provide 25 character field for each point identifier.
  - .2 Point expansion: comprised of three fields, one for each descriptor. Expanded form of shortform or acronym used in "area", "system" and "point" descriptors is placed into appropriate point expansion field. Database must provide 32 character field for each point expansion.
  - .3 Bilingual systems to include additional point identifier expansion fields of equal capacity for each point name for second language.
    - .1 System to support use of numbers and readable characters including blanks, periods or underscores to enhance user readability for each of the above strings.
- .3 Point Object Type: points fall into following object types:
  - .1 AI (analog input).
  - .2 AO (analog output).
  - .3 DI (digital input).
  - .4 DO (digital output).
  - .5 Pulse inputs.
- .4 Symbols and engineering unit abbreviations utilized in displays: to ANSI/ISA S5.5.
  - .1 Printouts: to ANSI/IEEE 260.1.
  - .2 Refer also to Section 25 05 54 - EMCS: Identification.

## 1.5 SYSTEM DESCRIPTION

- .1 Refer to control schematics for system architecture.
- .2 Work covered by sections referred to above consists of fully operational EMCS, including, but not limited to, following:
  - .1 Building Controllers.
  - .2 Control devices as listed in I/O point summary tables.
  - .3 Data communications equipment necessary to effect EMCS data transmission system.
  - .4 Field control devices.
  - .5 Software/Hardware complete with full documentation.
  - .6 Complete operating and maintenance manuals.
  - .7 Training of personnel.
  - .8 Acceptance tests, technical support during commissioning, full documentation.
  - .9 Wiring interface co-ordination of equipment supplied by others.



- .10 Miscellaneous work as specified in these sections and as indicated.
- .3 Design Requirements:
  - .1 Design and provide conduit and wiring linking elements of system.
  - .2 Supply sufficient programmable controllers of types to meet project requirements. Quantity and points contents as reviewed by Departmental Representative prior to installation.
  - .3 Location of controllers as reviewed by Departmental Representative prior to installation.
  - .4 Provide utility power to EMCS as indicated.
  - .5 Metric references: in accordance with CAN/CSA Z234.1.
- .4 Language Operating Requirements:
  - .1 Provide English operator selectable access codes.
  - .2 Use non-linguistic symbols for displays on graphic terminals wherever possible. Other information to be in English.
  - .3 Operating system executive: provide primary hardware-to-software interface with associated documentation to be in English.
  - .4 System manager software: include in English system definition point database, additions, deletions or modifications, control loop statements, use of high level programming languages, report generator utility and other OS utilities used for maintaining optimal operating efficiency.
  - .5 Include, in English:
    - .1 Input and output commands and messages from operator-initiated functions, field related changes, alarms as defined in CDL's or assigned limits (i.e. commands relating to day-to-day operating functions and not related to system modifications, additions, or logic re-definitions).
    - .2 Graphic "display" functions, point commands to turn systems on or off, manually override automatic control of specified hardware points. To be in English at specified OWS and to be able to operate one terminal in English and second in French. Point name expansions in both languages.
    - .3 Reporting function such as trend log, trend graphics, alarm report logs, energy report logs, maintenance generated logs.

## 1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 00 10 00 – General Instructions and 25 05 02 - EMCS: Shop Drawings, Product Data and Review Process.
- .2 Submit for review:
  - .1 Equipment list and systems manufacturers within 10 days after award of contract.
- .3 Quality Control:
  - .1 Provide equipment and material from manufacturer's regular production, CSA certified, manufactured to standard quoted plus additional specified requirements.
  - .2 Where CSA certified equipment is not available submit such equipment to inspection authorities for special inspection and approval before delivery to site.
  - .3 Submit proof of compliance to specified standards with shop drawings and product data in accordance with Section 25 05 02 - EMCS: Shop Drawings,

- Product Data and Review Process. Label or listing of specified organization is acceptable evidence.
- .4 In lieu of such evidence, submit certificate from testing organization, approved by Departmental Representative, certifying that item was tested in accordance with their test methods and that item conforms to their standard/code.
  - .5 For materials whose compliance with organizational standards/codes/specifications is not regulated by organization using its own listing or label as proof of compliance, furnish certificate stating that material complies with applicable referenced standard or specification.
  - .6 Submit certificate of acceptance from authority having jurisdiction to Departmental Representative.
  - .7 Existing devices intended for re-use: submit test report.

### **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of Contract.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials in accordance with Section 00 10 00 – General Instructions.
  - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

### **1.8 EXISTING- CONTROL COMPONENTS**

- .1 Utilize existing control wiring as indicated.
- .2 Re-use field control devices that are usable in their original configuration provided that they conform to applicable codes, standards specifications.
  - .1 Do not modify original design of existing devices without written permission from Departmental Representative.
  - .2 Provide for new, properly designed device where re-usability of components is uncertain.
- .3 Inspect and test existing devices intended for re-use within 30 days of award of contract, and prior to installation of new devices.
  - .1 Furnish test report within 40 days of award of contract listing each component to be re-used and indicating whether it is in good order or requires repair by Departmental Representative.
  - .2 Failure to produce test report will constitute acceptance of existing devices by contractor.
- .4 Non-functioning items:
  - .1 Provide with report specification sheets or written functional requirements to support findings.
  - .2 Departmental Representative will repair or replace existing items judged defective yet deemed necessary for EMCS.

- .5 Submit written request for permission to disconnect controls and to obtain equipment downtime before proceeding with Work.
- .6 Assume responsibility for controls to be incorporated into EMCS after written receipt of approval from Departmental Representative.
  - .1 Be responsible for items repaired or replaced by Departmental Representative.
  - .2 Be responsible for repair costs due to negligence or abuse of equipment.
  - .3 Responsibility for existing devices terminates upon final acceptance of applicable portions of EMCS as approved by Departmental Representative.
- .7 Remove existing controls not re-used or not required. Place in approved storage for disposition as directed.

## **PART 2 - PRODUCTS**

### **2.1 EQUIPMENT**

- .1 There is an existing Ainsworth system presently installed in the building. All materials must be selected to ensure compatibility with the existing systems.

### **2.2 EQUIPMENT**

- .1 Control Network Protocol and Data Communication Protocol: to ASHRAE STD 135.
- .2 Complete list of equipment and materials to be used on project and forming part of tender documents by adding manufacturer's name, model number and details of materials, and submit for approval.

### **2.3 ADAPTORS**

- .1 Provide adaptors between metric and imperial components.

## **PART 3 - EXECUTION**

### **3.1 MANUFACTURER'S RECOMMENDATIONS**

- .1 Installation: to manufacturer's recommendations.

**END OF SECTION**



## **PART 1 - GENERAL**

### **1.1 DEFINITIONS**

- .1 Acronyms and definitions: refer to Section 25 05 01 - EMCS: General Requirements.

### **1.2 DESIGN REQUIREMENTS**

- .1 Preliminary Design Review: to contain following contractor and systems information.
  - .1 Location of local office.
  - .2 Description and location of installing and servicing technical staff.
  - .2 Location and qualifications of programming design and programming support staff.
  - .3 List of spare parts.
  - .4 Location of spare parts stock.
  - .5 Names of sub-contractors and site-specific key personnel.
  - .6 Sketch of site-specific system architecture.
  - .7 Specification sheets for each item including memory provided, programming language, speed, type of data transmission.
  - .8 Descriptive brochures.
  - .9 Sample CDL and graphics (systems schematics).
  - .10 Response time for each type of command and report.
  - .11 Item-by-item statement of compliance.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals in accordance with Section 00 10 00 – General Instructions and coordinate with requirements in this Section.
- .2 Submit preliminary design document within 5 working days after contract award, for review by Departmental Representative.
- .3 Shop Drawings to consist of 3 hard copies and 1 soft copy of design documents, shop drawings, product data and software.
- .4 Hard copy to be completely indexed and coordinated package to assure compliance with contract requirements and arranged in same sequence as specification and cross-referenced to specification section and paragraph number.
- .5 Soft copy to be in AutoCAD - latest version and Microsoft Word latest version format, structured using menu format for easy loading and retrieval on OWS.

### **1.4 PRELIMINARY SHOP DRAWING REVIEW**

- .1 Submit preliminary shop drawings within 30 working days of award of contract and

include following:

- .1 Specification sheets for each item. To include manufacturer's descriptive literature, manufacturer's installation recommendations, specifications, drawings, diagrams, performance and characteristic curves, catalogue cuts, manufacturer's name, trade name, catalogue or model number, nameplate data, size, layout, dimensions, capacity, other data to establish compliance.
- .2 Detailed system architecture showing all points associated with each controller including signal levels, pressures where new EMCS ties into existing control equipment.
- .3 Spare point capacity of each controller by number and type.
- .4 Controller locations.
- .5 Auxiliary control cabinet locations.
- .6 Single line diagrams showing cable routings, conduit sizes, spare conduit capacity between control centre, field controllers and systems being controlled.
- .7 Valves: complete schedule listing including following information: designation, service, manufacturer, model, point ID, design flow rate, design pressure drop, required Cv, Valve size, actual Cv, spring range, pilot range, required torque, actual torque and close off pressure (required and actual).

## 1.5 DETAILED SHOP DRAWING REVIEW

- .1 Submit detailed shop drawings within 60 working days after award of contract and before start of installation and include following:
  - .1 Corrected and updated versions (hard copy only) of submissions made during preliminary review.
  - .2 Wiring diagrams.
  - .3 Piping diagrams and hook-ups.
  - .4 Interface wiring diagrams showing termination connections and signal levels for equipment to be supplied by others.
  - .5 Shop drawings for each input/output point, sensors, transmitters, showing information associated with each particular point including:
    - .1 Sensing element type and location.
    - .2 Transmitter type and range.
    - .3 Associated field wiring schematics, schedules and terminations.
    - .4 Complete Point Name Lists.
    - .5 Setpoints, curves or graphs and alarm limits (high and low, 3 types critical, cautionary and maintenance), signal range.
    - .6 Software and programming details associated with each point.
    - .7 Manufacturer's recommended installation instructions and procedures.
    - .8 Input and output signal levels or pressures where new system ties into existing control equipment.
  - .6 Control schematics, narrative description, CDL's fully showing and describing automatic and manual procedure required to achieve proper operation of project, including under complete failure of EMCS.
  - .7 Graphic system schematic displays of air and water systems with point identifiers and textual description of system, and typical floor plans as specified.
  - .8 Complete system CDL's including companion English language explanations on same sheet but with different font and italics. CDL's to contain specified energy

- optimization programs.
- .9 Listing and example of specified reports.
- .10 Listing of time of day schedules.
- .11 Mark up to-scale construction drawing to detail control room showing location of equipment and operator work space.
- .12 Type and size of memory with statement of spare memory capacity.
- .13 Full description of software programs provided.
- .14 Sample of "Operating Instructions Manual" to be used for training purposes.
- .15 Outline of proposed start-up and verification procedures. Refer to Section 25 01 11 - EMCS: Start-up, Verification and Commissioning.

## **1.6 QUALITY ASSURANCE**

- .1 Preliminary Design Review Meeting: Convene meeting within 45 working days of award of contract to:
  - .1 Undertake functional review of preliminary design documents, resolve inconsistencies.
  - .2 Resolve conflicts between contract document requirements and actual items (e.g.: points list inconsistencies).
  - .3 Review interface requirements of materials supplied by others.
  - .4 Review "Sequence of Operations".
- .2 Contractor's programmer to attend meeting.
- .3 Departmental Representative retains right to revise sequence or subsequent CDL prior to software finalization without cost to Departmental Representative.

## **PART 2 - PRODUCTS**

### **2.1 NOT USED**

- .1 Not Used.

## **PART 3 - EXECUTION**

### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 SUMMARY**

- .1 Related Requirements
  - .1 Section 25 05 01 – EMCS: General Requirements.

### **1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International).
  - .1 CSA C22.1-2015, The Canadian Electrical Code, Part I (19th Edition), Safety Standard for Electrical Installations.

### **1.3 DEFINITIONS**

- .1 For acronyms and definitions refer to Section 25 05 01 - EMCS: General Requirements.

### **1.4 SYSTEM DESCRIPTION**

- .1 Language Operating Requirements: provide identification for control items in English.

### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals in accordance with Section 00 10 00 – General Instructions supplemented and modified by requirements of this Section.
- .2 Submit to Departmental Representative for approval samples of nameplates, identification tags and list of proposed wording.

## **PART 2 - PRODUCTS**

### **2.1 NAMEPLATES FOR PANELS**

- .1 Identify by Plastic laminate, 3 mm thick, matt white finish, black core, square corners, lettering accurately aligned and engraved into core.
- .2 Sizes: 25 x 67 mm minimum.
- .3 Lettering: minimum 7 mm high, black.
- .4 Inscriptions: machine engraved to identify function.



## **2.2 NAMEPLATES FOR FIELD DEVICES**

- .1 Identify by plastic encased cards attached by chain.
- .2 Sizes: 50 x 100 mm minimum.
- .3 Lettering: minimum 5 mm high produced from laser printer in black.
- .4 Data to include: point name and point address.
- .5 Companion cabinet: identify interior components using plastic enclosed cards with point name and point address.

## **2.3 NAMEPLATES FOR ROOM SENSORS**

- .1 Identify by stick-on labels using point identifier.
- .2 Location: as directed by Departmental Representative.
- .3 Letter size: to suit, clearly legible.

## **2.4 WARNING SIGNS**

- .1 Equipment including motors, starters under remote automatic control: supply and install orange coloured signs warning of automatic starting under control of EMCS.
- .2 Sign to read: "Caution: This equipment is under automatic remote control of EMCS" as reviewed by Departmental Representative's.

## **2.5 WIRING**

- .1 Supply and install numbered tape markings on wiring at panels, junction boxes, splitters, cabinets and outlet boxes.
- .2 Colour coding: to CSA C22.1. Use colour coded wiring in communications cables, matched throughout system.
- .3 Power wiring: identify circuit breaker panel/circuit breaker number inside each EMCS panel.

## **2.6 CONDUIT**

- .1 Colour code EMCS conduit.
- .2 Pre-paint box covers and conduit fittings.

- .3 Coding: use fluorescent orange paint and confirm colour with Departmental Representative during "Preliminary Design Review".

### **PART 3 - EXECUTION**

#### **3.1 NAMEPLATES AND LABELS**

- .1 Ensure that manufacturer's nameplates, CSA labels and identification nameplates are visible and legible at all times.

#### **3.2 EXISTING PANELS**

- .1 Correct existing nameplates and legends to reflect changes made during Work.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 SUMMARY**

- .1 Related Requirements
  - .1 Section 25 05 01 – EMCS: General Requirements.
- .2 References.
  - .1 Canada Labour Code (R.S. 1985, c. L-2)/Part I - Industrial Relations.
  - .2 Canadian Standards Association (CSA International).
    - .1 CSA Z204-94(R1999), Guidelines for Managing Indoor Air Quality in Office Buildings.

### **1.2 DEFINITIONS**

- .1 BC(s) - Building Controller(s).
- .2 OWS - Operator Work Station.
- .3 For additional acronyms and definitions refer to Section 25 05 01 - EMCS: General Requirements.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals in accordance with Section 00 10 00 – General Instructions.
- .2 Submit detailed preventative maintenance schedule for system components to Departmental Representative.
- .3 Submit detailed inspection reports to Departmental Representative.
- .4 Submit dated, maintenance task lists to Departmental Representative and include the following sensor and output point detail, as proof of system verification:
  - .1 Point name and location.
  - .2 Device type and range.
  - .3 Measured value.
  - .4 System displayed value.
  - .5 Calibration detail
  - .6 Indication if adjustment required,
  - .7 Other action taken or recommended.
- .5 Submit network analysis report showing results with detailed recommendations to correct problems found.
- .6 Records and logs: in accordance with Section 00 10 00 – General Instructions.
  - .1 Maintain records and logs of each maintenance task on site.
  - .2 Organize cumulative records for each major component and for entire EMCS

- chronologically.
- .3 Submit records to Departmental Representative, after inspection indicating that planned and systematic maintenance have been accomplished.
  - .7 Revise and submit to Departmental Representative in accordance with Section 00 10 00 – General Instructions "As-built drawings" documentation and commissioning reports to reflect changes, adjustments and modifications to EMCS made during warranty period.

#### **1.4 MAINTENANCE SERVICE DURING WARRANTY PERIOD**

- .1 Provide services, materials, and equipment to maintain EMCS for specified warranty period. Provide detailed preventative maintenance schedule for system components as described in Submittal article.
- .2 Emergency Service Calls:
  - .1 Initiate service calls when EMCS is not functioning correctly.
  - .2 Qualified control personnel to be available during warranty period to provide service to "CRITICAL" components whenever required at no extra cost.
  - .3 Furnish Departmental Representative with telephone number where service personnel may be reached at any time.
  - .4 Service personnel to be on site ready to service EMCS [within 2 hours] after receiving request for service.
  - .5 Perform Work continuously until EMCS restored to reliable operating condition.
- .3 Operation: foregoing and other servicing to provide proper sequencing of equipment and satisfactory operation of EMCS based on original design conditions and as recommended by manufacturer.
- .4 Work requests: record each service call request, when received separately on approved form and include:
  - .1 Serial number identifying component involved.
  - .2 Location, date and time call received.
  - .3 Nature of trouble.
  - .4 Names of personnel assigned.
  - .5 Instructions of work to be done.
  - .6 Amount and nature of materials used.
  - .7 Time and date work started.
  - .8 Time and date of completion.
- .5 Provide system modifications in writing.
  - .1 No system modification, including operating parameters and control settings, to be made without prior written approval of Departmental Representative.

#### **PART 2 - PRODUCTS**

## 2.1 NOT USED

- .1 Not Used.

## PART 3 - EXECUTION

### 3.1 FIELD QUALITY CONTROL

- .1 Perform as minimum (3) three minor inspections and one major inspection (more often if required by manufacturer) per year. Provide detailed written report to Departmental Representative as described in Submittal article.
- .2 Perform inspections during regular working hours, 0800 to 1630 h, Monday through Friday, excluding statutory holidays.
- .3 Following inspections are minimum requirements and should not be interpreted to mean satisfactory performance:
  - .1 Perform calibrations using test equipment having traceable, certifiable accuracy at minimum 50% greater than accuracy of system displaying or logging value.
  - .2 Check each field input/output device in accordance with Canada Labour Code - Part I and CSA Z204.
  - .3 Provide dated, maintenance task lists, as described in Submittal article, as proof of execution of complete system verification.
- .4 Minor inspections to include, but not limited to:
  - .1 Perform visual, operational checks to BC's, peripheral equipment, interface equipment and other panels.
  - .2 Check equipment cooling fans as required.
  - .3 Visually check for mechanical faults, air leaks and proper pressure settings on pneumatic components.
  - .4 Review system performance with Operations Supervisor to discuss suggested or required changes.
- .5 Major inspections to include, but not limited to:
  - .1 Minor inspection.
  - .2 Clean OWS(s) peripheral equipment, BC(s), interface and other panels, micro-processor interior and exterior surfaces.
  - .3 Check signal, voltage and system isolation of BC(s), peripherals, interface and other panels.
  - .4 Verify calibration/accuracy of each input and output device and recalibrate or replace as required.
  - .5 Provide mechanical adjustments, and necessary maintenance on printers.
  - .6 Run system software diagnostics as required.
  - .7 Install software and firmware enhancements to ensure components are operating at most current revision for maximum capability and reliability.
    - .1 Perform network analysis and provide report as described in Submittal

article.

- .6 Rectify deficiencies revealed by maintenance inspections and environmental checks.
- .7 Continue system debugging and optimization.
- .8 Testing/verification of occupancy and seasonal-sensitive systems to take place during four (4) consecutive seasons, after facility has been accepted, taken over and fully occupied.
  - .1 Test weather-sensitive systems twice: first at near winter design conditions and secondly under near summer design conditions.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 SUMMARY**

- .1 Related Requirements
  - .1 Section 25 05 01 – EMCS: General Requirements.

### **1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International).
  - .1 CSA T529-95(R2000), Telecommunications Cabling Systems in Commercial Buildings (Adopted ANSI/TIA/EIA-568-A with modifications).
  - .2 CSA T530-99(R2004), Commercial Building Standard for Telecommunications Pathways and Spaces (Adopted ANSI/TIA/EIA-569-A with modifications).
- .2 Institute of Electrical and Electronics Engineers (IEEE)/Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements.
  - .1 IEEE Std 802.3TM -2002, Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications.
- .3 Telecommunications Industries Association (TIA)/Electronic Industries Alliance (EIA)
  - .1 TIA/EIA-568, Commercial Building Telecommunications Cabling Standards Set, Part 1 General Requirements Part 2 Balanced Twisted-Pair Cabling Components Part 3 Optical Fiber Cabling Components Standard.
  - .2 TIA/EIA-569-A, Commercial Building Standard for Telecommunications Pathways and Spaces.
- .4 Treasury Board Information Technology Standard (TBITS).
  - .1 TBITS 6.9-2000, Profile for the Telecommunications Wiring System in Government Owned and Leased Buildings - Technical Specifications.

### **1.3 DEFINITIONS**

- .1 Acronyms and definitions: refer to Section 25 05 01 - EMCS - General Requirements.

### **1.4 SYSTEM DESCRIPTION**

- .1 Data communication network to link Operator Workstations and Master Control Units (MCU) in accordance with CSA T530.
  - .1 Provide reliable and secure connectivity of adequate performance between different sections (segments) of network.
  - .2 Allow for future expansion of network, with selection of networking technology and communication protocols.

- .2 Data communication network to include, but not limited to:
  - .1 EMCS-LAN.
  - .2 Modems.
  - .3 Network interface cards.
  - .4 Network management hardware and software.
  - .5 Network components necessary for complete network.

## 1.5 DESIGN REQUIREMENTS

- .1 EMCS Local Area Network (EMCS-LAN).
  - .1 High speed, high performance, local area network over which MCUs and OWSs communicate with each other directly on peer to peer basis in accordance with IEEE 802.3/Ethernet Standard.
    - .1 EMCS-LAN to: BACnet.
  - .2 Each EMCS-LAN to be capable of supporting at least 50 devices.
  - .3 Support of combination of MCUs and OWSs directly connected to EMCS-LAN.
  - .4 High speed data transfer rates for alarm reporting, quick report generation from multiple controllers, upload/download information between network devices. Bit rate to be 10 Megabits per second minimum.
  - .5 Detection and accommodation of single or multiple failures of either OWSs, MCUs or network media. Operational equipment to continue to perform designated functions effectively in event of single or multiple failures.
  - .6 Commonly available, multiple sourced, networking components and protocols to allow system to co-exist with other networking applications including office automation.
- .2 Dynamic Data Access.
  - .1 LAN to provide capabilities for OWSs, either network resident or connected remotely, to access point status and application report data or execute control functions for other devices via LAN.
  - .2 Access to data to be based upon logical identification of building equipment.
- .3 Network Medium.
  - .1 Network medium: twisted cable, compatible with network protocol to be used within buildings.

## PART 2 - PRODUCTS

### 2.1 NOT USED

- .1 Not Used.

## PART 3 - EXECUTION



**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 SUMMARY**

- .1 Related Requirements
  - .1 Section 25 05 01 – EMCS – General Requirements.
  - .2 Section 25 05 02 - EMCS: Shop Drawings, Product Data and Review Process.

### **1.2 REFERENCES**

- .1 American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc. (ASHRAE).
  - .1 ASHRAE 2003, Applications Handbook, SI Edition.
- .2 Canadian Standards Association (CSA International).
  - .1 C22.2 No.205-M1983(R1999), Signal Equipment.
- .3 Institute of Electrical and Electronics Engineers (IEEE).
  - .1 IEEE C37.90.1-02, Surge Withstand Capabilities (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus.
- .4 Public Works and Government Services Canada (PWGSC)/Real Property Branch/Architectural and Engineering Services.
  - .1 MD13800, Energy Management and Control Systems (EMCS) Design Manual. English: <ftp://ftp.pwgsc.gc.ca/rps/docentre/mechanical/me214-e.pdf>

### **1.3 DEFINITIONS**

- .1 Acronyms and definitions: refer to Section 25 05 01 - EMCS: General Requirements.

### **1.4 DESCRIPTION**

- .1 General: Network of controllers comprising of LCU('s) to be provided to support building systems and associated sequence(s) of operations as detailed in these specifications.
  - .1 Provide sufficient controllers to meet intents and requirements of this section.
  - .2 Controller quantity, and point contents to be approved by Departmental Representative at time of preliminary design review.
- .2 Controllers: stand-alone intelligent Control Units.
  - .1 Incorporate programmable microprocessor, non-volatile program memory, RAM, power supplies, as required to perform specified functions.
  - .2 Incorporate communication interface ports for communication to LANs to exchange information with other Controllers.

- .3 Capable of interfacing with operator interface device.
- .4 Execute its logic and control using primary inputs and outputs connected directly to its onboard input/output field terminations or slave devices, and without need to interact with other controller. Secondary input used for reset such as outdoor air temperature may be located in other Controller(s).
  - .1 Secondary input used for reset such as outdoor air temperature may be located in other Controller(s).
- .3 Interface to include provisions for use of dial-up modem for interconnection with remote modem.
  - .1 Dial-up communications to use 56 Kbit modems and voice grade telephone lines.
  - .2 Each stand-alone panel may have its own modem or group of stand-alone panels may share modem.

## 1.5 DESIGN REQUIREMENTS

- .1 To include:
  - .1 Scanning of AI and DI connected inputs for detection of change of value and processing detection of alarm conditions.
  - .2 Perform On-Off digital control of connected points, including resulting required states generated through programmable logic output.
  - .3 Perform Analog control using programmable logic, (including PID) with adjustable dead bands and deviation alarms.
  - .4 Control of systems as described in sequence of operations.
  - .5 Execution of optimization routines as listed in this section.
- .2 Total spare capacity for LCUs: at least 25 % of each point type distributed throughout the MCUs and LCUs.
- .3 Field Termination and Interface Devices:
  - .1 To: CSA C22.2 No.205.
  - .2 Electronically interface sensors and control devices to processor unit.
  - .3 Include, but not be limited to, following:
    - .1 Programmed firmware or logic circuits to meet functional and technical requirements.
    - .2 Power supplies for operation of logics devices and associated field equipment.
    - .3 Lockable wall cabinet.
    - .4 Required communications equipment and wiring (if remote units).
    - .5 Leave controlled system in "fail-safe" mode in event of loss of communication with, or failure of, processor unit.
    - .6 Input Output interface to accept as minimum AI, AO, DI, DO functions as specified.
    - .7 Wiring terminations: use conveniently located screw type or spade lug terminals.
  - .4 AI interface equipment to:
    - .1 Convert analog signals to digital format with [10] bit analog-to-digital resolution.
    - .2 Provide for following input signal types and ranges:

- .1 4 - 20 mA;
- .2 0 - 10V DC;
- .3 Meet IEEE C37.90.1 surge withstand capability.
- .4 Have common mode signal rejection greater than 60dB to 60Hz.
- .5 Where required, dropping resistors to be certified precision devices which complement accuracy of sensor and transmitter range specified.
- .5 AO interface equipment:
  - .1 Convert digital data from controller processor to acceptable analog output signals using 8bit digital-to-analog resolution.
  - .2 Provide for following output signal types and ranges:
    - .1 4 - 20 mA.
    - .2 0 - 10 V DC.
  - .3 Meet IEEE C37.90.1 surge withstand capability.
- .6 DI interface equipment:
  - .1 Able to reliably detect contact change of sensed field contact and transmit condition to controller.
  - .2 Meet IEEE C37.90.1 surge withstand capability.
  - .3 Accept pulsed inputs up to 2kHz.
- .7 DO interface equipment:
  - .1 Respond to controller processor output, switch respective outputs. Each DO hardware to be capable of switching up to 0.5amps at 24V AC.
  - .2 Switch up to 5amps at 220V AC using optional interface relay.
- .4 Controllers and associated hardware and software: operate in conditions of 0 degrees C to 44 degrees C and 20 % to 90 % non-condensing RH.
- .5 Controllers (LCU): mount in wall mounted cabinet with hinged, keyed-alike locked door.
  - .1 Provide for conduit entrance from top, bottom or sides of panel.
  - .2 ECUs and TCUs to be mounted in equipment enclosures or separate enclosures.
  - .3 Mounting details as approved by Departmental Representative for ceiling mounting.
- .6 Cabinets to provide protection from water dripping from above, while allowing sufficient airflow to prevent internal overheating.
- .7 Provide surge and low voltage protection for interconnecting wiring connections.

## 1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 00 10 00 – General Instructions and Section 25 05 02 - EMCS: Shop Drawings, Product Data and Review Process.
  - .1 Submit product data sheets for each product item proposed for this project.

## 1.7 MAINTENANCE

- .1 Provide manufacturers recommended maintenance procedures for insertion in Section 25 05 03 - EMCS: Project Record Documents.

## **PART 2 - PRODUCTS**

### **2.1 LOCAL CONTROL UNIT (LCU)**

- .1 Provide multiple control functions for typical built-up and package HVAC systems, hydronic systems and electrical systems.
- .2 Minimum of 16 I/O points of which minimum be 4 AOs, 4 AIs, 4 DIs, 4 DOs.
- .3 Points integral to one Building System to be resident on only one controller.
- .4 Microprocessor capable of supporting necessary software and hardware to meet specified requirements as listed in previous MCU article with following additions:
  - .1 Include minimum 2 interface ports for connection of local computer terminal.
  - .2 Design so that shorts, opens or grounds on input or output will not interfere with other input or output signals.
  - .3 Physically separate line voltage (70V and over) circuits from DC logic circuits to permit maintenance on either circuit with minimum hazards to technician and equipment.
  - .4 Include power supplies for operation of LCU and associated field equipment.
  - .5 In event of loss of communications with, or failure of, MCU, LCU to continue to perform control. Controllers that use defaults or fail to open or close positions not acceptable.
  - .6 Provide conveniently located screw type or spade lug terminals for field wiring.

### **2.2 POINT NAME SUPPORT**

- .1 Controllers (LCU) to support PWGSC point naming convention as defined in Section 25 05 01 - EMCS: General Requirements.

## **PART 3 - EXECUTION**

### **3.1 LOCATION**

- .1 Location of Controllers to be approved by Departmental Representative.

### **3.2 INSTALLATION**

- .1 Install Controllers in secure locking enclosures as directed by Departmental Representative.
- .2 Provide necessary power from local 120V branch circuit panel for equipment.

- .3 Install tamper locks on breakers of circuit breaker panel.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 SUMMARY**

- .1 Related Sections:
  - .1 Section 00 10 00 – General Instructions.
  - .2 Section 00 15 45 – General and Fire Safety Requirements
  - .3 Section 25 05 01 - EMCS: General Requirements.
  - .4 Section 25 05 02 - EMCS: Shop Drawings, Product Data and Review Process.
  - .5 Section 25 05 54 - EMCS: Identification.
  - .6 Section 25 90 01 - EMCS: Site Requirements Applications and Systems Sequences of Operation.
  - .7 Section 26 05 00 - Common Work Results for Electrical.
  - .8 Section 26 27 26 - Wiring Devices.

### **1.2 REFERENCES**

- .1 American National Standards Institute (ANSI).
  - .1 ANSI C12.7-1993(R1999), Requirements for Watthour Meter Sockets.
  - .2 ANSI/IEEE C57.13-1993, Standard Requirements for Instrument Transformers.
- .2 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM B 148-97(03), Standard Specification for Aluminum-Bronze Sand Castings.
- .3 National Electrical Manufacturer's Association (NEMA).
  - .1 NEMA 250-03, Enclosures for Electrical Equipment (1000 Volts Maximum).
- .4 Air Movement and Control Association, Inc. (AMCA).
  - .1 AMCA Standard 500-D-98, Laboratory Method of Testing Dampers For Rating.
- .5 Canadian Standards Association (CSA International).
  - .1 CSA-C22.1-02, Canadian Electrical Code, Part 1 (19th Edition), Safety Standard for Electrical Installations.

### **1.3 DEFINITIONS**

- .1 Acronyms and Definitions: refer to Section 25 05 01 - EMCS: General Requirements.

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit shop drawings and manufacturer's installation instructions in accordance with Section 25 05 02 - EMCS: Submittals and Review Process.
- .2 Pre-Installation Tests.

- .1 Submit samples at random from equipment shipped, as requested by Departmental Representative, for testing before installation. Replace devices not meeting specified performance and accuracy.
- .3 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions for specified equipment and devices.

## 1.5 EXISTING CONDITIONS

- .1 Cutting and Patching: in accordance with Section 00 10 00 – General Instruction supplemented as specified herein.
- .2 Repair surfaces damaged during execution of Work.
- .3 Turn over to Departmental Representative existing materials removed from Work not identified for re-use.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- .1 Control devices of each category to be of same type and manufacturer.
- .2 External trim materials to be corrosion resistant. Internal parts to be assembled in watertight, heat resistant assembly.
- .3 Operating conditions: 0 - 32 degrees C with 10 - 90% RH (non-condensing) unless otherwise specified.
- .4 Terminations: use standard conduit box with slot screwdriver compression connector block unless otherwise specified.
- .5 Transmitters and sensors to be unaffected by external transmitters including walkie talkies.
- .6 Account for hysteresis, relaxation time, maximum and minimum limits in applications of sensors and controls.
- .7 Outdoor installations: use weatherproof construction in NEMA 4 enclosures.
- .8 Devices installed in user occupied space not exceed Noise Criteria (NC) of 35. Noise generated by any device must not be detectable above space ambient conditions.
- .9 Range: including temperature, as indicated in I/O summary in Section 25 90 01 - EMCS: Site Requirements, Applications and System Sequences of Operation.



## 2.2 CURRENT TRANSDUCERS

- .1 Purpose: combined sensor/transducer, to measure line current and produce proportional signal in one of following ranges:
  - .1 4-20 mA DC.
  - .2 0-1 volt DC.
  - .3 0-10 volts DC.
  - .4 0-20 volts DC.
- .2 Frequency insensitive from 10 - 80 hz.
- .3 Accuracy to 0.5% full scale.
- .4 Zero and span adjustments. Field adjustable range to suit motor applications.
- .5 Adjustable mounting bracket to allow for secure/safe mounting inside MCC.

## 2.3 WIRING

- .1 In accordance with Section 26 27 26 - Wiring Devices.
- .2 For wiring under 70 volts use FT6 rated wiring where wiring is not run in conduit. Other cases use FT4 wiring.
- .3 Wiring must be continuous without joints.
- .4 Sizes:
  - .1 Field wiring to digital device: #18AWG or 20AWG stranded twisted pair.
  - .2 Analog input and output: shielded #18 minimum solid copper or #20 minimum stranded twisted pair.

## 2.4 LOW VOLTAGE TRANSFORMER

- .1 CSA approved 120/24V, 60Hz transformer with a coil of continuous copper conductor and high dielectric strength isolation.
- .2 Meets NEMA standards.
- .3 Include all transformers with sufficient capacity to insure a complete automation of electromechanical systems.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- .1 Install equipment, components so that manufacturer's and CSA labels are visible and legible after commissioning is complete.

- .2 Install field control devices in accordance with manufacturers recommended methods, procedures and instructions.
- .3 Fire stopping: provide space for fire stopping in accordance with Section 00 15 45 – General and Fire Safety Requirements. Maintain fire rating integrity.
- .4 Electrical:
  - .1 Complete installation in accordance with Section 26 05 00 - Common Work Results for Electrical.
  - .2 Modify existing starters to provide for EMCS as indicated in I/O Summaries and as indicated.
  - .3 Refer to electrical control schematics included as part of control design schematics in Section 25 90 01 - EMCS: Site Requirements Applications and Systems Sequences of Operation. Trace existing control wiring installation and provide updated wiring schematics including additions, deletions to control circuits for review by Departmental Representative before beginning Work.
  - .4 Terminate wires with screw terminal type connectors suitable for wire size, and number of terminations.
  - .5 Install communication wiring in conduit.
    - .1 Provide complete conduit system to link Building Controllers, field panels and OWS(s).
    - .2 Conduit sizes to suit wiring requirements and to allow for future expansion capabilities specified for systems.
    - .3 Maximum conduit fill not to exceed 40%.
    - .4 Design drawings do not show conduit layout.
  - .6 Do not run exposed conduits in normally occupied spaces unless otherwise indicated or unless impossible to do otherwise. Departmental Representative to review before starting Work. Wiring in mechanical rooms, wiring in service rooms and exposed wiring must be in conduit.

### **3.2 IDENTIFICATION**

- .1 Identify field devices in accordance with Section 25 05 54 - EMCS: Identification.

### **3.3 TESTING AND COMMISSIONING**

- .1 Calibrate and test field devices for accuracy and performance.

**END OF SECTION**



# **APPENDIX “A”**

NATIONAL RESEARCH COUNCIL CANADA  
1200 MONTREAL ROAD  
OTTAWA, ONTARIO  
K1A 0R6

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## DESIGNATED SUBSTANCES SURVEY



## BUILDING M-7 OTTAWA, ON

Distribution:  
2 copies – National Research Council Canada  
1 copy – Oakhill Environmental Inc.

December 2008



**OAKHILL**  
ENVIRONMENTAL INC.



## EXECUTIVE SUMMARY

Oakhill Environmental (Oakhill) was retained by National Research Council Canada (NRC) to conduct a designated substances survey within Building M-7 in Ottawa, Ontario. All site work was completed from October 30<sup>th</sup> to November 10<sup>th</sup>, 2008.

All work carried out meets the requirements of the Ontario Occupational Health and Safety Act and WHMIS Regulation (formerly Bill 208). The purpose of the investigation was to identify any potential designated substances and mould.

Based on the visual inspection and laboratory analyses, designated substances were identified to be present in the facility. A summary of the survey recommendations is presented in Table 1.

**Table 1 - Summary of Findings and Recommendations**

Issue	Comments	Recommendations
Asbestos	Room 4 (FS#B001)	
	Five damaged mud joint compound fittings were identified on the condensate system. (5 units)	Encapsulate the five damaged mud joint compound fittings on the condensate system.
	Seven damaged sections of Aircell pipe insulation were identified on the condensate system. (2.8 LM)	Seven encapsulations are required on the damaged Aircell pipe insulation on the condensate system.
	Six damaged mud joint compound fittings were identified on the steam system. (6 units)	Encapsulate the six damaged mud joint compound fittings on the steam system.
	Seven damaged sections of Aircell pipe insulation were identified on the steam system. (3.1 LM)	Seven encapsulations are required on the damaged Aircell pipe insulation on the steam system.
	Two damaged sections of Sweatwrap pipe insulation were identified on the domestic cold water system. (1 LM)	Two encapsulations are required on the damaged Sweatwrap pipe insulation on the domestic cold water system.
	Room 4A (FS#B002)	
	Two damaged sections of Aircell pipe insulation were identified on the steam system. (0.6 LM)	Two removals are required on the damaged Aircell pipe insulation on the steam system.
	One damaged section of Aircell pipe insulation was identified on the steam system. (0.3 LM)	One encapsulation is required on the damaged Aircell pipe insulation on the steam system.



Issue	Comments	Recommendations
	Four damaged mud joint compound fittings were identified on the steam system. (4 units)	Encapsulate the four damaged mud joint compound fittings on the steam system.
	One damaged mud joint compound fitting was identified on the steam system. (1 unit)	Remove the one damaged mud joint compound fitting on the steam system.
	One exposed mud joint compound fitting was identified on the steam system. (1 unit)	Remove the one exposed mud joint compound fitting on the steam system.
	Three damaged sections of Aircell pipe insulation were identified on the steam system. (0.8 LM)	Three encapsulations are required on the damaged Aircell pipe insulation on the steam system.
	One damaged section of Sweatwrap pipe insulation was identified on the domestic cold water system. (0.5 LM)	One encapsulation is required on the damaged Sweatwrap pipe insulation on the domestic cold water system.
	Three damaged mud joint compound fittings were identified on the condensate system. (3 units)	Encapsulate the three damaged mud joint compound fittings on the condensate system.
	Mud joint compound fitting insulation residual was identified on the condensate system. (1 unit)	Remove the mud joint compound fitting insulation residual on the condensate system.
	Three damaged sections of Aircell pipe insulation were identified on the condensate system. (1.1 LM)	Three encapsulations are required on the damaged Aircell pipe insulation on the condensate system.
	One damaged mud joint compound fitting was identified on the condensate system. (1 unit)	Remove the one damaged mud joint compound fitting on the condensate system.
<b>Rooms 3 &amp; 3A (FS#B003)</b>		
	One damaged mud joint compound fitting was identified on the condensate system. (1 unit)	Encapsulate the one damaged mud joint compound fitting on the condensate system.
	One damaged mud joint compound fitting was identified on the steam system. (1 unit)	Encapsulate the one damaged mud joint compound fitting on the steam system.
<b>Room 01 (FS#B005)</b>		
	Damaged 12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern) was identified on the walls and ceiling. (<8.0 m2)	Eight removals are required on the damaged 12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern) on the walls and ceiling.



Issue	Comments	Recommendations
	ACM debris (12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern)) was identified on the floor. (>1.0 m2)	Clean up is required on the ACM debris (12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern)) was identified on the floor.
Room 030 (FS#B007)		
	Open end of Aircell pipe insulation was identified on the steam system. (0.2 LM)	One encapsulation is required on the open ended Aircell pipe insulation on the steam system.
Room 01B (FS#B010)		
	Damaged 12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern) was identified on the walls and ceiling. (1.0 m2)	Two removals are required on the damaged 12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern) on the walls and ceiling.
Room 11 (FS#B011)		
	One damaged mud joint compound fitting was identified on the condensate system. (1 unit)	Remove the one damaged mud joint compound fitting on the condensate system.
	Two open ends of Aircell pipe insulation were identified on the steam system. (0.4 LM)	Two encapsulations are required on the open ended Aircell pipe insulation on the steam system.
	One damaged section of Aircell pipe insulation was identified on the condensate system. (0.2 LM)	One encapsulation is required on the damaged Aircell pipe insulation on the condensate system.
Room 9 (FS#B012)		
	One damaged section of Aircell pipe insulation was identified on the steam system. (0.3 LM)	One encapsulation is required on the damaged Aircell pipe insulation on the steam system.
	Four damaged mud joint compound fittings were identified on the steam system. (4 units)	Encapsulate the four damaged mud joint compound fittings on the steam system.
	Two damaged sections of Aircell pipe insulation were identified on the condensate system. (0.5 LM)	Two encapsulations are required on the damaged Aircell pipe insulation on the condensate system.
	One damaged mud joint compound fitting was identified on the condensate system. (1 unit)	Encapsulate the one damaged mud joint compound fitting on the condensate system.
Room 1B (FS#B013)		
	Mud joint compound fitting insulation residual was identified on the steam system. (1 unit)	Remove the mud joint compound fitting insulation residual on the steam system.





Issue	Comments	Recommendations
<b>Room 15 (FS#G001)</b>		
	Two damaged mud joint compound fittings were identified on the condensate system. (2 units)	Encapsulate the two damaged mud joint compound fittings on the condensate system.
	Four damaged sections of Aircell pipe insulation were identified on the condensate system. (0.8 LM)	Four encapsulations are required on the damaged Aircell pipe insulation on the condensate system.
	One damaged section of Aircell pipe insulation was identified on the condensate system. (1.0 LM)	One removal is required on the damaged Aircell pipe insulation on the condensate system.
	One damaged mud joint compound fitting was identified on the steam system. (1 unit)	Remove the one damaged mud joint compound fitting on the steam system.
	Four open ends of Aircell pipe insulation were identified on the steam system. (0.8 LM)	Four encapsulations are required on the open ends of Aircell pipe insulation on the steam system.
	Two damaged sections of Aircell pipe insulation were identified on the steam system. (0.4 LM)	Two encapsulations are required on the damaged Aircell pipe insulation on the steam system.
<b>Room 16 (FS#G002)</b>		
	Two open ends of Aircell pipe insulation were identified on the domestic hot water system. (0.4 LM)	Two encapsulations are required on the open ended Aircell pipe insulation on the domestic hot water system.
	One damaged section of Sweatwrap pipe insulation was identified on the domestic cold water system. (0.2 LM)	One encapsulation is required on the damaged Sweatwrap pipe insulation on the domestic cold water system.
<b>Hall 127 (FS#1003)</b>		
	One damaged mud joint compound fitting was identified on the steam system. (1 unit)	Encapsulate the one damaged mud joint compound fitting on the steam system.
<b>Room 102A (FS#1018)</b>		
	One damaged mud joint compound fitting was identified on the steam system. (1 unit)	Encapsulate the one damaged mud joint compound fitting on the steam system.
<b>Room 101 (FS#1021)</b>		
	Two open ends of Aircell pipe insulation were identified on the condensate system. (0.4 LM)	Two encapsulations are required on the open ended Aircell pipe insulation on the condensate system.



Issue	Comments	Recommendations
	Two open ends of Aircell pipe insulation were identified on the steam system. (0.4 LM)	Two encapsulations are required on the open ended Aircell pipe insulation on the steam system.
	One damaged section of Aircell pipe insulation was identified on the steam system. (0.2 LM)	One encapsulation is required on the damaged Aircell pipe insulation on the steam system.
	One damaged mud joint compound fitting was identified on the steam system. (1 unit)	Encapsulate the one damaged mud joint compound fitting on the steam system.
Hall 113 (FS#1022)		
	Open end of Sweatwrap pipe insulation was identified on an undetermined system. (0.8 LM)	Two encapsulations are required on the open ended Aircell pipe insulation on the undetermined system.
Room 119 (FS#1026)		
	One damaged mud joint compound fitting was identified on the steam system. (1 unit)	Encapsulate the one damaged mud joint compound fitting on the steam system.
	Two damaged sections of Aircell pipe insulation were identified on the steam system. (0.4 LM)	Two encapsulations are required on the damaged Aircell pipe insulation on the steam system.
	One damaged mud joint compound fitting was identified on the condensate system. (1 unit)	Encapsulate the one damaged mud joint compound fitting on the condensate system.
	Two damaged sections of Aircell pipe insulation were identified on the condensate system. (0.4 LM)	Two encapsulations are required on the damaged Aircell pipe insulation on the condensate system.
Room 129 (FS#1029)		
	One damaged section of Transite panel was identified on the wall. (0.5 m <sup>2</sup> )	One damaged section of Transite panel was identified on the wall. (0.5 m <sup>2</sup> )
Southwest of Room 203 (FS#MZ04)		
	One damaged mud joint compound fitting was identified on the combined condensate/steam system. (1 unit)	Encapsulate the one damaged mud joint compound fitting on the combined condensate/steam system.
	Two damaged mud joint compound fittings were identified on the steam system. (3 units)	Encapsulate the two damaged mud joint compound fittings on the steam system.
Lead	Seven paint samples were submitted for lead analysis. One of the samples submitted; the light grey paint on a	The draft Proposed Lead Regulation on Construction Projects, May 5, 1995, (enforced by the Ministry of Labour) does not require removal



Issue	Comments	Recommendations
	<p>door in Room 4A (FS#B002), contained greater than 5,000 ppm of lead and are therefore classified as lead-based paint. The remaining six samples were not found to contain significant levels of lead (i.e., equal to or greater than 5000 ppm).</p> <p>Lead may also be present in the solder used on copper domestic water lines, as caulking in bell fittings for cast iron drainage pipes, in glazing on the ceramic tiles and in electrical equipment, wiring or fixtures.</p>	<p>of lead paint or lead-based materials, unless work on these materials is likely to produce lead fumes or dust, for example during welding, torch cutting, grinding, sanding or sandblasting.</p> <p>In the event that such work is conducted at this facility, ensure that lead fumes or dust do not exceed the maximum allowable Time Weighted Average Exposure Value (TWAEV) of 0.15 mg/m<sup>3</sup> as prescribed by the OHSA.</p>
Mercury	Mercury vapour may be present in fluorescent light tubes and thermostats. Mercury may also be present in paints and adhesives.	Mercury, or mercury vapour within light fixtures, pose no risk to workers or occupants, provided the mercury containers remain intact and undisturbed. Where possible, fluorescent lights should be recycled at an approved recycling facility. Mercury must be handled and disposed of in accordance with O. Reg. 390/00 and O. Reg. 558/00.
Silica	Silica may be present in concrete, cement mortar and non-fibreglass acoustic ceiling tiles.	Ensure workers performing demolition work are not exposed to airborne silica levels in excess of 0.20 mg/m <sup>3</sup> by providing respiratory protection, and/or wetting down work area, and providing workers with a facility to properly wash prior to exiting the work area as prescribed by O.Reg.845/90.
Suspect Mould	Room 5 (FS#B006)	
	Suspect mould was observed in four locations on the chiller system fitting insulation below the solid ceiling. (>1 m <sup>2</sup> respectively)	Bulk fungal analysis should be performed to the species level. Once the hazard is qualified, the mould should be removed and the source of the moisture should be mitigated.
	Room 30A (FS#G007)	
Suspect mould was observed in two locations on the domestic cold water system fitting insulation below the solid ceiling. (>1 m <sup>2</sup> respectively)	Bulk fungal analysis should be performed to the species level. Once the hazard is qualified, the mould should be removed and the source of the moisture should be mitigated.	



Issue	Comments	Recommendations
Room 102 (FS#1017)		
	Suspect mould was observed in three locations on the chiller system fitting insulation below the solid ceiling. (>1 m <sup>2</sup> respectively)	Bulk fungal analysis should be performed to the species level. Once the hazard is qualified, the mould should be removed and the source of the moisture should be mitigated.
Room 102A (FS#1018)		
	Suspect mould was observed in one location on the chiller system fitting insulation below the solid ceiling. (>1 m <sup>2</sup> respectively)	Bulk fungal analysis should be performed to the species level. Once the hazard is qualified, the mould should be removed and the source of the moisture should be mitigated.
Mezzanine above Room 101 (FS#MZ01)		
	Suspect mould was observed in two locations on the chiller system fitting and pipe insulation below the solid ceiling. (>1 m <sup>2</sup> respectively)	Bulk fungal analysis should be performed to the species level. Once the hazard is qualified, the mould should be removed and the source of the moisture should be mitigated.

From initial testing, three of seven plaster samples were found to be asbestos containing. Each of the three samples which tested positive for asbestos were taken in functional spaces B005 & B010 where homogeneous number 06 (12" x 12" ACM ceiling tile) was present. The plaster wall system had been applied on top of the 12" x 12" ACM tile, which was fastened on the walls. There remained uncertainty regarding whether the plaster is ACM. Before issuing a final report, Oakhill decided to test the hypothesis that the presence and location of the ACM tiles and the extent of damage to the ACM tile in several locations influenced the results for the plaster analysis. The plaster in the building was therefore re-sampled. Twelve additional plaster samples were submitted for re-sampling, five from the areas with the 12' x 12' ACM ceiling/wall tile and seven from other areas, within the same construction date. The results from the re-sampling indicated that the five samples from functional spaces B005 and B010 were asbestos containing, while the seven samples that were collected from the ground floor foyer and hall (built during the same era) were non-ACM. It was therefore concluded that the building plaster is non-ACM, and that the ACM tiles had adhered to the plaster during collection of the complete profile of the plaster system. As the inspection of the building was non-intrusive, it was not able to be determined if the other areas with plaster had the 12" x 12" acoustical tile under the plaster layer. It will be listed as non-ACM in the FS forms.

None of the other designated substances were observed during the course of the survey inspection.



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## **1.0 INTRODUCTION**

Oakhill Environmental (Oakhill) was retained by the National Research Council Canada (NRC) to perform a survey for Designated Substances and mould of Building M-7 in Ottawa, Ontario. Building M-7 was surveyed from October 30<sup>th</sup> to November 10<sup>th</sup>, 2008.

The purpose of the investigation was to identify any building materials or equipment containing certain substances termed “Designated Substances” and mould.

This survey will enable NRC to:

1. Manage asbestos containing materials (ACM’s) to ensure that these materials are in good condition and provide recommendations for ACM’s that are in need of repair,
2. Provide this report to NRC building managers, project managers, contractors and subcontracts enabling them to comply with O. Reg. 278/05, the regulation regarding asbestos on construction projects and in buildings and repair operations, and
3. Provide a comprehensive survey, which will enable NRC to develop a Management Plan to deal with designated substances.

## **1.1 Limitations**

This report details the accessible Designated Substances found within the building and the exterior walls. Representative views were made above accessible suspended ceiling systems. Throughout the process of inspection there were, on numerous occasions, areas that were inaccessible. These areas include but are not limited to: areas above solid ceilings, areas behind solid walls and internal components of machinery or equipment. These areas require intrusive investigative techniques, which may compromise the integrity of that system. An example of an intrusive issue is asphaltic roofing felts (tar paper), which may contain asbestos. However, due to the potential for damages to the building and its contents, as well as safety reasons, no samples were obtained from the roofing systems at the facility. Intrusive investigative techniques are only undertaken at the expressed request of NRC staff where forthcoming renovations projects are known.

Any area that was not inspected and considered inaccessible in this report should be dealt with cautiously in future endeavours before undertaking any form of work, as there may be ACM in this area. In such future situations, samples should be collected and analyzed of all suspect ACM before commencing work. Any area that was not accessible at the time of inspection would be noted within the report.



The report reflects the observations of accessed areas, findings and analysis of materials sampled during the survey. Designated Substances may have been removed from or added to the project area. It is the NRC's responsibility to disclose whether any Designated Substances have been added to or removed from the project area.

The material in it reflects Oakhill's best judgement based on the information discovered at the time of preparation and within the Designated Substance Survey scope of work. There may be materials on-site, which are not represented by these investigations. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Oakhill accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.





## 2.0 SCOPE OF WORK

The purpose of the investigation was to identify any building materials or equipment containing certain substances termed “Designated Substances” and mould. The scope defined for this project is summarized below.

1. To provide assessments for the presence of Designated Substances which include:
  - Acrylonitrile
  - Arsenic
  - Asbestos
  - Benzene
  - Coke Oven Emissions
  - Ethylene Oxide
  - Isocyanates
  - Lead
  - Mercury
  - Silica (free crystalline silica)
  - Vinyl Chloride (vinyl chloride monomer, not PVC)
  - And in addition Mould
2. Assessment will include building materials and components incorporated in the structure and finishes (including exterior finishes). Items not included are building and service tunnels, owner or occupant articles within the building (e.g. process materials or equipment, furniture, etc.), soil contaminants, groundwater, vessels, drums or underground storage tanks)
3. To collect samples of suspect building materials to verify the presence of asbestos and lead
4. To provide testing from a certified laboratory on samples collected of suspect asbestos and lead
5. Provide three hard and electronic (PDF) copies of the final report.



### 3.0 REGULATORY CRITERIA, STANDARDS AND GUIDELINES

The following regulatory criteria, standards, and guidelines were applied for the interpretation and reporting of observations, laboratory data, and on-site monitoring data. The building materials and contents were visually examined to determine the presence of the following designated substances in accordance with the requirements of the Ministry of Labour's (MOL) Occupational Health and Safety Act, Section 30:

Acrylonitrile	O. Reg. 835/90 as amended by O. Reg. 101/04
Arsenic	O. Reg. 836/90 as amended by O. Reg. 102/04
Asbestos	O. Reg. 278/05 and O. Reg. 347/90
Benzene	O. Reg. 839/90 as amended by O. Reg. 105/04
Ethylene Oxide	O. Reg. 841/90 as amended by O. Reg. 107/04
Isocyanates	O. Reg. 842/90 as amended by O. Reg. 108/04
Lead	O. Reg. 843/90 as amended by O. Reg. 109/04
Mercury	O. Reg. 844/90 as amended by O. Reg. 110/04 and the MOL guideline
Silica	O. Reg. 845/90 as amended by O. Reg. 111/04
Vinyl Chloride	O. Reg. 846/90 as amended by O. Reg. 112/04

Asbestos-Containing Material (ACM) is defined as "Material that contains 0.5% or more asbestos by dry weight". Friable Material is defined as "material that: (a) when dry, can be crumbled, pulverized or powdered by hand pressure, or (b) is crumbled, pulverized or powdered".

For asbestos, lead and silica the above regulations define exposure guidelines for a worker's time-weighted average exposure of the material in air. Airborne levels should not exceed 0.01 fibres/m<sup>3</sup> of asbestos in air, 0.15 mg/m<sup>3</sup> of lead in air, 4.3 mg/m<sup>3</sup> of acrylonitrile in air, 0.2 mg/m<sup>3</sup> of arsenic in air, 3.0 mg/m<sup>3</sup> of benzene in air and 0.2 mg/m<sup>3</sup> of silica in air. The above regulations classify disturbances (Type 1, Type 2, and Type 3), handling requirements, respiratory requirements and monitoring requirements.

The Ministry of Labour published, The Safe Handling of Mercury, A Guideline for the Construction Industry, Jan 1991, outlining the health effects, sources, respiratory protection during the clean up of mercury. From the U.S. Department of Housing and Urban Development, Lead- Based Paint is classified as any paint application containing at least 1.0 milligrams of lead per square centimetre of surface area (1.0 mg/cm<sup>2</sup>) or at least 0.5% lead content by weight (5,000 ppm) or 5,000 µg/g.

The Provincial Government has issued O. Reg. 558/00 controlled under R.R.O. 1990, Regulation 347 outlining generator, hauler and receiver requirements for wastes dependant on the results of leachate analyses. Provincial and Federal regulations also outline the packaging and transportation of wastes.



## 4.0 SURVEY METHODOLOGY

### 4.1 Background Information Review

Reviewing existing reports, interviewing knowledgeable NRC staff, and reviewing as-built drawings allowed Oakhill to obtain a basic understanding of potential issues regarding each building.

### 4.2 Field Investigation

A detailed visual survey of all accessible areas of the building on a room-by-room basis, including ceiling spaces above removable acoustical ceiling tiles; and wall spaces behind removable panels. Each area or room of the building was assigned a four-digit functional space identification number beginning with 1001. A room-by-room inspection was conducted for Designated Substances in all accessible areas. All suspect ACM and lead were sampled and were categorized with a unique homogeneous material number. Visual assessment of all known and suspect ACM included assessment as to friability, type, quantity, condition, accessibility, appropriate response, as well as comments made on the potential or likelihood of future damage or exposure to ACM by building occupants. Quantification of all ACM's were approximations only, not actual measurements. Square metres or linear metres were generally used for quantifying ACM. All ACM's are documented through functional space forms and photographs.

In the performance of this Designated Substances survey, Oakhill utilized the project team comprised of the following staff:

Mr. Fil Barillaro, M.A.Sc., P.Eng.	Project Manager
Mr. Kevin Christian, M.Sc., P.Geo.	QA Reviewer
Mr. Bill McGovern	Environmental Analyst
Mr. Raivo Tahiste	Environmental Analyst
Mr. Gino Barillaro	Environmental Analyst
Mr. Sean Bagnulo	Environmental Analyst
Ms. Tanya Fiocca	Administration

#### 4.2.1 Homogenous Materials

Materials were grouped to be homogenous. That is, materials that are uniform in colour and texture were assumed to be similar in content. Regarding asbestos, samples collected of suspect materials adhered to O. Reg. 278/05, Table 1 Bulk Material Samples – Section 3 (3), for minimum sample requirements for respective suspect materials and quantities. Samples were randomly collected to be representative of each suspect ACM and lead material and then assigned a homogenous material number accordingly. A



homogenous materials list was generated which consists of suspect ACM sampled, with positive materials highlighted. The Homogenous Materials List is located in Table 2 of this report.

### **4.3 Sample Collection**

Collection of bulk samples of suspect materials for submission to AGAT Laboratories Ltd., in Mississauga, Ontario for analysis for asbestos (as percentage asbestos fibre, and type of asbestos fibre) and for lead (ug/g).

#### **4.3.1 Bulk Sample Collection**

Oakhill field staff wore half-face respirators with P100 cassettes during bulk sampling events. Building materials were pre-dampened with an application of amended water from a spray bottle to suppress surface and airborne fibres prior to disturbance for sample collection.

The building material sampled was sealed with caulking after sample collection to restore the material to its original condition. Every effort to minimize intrusion of the sampled building materials was always of paramount consideration. Each sample was sealed in a new plastic bag and labeled with a unique sample number and then double bagged. Chain of custody records were completed on-site and submitted with all samples to an approved laboratory.

All bulk materials sampled were randomly collected and are representative of each area of homogenous material. The minimum number of bulk materials to be collected from an area of homogenous material was in accordance with O. Reg. 278/05, Section 3 (3) (Table 1). All analysis of suspect asbestos containing materials was conducted according to O. Reg. 278/05, Section 3 (1) which states that the following standard be used: U.S. Environmental Protection Agency. Test method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials. June 1993. Sample locations are depicted in Appendix D.

#### **4.3.2 Sample Analysis**

All bulk samples were submitted to AGAT Laboratories Inc. (AGAT) in Mississauga, Ontario, an independent laboratory, for analysis.

AGAT has been evaluated and has been found to comply with the criteria and standards established by the Canadian Association for Environmental Laboratories (CAEAL) for asbestos fibre analysis by phase



contrast microscopy. The American Industrial Hygiene Association (AIHA) has accredited AGAT for the Industrial Hygiene Laboratory Accreditation Program for Asbestos using optical microscopy. Suspect bulk samples were analyzed using polarized light microscopy, and were based on a “test for first positive” approach. Laboratory results of the asbestos and lead sampling can be found in Appendices B and C respectively.



## 5.0 FINDINGS AND RECOMMENDATIONS

The results of the survey for designated substances and mould at building M-7 are discussed below.

### 5.1 Asbestos

All potential asbestos-containing materials sampled have been compiled into a homogenous materials list. Each homogenous material is given a homogeneous number, description, analytical result and corresponding sample numbers. The homogeneous materials list for building M-7 is shown in Table 2.

**Table 2 – Homogeneous Materials List**

Hom. Mat. #	Material Description	Asbestos Type & Conc.	Sample No.
01	<b>Mud Joint Compound Fitting Insulation (high temp)</b>	<b>55% Chrysotile</b>	<b>M7-01</b>
02	<b>Aircell Pipe Insulation (condensate)</b>	<b>50% Chrysotile</b>	<b>M7-02</b>
03	<b>Aircell Pipe Insulation (steam)</b>	<b>60% Chrysotile</b>	<b>M7-03</b>
04	<b>Sweat Wrap Pipe Insulation (domestic cold water)</b>	<b>10% Chrysotile</b>	<b>M7-04</b>
05	Mud Joint Compound Fitting Insulation (domestic cold water)	NAD	M7-05
06	<b>12" x 12" Ceiling/Wall Tile (uniform hole pattern)</b>	<b>6% Chrysotile</b>	<b>M7-06</b>
07	<b>*Plaster applied over 12" x 12" Ceiling/Wall Tile (uniform hole)</b>	<b>2% Chrysotile</b>	<b>M7-07</b>
08	<b>Mud Joint Compound Fitting Insulation (grey) found on all systems in wing constructed in 1965</b>	<b>40% Chrysotile</b>	<b>M7-08</b>
09	2' x 4' Ceiling Tile (deep divot)	NAD	M7-09
10	<b>Mud Joint Compound Fitting Insulation with black mastic (tower water return)</b>	<b>20% Chrysotile</b>	<b>M7-10</b>
11	Linoleum (brown)	NAD	M7-11
12	<b>Transite Panel</b>	<b>30% Chrysotile</b>	<b>M7-12</b>
13	MagBlock Pipe insulation (high temp)	NAD	M7-13

Hom. Mat. # – Homogeneous Material Number    Conc. – Concentration    NAD – No Asbestos Detected

\* Requires re-sampling, please see Section 5.1.1

#### 5.1.1 Survey Findings

The nine building materials that contain asbestos are as follows:

- 1) Mud joint compound fitting insulation on the high temperature systems.
- 2) Aircell pipe insulation on the condensate system.
- 3) Aircell pipe insulation on the steam system.
- 4) Sweat wrap pipe insulation on the domestic cold water system.
- 5) 12"x12" ceiling/wall tile. (uniform hole pattern)
- 6) \*Plaster applied over 12"x 12" Ceiling/Wall tiles. Please see further explanation below.
- 7) Mud joint compound fitting insulation (grey) on the all systems in the wing constructed in 1965.
- 8) Mud joint compound fitting insulation with black mastic on the tower water return system.



9) Transite panel on the walls and ceilings.

From initial testing, three of seven plaster samples were found to be asbestos containing. Each of the three samples which tested positive for asbestos were taken in functional spaces B005 & B010 where homogeneous number 06 (12" x 12" ACM ceiling tile) was present. The plaster wall system had been applied on top of the 12" x 12" ACM tile, which was fastened on the walls. There remained uncertainty regarding whether the plaster is ACM. Before issuing a final report, Oakhill decided to test the hypothesis that the presence and location of the ACM tiles and the extent of damage to the ACM tile in several locations influenced the results for the plaster analysis. The plaster in the building was therefore re-sampled. Twelve additional plaster samples were submitted for re-sampling, five from the areas with the 12' x 12' ACM ceiling/wall tile and seven from other areas, within the same construction date. The results from the re-sampling indicated that the five samples from functional spaces B005 and B010 were asbestos containing, while the seven samples that were collected from the ground floor foyer and hall (built during the same era) were non-ACM. It was therefore concluded that the building plaster is non-ACM, and that the ACM tiles had adhered to the plaster during collection of the complete profile of the plaster system. As the inspection of the building was non-intrusive, it was not able to be determined if the other areas with plaster had the 12" x 12" acoustical tile under the plaster layer. It will be listed as non-ACM in the FS forms.

Table 3 provides a summary of all asbestos-containing materials by room. This table can be cross-referenced with the functional space forms in Appendix B to find a complete description of the room where ACM materials were encountered.

**Table 3 – Summary of ACM by Room Listing**

Functional Space ID#	Location	Homo. Mat. #	Material Description and Quantity	Response Measure
<b>Basement</b>				
B001	Room 4	1	Mud Joint Compound Fitting on the condensate system. – 5 Units	O&M
		1	Mud Joint Compound Fitting on the condensate system. – 5 Units	5 Encaps
		2	Aircell Pipe Insulation on the condensate system. – 12 LM	O&M
		2	Aircell Pipe Insulation on the condensate system. – 2.8 LM	7 Encaps
		1	Mud Joint Compound Fitting on the steam system. – 19 Units	O&M
		1	Mud Joint Compound Fitting on the steam system. – 6 Units	6 Encaps
		3	Aircell Pipe Insulation on the steam system. – 30 LM	O&M
		3	Aircell Pipe Insulation on the on the steam system. – 3.1 LM	7 Encaps



Functional Space ID#	Location	Homo. Mat. #	Material Description and Quantity	Response Measure
		4	Sweat Wrap Pipe Insulation on the domestic cold water system. – 6 LM	O&M
		4	Sweat Wrap pipe Insulation on the domestic cold water system. – 1 LM	2 Encaps
B002	Rooms 4A, 4B, 7, 7A, 7B	1	Mud Joint Compound Fitting on the condensate system. – 24 Units	O&M
		1	Mud Joint Compound Fitting on the condensate system. – 3 Units	3 Encaps
		2	Aircell Pipe Insulation on the condensate system. – 15 LM	O&M
		2	Aircell Pipe Insulation on the condensate system. – 1.1 LM	3 Encaps
		1	Mud Joint Compound Fitting on the steam system. – 20 Units	O&M
		1	Mud Joint Compound Fitting on the steam system. – 4 Units	4 Encaps
		1	Mud Joint Compound Fitting on the steam system. – 2 Units	2 Removals
		3	Aircell Pipe Insulation on the steam system. – 31 LM	O&M
		3	Aircell Pipe Insulation on the steam system. – 0.6 LM	2 Removals
		3	Aircell Pipe Insulation on the steam system. – 0.8 LM	3 Encaps
		4	Sweat Wrap Pipe Insulation on the domestic cold water system. – 12 LM	O&M
		4	Sweat Wrap Pipe Insulation on the domestic cold water system. – 0.5 LM	1 Encap
		10	Mud Joint Compound Fitting (with black mastic) on the tower water system. – 4 Units	O&M
B003	Rooms 3, 3A	1	Mud Joint Compound Fitting on the condensate system. – 1 Unit	O&M
		1	Mud Joint Compound Fitting on the condensate system. – 1 Unit	1 Encap
		1	Mud Joint Compound Fitting on the steam system. – 5 Units	O&M
		1	Mud Joint Compound Fitting on the steam system. – 1 Unit	1 Encap
B004	Room Test Cell #6	1	Mud Joint Compound Fitting on the steam system. – 3 Units	O&M
B005	Room 01	6	12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern). – <8 m <sup>2</sup>	8 Removals
		6	12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern). – 96 m <sup>2</sup>	O&M
		6	ACM debris 12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern). – >1 m <sup>2</sup>	Clean-up
B007	Rooms 030, 031	2	Aircell Pipe Insulation on the steam system. – 1 LM	O&M
		2	Aircell Pipe Insulation on the steam system. – 0.2 LM	1 Encap
B010	Room 01B	6	12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern). – >1 m <sup>2</sup>	2 Removals
		6	12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern). – 12 m <sup>2</sup>	O&M
B011	Rooms 11, Server Closet	3	Aircell Pipe Insulation on the steam system. – 4 LM	O&M
		3	Aircell Pipe Insulation on the steam system. – 0.4 LM	2 Encaps
		2	Aircell Pipe Insulation on the condensate system. – 0.2 LM	1 Encap
		1	Mud Joint Compound Fitting on the condensate system. – 1 Unit	O&M
		1	Mud Joint Compound Fitting on the condensate system. – 1 Unit	1 Removal
B012	Rooms 9, Hallway, Stairs, Closet	3	Aircell Pipe Insulation on the steam system. – 7 LM	O&M
		3	Aircell Pipe Insulation on the steam system. – 0.3 LM	1 Encap
		1	Mud Joint Compound Fitting on the steam system. – 2 Units	O&M
		1	Mud Joint Compound Fitting on the steam system. – 4 Units	4 Encaps
		2	Aircell Pipe Insulation on the condensate system. – 7 LM	O&M
		2	Aircell Pipe Insulation on the condensate system. – 0.5 LM	2 Encaps
		1	Mud Joint Compound Fitting on the condensate system. – 1 Unit	O&M
		1	Mud Joint Compound Fitting on the condensate system. – 1 Unit	1 Encap
4	Sweat Wrap Pipe Insulation on the domestic cold water system. – 6 LM	O&M		





Functional Space ID#	Location	Homo. Mat. #	Material Description and Quantity	Response Measure
B013	Rooms 1B, Hall 8	1	Mud Joint Compound Fitting residual on the steam system. – 1 Unit	1 Removal
B016	North Confined Space	10	Mud Joint Compound Fitting (with black mastic) on the tower water system. – 3 Units	O&M
<b>Ground Floor</b>				
G001	Room 15	1	Mud Joint Compound Fitting on the condensate system. – 5 Units	O&M
		1	Mud Joint Compound Fitting on the condensate system. – 2 Units	2 Encaps
		2	Aircell Pipe Insulation on the condensate system. – 9 LM	O&M
		2	Aircell Pipe Insulation on the condensate system. – 0.8 LM	4 Encaps
		2	Aircell Pipe Insulation on the condensate system. – 1 LM	1 Removal
		1	Mud Joint Compound Fitting on the steam system. – 3 Units	O&M
		1	Mud Joint Compound Fitting on the steam system. – 1 Unit	1 Encap
		3	Aircell Pipe Insulation on the steam system. – 9 LM	O&M
		3	Aircell Pipe Insulation on the steam system. – 0.8 LM	4 Encaps
		3	Aircell Pipe Insulation on the steam system. – 0.4 LM	2 Encaps
G002	Rooms 16, Woman's Washroom	4	Sweat Wrap Pipe Insulation on the domestic cold water system. – 3 LM	O&M
		4	Sweat Wrap Pipe Insulation on the domestic cold water system. – 0.2 LM	O&M
		4	Sweat Wrap Pipe Insulation on the domestic cold water system. – 0.4 LM	1 Encap
		2	Aircell Pipe Insulation on the domestic hot water system. – 5 LM	O&M
		2	Aircell Pipe Insulation on the domestic hot water system. – 0.4 LM	2 Encaps
1	Mud Joint Compound Fitting on the domestic hot water system. – 1 Unit	O&M		
<b>First Floor</b>				
1001	Rooms 100, 100A	6	12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern) on the deck. - 27 m <sup>2</sup>	O&M
1003	Hallway 127	6	12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern) on the deck. - 5 m <sup>2</sup>	O&M
		8	Mud Joint Compound Fitting on the condensate system. – 1 Unit	O&M
		8	Mud Joint Compound Fitting on the steam system. – 1 Unit	1 Encap
		8	Mud Joint Compound Fitting on the domestic cold water system. – 1 Unit	O&M
1004	Room 104	8	Mud Joint Compound Fitting on the condensate system. – 1 Unit	O&M
		8	Mud Joint Compound Fitting on the steam system. – 1 Unit	O&M
		8	Mud Joint Compound Fitting on the domestic cold water system. – 1 Unit	O&M
1005	Room 106	6	12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern) on the deck. - 28 m <sup>2</sup>	O&M
1006	Room 108	6	12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern) on the deck. - 28 m <sup>2</sup>	O&M
1007	Room 110	6	12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern) on the deck. - 28 m <sup>2</sup>	O&M
1008	Rooms 112, 112A	6	12" x 12" Ceiling Tile / Wall Tile (uniform hole pattern) on the deck. - 19 m <sup>2</sup>	O&M
1009	Rooms 120, 121,	8	Mud Joint Compound Fitting on the condensate system. – 6 Units	O&M
		8	Mud Joint Compound Fitting on the steam system. – 5 Units	O&M



Functional Space ID#	Location	Homo. Mat. #	Material Description and Quantity	Response Measure
	122, 123, 124, 125, 126, Hallway 128	8	Mud Joint Compound Fitting on the domestic cold water system. – 2 Units	O&M
1018	Room 102A	1	Mud Joint Compound Fitting on the condensate system. – 5 Units	O&M
		2	Aircell Pipe Insulation on the condensate system. – 12 LM	O&M
		1	Mud Joint Compound Fitting on the steam system. – 6 Units	O&M
		1	Mud Joint Compound Fitting on the steam system. – 1 Unit	1 Encap
		3	Aircell Pipe Insulation on the steam system. – 15 LM	O&M
1021	Room 101 Machine Shop	1	Mud Joint Compound Fitting on the condensate system. – 5 Units	O&M
		2	Aircell Pipe Insulation on the condensate system. – 17 LM	O&M
		2	Aircell Pipe Insulation on the condensate system. – 0.4 LM	2 Encaps
		1	Mud Joint Compound Fitting on the steam system. – 13 Units	O&M
		1	Mud Joint Compound Fitting on the steam system. – 1 Unit	1 Encap
		3	Aircell Pipe Insulation on the steam system. – 17 LM	O&M
		3	Aircell Pipe Insulation on the steam system. – 0.6 LM	3 Encap
1022	Hallway 113	4	Sweat Wrap Pipe Insulation on an unknown system. – 5 LM	O&M
		4	Sweat Wrap Pipe Insulation on an unknown system. – 0.8 LM	2 Encaps
1026	Rooms 119, 119B	1	Mud Joint Compound Fitting on the condensate system. – 3 Units	O&M
		1	Mud Joint Compound Fitting on the condensate system. – 1 Unit	1 Encap
		2	Aircell Pipe Insulation on the condensate system. – 20 LM	O&M
		2	Aircell Pipe Insulation on the condensate system. – 0.4 LM	2 Encaps
		1	Mud Joint Compound Fitting on the steam system. – 6 Units	O&M
		1	Mud Joint Compound Fitting on the steam system. – 1 Unit	1 Encap
		3	Aircell Pipe Insulation on the steam system. – 22 LM	O&M
1029	Room 129	12	Transite panel on the wall. – 16 m <sup>2</sup>	O&M
		12	Transite panel on the wall. – 0.5 m <sup>2</sup>	1 Encap
<b>Mezzanine</b>				
MZ04	Rooms 320, Stairwell	1	Mud Joint Compound Fitting on the condensate system. – 1 Unit	1 Encap
		1	Mud Joint Compound Fitting on the steam system. – 3 Units	3 Encaps
		3	Aircell Pipe Insulation on the steam system. – 20 LM	O&M

LM – linear metre                      O&M – Operations & Maintenance  
Encap – Encapsulation                  Homo. – Homogeneous Mat. -Materials

Asbestos was detected in nine homogeneous building materials sampled from the facility. The ACM was categorized as to whether it was friable or non-friable. Further, the materials were grouped according to their similar composition, system and general appearance. The following sub-sections are the result of which materials were considered friable or non-friable. Photographs are provided along with a brief description of the material.



### 5.1.2 Friable ACM

#### **Mud Joint Compound**

A representative photograph of mud joint compound fitting insulation. This material is a malleable grey insulation that has the appearance of granular mud. It appears smooth, round and hard when it is intact with appropriate exterior jacketing.



#### **Aircell**

A representative photograph of aircell pipe insulation. This material is grey and white in colour. Aircell is layers of corrugated paper, which gives it the appearance of a honeycomb pattern when the profile is observed.



#### **Sweat Wrap**

A representative photograph of sweat wrap pipe insulation. This material has several layers of brown or grey waffle pattern paper layers with the outer layer consisting of a white paper layer that contains asbestos. This type of pipe insulation was used for low temperature applications only.





### **Mud Joint Compound with Black Mastic**

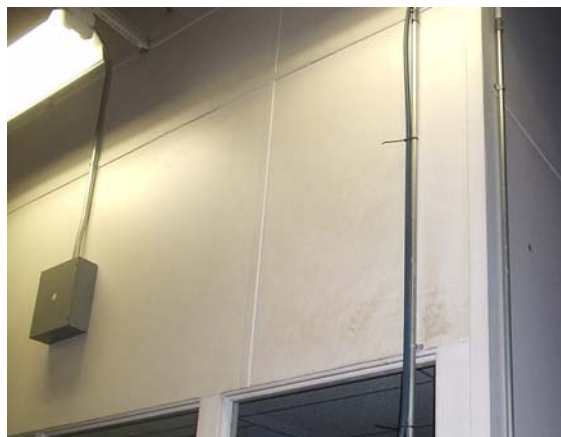
A representative photograph of mud joint compound fitting insulation. This type of fitting insulation has a black mastic exterior. This material is a malleable grey insulation that has the appearance of granular mud. It appears smooth, round and hard when it is intact with appropriate exterior jacketing.



### **5.1.3 Non-Friable ACM**

#### **Transite Panel**

A representative photograph of transite panel. Transite is a composite material made up of asbestos and cement that was a manufactured product at the time of installation. It was generally used in areas as a fire retardant. It is a rigid material that fractures when broken and may appear as other types of non-acm panel.



**12"x12" Ceiling/Wall Tile**  
A representative photograph of 9" x 9" vinyl asbestos floor tile (VAT). This material may be found in any number of different colours and patterns. VAT's are normally quite rigid and non-friable. VAT's are sometimes found under carpeting or they may be present as the only flooring.







### **Plaster**

A representative photograph of plaster. ACM plaster is not distinguishable from non-ACM plaster by visual observation. Plaster is white, hard and smooth and is non-friable in its original condition. Plaster is used as a finishing coat for walls and ceilings.



### **5.1.4 Survey Recommendations**

Under O. Reg. 278/05 damaged and exposed ACM's are required to be repaired or removed. In building M-7, the damaged asbestos containing materials, found in Table 3 and summarized in Table 1, will require Type 2 asbestos abatement procedures for removal or repair of 1 square meter or less of material and Type 3 asbestos abatement precautions for removal of greater than 1 square meter of material. These issues should be addressed as soon as possible.

The O. Reg. 278/05 also requires the removal of all ACM's that have a potential of being disturbed during renovations or demolition. Should friable ACM's remain in the building, in GOOD condition, the regulation also requires that an Asbestos Management Plan be implemented and kept in place until such time that the ACM's have been removed. The management plan will include periodic assessment and record updating to be performed on the remaining ACM at least every 12 months.

Building staff and contractors should be made aware of the location and hazards associated with the ACM's and instructed to not disturb this material. Any disturbance of this material should be reported immediately to property management and appropriate control measures put into place without delay.

## **5.2 Lead**

### **5.2.1 Survey Findings**

Based on visual observations during Oakhill's room-by-room surveys, potential lead was sampled in seven paint finishes. Samples were collected from the painted exterior and interior surfaces of building M-7 and were analysed for lead content.



The analytical results are provided in Appendix C and are summarized below in Table 4.

**Table 4 – Results of Lead Investigation**

Sample	Location	Colour	Results (ppm Lead)	Considered Lead Based Paint*
M7-L1	Duct in FS#EX01	Flat Black Paint	287	No
M7-L2	Railing in FS#EX01	Glossy Black Paint	1180	No
M7-L3	Wall in FS#EX01	White Paint	29	No
M7-L4	Traffic post piping in FS#B001	Red Paint	33	No
M7-L5	Railing in FS#B001	Yellow Paint	164	No
<b>M7-L6</b>	<b>Door in FS#B002</b>	<b>Light Grey Paint</b>	<b>10300</b>	<b>Yes</b>
M7-L7	Floor in FS#B002	Medium Grey Paint	1180	No

\*Note: Ontario Ministry of Labour (MOL) considers 5,000 ppm lead to be a lead-based paint (LBP).

### 5.2.2 Survey Recommendations

Based on the analytical results, the light grey paint on the door of room 4A (FS#B002) contained greater than 5,000 ppm of lead and are therefore classified as lead-based paint. The remaining samples did not contain greater than 5,000 ppm lead and are therefore classified as non-lead-based paints.

Lead may be present in the solder used on copper domestic water lines, as caulking in bell fittings for cast-iron drainage pipes and in electrical equipment, wiring or fixtures.

Direct disturbance of the materials can minimize the impact of lead products during removal. Removal of lead materials as an intact unit is the preferred method of removal. Mechanically powered tools increase the airborne concentration of lead dust.

Contractors are responsible to ensure that the workers are not exposed to airborne lead dust levels in excess of 0.15 mg/m<sup>3</sup>. This can be accomplished by:

- Providing respiratory protection and coveralls
- Suppressing dust levels by wetting with amended water, mops or HEPA vacuums
- Using drop-sheets and polyethylene barriers to control dust
- Ensuring the work areas have adequate ventilation
- Provide workers with the means to practice good hygiene practices when leaving the work area

The removal of metallic lead materials should be carried out in accordance with Ontario Regulation 843/90 and the Ontario Ministry of Labour (MOL) draft Proposed Lead Regulation on Construction Projects, both



made under the Occupational Health and Safety Act. Any lead-containing materials should also be disposed of in accordance with Ontario Regulation 558 (formerly O. Reg. 347).

In addition, it is recommended that the United States Department of Housing and Urban Development Guideline, of 0.5 % lead (by weight) or 5,000 parts per million (ppm) lead be used as a guideline for determining whether the use of precautions as outlined in the proposed regulation would be required during the above noted operations. Airborne lead dust or fumes should not exceed the MOL TWAEV of 0.15 milligram per cubic metre ( $\text{mg}/\text{m}^3$ ) during the removal of lead based paints and products.

### **5.3 Mercury**

#### **5.3.1 Survey Findings**

Mercury vapour is present inside fluorescent light fixtures. Tubes should be removed intact prior to removing the fixtures. Liquid mercury may also be present inside thermostats and manometers in mechanical equipment.

#### **5.3.2 Survey Recommendations**

Prior to removal of fluorescent light fixtures, the tubes should be removed from the fixtures intact to prevent the mercury vapour from escaping. As long as the tubes are not broken, workers will not be exposed to hazardous mercury vapour. Prior to demolition of the facility, mercury-containing materials must be removed as per Ontario Regulation 844/90. During demolition, ensure that the maximum concentration of exposure to airborne mercury does not exceed  $0.03 \text{ mg Hg}/\text{m}^3$  of air.

If applicable, mercury should be collected from thermostats, thermometers, and manometers prior to demolition, however care should be taken to control the release of mercury into the air.

### **5.4 Silica**

#### **5.4.1 Survey Findings**

Based on the historic composition of building materials, crystalline silica is present in the following building materials:

- Concrete floor slabs;
- Terra cotta and masonry block walls;
- Mortar; and
- Acoustic ceiling tiles.



## **5.4.2 Survey Recommendations**

Contractors are responsible to ensure workers are not exposed to airborne silica levels in excess of 0.20 mg/m<sup>3</sup> when dealing with the above materials. This can be accomplished by:

- Minimize disturbance of the material
- Providing respiratory protection and coveralls
- Suppressing dust levels by wetting with amended water, mops or HEPA vacuums
- Using drop-sheets and polyethylene barriers to control dust
- Ensuring the work areas have adequate ventilation
- Provide workers with the means to practice good hygiene practices when leaving the work area

Use of mechanically powered tools for any demolition work increases the concentration of airborne silica and therefore requires more stringent respiratory protection and controlled work procedures.

## **5.5 Isocyanates**

### **5.5.1 Survey Findings**

At the time of the site inspection, no evidence of isocyanates was noted as part of the structure or finishes.

## **5.6 Vinyl Chloride Monomer**

### **5.6.1 Survey Findings**

At the time of the site inspection, no evidence of vinyl chloride monomer was noted as part of the structure or finishes.

## **5.7 Benzene**

### **5.7.1 Survey Findings**

Benzene may be present in a stable form within roofing materials, paints and adhesives.

### **5.7.2 Survey Recommendations**

It is not expected that benzene concentrations in air will exceed the maximum allowable TWAEV for a worker to benzene (3.0 mg/m<sup>3</sup>). To minimize potential benzene exposure, apply paints and adhesives in well-ventilated areas.

## **5.8 Acrylonitrile**

### **5.8.1 Survey Findings**





At the time of the site inspection, no evidence of acrylonitrile was noted as part of the structure or finishes.

## **5.9 Coke Oven Emissions**

### **5.9.1 Survey Findings**

At the time of the site inspection, no evidence of coke oven emissions was noted as part of the structure or finishes.

## **5.10 Arsenic**

### **5.10.1 Survey Findings**

At the time of the site inspection, no evidence of arsenic was noted as part of the structure or finishes.

### **5.10.2 Survey Recommendations**

Arsenic or arsenic-containing compounds may be present in stable form in paints and adhesives. It is not expected that arsenic concentrations in air will exceed the maximum allowable TWAEV for a worker to arsenic ( $0.2 \text{ mg/m}^3$ ). To minimize potential arsenic exposure, apply paints and adhesives in well-ventilated areas.

## **5.11 Mould**

### **5.11.1 Survey Findings**

At the time of the site inspection, mould was suspect to be present on the chiller fitting and pipe insulation in ten locations and on the domestic cold water fitting insulation in two locations. Suspect mould locations were identified in the following functional space areas: B006, G007, 1017, 1018 and MZ01.

### **5.11.2 Survey Recommendations**

Oakhill recommends that the mould be removed and insulating materials that may be used to re-insulate the chiller and domestic cold water pipe and fitting insulation be re-evaluated to prevent future occurrences of mould growth.

Continued diligence is recommended to avoid scenarios, which can support fungi growth specifically: water in the presence of cellulose-based surfaces. There must be moisture (such as leaking pipes, cracked window seals, etc.) as well as an indoor substrate (such as the paper layer of drywall, wood, potted plants, etc.) to support fungal growth. Simply replacing the substrate is not a solution to the problem. The root cause is required to be identified.



## 6.0 CLOSURE

This report has been prepared for the sole benefit of the National Research Council of Canada.

The conclusions presented represent the best judgement of the assessor based on current environmental standards and on the site conditions observed from October 30<sup>th</sup> to November 10<sup>th</sup>, 2008. Due to the nature of the investigation and the limitations of the available data, the assessor cannot warrant against undiscovered environmental liabilities. It is possible that additional, concealed designated substances may become evident during demolition activities.

Should additional information become available, Oakhill requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.

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

**Oakhill Environmental Inc.**

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Fil Barillaro, M.A.S.c., P.Eng.  
Project Manager

**APPENDIX A**

**DESIGNATED SUBSTANCES BACKGROUND INFORMATION**

## Acrylonitrile

Acrylonitrile is regulated in Ontario under Regulation 835/90 of the Occupational Health and Safety Act. Acrylonitrile is a clear liquid that may be colourless or yellow and that readily reacts with other chemicals to produce long, chain-like molecules (polymers). Acrylonitrile-based polymers are used to produce nitrile rubbers, plastics, acrylic fibres, coatings and adhesives. Workers are typically exposed to acrylonitrile at manufacturing facilities that produce the aforementioned products through inhaling its vapour, direct skin contact, or through ingestion. Although acrylonitrile may be present in some of the building materials, including adhesives and coatings, the chemical will likely be bonded in the polymer form. Therefore, it is not expected that an adverse exposure to acrylonitrile will occur unless the building materials are heated to extreme temperatures. Acrylonitrile vapours may become released from the acrylonitrile-based polymers during a process where high temperatures are applied. Acrylonitrile is classified as *possibly carcinogenic to humans (Group 2b)* as evidence from long-term epidemiological studies since 1980 is conflicting. It is not expected that acrylonitrile concentrations in the air will exceed the maximum allowable time weighted average exposure value (TWAEV) for a worker to acrylonitrile (4.3 mg/m<sup>3</sup>).

## Arsenic

Arsenic is regulated in Ontario under Regulation 836/90 of the Occupational Health and Safety Act. The presence of arsenic in the paint coating on interior and exterior finishes is possible. There are no regulated procedures for the removal of paint containing arsenic. If the paint does not contain lead, but does contain arsenic, the comments concerning lead paint, discussed in below, are expected to address the potential arsenic emissions. As the painted surfaces will be handled as per the proposed lead regulation, it is not expected that arsenic concentrations in the air will exceed the maximum allowable TWAEV for a worker to arsenic (0.2 mg/m<sup>3</sup>). Human health studies from Argentina and Chile have concluded that arsenic ingestion can result in increased risk of bladder and lung cancer. Non-cancer effects include skin lesions and chronic respiratory disease.

## Asbestos

The term "asbestos" describes six naturally occurring fibrous minerals, namely chrysotile, amosite, crocidolite, tremolite, anthophyllite and actinolite. Of the six forms of asbestos, chrysotile (white asbestos), amosite (brown asbestos) and crocidolite (blue asbestos) are the most commonly used. Asbestos has been known to man for centuries and has been used in literally hundreds of products. Asbestos was used because it is strong, insulates well, and resists fire and corrosion.

The Regulation for Asbestos, Ontario Regulation 278/05, made under the Occupational Health and Safety Act defines asbestos as any of the following fibrous silicates:

- Actinolite, Amosite, Anthophyllite, Chrysotile, Crocidolite and Tremolite.

It is important to note that asbestos is defined further as either "friable" or "non-friable". O. Reg. 278/05 defines friable as:

*"friable material" means material that,*

- *when dry, can be crumbled, pulverized or powdered by hand pressure, or*
- *is crumbled, pulverized or powdered;*

Non-friable is any material that doesn't fit the criteria for friable. Essentially, any material that cannot be *crumbled, pulverized or powdered by hand pressure or is not crumbled, pulverized or powdered.*

The distinction between whether an asbestos-containing material (ACM) is friable or non-friable is a notable characteristic as the *'friability'* of the ACM translates the **potential** risk of producing an airborne fibre release.

Non-friable ACM's offer far less potential risk of producing an airborne fibre release. These materials should not be cut or shaped using power tools, because this procedure allows for the release of asbestos fibres.

Materials that contain asbestos are commonly referred to as ACM's. O. Reg. 278/05, defines an ACM as:

- *material that contains 0.5 per cent or more asbestos by dry weight;*

The Revised Regulations of Ontario (1990), Regulation 347 (The General Waste Regulation) requires the disposal of asbestos waste in a double sealed container, properly labelled and free of cuts, tears or punctures. The waste must be disposed of in a licensed waste facility, which has been properly notified of the presence of asbestos waste. The federal "Transportation of Dangerous Goods Act" covers the transport of asbestos waste to the disposal site. Asbestos waste is to be handled by a licensed waste hauler.

Asbestos is typically found in plaster, mechanical insulation, gaskets, thermal insulation on pipes, refractory material, roofing felts, floor tiles, ceiling tiles and parging, heat resistant panels, incandescent light fixture reflector plates, and any other material requiring a high degree of durability or thermal resistance. The common use of potential friable (breakable by hand) ACM's in construction ceased voluntarily in the mid 1970s; however, the spray application of asbestos-containing fireproofing was not prohibited until 1986. The airborne maximum allowable TWAEV for a worker to asbestos depends on the type of asbestos, they include, amosite (0.1 f/cc), crocidolite (0.1 f/cc) and other forms of asbestos (1.0 f/cc). Asbestos fibres cumulate in the lungs. Human health effects are proportional to exposure. Studies show long term or high dose exposure can result in scarring of the lung and restricted breathing. Mesothelioma (cancer of the pleural lining) and other lung cancers are also related to asbestos exposure.

## **Benzene**

Benzene is regulated in Ontario under Regulation 839/90 of the Occupational Health and Safety Act Historically; benzene has been produced as a by-product of coal gasification and metallurgical coke production in steel making. The light oil product from such processes contains benzene, toluene, ethyl benzene and xylene, and these components are separated by distillation. Today, most benzene is produced from the refining of petroleum.

Benzene has applications as a solvent in synthetic rubber manufacturing and processing, and in paints, varnishes, stains, adhesives, roofing materials and sealants. The use of benzene in tire and other rubber goods manufacturing and as a solvent and component of paints and adhesives has declined considerably as a result of concerns about workplace exposure. Nevertheless, it is often present in trace quantities in petroleum and aromatic solvents, some of which have replaced benzene in many uses. Benzene is also a minor component of gasoline sold in Canada.

The maximum allowable TWAEV for a worker to benzene is 3 mg/m<sup>3</sup>. Based on the age of the facility, it is possible that benzene was present in the paints, adhesives and roofing materials used during the original construction of the facilities. However, over time, the benzene component typically volatilizes out of the paints, solvents and roofing bitumens and is released into the ambient air. Therefore, it is likely that only trace levels of benzene presently exist in these building materials. It is not expected that benzene emissions from any existing building materials on site will exceed the allowable TWAEV.

Exposure to benzene can range in severity from nausea to suppression of the immune system and death. Long-term exposure to benzene can potentially result in Acute Myeloid Leukemia, Secondary Aplastic Leukemia and damage to the reproductive system.

## **Ethylene Oxides**

Ethylene Oxides are regulated in Ontario under Regulation 841/90 of the Occupational Health and Safety Act. Ethylene oxide is a common by-product of fumigation or sterilization procedures. The airborne maximum

allowable TWAEV for a worker to Ethylene Oxides is  $1.8 \text{ mg/m}^3$ . Acute exposure may result in vomiting, shortness of breath and dizziness. Chronic exposure has been associated with the occurrence of cancer, reproductive effects, mutagenic changes and neurotoxicity.

## **Isocyanates**

Isocyanates is regulated in Ontario under Regulation 842/90 of the Occupational Health and Safety Act. Isocyanates are a class of chemicals used in the manufacture of certain types of plastics, foams and roof insulation. The Isocyanate (-CNO) group reacts very readily with certain other types of molecules, a property responsible for the usefulness of Isocyanates in industry. Due to the high reactivity of the Isocyanate group, exposure to Isocyanates can result in primary irritation, sensitization and hypersensitivity reactions. The respiratory system, the eyes and the skin are the main areas affected by exposure. Isocyanates in their initial form are found as a vapour, a mist, or a dust which become airborne and then taken into the body. Once the Isocyanates are chemically bonded to other chemicals during manufacturing processes, the Isocyanates are not readily available to become airborne unless heated. Therefore, Isocyanate exposure is not expected to be a concern as long as the burning of plastics, foams, and insulation is not carried out. The airborne maximum allowable TWAEV for a worker to Isocyanates is 0.005 ppm.

## **Lead**

Lead is regulated in Ontario under Regulation 843/90 of the Occupational Health and Safety Act. The Ontario Ministry of Labour (MOL) draft Proposed Lead Regulation on Construction Projects, made under the Occupational Health and Safety Act, May 5, 1995, states that the removal of lead paint is not required unless work on these materials are likely to produce airborne lead dust or fumes, for example during welding, torch cutting, sanding and sand blasting. If these operations are likely to occur during building renovations or demolition, it is recommended that the removal of lead paint be carried out in accordance with procedures outlined in the proposed regulation.

Based on conversations with the MOL, it is recommended that the United States Department of Housing and Urban Development Guideline, of 0.5 % lead (by weight) or 5,000 parts per million (ppm) lead be used as a guideline for determining whether the use of precautions as outlined in the proposed regulation would be required during the above noted operations. Airborne lead dust or fumes should not exceed the MOL TWAEV of 0.15 milligram per cubic metre ( $\text{mg/m}^3$ ) during the removal of lead based paints and products.

Lead may be used in its pure metallic form or combined chemically with other elements to form lead compounds. Metallic lead is used to make products such as electric storage batteries, ammunition, lead solder, radiation shields, pipes, and sheaths for electric cables. Metallic lead is sometimes combined with other metals such as copper, tin and antimony as lead alloys for use in the manufacture of a variety of metal products.

Organic lead compounds contain a lead atom covalently bonded to carbon. Common examples of organic lead compounds include lead "soaps" such as lead oleates, high-pressure lubricants, and anti-knock agents in gasoline.

Inorganic lead compounds (or lead salts) result when lead is combined with an element other than carbon. Examples are lead oxide, lead chromate, lead carbonate and lead nitrate. Inorganic lead compounds may occur as solids or in solutions, and are used in insecticides, pigments, paints, frits, glasses, plastics, and rubber compounds.

Lead may affect the health of workers if it is in a form that may be inhaled, ingested or absorbed through the skin. Lead dust consists of small, solid particles of metallic lead or lead compounds that are generated by sanding, grinding, polishing, and sawing operations. Lead fume is produced in significant amounts when solid lead or materials containing lead are heated to temperatures above  $500^\circ \text{C}$ , as in welding and flame cutting or burning.

## **Mercury**

Mercury is regulated in Ontario under Regulation 844/90 of the Occupational Health and Safety Act. Mercury is commonly found in buildings as mercury vapour lighting, in thermometers, thermostats and some electrical switches. Mercury can also be found in minor amounts in fluorescent lamp tubes and in paints and adhesives.

Mercury, or mercury vapour within light fixtures, thermometers, thermostats and electrical switches poses no risk to workers or occupants provided the mercury containers remain intact and undisturbed. Prior to demolition, remove mercury containers and store in a safe location. The airborne maximum allowable TWAEV for a worker to mercury is 0.05 mg/m<sup>3</sup>.

Short-term exposure to mercury is a rare occurrence due to the more stringent controls. Historically, short-term exposure to high concentrations of mercury vapour included: harmful effects of the nervous, respiratory and digestive systems and the kidneys.

## **Silica**

Silica is regulated in Ontario under Regulation 845/90 of the Occupational Health and Safety Act. Silica, also referred to as free crystalline silica, is found in concrete, cement, mortar, ceramic wall and floor tiles, stucco finishes and acoustic ceiling tiles. Prolonged exposure to, and inhalation of free crystalline silica, may result in respiratory disease known as silicosis, which is characterised by progressive fibrosis of the inner lung tissue and marked shortness of breath or impaired lung function. The maximum TWAEV for airborne Silica dust is 0.20 mg/m<sup>3</sup>.

Precautions should be taken during work on concrete (coring etc.) and ceiling tiles to minimize exposure to free crystalline silica dust. Silica exposure should not exceed the MOL TWAEV of 0.20 milligrams per cubic metre (mg/m<sup>3</sup>) during demolition activities. This can be achieved by:

- . providing workers with respiratory protection;
- . wetting the surface of the materials to prevent dust emissions;
- . provide workers with facilities to properly wash prior to exiting the work area.

## **Vinyl Chloride**

Vinyl Chloride is regulated in Ontario under Regulation 846/90 of the Occupational Health and Safety Act. Vinyl chloride is found in many applications in buildings such as plumbing pipes, protective coatings on insulated pipes and interior finishes (i.e., vinyl baseboard trim). Vinyl chlorides in the above materials are bound in a solid matrix and are unlikely to become airborne such that it would exceed the maximum allowable TWAEV of 5.2 mg/m<sup>3</sup>.

Human health effects from long-term exposure include: cancer of the liver, damage to the immune and reproductive systems.

## **Fungi**

There is essentially no fungus-free environment in our daily lives. Fungal spores are abundant in outdoor air and exposure to fungi occurs commonly in indoor environments.

Continued cleaning diligence is recommended to avoid scenarios which can support fungi growth such as water in the presence of cellulose-based surfaces. There must be a moisture or water problem to support fungal growth.

**APPENDIX B**  
**ANALYTICAL RESULTS – ASBESTOS**





# Certificate of Analysis

AGAT WORK ORDER: 08T302917  
PROJECT NO: PR-07-021

5835 COOPERS AVENUE  
MISSISSAUGA, ON  
CANADA L4Z 1Y2

PH: (905)712-5100  
FAX: (905)712-5122  
http://www.agatlabs.com

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Fil Barillo

Bulk Asbestos											
DATE SAMPLED: Nov 03, 2008			DATE RECEIVED: Nov 06, 2008			DATE REPORTED: Nov 14, 2008			SAMPLE TYPE: Other		
	Unit	G / S	RDL	M7-1A 1139821	M7-2A 1139838	M7-3A 1139845	M7-4A 1139848	M7-5A 1139851	M7-5B 1139852	M7-5C 1139853	M7-6A 1139854
Bulk Asbestos	%	0.5	0.5	55	50	60	10	NAD	NAD	NAD	6
	Unit	G / S	RDL	M7-7A 1139858	M7-7B 1139859	M7-7C 1139860	M7-7D 1139861	M7-7E 1139863	M7-8A 1139864		
Bulk Asbestos	%	0.5	0.5	NAD	0.5	0.5	NAD	NAD	40		

**Comments:** RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to OHSAA - Reg. 278  
 1139821- Condition of samples were satisfactory at time of arrival in laboratory.  
 1139864 Subcontracted parameter  
 ND - Not Detected

Certified By: Elizabeth Potkowska



# Guideline Violation

AGAT WORK ORDER: 08T302917  
PROJECT NO: PR-07-021

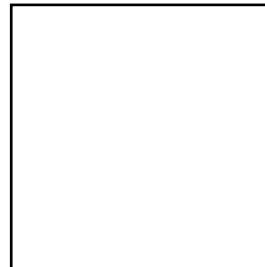
5835 COOPERS AVENUE  
MISSISSAUGA, ON  
CANADA L4Z 1Y2

PH: (905)712-5100  
FAX: (905)712-5122  
<http://www.agatlabs.com>

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Fil Barillo

SAMPLE ID	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
1139821	OHSA - Reg. 278	Bulk Asbestos	Bulk Asbestos	0.5	55
1139838	OHSA - Reg. 278	Bulk Asbestos	Bulk Asbestos	0.5	50
1139845	OHSA - Reg. 278	Bulk Asbestos	Bulk Asbestos	0.5	60
1139848	OHSA - Reg. 278	Bulk Asbestos	Bulk Asbestos	0.5	10
1139854	OHSA - Reg. 278	Bulk Asbestos	Bulk Asbestos	0.5	6
1139864	OHSA - Reg. 278	Bulk Asbestos	Bulk Asbestos	0.5	40





**Certificate of Analysis**  
**AGAT WORK ORDER: 08T304536**  
**PROJECT NO: PR-07-021**

5835 COOPERS AVENUE  
 MISSISSAUGA, ON  
 CANADA L4Z 1Y2

PH: (905)712-5100  
 FAX: (905)712-5122  
 http://www.agatlabs.com

**CLIENT NAME: OAKHILL ENVIRONMENTAL**

**ATTENTION TO: Fil Barillaro**

**Bulk Asbestos\***

DATE SAMPLED: Nov 07, 2008		DATE RECEIVED: Nov 17, 2008			DATE REPORTED: Nov 24, 2008				SAMPLE TYPE: Other		
Unit	G / S	RDL	M7-7F 1152821	M7-9A 1152824	M7-9B 1152825	M7-9C 1152826	M7-10A 1152827	M7-11A 1152830	M7-11B 1152831	M7-11C 1152832	
Bulk Asbestos*	%	0.5	0.5	2	NAD	NAD	NAD	20	NAD	NAD	NAD
Unit	G / S	RDL	M7-12A 1152833	M7-13A 1152836	M7-13B 1152837	M7-13C 1152838					
Bulk Asbestos*	%	0.5	0.5	30	NAD	NAD	NAD				

**Comments:** RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to OSHA - Reg. 278

- 1152821** Condition of samples were satisfactory at time of arrival in laboratory.  
 \* Subcontracted parameter  
 Asbestos Types: Chrysotile 2.0%  
 Comment: Base Coat
- 1152824-1152826** Condition of samples were satisfactory at time of arrival in laboratory.  
 \* Subcontracted parameter  
 NAD - No Asbestos Detected
- 1152827** Condition of samples were satisfactory at time of arrival in laboratory.  
 \* Subcontracted parameter  
 Asbestos Types: Chrysotile 20.0%
- 1152830-1152832** Condition of samples were satisfactory at time of arrival in laboratory.  
 \* Subcontracted parameter  
 NAD - No Asbestos Detected
- 1152833** Condition of samples were satisfactory at time of arrival in laboratory.  
 \* Subcontracted parameter  
 Asbestos Types: Chrysotile 30.0%
- 1152836-1152838** Condition of samples were satisfactory at time of arrival in laboratory.  
 \* Subcontracted parameter  
 NAD - No Asbestos Detected

**Certified By:**

*Elizabeth Potkowska*



# Guideline Violation

AGAT WORK ORDER: 08T304536  
PROJECT NO: PR-07-021

5835 COOPERS AVENUE  
MISSISSAUGA, ON  
CANADA L4Z 1Y2

PH: (905)712-5100  
FAX: (905)712-5122  
<http://www.agatlabs.com>

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Fil Barillaro

SAMPLE ID	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
1152821	OHSA - Reg. 278	Bulk Asbestos*	Bulk Asbestos*	0.5	2
1152827	OHSA - Reg. 278	Bulk Asbestos*	Bulk Asbestos*	0.5	20
1152833	OHSA - Reg. 278	Bulk Asbestos*	Bulk Asbestos*	0.5	30



# Certificate of Analysis

AGAT WORK ORDER: 08T309758  
PROJECT NO: PR-07-021

5835 COOPERS AVENUE  
MISSISSAUGA, ON  
CANADA L4Z 1Y2

PH: (905)712-5100  
FAX: (905)712-5122  
http://www.agatlabs.com

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Fil Barillaro

## Bulk Asbestos\*

DATE SAMPLED: Dec 12, 2008      DATE RECEIVED: Dec 16, 2008      DATE REPORTED: Dec 23, 2008      SAMPLE TYPE: Other

	Unit	G / S	RDL	RS-1A 1188782	RS-1B 1188784	RS-1C 1188785	RS-1D 1188787	RS-1E 1188788
Bulk Asbestos*	%	0.5	0.5	0.8	0.8	1	0.8	0.5

**Comments:** RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to OHSA - Reg. 278

- 1188782- Condition of samples were satisfactory at time of arrival in laboratory.
- 1188784 \* Subcontracted parameter  
Asbestos Type: Chrysotile 0.8%
- 1188785 Condition of samples were satisfactory at time of arrival in laboratory.  
\* Subcontracted parameter  
Asbestos Type: Chrysotile 1.0%
- 1188787 Condition of samples were satisfactory at time of arrival in laboratory.  
\* Subcontracted parameter  
Asbestos Type: Chrysotile 0.8%
- 1188788 Condition of samples were satisfactory at time of arrival in laboratory.  
\* Subcontracted parameter  
Asbestos Type: Chrysotile 0.5%

Certified By: \_\_\_\_\_



# Certificate of Analysis

AGAT WORK ORDER: 08T310892  
PROJECT NO: PR-08-043

5835 COOPERS AVENUE  
MISSISSAUGA, ON  
CANADA L4Z 1Y2

PH: (905)712-5100  
FAX: (905)712-5122  
http://www.agatlabs.com

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Fil Barillaro

## Bulk Asbestos\*

DATE SAMPLED: Dec 18, 2008      DATE RECEIVED: Dec 24, 2008      DATE REPORTED: Jan 05, 2009      SAMPLE TYPE: Other

	Unit	G / S	RDL	RS2-1A 1197138	RS2-1B 1197139	RS2-1C 1197140	RS2-1D 1197141	RS2-1E 1197142	RS2-1F 1197143	RS2-1G 1197144
Bulk Asbestos*	%	0.5	0.5	NAD	NAD	NAD	NAD	NAD	NAD	NAD

**Comments:** RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to OHSA - Reg. 278  
 1197138- Condition of samples were satisfactory at time of arrival in laboratory.  
 1197144 \* Subcontracted parameter  
 NAD - No Asbestos Detected

Certified By: Jacky Takewhi

**APPENDIX C**  
**ANALYTICAL RESULTS – LEAD**



# Certificate of Analysis

AGAT WORK ORDER: 08T302896  
PROJECT NO: PR-07-021

5835 COOPERS AVENUE  
MISSISSAUGA, ON  
CANADA L4Z 1Y2

PH: (905)712-5100  
FAX: (905)712-5122  
http://www.agatlabs.com

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Fil Barillo

## Lead in Paint

DATE SAMPLED: Oct 31, 2008

DATE RECEIVED: Nov 06, 2008

DATE REPORTED: Nov 14, 2008

SAMPLE TYPE: paint

	Unit	G / S	RDL	M7-L1 1139706	M7-L2 1139708	M7-L3 1139709	M7-L4 1139710	M7-L5 1139711	M7-L6 1139712	M7-L7 1139714
Lead	ug/g		10	287	1180	29	33	164	10300	1180

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:



**APPENDIX D**  
**PHOTOGRAPH LOGS**

**M-7 ASBESTOS PHOTOGRAPH LOG**







<b>Photo #</b>	<b>Functional Space #</b>	<b>Location</b>	<b>Comments</b>	<b>Photograph</b>
A1	B001	Room 4	Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1unit).	
A2	B001	Room 4	Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1unit).	
A3	B001	Room 4	Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1unit).	
A4	B001	Room 4	Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1unit).	
A5	B001	Room 4	Condensate: 1 damaged mud joint compound fitting insulation requires 1 encapsulation (1unit).	
A6	B001	Room 4	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	








Photo #	Functional Space #	Location	Comments	Photograph
A7	B001	Room 4	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.6 LM).	
A8	B001	Room 4	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (1.2 LM).	
A9	B001	Room 4	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A10	B001	Room 4	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A11	B001	Room 4	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A12	B001	Room 4	Condensate: 1 damaged section of aircell pipe requires 1 encapsulation (0.2 LM).	
A13	B001	Room 4	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	








Photo #	Functional Space #	Location	Comments	Photograph
A14	B001	Room 4	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A15	B001	Room 4	Steam: 1 exposed mud joint compound fitting requires 1 encapsulation (1 unit).	
A16	B001	Room 4	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A17	B001	Room 4	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A18	B001	Room 4	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A19	B001	Room 4	Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.9 LM).	
A20	B001	Room 4	Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	








Photo #	Functional Space #	Location	Comments	Photograph
A21	B001	Room 4	Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM). Steam: 2 open ends of aircell pipe insulation require 2 encapsulations (0.4 LM).	
A22	B001	Room 4	Steam: 2 damaged sections of aircell pipe insulation require 2 encapsulations (1.5 LM).	
A23	B001	Room 4	DCW: 1 damaged section of sweatwrap pipe insulation requires 1 encapsulation (0.5 LM).	
A24	B001	Room 4	DCW: 1 damaged section of sweatwrap pipe insulation requires 1 encapsulation (0.5 LM).	
A25	B002	Room 4A	Steam: 1 damaged section of aircell pipe insulation requires 1 removal (0.4 LM).	
A26	B002	Room 4A	Steam: 1 damaged section of aircell pipe insulation requires 1 removal (0.2 LM).	
A27	B002	Room 4A	Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.3 LM).	










Photo #	Functional Space #	Location	Comments	Photograph
A28	B002	Room 4A	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A29	B002	Room 4A	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A30	B002	Room 4A	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A31	B002	Room 7	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A32	B002	Room 7	Steam: 1 damaged mud joint compound fitting requires 1 removal (1 unit).	
A33	B002	Room 7	Steam: 1 exposed mud joint compound fitting requires 1 removal (1 unit).	
A35	B002	Room 7	Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.3 LM).	








Photo #	Functional Space #	Location	Comments	Photograph
A36	B002	Room 7	Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A37	B002	Room 7	DCW: 1 damaged section of sweatwrap pipe insulation requires 1 encapsulation (0.5 LM).	
A38	B002	Room 7A	Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A39	B002	Room 7	Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A40	B002	Room 4B	Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A41	B002	Room 4B	Condensate: 1 residual mud joint compound fitting requires 1 removal (1 unit).	
A42	B002	Room 4B	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.3 LM).	








Photo #	Functional Space #	Location	Comments	Photograph
A43	B002	Room 4A	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.5 LM).	
A44	B002	Room 4A	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.3 LM).	
A45	B003	Room 3A	Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A46	B003	Rooms 3, 3A	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A49	B007	Room 030	Steam: 1 open end of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A51	B011	Room 11	Condensate: 1 damaged mud joint compound fitting requires 1 removal (1 unit). Steam: 2 open ends of aircell pipe insulation require 2 encapsulations (0.4LM).	
A52	B011	Room 11	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	










Photo #	Functional Space #	Location	Comments	Photograph
A53	B012	Room 9	Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.3 LM).	
A54	B012	Room 9	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A55	B012	Room 9	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A56	B012	Room 9	Steam: 2 damaged mud joint compound fitting require 2 encapsulations (2 units).	
A57	B012	Room 9	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.3 LM).	
A58	B012	Room 9	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A59	B012	Room 9	Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	








Photo #	Functional Space #	Location	Comments	Photograph
A60	B013	Room 1B	Steam: 1 residual mud joint compound fitting requires 1 removal (1 unit).	
A62	G001	Room 15	Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A63	G001	Room 15	Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A64	G001	Room15	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A65	G001	Room 15	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A66	G001	Room 15	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A67	G001	Room 15	Condensate: 1 damaged section of aircell pipe insulation requires 1 removal (1.0 LM).	








Photo #	Functional Space #	Location	Comments	Photograph
A68	G001	Room 15	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A69	G001	Room 15	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A70	G001	Room 15	Steam: 4 open ends of aircell pipe insulation require 4 encapsulations (0.8 LM).	
A71	G001	Room 15	Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A72	G001	Room 15	Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A73	G002	Room 16	DHW: 1 open end of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A74	G002	Room 16	DHW: 1 open end of aircell pipe insulation requires 1 encapsulation (0.2 LM).	





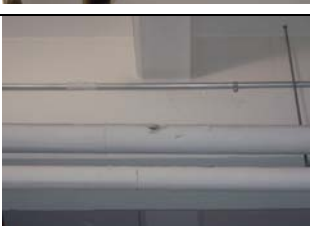


Photo #	Functional Space #	Location	Comments	Photograph
A75	G002	Room 16	DCW: 1 damaged section of sweatwrap pipe insulation requires 1 encapsulation (0.2 LM).	
A77	1003	Hall 127	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A79	1018	Room 102A	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1unit).	
A80	1021	Room 101	Condensate: 2 open ends of aircell pipe insulation require 2 encapsulations (0.4 LM). Steam: 2 open ends of aircell pipe insulation require 2 encapsulations (0.4 LM).	
A81	1021	Room 101	Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A83	1021	Room101	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A84	1022	Hall 113	Unknown System: 1 open end of sweatwrap pipe insulation requires 1 encapsulation (0.4 LM).	








Photo #	Functional Space #	Location	Comments	Photograph
A85	1022	Hall 113	Unknown System: 1 open end of sweatwrap pipe insulation requires 1 encapsulation (0.4 LM).	
A86	1026	Room 119	Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A87	1026	Room 119	Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A88	1026	Room 119	Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A89	1026	Room 119	Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A90	1026	Room 119	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	
A91	1026	Room 119	Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	


















Photo #	Functional Space #	Location	Comments	Photograph
A92	MZ04	SW by 203	Condensate & Steam (combined line & elbow): 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	
A93	MZ04	Room 320	Steam: 1 damaged mud joint compound fitting insulation requires 1 encapsulation (1 unit)	
A94	MZ04	Room 320	Steam: 2 damaged mud joint compound fitting require 2 encapsulations (2 units).	
A96	B005	Room 01B	Wall & Ceiling Tile: 1 damaged 12" x 12" Ceiling Tile (uniform hole pattern) requires 1 removal (<1.0 unit <sup>2</sup> ).	
A97	B005	Room 01B	Wall & Ceiling Tile: 1 damaged 12" x 12" Ceiling Tile (uniform hole pattern) requires 1 removal (<1.0 m <sup>2</sup> ).	
A98	B005	Room 01	Wall & Ceiling: ACM debris (12" x 12" Ceiling Tile (uniform hole pattern) (<1.0 m <sup>2</sup> ) requires clean-up.	
A99	B010	Room 01	Wall & Ceiling Tile: 1 damaged area of 12" x 12" Ceiling Tile (uniform hole pattern) requires (<1.0 m <sup>2</sup> ) removal.	

Photo #	Functional Space #	Location	Comments	Photograph
A100	B010	Room 01	Wall & Ceiling Tile: 1 damaged area of 12" x 12" Ceiling Tile (uniform hole pattern) requires (<1.0 m2) removal.	
A101	B010	Room 01	Wall & Ceiling Tile: 1 damaged area of 12" x 12" Ceiling Tile (uniform hole pattern) requires (<1.0 m2) removal.	
A102	B010	Room 01	Wall & Ceiling Tile: 1 damaged area of 12" x 12" Ceiling Tile (uniform hole pattern) requires (<1.0 m2) removal.	
A103	B010	Room 01	Wall & Ceiling Tile: 1 damaged area of 12" x 12" Ceiling Tile (uniform hole pattern) requires (<1.0 m2) removal.	
A104	B010	Room 01	Wall & Ceiling Tile: 1 damaged area of 12" x 12" Ceiling Tile (uniform hole pattern) requires (<1.0 m2) removal.	
A105	B010	Room 01	Wall & Ceiling Tile: 1 damaged area of 12" x 12" Ceiling Tile (uniform hole pattern) requires (<1.0 m2) removal.	
A106	B010	Room 01	Wall & Ceiling Tile: 1 damaged area of 12" x 12" Ceiling Tile (uniform hole pattern) requires (<1.0 m2) removal.	

**M-7 LEAD PHOTOGRAPH LOG**

<b>Photo #</b>	<b>FS #</b>	<b>Location</b>	<b>Material Description</b>	<b>Lead Conc. (ppm)</b>	<b>Photograph</b>
L6	B002	Room 4A	Light Grey Paint on Door	10300	



### M-7 MOULD PHOTOGRAPH LOG








Photo #	Functional Space #	Location	Comments	Photograph
M1	B006	Room 5	Suspect mould on chiller system.	
M2	B006	Room 5	Suspect mould on chiller system.	
M3	B006	Room 5	Suspect mould on chiller system.	
M4	B006	Room 5	Suspect mould on chiller system.	
M5	G007	Room 30A	Suspect mould on domestic cold water system.	
M6	G007	Room 30A	Suspect mould on domestic cold water system.	

Photo #	Functional Space #	Location	Comments	Photograph
M7	1017	Room 102	Suspect mould on chiller system. (3 Locations)	
M8	1018	Room 102A	Suspect mould on chiller system.	
M9	MZ01	Mezzanine above Room 101	Suspect mould on chiller system. (2 Locations)	

**APPENDIX E**  
**FLOOR PLANS**



**LEGEND**

- 1001 FUNCTIONAL SPACE #
- ACM PIPE INSULATION: STEAM
- ACM PIPE INSULATION: CONDENSATE
- ACM PIPE INSULATION: DOMESTIC CW
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE
- ▨ ACM 12"X12" CEILING & WALL TILE

**NOTE:**  
 ACM fitting insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: f's, valves, ends, hangers, etc.

**CLIENT**

NATIONAL RESEARCH COUNCIL CANADA  
 ADMINISTRATIVE SERVICES  
 AND PROPERTY MANAGEMENT  
 BUILDING M-19  
 1200 MONTREAL RD.  
 OTTAWA, ON, K1A 0R6

**PROJECT**

DESIGNATED SUBSTANCES SURVEY  
 BUILDING M-7

**PROJECT NO.**

PR-08-43

**DATE**

DECEMBER 2008

**SCALE**

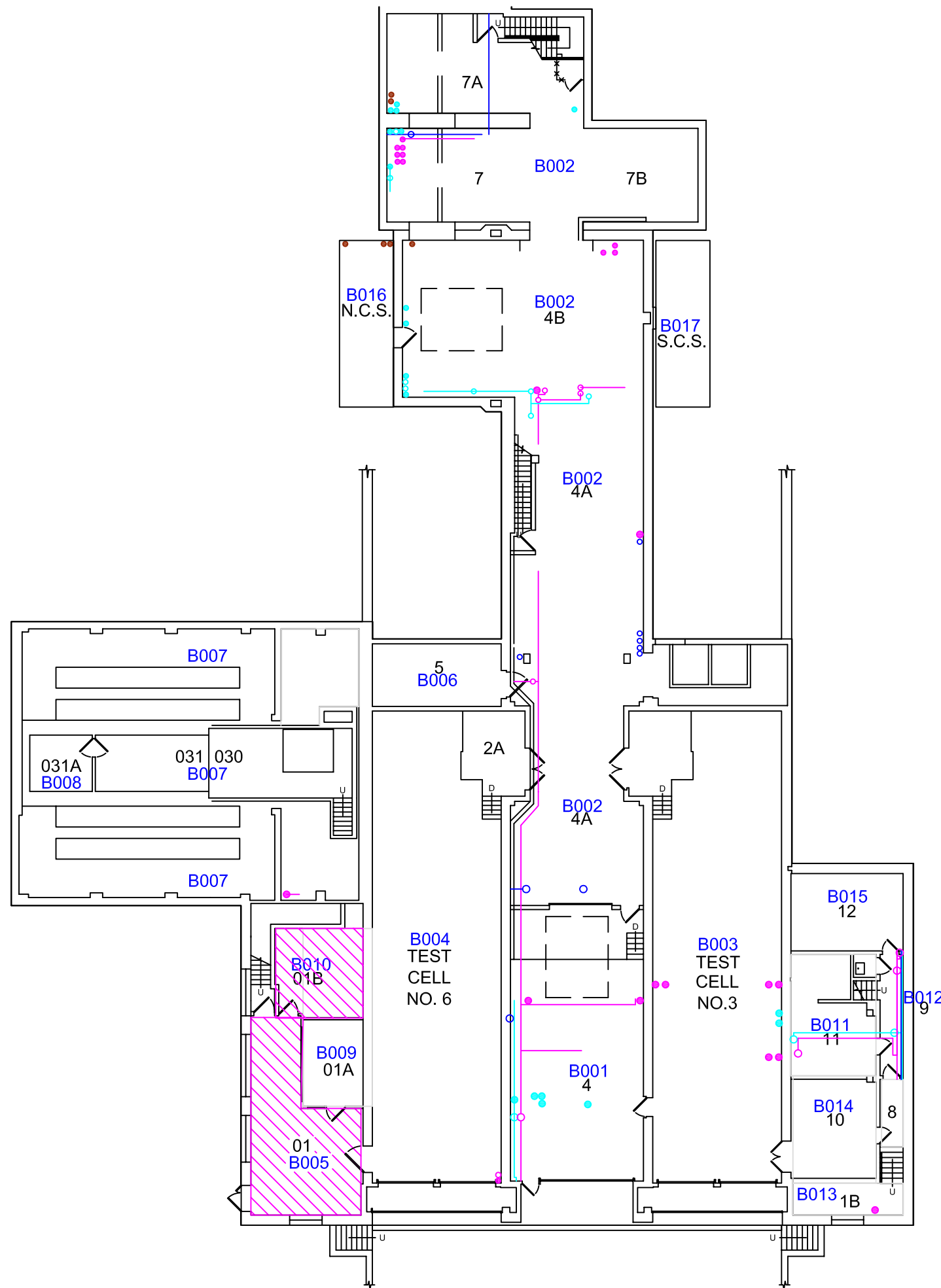
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**TITLE**

**-BASEMENT-  
 ASBESTOS  
 LOCATIONS**

**SHEET**

**B-1**





**LEGEND**

- 1001 FUNCTIONAL SPACE #
- ▲ ACM DEBRIS
- ▲ DAMAGED ACM LOCATION
- P# PHOTOGRAPH #
- ACM PIPE INSULATION: STEAM
- ACM PIPE INSULATION: CONDENSATE
- ACM PIPE INSULATION: DOMESTIC CW
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE
- ▨ ACM 12"X12" CEILING & WALL TILE

ACM fitting insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: f's, valves, ends, hangers, etc.

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 AND PROPERTY MANAGEMENT  
 BUILDING M-19  
 1200 MONTREAL RD.  
 OTTAWA, ON, K1A 0R6

**PROJECT**

DESIGNATED SUBSTANCES SURVEY  
 BUILDING M-7

**PROJECT NO.**

PR-08-43

**DATE**

DECEMBER 2008

**SCALE**

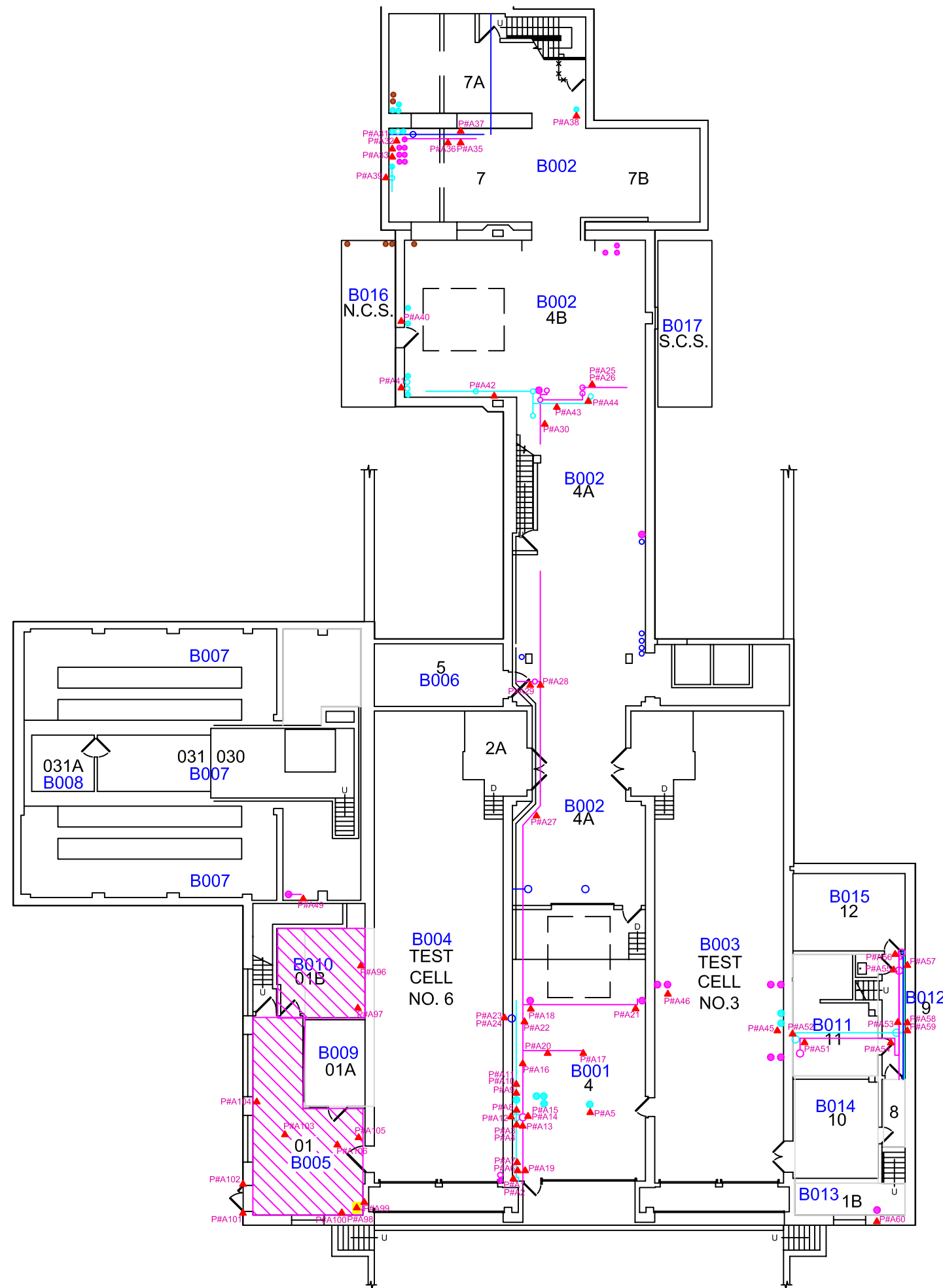
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**TITLE**

**-BASEMENT-  
 ASBESTOS  
 SURVEY**

**SHEET**

**B-2**





**LEGEND**

- 1001 FUNCTIONAL SPACE #
- SAMPLE LOCATION: NON-ACM
- SAMPLE LOCATION: ACM
- SAMPLE LOCATION: NON-LEAD
- SAMPLE LOCATION: LEAD
- P# PHOTOGRAPH #
- SUSPECT MOULD
- ⊕ POSITIVE ACM PLASTER RE-SAMPLES

**NOTE:**  
 ACM fitting insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: f's, valves, ends, hangers, etc.

**CLIENT**

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 AND PROPERTY MANAGEMENT  
 BUILDING M-19  
 1200 MONTREAL RD.  
 OTTAWA, ON, K1A 0R6

**PROJECT**

DESIGNATED SUBSTANCES SURVEY  
 BUILDING M-7

**PROJECT NO.**

PR-08-43

**DATE**

DECEMBER 2008

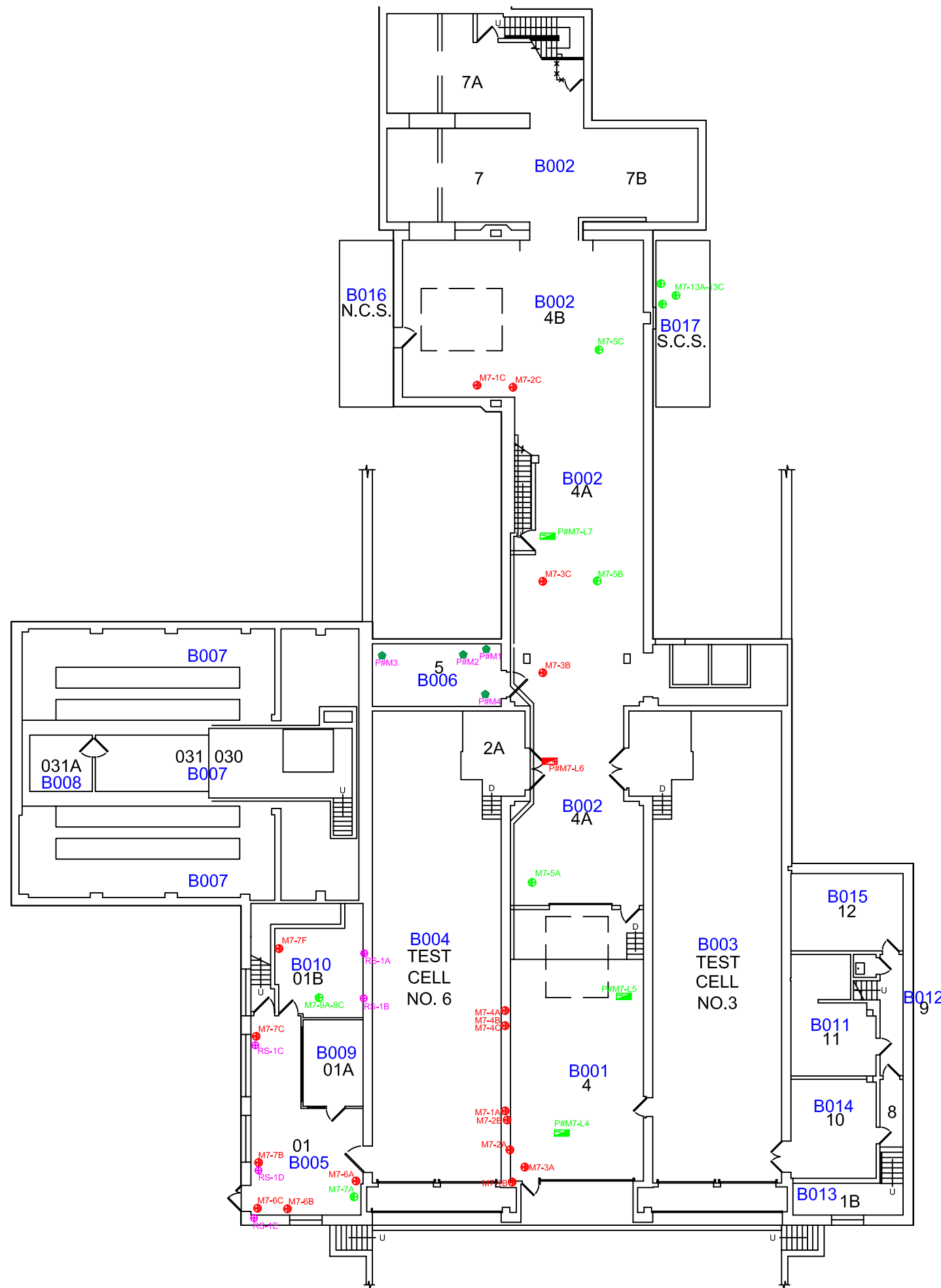
**SCALE**

NTS

**TITLE**  
**-BASEMENT-  
 SAMPLE  
 LOCATIONS  
 & MOULD  
 LOCATIONS**

**SHEET**

**B-3**





**LEGEND**

- 1001 FUNCTIONAL SPACE #
- ACM PIPE INSULATION: STEAM
- ACM PIPE INSULATION: CONDENSATE
- ACM PIPE INSULATION: DOMESTIC CW
- ACM PIPE INSULATION: DOMESTIC HW
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE

**NOTE:**  
 ACM fitting insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: t's, valves, ends, hangers, etc.

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 BUILDING M-19  
 1200 MONTREAL RD.  
 OTTAWA, ON, K1A 0R6

**PROJECT**

DESIGNATED SUBSTANCES SURVEY  
 BUILDING M-7

**PROJECT NO.**

PR-08-43

**DATE**

DECEMBER 2008

**SCALE**

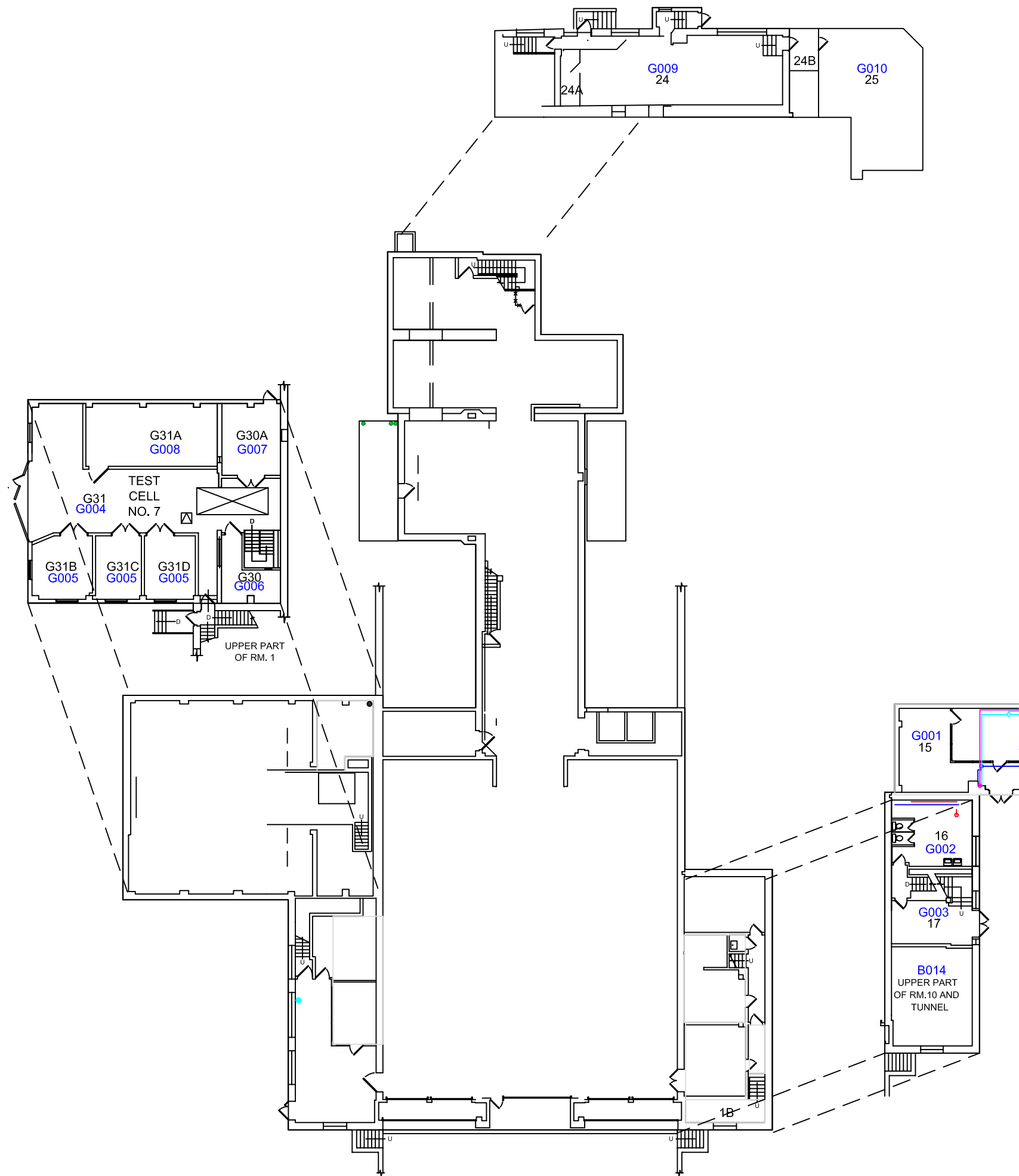
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**TITLE**

**-GROUND FLOOR-  
 ASBESTOS  
 LOCATIONS**

**SHEET**

**G-1**





**LEGEND**

- 1001 FUNCTIONAL SPACE #
- ▲ DAMAGED ACM LOCATION
- P# PHOTOGRAPH #
- ACM PIPE INSULATION: STEAM
- ACM PIPE INSULATION: CONDENSATE
- ACM PIPE INSULATION: DOMESTIC CW
- ACM PIPE INSULATION: DOMESTIC HW
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE

ACM fitting insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: t's, valves, ends, hangers, etc.

**CLIENT**  
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 1200 MONTREAL RD.  
 OTTAWA, ON, K1A 0R6

**PROJECT**  
 DESIGNATED SUBSTANCES SURVEY  
 BUILDING M-7

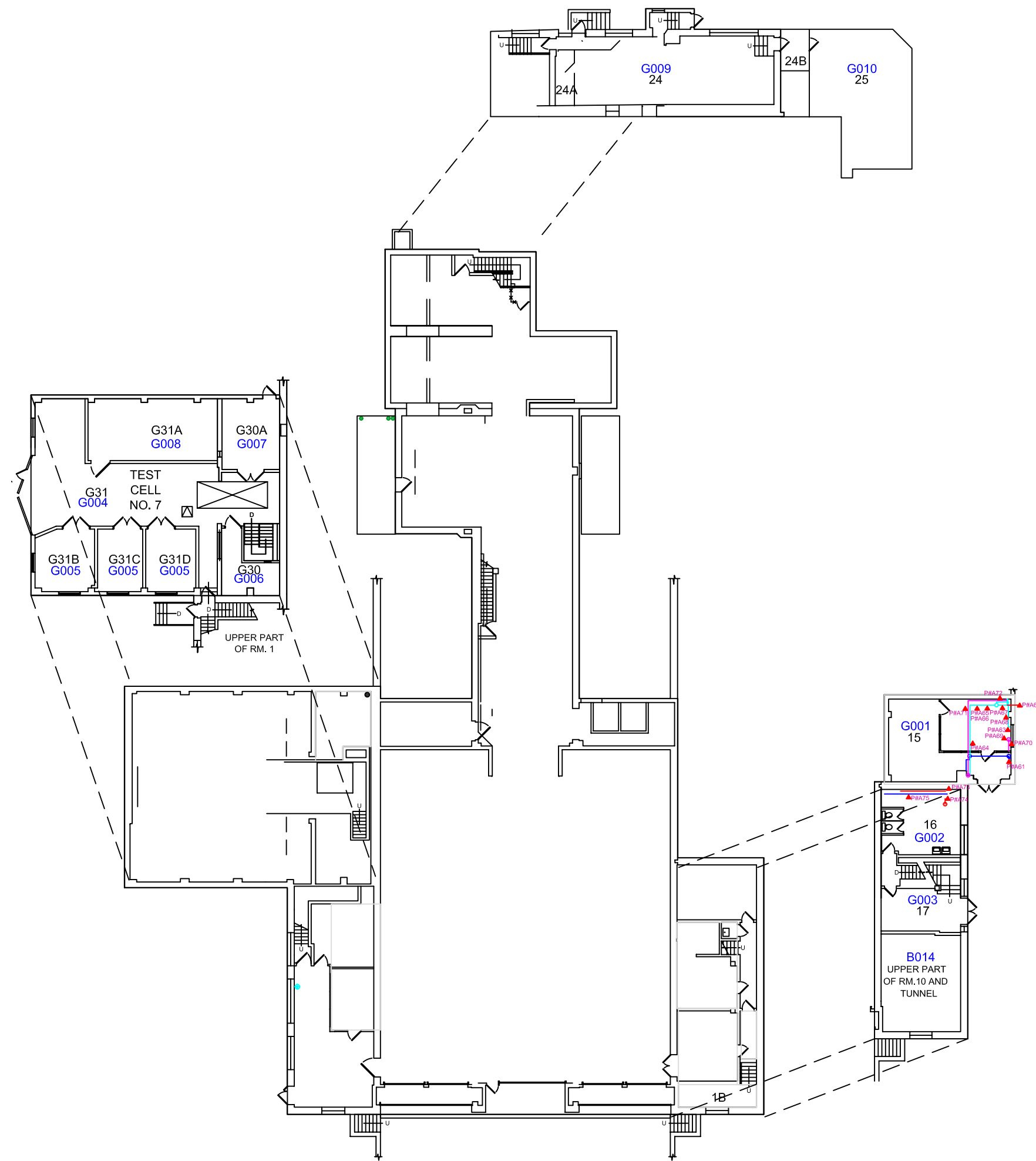
**PROJECT NO.**  
 PR-08-43

**DATE**  
 DECEMBER 2008

**SCALE**  
 NTS

**TITLE**  
 -GROUND FLOOR-  
 ASBESTOS  
 SURVEY

**SHEET**  
**G-2**







**LEGEND**

- 1001 FUNCTIONAL SPACE #
- P\* PHOTOGRAPH #
- ◆ SUSPECT MOULD
- ⊕ NEGATIVE ACM PLASTER RE-SAMPLES

**NOTE:**  
 ACM fitting insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: f's, valves, ends, hangers, etc.

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 ADMINISTRATIVE SERVICES  
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 BUILDING M-19  
 1200 MONTREAL RD.  
 OTTAWA, ON, K1A 0R6

**PROJECT**  
 DESIGNATED SUBSTANCES SURVEY  
 BUILDING M-7

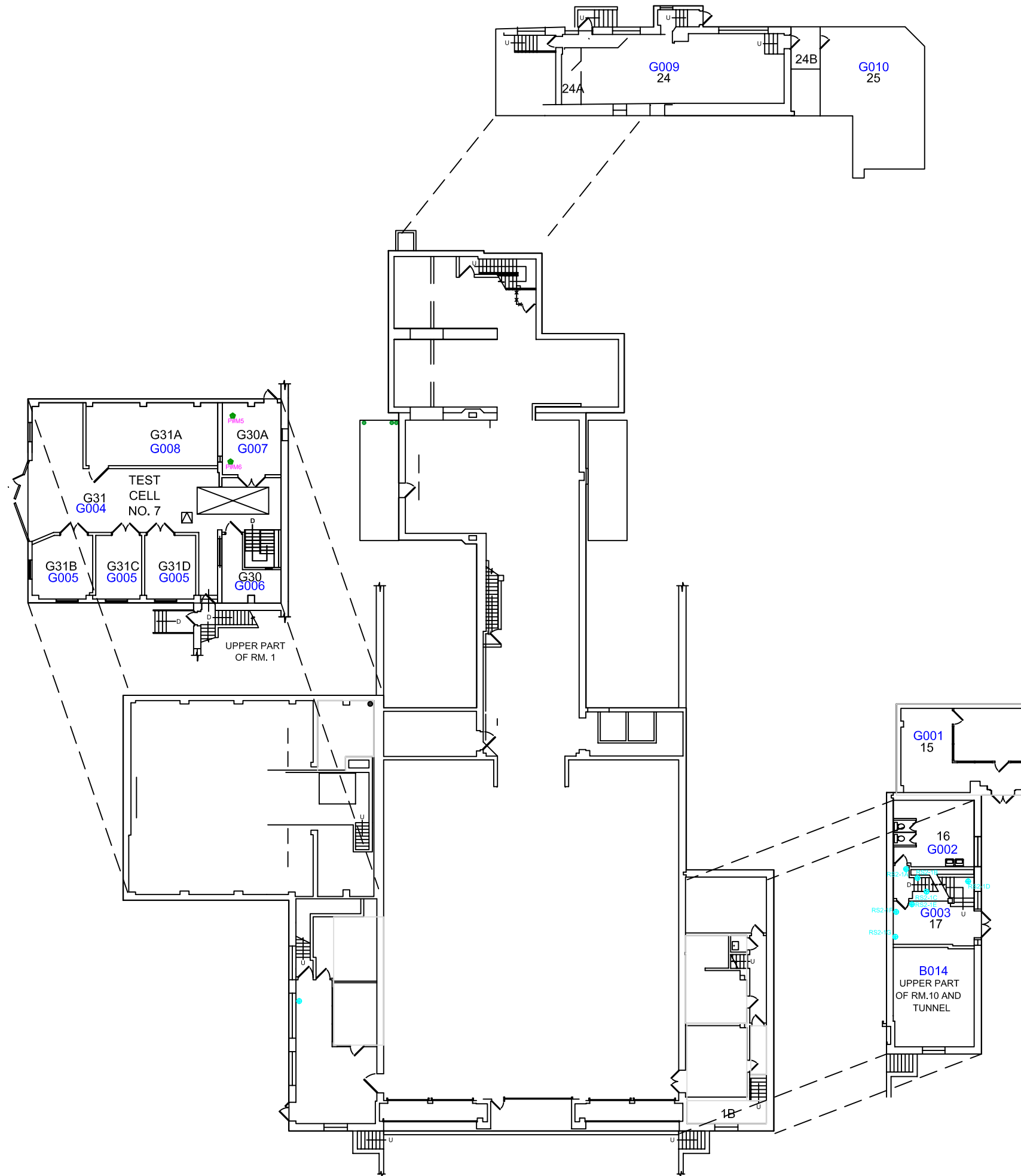
**PROJECT NO.**  
 PR-08-43

**DATE**  
 DECEMBER 2008

**SCALE**  
 NTS

**TITLE**  
 -GROUND FLOOR-  
**SAMPLE  
 LOCATIONS  
 & MOULD  
 LOCATIONS**

**SHEET**  
**G-3**





**LEGEND**

- 1001 FUNCTIONAL SPACE #
- ACM PIPE INSULATION: STEAM
- ACM PIPE INSULATION: CONDENSATE
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE
- ACM FITTING INSULATION: DOMESTIC CW
- ACM 12"x12" CEILING & WALL TILE
- ACM TRANSITE PANEL

**NOTE:**  
 ACM fitting insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: t's, valves, ends, hangers, etc.

**CLIENT**

NATIONAL RESEARCH COUNCIL CANADA  
 ADMINISTRATIVE SERVICES  
 AND PROPERTY MANAGEMENT  
 BUILDING M-19  
 1200 MONTREAL RD.  
 OTTAWA, ON, K1A 0R6

**PROJECT**

DESIGNATED SUBSTANCES SURVEY  
 BUILDING M-7

**PROJECT NO.**

PR-08-43

**DATE**

DECEMBER 2008

**SCALE**

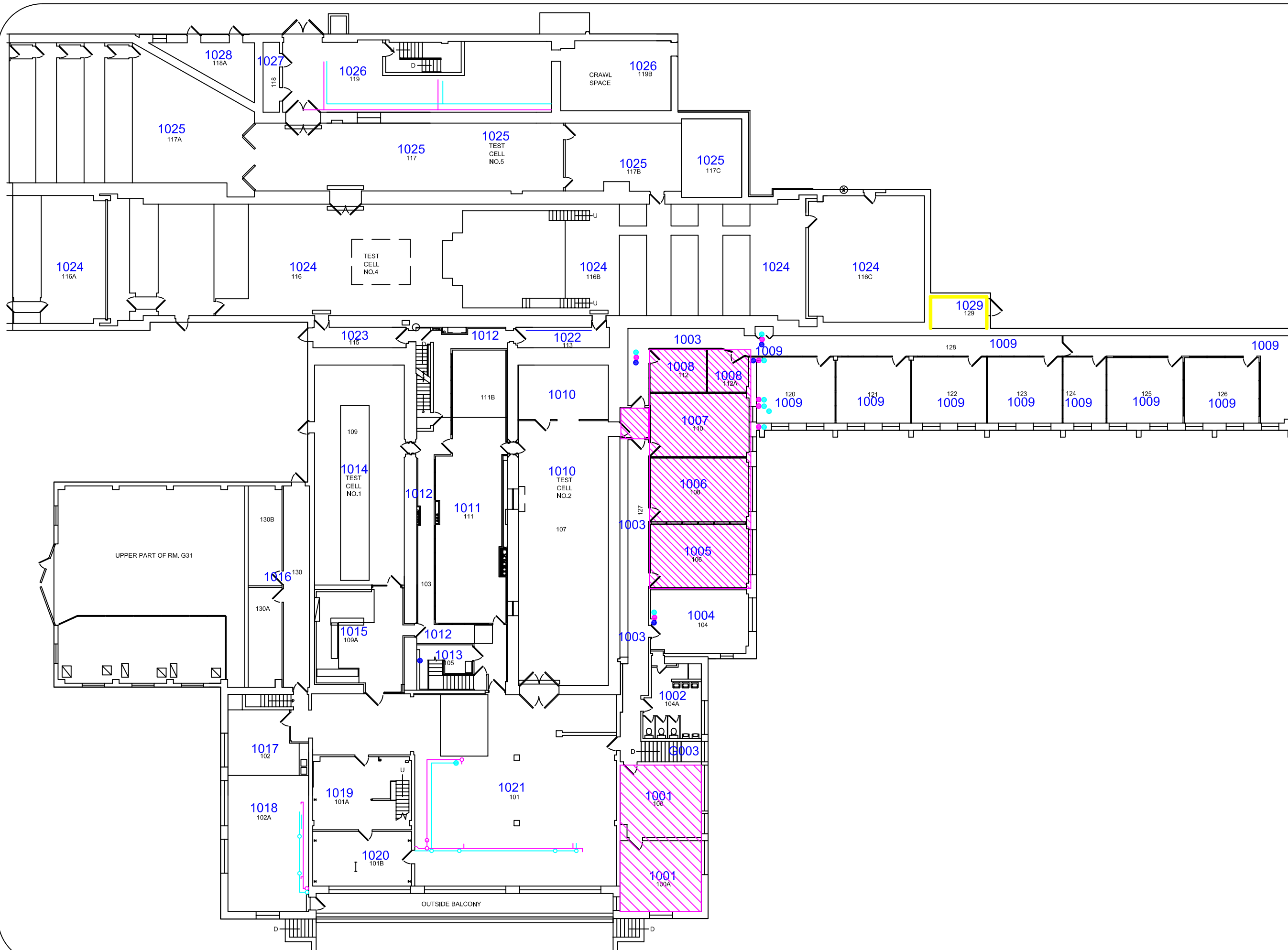
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**TITLE**

**-FIRST FLOOR-  
 ASBESTOS  
 LOCATIONS**

**SHEET**

**1-1**





**LEGEND**

- 1001 FUNCTIONAL SPACE #
- ▲ DAMAGED ACM LOCATION
- P# PHOTOGRAPH #
- ACM PIPE INSULATION: STEAM
- ACM PIPE INSULATION: CONDENSATE
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE
- ACM FITTING INSULATION: DOMESTIC CW
- ▨ ACM 12"X12" CEILING & WALL TILE
- ACM TRANSITE PANEL

ACM fitting insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: f's, valves, ends, hangers, etc.

**CLIENT**

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 ADMINISTRATIVE SERVICES  
 AND PROPERTY MANAGEMENT  
 BUILDING M-19  
 1200 MONTREAL RD.  
 OTTAWA, ON, K1A 0R6

**PROJECT**

DESIGNATED SUBSTANCES SURVEY  
 BUILDING M-7

**PROJECT NO.**

PR-08-43

**DATE**

DECEMBER 2008

**SCALE**

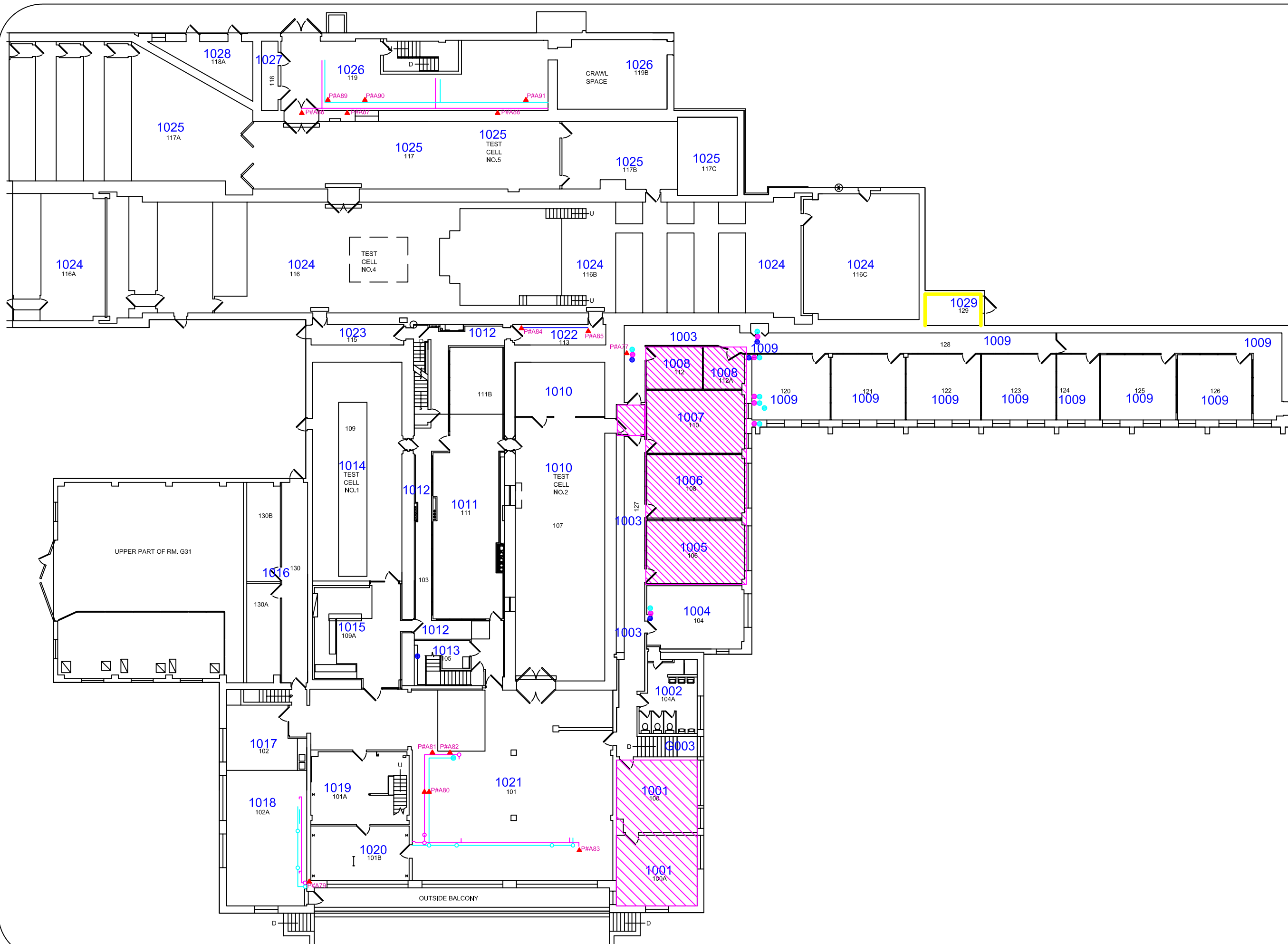
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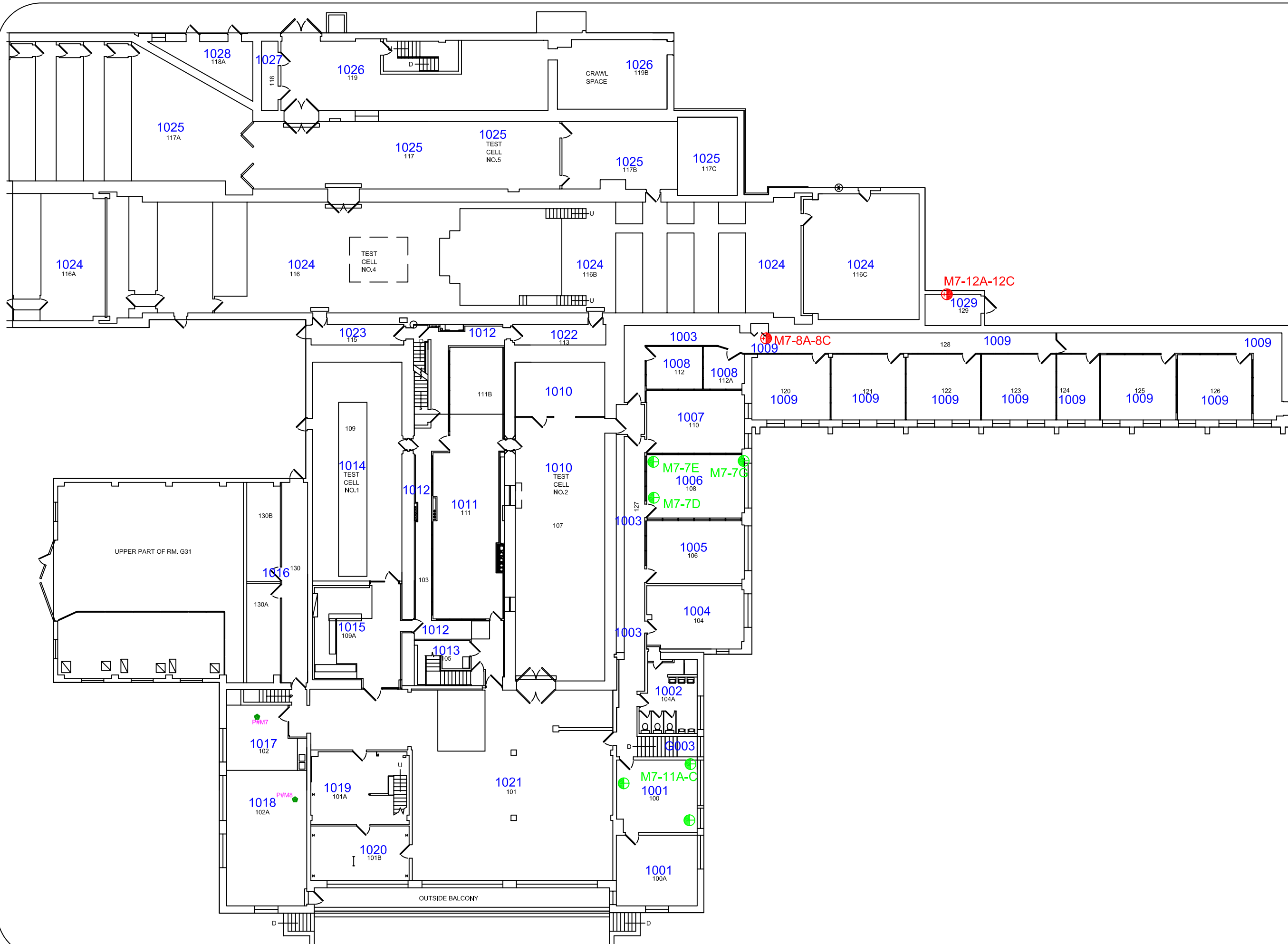
**TITLE**

**-FIRST FLOOR-  
 ASBESTOS  
 SURVEY**

**SHEET**

**1-2**





- LEGEND**
- 1001 FUNCTIONAL SPACE #
  - SAMPLE LOCATION: NON-ACM
  - SAMPLE LOCATION: ACM
  - P# PHOTOGRAPH #
  - ◆ SUSPECT MOULD

**NOTE:**  
 ACM fitting/insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: t's, valves, ends, hangers, etc.

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 BUILDING M-19  
 1200 MONTREAL RD.  
 OTTAWA, ON, K1A 0R6

**PROJECT**  
 DESIGNATED SUBSTANCES SURVEY  
 BUILDING M-7

**PROJECT NO.**  
 PR-08-43

**DATE**  
 DECEMBER 2008

**SCALE**  
 NTS

**TITLE**  
**-FIRST FLOOR-  
 SAMPLE  
 LOCATIONS  
 & MOULD  
 LOCATIONS**

**SHEET**  
**1-3**



**LEGEND**

- 1001 FUNCTIONAL SPACE #
- ACM PIPE INSULATION: STEAM
- ACM PIPE INSULATION: CONDENSATE
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE

**NOTE:**  
 ACM fitting insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: t's, valves, ends, hangers, etc.

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**PROJECT**

DESIGNATED SUBSTANCES SURVEY  
 BUILDING M-7

**PROJECT NO.**

PR-08-43

**DATE**

DECEMBER 2008

**SCALE**

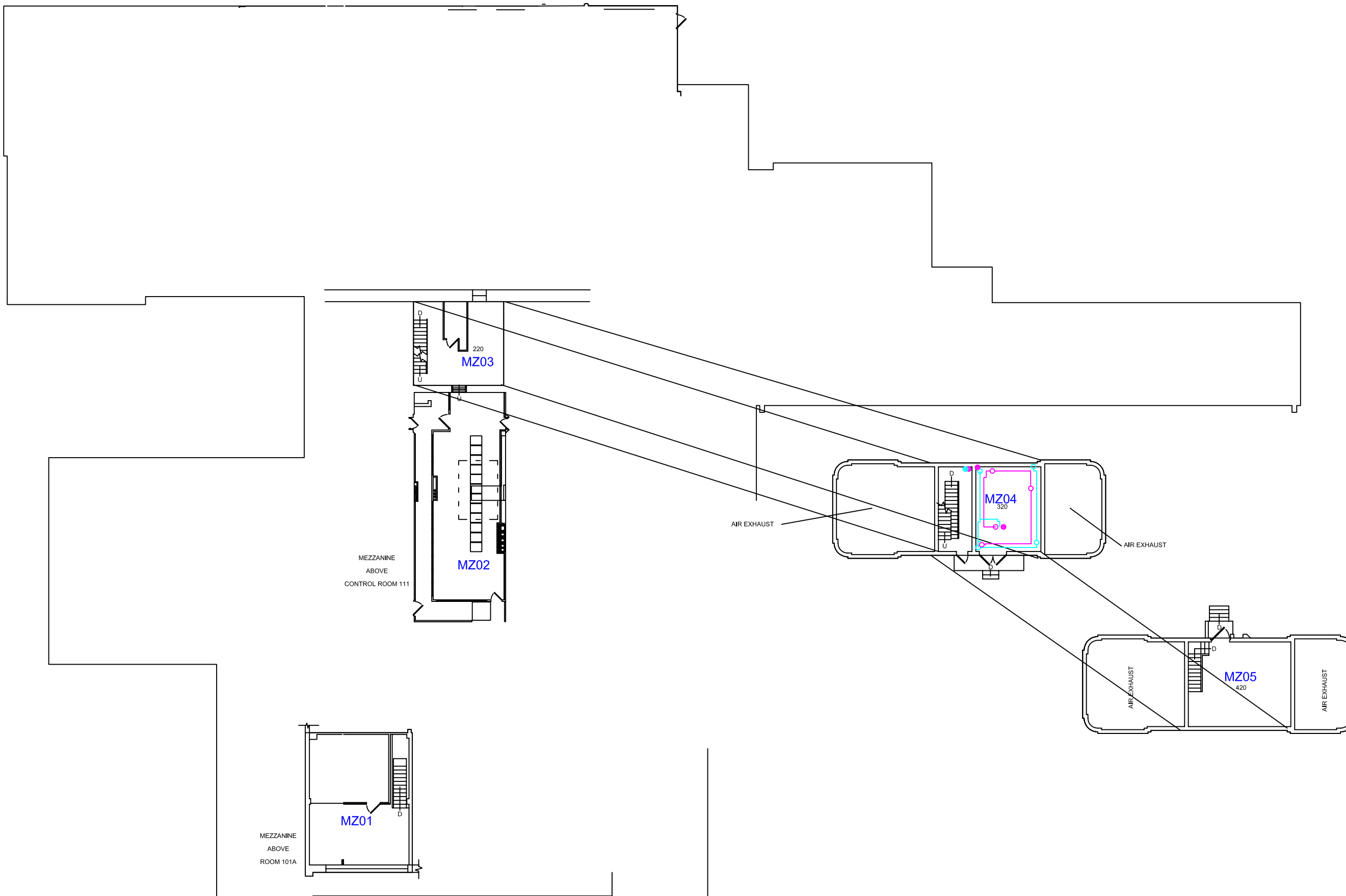
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**TITLE**

**-MEZZANINE-  
 ASBESTOS  
 LOCATIONS**

**SHEET**

**MZ-1**



**OUTLINE OF FIRST FLOOR**



**LEGEND**

- 1001 FUNCTIONAL SPACE #
- ▲ DAMAGED ACM LOCATION
- P# PHOTOGRAPH #
- ACM PIPE INSULATION: STEAM
- ACM PIPE INSULATION: CONDENSATE
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE

ACM fitting insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: t's, valves, ends, hangers, etc.

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 BUILDING M-7

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PR-08-43

**DATE**

DECEMBER 2008

**SCALE**

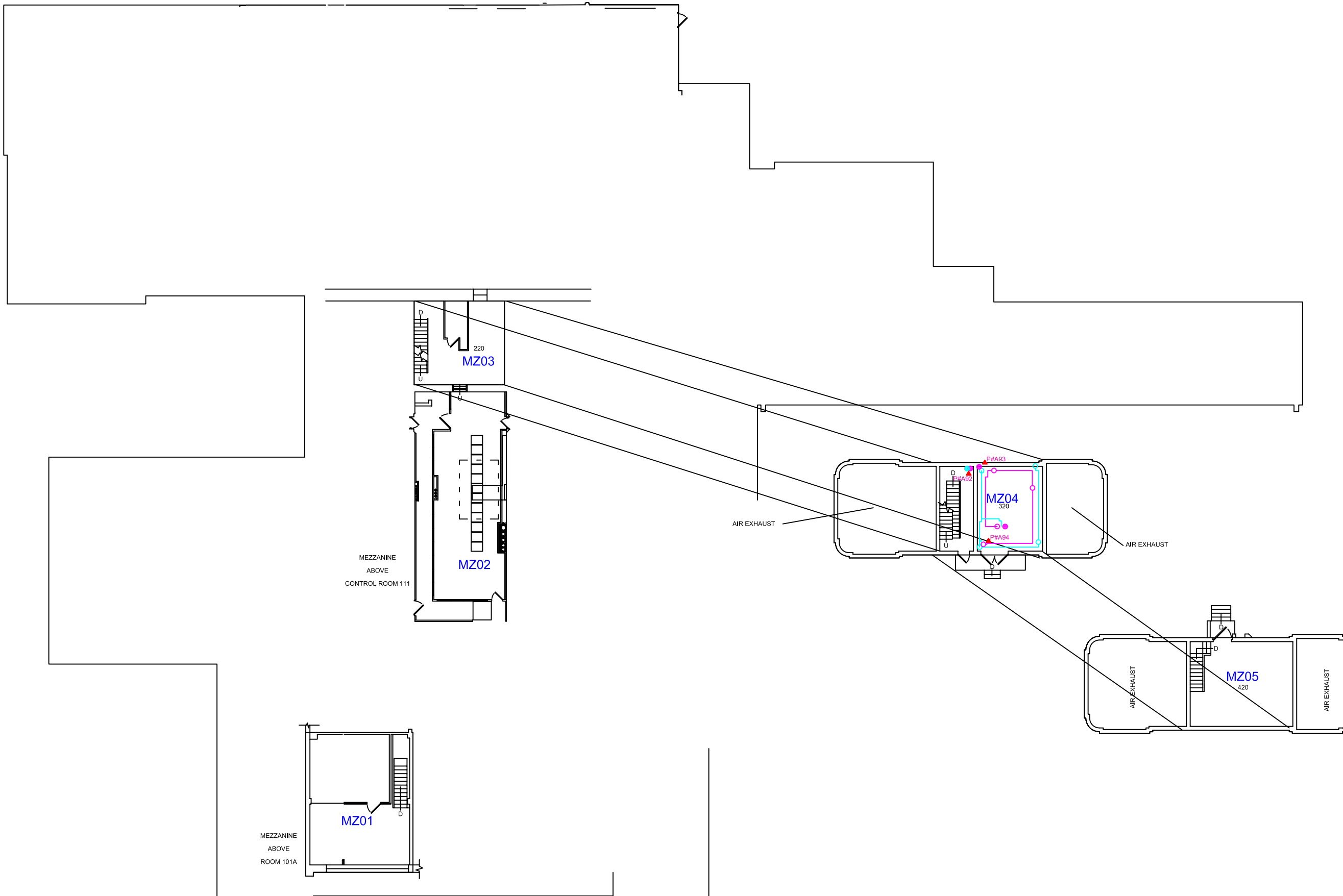
NTS

**TITLE**

**-MEZZANINE-  
 ASBESTOS  
 SURVEY**

**SHEET**

**MZ-2**



**OUTLINE OF FIRST FLOOR**



**LEGEND**

- 1001 FUNCTIONAL SPACE #
- P# PHOTOGRAPH #
- SUSPECT MOULD

**NOTE:**  
 ACM fitting insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: f's, valves, ends, hangers, etc.

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 BUILDING M-7

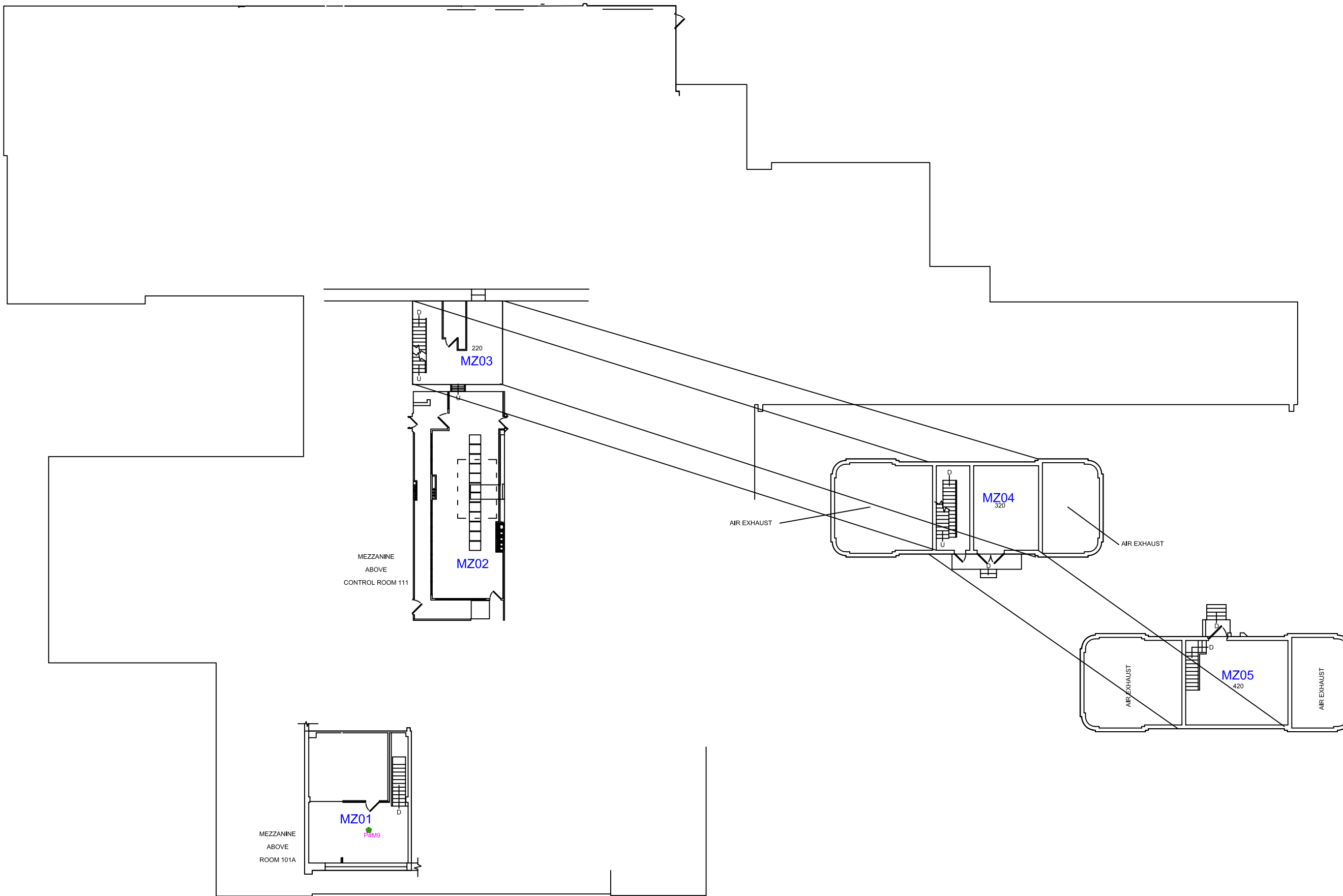
**PROJECT NO.**  
 PR-08-43

**DATE**  
 DECEMBER 2008

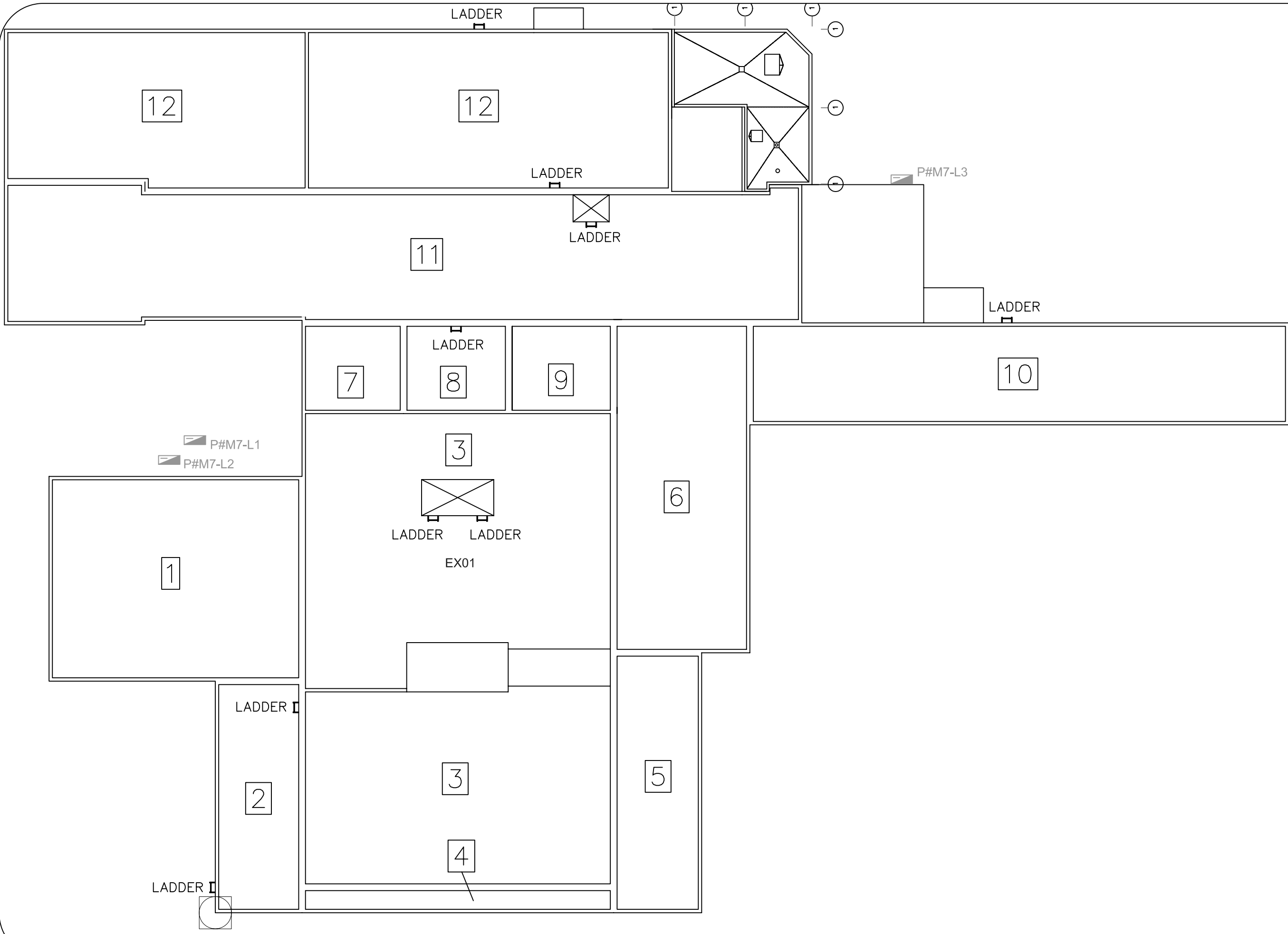
**SCALE**  
 NTS

**TITLE**  
**-MEZZANINE-  
 SAMPLE  
 LOCATIONS  
 & MOULD  
 LOCATIONS**

**SHEET**  
**MZ-3**



**OUTLINE OF FIRST FLOOR**



**LEGEND**  
 1001 FUNCTIONAL SPACE #  
 ▣ SAMPLE LOCATION: NON-LEAD

**NOTE:**  
 ACM fitting insulation locations are shown only on systems where NON-ACM pipe insulation was found. ONLY ACM ELBOWS are shown. These systems may also have ACM on: t's, valves, ends, hangers, etc.

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**PROJECT**  
 DESIGNATED SUBSTANCES SURVEY  
 BUILDING M-7

**PROJECT NO.**  
 PR-08-43

**DATE**  
 DECEMBER 2008

**SCALE**  
 NTS

**TITLE**  
**-EXTERIOR-  
 SURVEY**

**SHEET**  
**EX-1**



**APPENDIX F**  
**FUNCTIONAL SPACE FORMS**

## Functional Space Forms

The functional space form provides a general guide of information collected in each room or area of the facility and is considerate of but is not limited to the following:

- (a) **Building Materials** - Each building material is given a description as to the location, homogenous material number, location and system;
- (b) **ACM Assessment** - Each building material that is found to contain ACM is assessed as to friability, ACM type, quantity, condition, access and appropriate response;
- (c) **Report Reference** - Report references to building materials with respect to drawings and photographs numbers is made available for convenience. Drawings and photographs are located in the Appendices section of this report.

Each functional space is assigned a four digit number beginning with 1001 for the first floor, 2001 for the second floor, 3001 for the third floor, and so on. Functional spaces are determined on a room-to-room or area-to-area basis. Also, included on each form is: building, date, Oakhill job number, functional space area name, inspector and notes. In the notes section important additional comments are made regarding ACM found in this area, samples collected and any areas within this functional space that were considered inaccessible at the time of inspection.

The functional space form is a useful tool for the collection of survey data and communication of such data for your record keeping purposes.

## Criteria for Assessing Condition of ACM

The following criteria were used for evaluating the condition of ACM:

**GOOD (G):** The building material has no evidence of exposed ACM and exhibits no signs of damage or deterioration

**FAIR (F):** The building material has minor damage (less than 2%) and the potential for an airborne release of asbestos is low to moderate.

**POOR (P):** The building material has moderate to major damage (greater than 2%) and the potential for an airborne release of asbestos is moderate to moderate to high.

The evaluation of the potential for an airborne release of asbestos from an ACM is also considerate of fibre generating mechanisms. This involves any form of action that can cause deterioration of the ACM resulting in the generation of airborne asbestos fibres. Typical fibre generating mechanisms may include: water damage, grinding, vibration, air movement, etc. This determination is made based on the best professional judgement of the experienced inspector.

## **Criteria for Assessing Access to ACM**

The accessibility of ACM identified was rated as:

*Access A:* All building occupants may have access to this area.

*Access B:* Restricted to building staff only.

*Access C:* Areas of the building located behind walls or ceiling systems.

## **Response**

Each ACM material, after all considerations, is given an appropriate response. The following is an explanation of each response that may be given:

*Removal:* For extensively damaged materials that cannot sustain encapsulation or materials that pose a significant potential for an airborne release and exposure to building occupants (i.e. debris). Requires immediate attention and encapsulation is not an option.

*Encapsulation:* Encapsulation involves the repair of damaged materials (i.e. canvas and lagging of damaged ACM pipe insulation). Materials that require encapsulation pose a potential risk of an airborne release ranging from low to high but restoration of the ACM is still a viable option. Encapsulation is not applicable if the material is severely deteriorated.

*O & M Operations & Maintenance:* These materials were found in good condition and should be periodically inspected.

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Building ID: M-07	Notes: 1) Samples M7-L1, M7-L2, M7-L3 were collected here.	Functional Space (FS #): EX01
Date: Oct. 31, 2008		Location: Exterior
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	--	--	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) Samples M7-1A, M7-1B, M7-2A, M7-2B, M7-3A, M7-4A, M7-4B, M7-4C, M7-L4 & M7-L5 were collected here. 2) Condensate: 5 damaged mud joint compound fittings require 5 encapsulations. (5 units) 3) Condensate: 7 damaged sections of aircell pipe insulation requires 7 encapsulations. (2.8 LM) 4) Steam: 6 damaged mud joint compound fittings hanger requires 6 encapsulations. (6 units) 5) Steam: 7 damaged sections of aircell pipe insulation requires 7 encapsulations (3.1 LM). 6) DCW: 2 damaged sections of sweatwrap pipe insulation requires 1 encapsulation (1 LM).	Functional Space (FS #): B001
Date: Nov. 3, 2008		Location: Room 4 (Garage Bay)
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
	--	Concrete Block	Wall	N	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	N	--	--	--	--	--	--	--	--
	--	Wood	Ceiling	N	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	1	MJC FI	Cond.	Y	Y	55% Chrysotile	5 units	G	B	O & M	B1	--
	1	MJC FI	Cond.	Y	Y	55% Chrysotile	5 units	F	B	5 encapsulations	B2	A1, A2, A3, A4, A5
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	12 LM	G	B	O & M	B1	--
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	2.8 LM	F	B	7 encapsulations	B2	A6, A7, A8, A9, A10, A11, A12
	1	MJC FI	Steam	Y	Y	55% Chrysotile	19 units	G	B	O & M	B1	--
	1	MJC FI	Steam	Y	Y	55% Chrysotile	6 units	F	B	6 encapsulations	B2	A13, A14, A15, A16, A17, A18
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	30 LM	G	B	O & M	B1	--
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	3.1 LM	F	B	7 encapsulations	B2	A19, A20, A21, A22
	4	Sweatwrap PI	DCW	Y	Y	10% Chrysotile	6 LM	G	B	O & M	B1	--
	4	Sweatwrap PI	DCW	Y	Y	10% Chrysotile	1 LM	F	B	2 encapsulations	B2	A23, A24
	--	FG PI & FI	HPS/Cond.	--	--	--	--	--	--	--	--	--
	--	FG PI & FI with aluminium casing	DCW/Cond.	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) Samples M7-1C, M7-2C, M7-3B, M7-3C, M7-5A, M7-5B, M7-5C, M7-10A, M7-10B, M7-10C, M7-L6 & M7-L7 were collected here. 2) Condensate: Three damaged mud joint compound fittings require three encapsulations. (3 units) and Mud joint compound fitting insulation (residual) requires one removal. 3) Condensate: Three damaged sections of aircell pipe insulation requires three encapsulations. (1.1 LM) 4) Steam: Four damaged mud joint compound fittings require four encapsulations. (4 units) 5) Steam: Two damaged mud joint compound fittings require two removals. (2 units) 6) Steam: Three damaged sections of aircell pipe insulation requires three encapsulations. (0.8 LM) 7) Steam: Two damaged sections of aircell pipe insulation requires two removals. (0.6 LM) 8) DCW: One damaged section of sweatwrap pipe insulation requires one encapsulation. (0.5 LM)	Functional Space (FS #): B002  Location: Rooms 4A, 4B, 7, 7A, 7B  Inspectors: SB & RT
Date: Nov. 4, 2008		
Project #: PR-08-043		

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
	--	Concrete Block	Wall	N	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	N	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	1	MJC FI	Condensate	Y	Y	55% Chrysotile	24 Units	G	B	O&M	B1	--
	1	MJC FI	Condensate	Y	Y	55% Chrysotile	3 Units	P	B	3 encapsulations	B2	A38, A39, A40
	1	MJC FI (residual)	Condensate	Y	Y	55% Chrysotile	1 Unit	P	B	1 removal	B2	A41
	2	Aircell PI	Condensate	Y	Y	50% Chrysotile	15 LM	G	B	O&M	B1	--
	2	Aircell PI	Condensate	Y	Y	50% Chrysotile	1.1 LM	F	B	3 encapsulations	B2	A42, A43, A44
	1	MJC FI	Steam	Y	Y	55% Chrysotile	20 Units	G	B	O&M	B1	--
	1	MJC FI	Steam	Y	Y	55% Chrysotile	4 units	P	B	4 encapsulations	B2	A28, A29, A30, A31
	1	MJC FI	Steam	Y	Y	55% Chrysotile	2 Units	P	B	2 removals	B2	A32, A33
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	31 LM	G	B	O&M	B1	--
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	0.6 LM	P	B	2 removals	B2	A25, A26
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	0.8 LM	F	B	3 encapsulations	B2	A27, A35, A36
	4	Sweatwrap PI	DCW	Y	Y	10% Chrysotile	12 LM	G	B	O&M	B1	--
	4	Sweatwrap PI	DCW	Y	Y	10% Chrysotile	0.5 LM	F	B	1 encapsulation	B2	A37
	10	MJC FI (with black mastic)	Tower water	Y	Y	20% Chrysotile	4 units	G	B	O&M	B1	--
	5	MJC FI	DCW	Y	N	NAD	--	--	--	--	--	--
	--	FG PI & FI	Cond./Steam	N	--	--	--	--	--	--	--	--
	--	FG PI & FI with aluminium casing	Steam/DCW	N	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07  Date: Nov. 5, 2008  Project #: PR-08-043	Notes: 1) Cond.: 1 damaged mud joint compound fitting require 1 encapsulation (1 unit). 2) Steam: 1 damaged mud joint compound fitting require 1 encapsulation (1 unit).	Functional Space (FS #): B003  Location: Rooms 3 & 3A  Inspectors: SB & RT
---	--	--

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	N	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI with aluminium casing	Cond./ Steam	N	--	--	--	--	--	--	--	--
	--	FG PI & FI	DCW/Steam	N	--	--	--	--	--	--	--	--
	1	MJC FI	Cond.	Y	Y	55% Chrysotile	1 unit	G	B	O & M	B1	--
	1	MJC FI	Cond.	Y	Y	55% Chrysotile	1 unit	F	B	1 encapsulation	B2	A45
	1	MJC FI	Steam	Y	Y	55% Chrysotile	5 units	G	B	O & M	B1	--
	1	MJC FI	Steam	Y	Y	55% Chrysotile	1 unit	F	B	1 encapsulation	B2	A46
	5	MJC FI	DCW	N	--	NAD	--	--	--	--	--	--
	--	FG PI & FI	Tower Water	N	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) All ACM's were observed to be in good condition during the survey.	Functional Space (FS #): B004
Date: Nov 5, 2008		Location: Room Test Cell #6
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	N	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	1	MJC FI	Steam	Y	Y	55% Chrysotile	3 units	G	B	O & M	--	--
	--	FG PI & FI	Steam/Cond.	N	--	--	--	--	--	--	--	--
	--	FG PI & FI with aluminium casing	DCW	N	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07  Date: Nov 5, 2008  Project #: PR-08-043	Notes: 1) Wall & Ceiling Tile: 8 damaged areas of 12" x 12" Ceiling Tile (uniform hole pattern) requires 8 removals (<1.0 m2 each). 2) Wall & Ceiling Tile: ACM debris (12" x 12" Ceiling Tile (uniform hole pattern)) (>1m2) requires clean-up. 3) From re-sampling of the building plaster it was determined that the positive result was from the ACM Wall & Ceiling located in this functional space.	Functional Space (FS #): B005  Location: Room 01  Inspectors: SB & RT
--	--	---

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls/Ceiling	6	12" x 12" CT/WT (uniform hole pattern)	Wall & Ceiling	Y	Y	6% Chrysotile	<8.0 m <sup>2</sup>	P	B	8 Removals	B2	A99, A100, A101, A102, A103, A104, A105, A106
	6	12" x 12" CT/WT (uniform hole pattern)	Wall & Ceiling	Y	Y	6% Chrysotile	96 m <sup>2</sup>	G	B	O & M	B1	
	6	CM Debris (12" x 12" CT/WT (uniform hole pattern)	Wall & Ceiling	Y	Y	6% Chrysotile	>1.0 m <sup>2</sup>	P	B	Clean up	B2	A98
Ceiling	--	Concrete	Ceiling	N	--	--	--	--	--	--	--	--
Walls	7	Plaster	Walls	--	--	NAD	--	--	--	See Note #3	--	--
	--	Concrete	Walls	--	--	--	--	--	--	--	--	--
	--	Concrete Block	Walls	--	--	--	--	--	--	--	--	--
	--	Drywall	Walls	--	--	--	--	--	--	--	--	--
	--	MDF	Walls	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI	Steam/Cond.	N	--	--	--	--	--	--	--	--
		FG FI	DCW	N	--	--	--	--	--	--	--	--
		FG PI with aluminium casing	DCW	N	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07  Date: Nov. 5, 2008  Project #: PR-08-043	Notes: 1) Suspect mould was observed in 4 locations on the chiller system. 2) No ACM's were observed in this area.	Functional Space (FS #): B006  Location: Room 5  Inspectors: SB & RT
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Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI with aluminium casing	Chiller/Cond.	N	--	--	--	--	--	--	--	--
	--	FG PI & FI	Steam/Chiller	N	--	--	--	--	--	--	--	--
	--	Suspect Mould	Chiller	N	--	--	--	--	--	4 locations	B3	M1, M2, M3, M4

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation; PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) Steam: 1 open end of aircell pipe insulation requires 1 encapsulation (0.2 LM). 2) This functional space includes crawl spaces on both sides of the room; both designated as level 1 confined spaces. From observations using a hatch in Room G30A.	Functional Space (FS #): B007
Date: Nov 6, 2008		Location: Rooms 030 & 031
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
	--	Drywall	Wall	N	--	--	--	--	--	--	--	--
Ceiling	--	Metal	Ceiling	N	--	--	--	--	--	--	--	--
	--	Polystyrene	Ceiling	N	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	5	MJC FI	DCW	N	--	NAD	--	--	--	--	--	--
	5	MJC FI (residual)	DCW	N	--	NAD	--	--	--	--	--	--
	5	ACM debris (MJC FI)	DCW	N	--	NAD	--	--	--	--	--	--
	2	Aircell PI	Steam	Y	Y	50% Chrysotile	1 LM	G	C	O & M	B1	--
	2	Aircell PI	Steam	Y	Y	50% Chrysotile	0.2 LM	F	C	1 encapsulation	B2	A49
--	--	FG PI & FI	Steam/Cond.	N	--	--	--	--	--	--	--	--
--	--	FG PI & FI with aluminium casing	DCW	N	--	--	--	--	--	--	--	--
--	--	FG PI & FI with PVC casing	DCW	N	--	--	--	--	--	--	--	--
5	5	MJC FI	Unknown System	N	--	NAD	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07  Date: Nov 6, 2008  Project #: PR-08-043	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): B008  Location: Room 031A  Inspectors: SB & RT
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Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
	--	Fibreboard Insulation	Wall	N	--	--	--	--	--	--	--	--
Ceiling	--	Fibreboard Insulation	Ceiling	N	--	--	--	--	--	--	--	--
	--	Concrete	Ceiling	N	--	--	--	--	--	--	--	--
	--	Metal	Ceiling	N	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI	Unknown System	N	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) Wall & Ceiling Tile: 2 damaged areas of 12" x 12" Ceiling Tile (uniform hole pattern) requires 2 removals (>1.0 m2). 2) From re-sampling of the building plaster it was determined that the positive result was from the ACM Wall & Ceiling located in this functional space.	Functional Space (FS #): B010
Date: Nov 6, 2008		Location: Room 01B
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls/Ceiling	6	12" x 12" CT/WT (uniform hole)	Wall & Ceiling	Y	Y	6% Chrysotile	1m <sup>2</sup>	P	B	2 Removals	B2	A96, A97
	6	12" x 12" CT/WT (uniform hole)	Wall & Ceiling	Y	Y	6% Chrysotile	12m <sup>2</sup>	G	B	O & M	B1	--
Wall	7	Plaster	Wall	--	--	NAD	--	--	--	See Note #2	--	--
	--	Concrete Block	Wall	--	--	--	--	--	--	--	--	--
	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
Ceiling	9	2'x4' CT (large divot)	Ceiling	N	--	NAD	--	--	--	--	--	--
	--	2'x4' CT	Ceiling	N	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	Wood	Deck	N	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) Steam: 1 damaged mud joint compound fitting requires 1 removal (1 unit). 2) Steam: 2 open ends of aircell pipe insulation requires 2 encapsulations (0.4 LM). 3) Condensate: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.2 LM).	Functional Space (FS #): B011
Date: Nov 6, 2008		Location: Rooms 11 & Server closet
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
	--	Wood	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	3	Aircell PI	Steam	Y	Y	50% Chrysotile	4 LM	G	C	O & M	B1	--
	3	Aircell PI	Steam	Y	Y	50% Chrysotile	0.4 LM	F	C	2 encapsulations	B2	A51
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	0.2 LM	P	C	1 encapsulation	B2	A52
	1	MJC FI	Cond.	Y	Y	55% Chrysotile	1 unit	G	C	O & M	B1	--
	1	MJC FI	Cond.	Y	Y	55% Chrysotile	1 unit	P	C	1 removal	B2	A51

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) Steam: 1 damaged section of aircell pipe insulation requires 1 encapsulation (0.3 LM). 2) Steam: 4 damaged mud joint compound fittings require 4 encapsulations (4 units). 3) Condensate: 2 damaged sections of aircell pipe insulation require 2 encapsulations (0.5 LM). 4) Condensate: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	Functional Space (FS #): B012
Date: Nov 6, 2008		Location: Rooms 9, Hallway, stairs, & closet
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	N	--	--	--	--	--	--	--	--
	--	Wood	Ceiling	N	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	3	Aircell PI	Steam	Y	Y	60% Chrysotile	7 LM	G	B	O & M	B1	--
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	0.3 LM	F	B	1 encapsulation	B2	A53
	1	MJC FI	Steam	Y	Y	55% Chrysotile	2 units	G	B	O & M	B1	--
	1	MJC FI	Steam	Y	Y	55% Chrysotile	4 units	F	B	4 encapsulations	B2	A54, A55, A56
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	7 LM	G	B	O & M	B1	--
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	0.5 LM	F	B	2 encapsulations	B2	A57, A58
	1	MJC FI	Cond.	Y	Y	55% Chrysotile	1 unit	G	B	O & M	B1	--
	1	MJC FI	Cond.	Y	Y	55% Chrysotile	1 unit	F	B	1 encapsulation	B2	A59
	4	Sweatwrap PI	DCW	Y	Y	10% Chrysotile	6 LM	G	B	O & M	B1	--
	--	FG PI	Cond.	N	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) Steam: 1 residual mud joint compound fitting requires 1 removal (1 unit).	Functional Space (FS #): B013
Date: Nov. 6, 2008		Location: Room 1B & Hall 8
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	N	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI	Cond./Steam	N	--	--	--	--	--	--	--	--
	--	FG PI & FI with aluminium casing	Cond./Steam/ DCW	N	--	--	--	--	--	--	--	--
	1	MJC FI (residual)	Steam	Y	Y	55% Chrysotile	1 unit	P	C	1 removal	B2	A60

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation;                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): B014
Date: Nov 6, 2008		Location: Rooms
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	N	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG DI	Duct	--	--	--	--	--	--	--	--	--
	--	Metal DI	Duct	--	--	--	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation;                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): B015
Date: Nov 6, 2008		Location: Room 12
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
Ceiling	--	Wood	Ceiling	N	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI	DCW/Steam/Cond.	--	--	--	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07	Notes: 1) This area is a level 1 confined space; and was observed from the entrance. 2) All ACM's were observed to be in good condition during the survey.	Functional Space (FS #): B016
Date: Nov. 12, 2008		Location: North Confined Space
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Earth/Rock	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	10	MJC FI (with black mastic)	Tower Water	Y	Y	20% Chrysotile	3 units	G	C	O & M	--	--
	--	FG PI & FI	San. Drain/Cond.	--	--	--	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): B017
Date: Nov. 12, 2008		Location: Rooms South Confined Space
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Earth/Rock	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	--	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI	San. Drain/Cond.	--	--	--	--	--	--	--	--	--
	13	Magblock PI	Unknown	N	--	NAD	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) Condensate: 2 damaged mud joint compound fittings require 2 encapsulations (2 units). 2) Condensate: 4 damaged sections of aircell pipe insulation require 4 encapsulations (0.8 LM). 3) Condensate: 1 damaged section of aircell pipe insulation requires 1 removal (1.0 LM). 4) Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit). 5) Steam: 4 open ends of aircell pipe insulation require 4 encapsulations (0.8 LM). 6) Steam: 2 damaged sections of aircell pipe insulation require 2 encapsulations (0.4 LM).	Functional Space (FS #): G001
Date: Nov. 6, 2008		Location: Room 15
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	1	MJC FI	Cond.	Y	Y	55% Chrysotile	5 units	G	B	O & M	G1	--
	1	MJC FI	Cond.	Y	Y	55% Chrysotile	2 units	G	B	2 encapsulations	G2	A62, A63
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	9 LM	G	B	O & M	G1	--
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	0.8 LM	G	B	4 encapsulations	G2	A64, A65, A66, A68
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	1 LM	G	B	1 removal	G2	A67
	1	MJC FI	Steam	Y	Y	55% Chrysotile	3 units	G	B	O & M	G1	--
	1	MJC FI	Steam	Y	Y	55% Chrysotile	1 unit	F	B	1 encapsulation	G2	A69
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	9 LM	G	B	O & M	G1	--
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	0.8LM	F	B	4 encapsulations	G2	A70
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	0.4 LM	F	B	2 encapsulations	G2	A71, A72
	5	MJC FI	DCW	N	--	NAD	--	--	--	--	--	--
	4	Sweatwrap PI	DCW	Y	Y	20% Chrysotile	3 LM	G	B	O & M	G1	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): G003
Date: Nov. 6, 2008		Location: Foyer & Stairwell upper Landing
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Rubber	Floor	N	--	--	--	--	--	--	--	--
	--	Carpet	Floor	N	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	N	--	--	--	--	--	Post 1986	--	--
Above Ceiling	7	Plaster	Deck	--	--	NAD	--	--	--	--	--	--
	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation:                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): G004
Date: Nov. 6, 2008		Location: Room G31 Test Cell 7
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
		Metal	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
		Concrete Block	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--										
Below Ceiling	--	FG PI & FI with PVC casing	Cond./Steam	--	--	--	--	--	--	--	--	--
	--	FG PI & FI with aluminium casing	Steam.DCW	--	--	--	--	--	--	--	--	--
	5	MJC FI	Drain	N	--	NAD	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07  Date: Nov. 6, 2008  Project #: PR-08-043	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): G005  Location: Room G31B, G31C, G31D  Inspectors: SB & RT
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Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
		Concrete Block	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Metal	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI with aluminium casing	Chiller/Steam	--	--	--	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation:                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07  Date: Nov. 6, 2008  Project #: PR-08-043	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): G006  Location: Room G30  Inspectors: SB & RT
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Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Drywall	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI with aluminium casing	Chiller/Steam	--	--	--	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07	Notes: 1) No ACM's were observed in this area. 2) Suspect mould was observed in 2 locations on the DCW system.	Functional Space (FS #): G007
Date: Nov. 6, 2008		Location: Room G30A
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
	--	Wood	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Concrete Block	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Drywall	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI with aluminium casing	DCW	--	--	--	--	--	--	--	--	--
	--	FG PI & FI	Exhaust	--	--	--	--	--	--	--	--	--
	--	Suspect Mould	DCW	--	--	--	--	--	--	2 locations	G3	M5, M6

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07  Date: Nov. 6, 2008  Project #: PR-08-043	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): G008  Location: Room G31A  Inspectors: SB & RT
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Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
		Concrete Block	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI with aluminium casing	Cond./Steam	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): G009
Date: Nov. 6, 2008		Location: Room 24, 24A, 24B
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Terrazzo	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Fabric Panel	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Drywall	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	Metal	Duct	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI	Cond/ Steam	--	--	--	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07  Date: Nov. 6, 2008  Project #: PR-08-043	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): G010  Location: Room 25  Inspectors: SB & RT
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Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Terrazzo	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete Block	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	2' x 4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	Metal	Duct	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation; PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) All ACM's were observed to be in good condition during the survey.	Functional Space (FS #): 1001
Date: Nov. 7, 2008		Location: Rooms 100 & 100A
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Carpet	Floor	N	--	--	--	--	--	--	--	--
	11	Linoleum (brown)	Floor	N	--	NAD	--	--	--	--	--	--
Walls	--	Concrete	Wall	N	--	--	--	--	--	--	--	--
	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	N	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	FG DI	Duct	N	--	--	--	--	--	--	--	--
	--	Metal	Duct	N	--	--	--	--	--	--	--	--
	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
	6	12" x 12" CT/WT (uniform hole pattern)	Deck	Y	Y	6% Chrysotile	27 m <sup>2</sup>	G	C	O & M	1-1	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07  Date: Nov 7, 2008  Project #: PR-08-043	Notes: 1) No ACM's were observed in this area. 2) No access above ceiling.	Functional Space (FS #): 1002  Location: Room 104A Men's WR  Inspectors: SB & RT
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Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Terrazzo	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
Ceiling	7	Plaster	Ceiling	--	--	NAD	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07	Notes: 1) Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit).	Functional Space (FS #): 1003
Date: Nov 7, 2008		Location: Hallway 127
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	12"x12" FT (off white)	Floor	--	--	--	--	--	--	Post 1986	--	--
Walls	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	FG PI & FI with aluminium casing	Cond/Steam	--	--	--	--	--	--	--	--	--
	--	Metal	Duct	--	--	--	--	--	--	--	--	--
	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
	6	12" x 12" CT/WT (uniform hole pattern)	Deck	Y	Y	6% Chrysotile	5 m <sup>2</sup>	G	C	O & M	1-1	--
	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
	--	FG PI & FI	DCW	--	--	--	--	--	--	--	--	--
	8	MJF FI	Cond	Y	Y	40% Chrysotile	1 unit	G	B	O & M	1-1	--
	8	MJF FI	Steam	Y	Y	40% Chrysotile	1 unit	F	B	1 encapsulation	1-2	A77
	8	MJF FI	DCW	Y	Y	40% Chrysotile	1 unit	G	B	O & M	1-1	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) All ACM's were observed to be in good condition during the survey.	Functional Space (FS #): 1004
Date: Nov. 7, 2008		Location: Room 104
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Carpet	Floor	--	--	--	--	--	--	--	--	--
	11	Linoleum (brown)	Floor	--	--	NAD	--	--	--	--	--	--
Walls	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	7	Plaster	Deck	--	--	NAD	--	--	--	--	--	--
	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
	--	Metal	Duck	--	--	--	--	--	--	--	--	--
	--	FG DI	Duck	--	--	--	--	--	--	--	--	--
	8	MJF FI	Cond	Y	Y	40% Chrysotile	1 unit	G	B	O & M	1-1	--
	8	MJF FI	Steam	Y	Y	40% Chrysotile	1 unit	G	B	O & M	1-1	--
	8	MJF FI	DCW	Y	Y	40% Chrysotile	1 unit	G	B	O & M	1-1	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07	Notes: 1) All ACM's were observed to be in good condition during the survey.	Functional Space (FS #): 1005
Date: Nov 7, 2008		Location: Room 106
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	12"x12" FT (off white)	Floor	--	--	--	--	--	--	Post 1986	--	--
Walls	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	FG PI & FI with aluminium casing	Cond/Steam	--	--	--	--	--	--	--	--	--
	--	FG PI & Metal	Duct	--	--	--	--	--	--	--	--	--
	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
	6	12" x 12" CT/WT (uniform hole pattern)	Deck	Y	Y	6% Chrysotile	28 m <sup>2</sup>	G	C	O & M	1-1	--
	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) All ACM's were observed to be in good condition during the survey. 2) Sample M7-7G was collected here.	Functional Space (FS #): 1006
Date: Nov 7, 2008		Location: Room 108
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	12"x12" FT (off white)	Floor	--	--	--	--	--	--	Post 1986	--	--
Walls	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	FG PI & FI with aluminium casing	Cond/Steam	--	--	--	--	--	--	--	--	--
	--	FG PI & Metal	Duct	--	--	--	--	--	--	--	--	--
	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
	6	12" x 12" CT/WT (uniform hole pattern)	Deck	Y	Y	6% Chrysotile	28 m <sup>2</sup>	G	C	O & M	1-1	--
	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07  Date: Nov 7, 2008  Project #: PR-08-043	Notes: 1) All ACM's were observed to be in good condition during the survey. 2) No access under carpet.	Functional Space (FS #): 1007  Location: Room 110  Inspectors: SB & RT
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Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Carpet	Floor	--	--	--	--	--	--	--	--	--
Walls	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	FG PI & FI with aluminium casing	Cond/Steam	--	--	--	--	--	--	--	--	--
	--	FG PI & Metal	Duct	--	--	--	--	--	--	--	--	--
	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
	6	12" x 12" CT/WT (uniform hole pattern)	Deck	Y	Y	6% Chrysotile	28 m <sup>2</sup>	G	C	O & M	1-1	--
	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) All ACM's were observed to be in good condition during the survey.	Functional Space (FS #): 1008
Date: Nov 7, 2008		Location: Room 112 & 112A
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	12"x12" FT (off white)	Floor	--	--	--	--	--	--	Post 1986	--	--
Walls	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	FG PI & FI with aluminium casing	Cond/Steam	--	--	--	--	--	--	--	--	--
	--	FG PI & Metal	Duct	--	--	--	--	--	--	--	--	--
	7	Plaster	Wall	--	--	NAD	--	--	--	--	--	--
	6	12" x 12" CT/WT (uniform hole pattern)	Deck	Y	Y	6% Chrysotile	19 m <sup>2</sup>	G	C	O & M	1-1	--
	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
	--	FG PI & FI with aluminium casing	DCW	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07  Date: Nov. 7, 2008  Project #: PR-08-043	Notes: 1) All ACM's were observed to be in good condition during the survey.	Functional Space (FS #): 1009  Location: Rooms 120, 121, 122, 123,124, 125,126 & Hallway 128  Inspectors: SB & RT
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Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	12"x12" FT (off white)	Floor	--	--	--	--	--	--	Post 1986	--	--
Walls	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
	--	Metal Panel	Wall	--	--	--	--	--	--	--	--	--
	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	FG PI & FI with aluminium casing	Cond./DCW/Steam	--	--	--	--	--	--	--	--	--
	--	Metal	Duct	--	--	--	--	--	--	--	--	--
	--	FG DI	Duct	--	--	--	--	--	--	--	--	--
	8	MJC FI	Cond	Y	Y	40% Chrysotile	6 units	G	B	O & M	1-1	--
	8	MJC FI	Steam	Y	Y	40% Chrysotile	5 units	G	B	O & M	1-1	--
	8	MJC FI	DCW	Y	Y	40% Chrysotile	2 units	G	B	O & M	1-1	--
	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
	--	FG	Wall	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07  Date: Nov. 7, 2008  Project #: PR-08-043	Notes: 1) No ACM's were observed in this area. 2) No access above ceiling.	Functional Space (FS #): 1010  Location: Rooms 107 Test Cell 2  Inspectors: SB & RT
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Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Metal Panel	Wall	--	--	--	--	--	--	--	--	--
	--	Concrete Block	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
Above Ceiling	--	FG PI & FI with aluminium casing	Cond./Steam	--	--	--	--	--	--	--	--	--
	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
	--	FG PI & FI	Cond./Steam	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): 1011
Date: Nov. 7, 2008		Location: Room111 Control Room for Test Cell
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Terrazzo	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	FG PI & FI with aluminium casing	Cond./Steam	--	--	--	--	--	--	--	--	--
	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
	--	FG DI & Metal	Duct	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI with PVC casing	Cond./Steam	--	--	--	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation:                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07		Notes: 1) No ACM's were observed during the survey.								Functional Space (FS #):1012			
Date: Nov. 7, 2008										Location: Hall 103			
Project #: PR-08-043										Inspectors: SB & RT			
Building Materials:				ACM Assessment:						Report Reference:			
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:	
Floor	--	Terrazzo	Floor	--	--	--	--	--	--	--	--	--	
Walls	--	Drywall	Wall	--	--	--	--	--	--	--	--	--	
	--	Concrete Block	Wall	--	--	--	--	--	--	--	--	--	
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--	
Above Ceiling	--	FG DI	Duct	--	--	--	--	--	--	--	--	--	
	--	Concrete	Wall	--	--	--	--	--	--	--	--	--	
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--	
<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile			<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage						<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.				



Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): 1013
Date: Nov. 7, 2008		Location: Room 105 & Stairs
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	12"x12" FT (off white)	Floor	--	--	--	--	--	--	Post 1986	--	--
Walls	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
	--	Metal Panel	Wall	--	--	--	--	--	--	--	--	--
	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
Above Ceiling												
	--	FG PI & FI with aluminium casing	DCW	--	--	--	--	--	--	--	--	--
	--	Metal	Duct	--	--	--	--	--	--	--	--	--
	--	FG DI	Duct	--	--	--	--	--	--	--	--	--
	--	FG PI & FI	DHW/Drain									
	5	MJC FI	DCW	N	--	NAD	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07  Date: Nov 7, 2008  Project #: PR-08-043	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): 1014  Location: Room 109 Test Cell 1  Inspectors: SB & RT
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Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Metal	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
Above Ceiling	--	FG PI & FI	Cond/Steam	--	--	--	--	--	--	--	--	--
	--	FG PI & Metal	Duct	--	--	--	--	--	--	--	--	--
	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
	--	FG PI & FI with aluminium casing	Cond/Steam	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): 1015
Date: Nov 7, 2008		Location: Room 109a Control Room for Test Cell 1
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Terrazzo	Floor	--	--	--	--	--	--	Post 1986	--	--
	--	2'x2' FT	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Panel	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	FG PI & FI	Cond/Steam	--	--	--	--	--	--	--	--	--
	--	FG PI & Metal	Duct	--	--	--	--	--	--	--	--	--
	--	Concrete Block	Wall	--	--	--	--	--	--	--	--	--
	--	FG PI & FI with aluminium casing	Cond/Steam	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): 1016
Date: Nov 7, 2008		Location: Room 1130A, 130B & Hallway 130
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	12"x12" FT (beige)	Floor	--	--	--	--	--	--	Post 1986	--	--
	--	Wood	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete Block	Wall	--	--	--	--	--	--	--	--	--
	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Drywall	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07  Date: Nov 7, 2008  Project #: PR-08-043	Notes: 1) No ACM's were observed in this area. 2) Suspect mould was observed in 3 locations on the chiller system.	Functional Space (FS #): 1017  Location: Room 102 Lunch Room  Inspectors: SB & RT
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Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	12"x12" FT (beige)	Floor	--	--	--	--	--	--	Post 1986	--	--
	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	FG PI & FI with aluminum casing	Chiller	--	--	--	--	--	--	--	--	--
	--	Suspect Mould	Chiller	--	--	--	--	--	--	3 locations	1-3	M-07
	--	FG DI	Duct	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) Suspect mould was observed in 1 location on the chiller system. 2) Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1unit).	Functional Space (FS #): 1018
Date: Nov 10, 2008		Location: Room 102A
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI with aluminum casing	Chiller	--	--	--	--	--	--	--	--	--
	--	Suspect Mould	Chiller	--	--	--	--	--	--	1 location	1-3	M-08
	1	MJC FI	Cond.	Y	Y	55% Chrysotile	5 units	G	B	O & M	1-1	--
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	12 LM	G	B	O & M	1-1	--
	1	MJC FI	Steam	Y	Y	55% Chrysotile	6 units	G	B	O & M	1-1	--
	1	MJC FI	Steam	Y	Y	55% Chrysotile	1 unit	F	B	1 encapsulation	1-2	A79
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	15 LM	G	B	O & M	1-1	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): 1019
Date: Nov 10, 2008		Location: Room 101A & Stairs to Mezzanine
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
	--	Panel (MDF)	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Wood	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI	DCW	--	--	--	--	--	--	--	--	--
	--	Metal	Duct	--	--	--	--	--	--	--	--	--
	5	MJC FI	DCW	N	--	NAD	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07  Date: Nov 10, 2008  Project #: PR-08-043	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): 1020  Location: Room 101B  Inspectors: SB & RT
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Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	12"x12" FT (beige)	Floor	--	--	--	--	--	--	Post 1986	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
	--	Panel (MDF)	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	Panel (MDF)	Deck	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) Condensate: Two open ends of aircell pipe insulation require 2 encapsulations (0.4 LM). 2) Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit). 3) Steam: Three damaged section of aircell pipe insulation requires 3 encapsulations (0.6 LM).	Functional Space (FS #): 1021
Date: Nov 10, 2008		Location: Room 101 Machine Shop
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
	--	Wood	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Concrete Block	Wall	--	--	--	--	--	--	--	--	--
	--	Wood	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG DI	Duct	--	--	--	--	--	--	--	--	--
	--	FG PI & PVC FI	Chiller	--	--	--	--	--	--	--	--	--
	--	FG PI & FI	Cond./Steam	--	--	--	--	--	--	--	--	--
	1	MJC FI	Cond.	Y	Y	55% Chrysotile	5 units	G	B	O & M	1-1	--
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	17 LM	G	B	O & M	1-1	--
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	0.4 LM	F	B	2 encapsulations	1-2	A80
	1	MJC FI	Steam	Y	Y	55% Chrysotile	13 units	G	B	O & M	1-1	--
	1	MJC FI	Steam	Y	Y	55% Chrysotile	1 unit	F	B	1 encapsulation	1-2	A83
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	17 LM	G	B	O & M	1-1	--
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	0.6 LM	F	B	3 encapsulations	1-2	A80, A81

**Material Description:**  
MJC: Mud Joint Compound  
FI: Fitting Insulation  
PI: Pipe Insulation  
DI: Duct Insulation  
FG: Fibreglass  
FT: Floor Tile  
CT: Ceiling Tile

**Criteria for Condition of an ACM:**  
G: ACM is in GOOD condition; No damage  
F: ACM is in FAIR condition; Less than 2% damage  
P: ACM is in POOR condition; Greater than 2% damage

**Criteria for Access to an area containing ACM:**  
A: All building occupants may have access to this area.  
B: Restricted to building staff only.  
C: Areas of the building behind walls or ceiling system.









Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): 1025
Date: Nov 10, 2008		Location: Rooms 117, 117A, 117B & 117C Test Cell 5
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Wood	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI with aluminum casing	LPS/Cond	--	--	--	--	--	--	--	--	--
	--	Metal	Duct	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MIC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) Cond: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit). 2) Cond.: 2 damaged sections of aircell pipe insulation require 2 encapsulations (0.4 LM). 3) Steam: 1 damaged mud joint compound fitting requires 1 encapsulation (1 unit). 4) Steam: 2 damaged sections of aircell pipe insulation require 2 encapsulations (0.4 LM)	Functional Space (FS #): 1026
Date: Nov 10, 2008		Location: Rooms 119, 119B
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Wood	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI	LPS/Cond	--	--	--	--	--	--	--	--	--
	1	MJC FI	Cond.	Y	Y	55% Chrysotile	3 units	G	B	O & M	1-1	--
	1	MJC FI	Cond.	Y	Y	55% Chrysotile	1 unit	P	B	1 encapsulation	1-2	A89
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	20 LM	G	B	O & M	1-1	--
	2	Aircell PI	Cond.	Y	Y	50% Chrysotile	0.4 LM	G	B	2 encapsulations	1-2	A90, A91
	1	MJC FI	Steam	Y	Y	55% Chrysotile	6 units	G	B	O & M	1-1	--
	1	MJC FI	Steam	Y	Y	55% Chrysotile	1 unit	P	B	1 encapsulation	1-2	A86
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	22 LM	G	B	O & M	1-1	--
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	0.4 LM	G	B	2 encapsulations	1-2	A87, A88
	5	MJC FI	DCW	N	--	NAD	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): 1027
Date: Nov 10, 2008		Location: Rooms 118
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): 1028
Date: Nov 12, 2008		Location: Rooms 118A
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

<p><b>Material Description:</b>                  MJC: Mud Joint Compound                  FI: Fitting Insulation                  PI: Pipe Insulation                  DI: Duct Insulation                  FG: Fibreglass                  FT: Floor Tile                  CT: Ceiling Tile</p>	<p><b>Criteria for Condition of an ACM:</b>                  G: ACM is in GOOD condition; No damage                  F: ACM is in FAIR condition; Less than 2% damage                  P: ACM is in POOR condition; Greater than 2% damage</p>	<p><b>Criteria for Access to an area containing ACM:</b>                  A: All building occupants may have access to this area.                  B: Restricted to building staff only.                  C: Areas of the building behind walls or ceiling system.</p>
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Building ID: M-07		Notes: 1) No ACM's were observed in this area. 2) Suspect mould was observed in 2 locations on the chiller system.								Functional Space (FS #): MZ01			
Date: Nov 12, 2008										Location: Rooms 101A			
Project #: PR-08-043										Inspectors: SB & RT			
Building Materials:				ACM Assessment:						Report Reference:			
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:	
Floor	--	Wood	Floor	--	--	--	--	--	--	--	--	--	
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--	
	--	Panel (wood)	Wall	--	--	--	--	--	--	--	--	--	
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--	
	--	Wood	Ceiling	--	--	--	--	--	--	--	--	--	
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--	
Below Ceiling	--	FG PI & FI	Chiller	--	--	--	--	--	--	--	--	--	
	--	FG PI & FI with aluminum casing	Chiller	--	--	--	--	--	--	--	--	--	
	--	FG DI	Duct	--	--	--	--	--	--	--	--	--	
	--	Suspect Mould	Chiller	--	--	--	--	--	--	2 locations	1-3	M-09	
<b>Material Description:</b>			<b>Criteria for Condition of an ACM:</b>						<b>Criteria for Access to an area containing ACM:</b>				
MJC: Mud Joint Compound			G: ACM is in GOOD condition; No damage						A: All building occupants may have access to this area.				
FI: Fitting Insulation:			F: ACM is in FAIR condition; Less than 2% damage						B: Restricted to building staff only.				
PI: Pipe Insulation			P: ACM is in POOR condition; Greater than 2% damage						C: Areas of the building behind walls or ceiling system.				
DI: Duct Insulation													
FG: Fibreglass													
FT: Floor Tile													
CT: Ceiling Tile													



Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): MZ02
Date: Nov 12, 2008		Location: Rooms 111
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Drywall	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI	Chiller	--	--	--	--	--	--	--	--	--
	--	FG PI & FI with aluminum casing	Chiller	--	--	--	--	--	--	--	--	--
	--	FG DI	Duct	--	--	--	--	--	--	--	--	--
	--	FG PI & FI with PVC casing	Drain/DCW	--	--	--	--	--	--	--	--	--
	--	Foam PI & FI	Tower Water	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): MZ03
Date: Nov 12, 2008		Location: Rooms 220
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:						Report Reference:		
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Terrazzo	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Panel (cloth)	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI	Chiller	--	--	--	--	--	--	--	--	--
	--	FG PI & FI with aluminum casing	Chiller	--	--	--	--	--	--	--	--	--
	--	FG DI	Duct	--	--	--	--	--	--	--	--	--
	--	FG PI & FI with PVC casing	Drain/DCW	--	--	--	--	--	--	--	--	--
	--	Foam PI & FI	Tower Water	--	--	--	--	--	--	--	--	--

**Material Description:**  
 MJC: Mud Joint Compound  
 FI: Fitting Insulation:  
 PI: Pipe Insulation  
 DI: Duct Insulation  
 FG: Fibreglass  
 FT: Floor Tile  
 CT: Ceiling Tile

**Criteria for Condition of an ACM:**  
 G: ACM is in GOOD condition; No damage  
 F: ACM is in FAIR condition; Less than 2% damage  
 P: ACM is in POOR condition; Greater than 2% damage

**Criteria for Access to an area containing ACM:**  
 A: All building occupants may have access to this area.  
 B: Restricted to building staff only.  
 C: Areas of the building behind walls or ceiling system.



Building ID: M-07	Notes: 1) Cond & Steam (combined line & elbow): One damaged mudjoint compound fitting requires 1 encapsulation (1 unit). 2) Steam: Two damaged mudjoint compound fittings require 2 encapsulations (2 units).	Functional Space (FS #): MZ04
Date: Nov 12, 2008		Location: Rooms 320 & Stairwell
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
Above Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
Below Ceiling	--	FG PI & FI	Chiller	--	--	--	--	--	--	--	--	--
	--	FG PI & FI with aluminum casing	Steam/Cond	--	--	--	--	--	--	--	--	--
	--	FG DI	Duct	--	--	--	--	--	--	--	--	--
	--	FG PI & FI with PVC casing	Steam/Chiller/Cond.	--	--	--	--	--	--	--	--	--
	--	Foam PI & FI	Tower Water	--	--	--	--	--	--	--	--	--
	1	MJC FI	Condensate	Y	Y	55% Chrysotile	1 unit	F	B	1 encapsulation	MZ-2	A92
	1	MJC FI	Steam	Y	Y	55% Chrysotile	1 unit	G	B	O & M	MZ-1	--
	3	Aircell PI	Steam	Y	Y	60% Chrysotile	20 LM	G	B	O & M	MZ-1	--
	1	MJC FI	Steam	Y	Y	55% Chrysotile	3 units	F	B	2 encapsulations	MZ-2	A92, A93, A94

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): SW01
Date: Nov 12, 2008		Location: Rooms Stairwell East
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
	--	Terrazzo	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Concrete Block	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--
	--	FG PI & FI with aluminum casing	Steam	--	--	--	--	--	--	--	--	--

<b>Material Description:</b> MJC: Mud Joint Compound FI: Fitting Insulation: PI: Pipe Insulation DI: Duct Insulation FG: Fibreglass FT: Floor Tile CT: Ceiling Tile	<b>Criteria for Condition of an ACM:</b> G: ACM is in GOOD condition; No damage F: ACM is in FAIR condition; Less than 2% damage P: ACM is in POOR condition; Greater than 2% damage	<b>Criteria for Access to an area containing ACM:</b> A: All building occupants may have access to this area. B: Restricted to building staff only. C: Areas of the building behind walls or ceiling system.
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Building ID: M-07	Notes: 1) No ACM's were observed in this area.	Functional Space (FS #): SW02
Date: Nov 12, 2008		Location: Rooms Stairwell Centre
Project #: PR-08-043		Inspectors: SB & RT

Building Materials:				ACM Assessment:							Report Reference:	
Location:	Homo. Mat. #:	Material Description:	System:	ACM (Y/N):	Friable (Y/N):	ACM Type:	Quantity:	Condition (G,F,P):	Access (A,B,C):	Response / Comments:	Drawing #:	Photo #:
Floor	--	Concrete	Floor	--	--	--	--	--	--	--	--	--
	--	Metal	Floor	--	--	--	--	--	--	--	--	--
Walls	--	Concrete	Wall	--	--	--	--	--	--	--	--	--
	--	Concrete Block	Wall	--	--	--	--	--	--	--	--	--
Ceiling	--	Concrete	Ceiling	--	--	--	--	--	--	--	--	--
	--	2'x4' CT	Ceiling	--	--	--	--	--	--	Post 1986	--	--
Above Ceiling	--	Concrete	Deck	--	--	--	--	--	--	--	--	--
Below Ceiling	--	--	--	--	--	--	--	--	--	--	--	--

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**TP1 Amount Payable – General**

1.1 Subject to any other provisions of the contract, Her Majesty shall pay the Contractor, at the times and in the manner hereinafter set out, the amount by which

1.1.1 the aggregate of the amounts described in TP2 exceeds

1.1.2 the aggregate of the amounts described in TP3

and the Contractor shall accept that amount as payment in full satisfaction for everything furnished and done by him in respect of the work to which the payment relates.

**TP2 Amounts Payable to the Contractor**

2.1 The amounts referred to in TP1.1.1 are the aggregate of

2.1.1 the amounts referred to in the Articles of Agreement, and

2.1.2 the amounts, if any, that are payable to the Contractor pursuant to the General Conditions.

**TP3 Amounts Payable to Her Majesty**

3.1 The amounts referred to in TP1.1.2 are the aggregate of the amounts, in any, that the Contractor is liable to pay Her Majesty pursuant to the contract.

3.2 When making any payments to the Contractor, the failure of Her Majesty to deduct an amount referred to in TP3.1 from an amount referred to in TP2 shall not constitute a waiver of the right to do so, or an admission of lack of entitlement to do so in any subsequent payment to the Contractor.

**TP4 Time of Payment**

4.1 In these Terms of Payment

4.1.1 The “payment period” means a period of 30 consecutive days or such other longer period as is agreed between the Contractor and the Departmental Representative.

4.1.2 An amount is “due and payable” when it is due and payable by Her Majesty to the Contractor according to TP4.4, TP4.7 or TP4.10.

4.1.3 An amount is overdue when it is unpaid on the first day following the day upon which it is due and payable.

4.1.4 The “date of payment” means the date of the negotiable instrument of an amount due and payable by the Receiver General for Canada and given for payment.

4.1.5 The “Bank Rate” means the discount rate of interest set by the Bank of Canada in effect at the opening of business on the date of payment.



- 4.2 The Contractor shall, on the expiration of a payment period, deliver to the Departmental Representative in respect of that payment period a written progress claim that fully describes any part of the work that has been completed, and any material that was delivered to the work site but not incorporated into the work during that payment period.
- 4.3 The Departmental Representative shall, not later than ten days after receipt by him of a progress claim referred to in TP4.2,
- 4.3.1 inspect the part of the work and the material described in the progress claim; and
- 4.3.2 issue a progress report, a copy of which the Departmental Representative will give to the Contractor, that indicates the value of the part of the work and the material described in the progress claim that, in the opinion of the Departmental Representative,
- 4.3.2.1 is in accordance with the contract, and
- 4.3.2.2 was not included in any other progress report relating to the contract.
- 4.4 Subject to TP1 and TP4.5 Her Majesty shall, not later than 30 days after receipt by the Departmental Representative of a progress claim referred to in TP4.2, pay the Contractor
- 4.4.1 an amount that is equal to 95% of the value that is indicated in the progress report referred to in TP4.3.2 if a labour and material payment bond has been furnished by the Contractor, or
- 4.4.2 an amount that is equal to 90% of the value that is indicated in the progress report referred to in TP4.3.2 if a labour and material payment bond has not been furnished by the Contractor.
- 4.5 It is a condition precedent to Her Majesty's obligation under TP4.4 that the Contractor has made and delivered to the Departmental Representative,
- 4.5.1 a statutory declaration described in TP4.6 in respect of a progress claim referred to in TP4.2,
- 4.5.2 in the case of the Contractor's first progress claim, a construction schedule in accordance with the relevant sections of the Specifications, and
- 4.5.3 if the requirement for a schedule is specified, an update of the said schedule at the times identified in the relevant sections of the Specifications.
- 4.6 A statutory declaration referred to in TP4.5 shall contain a deposition by the Contractor that
- 4.6.1 up to the date of the Contractor's progress claim, the Contractor has complied with all his lawful obligations with respect to the Labour Conditions; and
- 4.6.2 up to the date of the Contractor's immediately preceding progress claim, all lawful obligations of the Contractor to subcontractors and suppliers of material in respect of the



work under the contract have been fully discharged.

- 4.7 Subject to TP1 and TP4.8, Her Majesty shall, not later than 30 days after the date of issue of an Interim Certificate of Completion referred to in GC44.2, pay the Contractor the amount referred to in TP1 less the aggregate of
- 4.7.1 the sum of all payments that were made pursuant to TP4.4;
  - 4.7.2 an amount that is equal to the Departmental Representative's estimate of the cost to Her Majesty or rectifying defects described in the Interim Certificate of Completion; and
  - 4.7.3 an amount that is equal to the Departmental Representative's estimate of the cost to Her Majesty of completing the parts of the work described in the Interim Certificate of Completion other than the defects referred to in TP4.7.2.
- 4.8 It is a condition precedent to Her Majesty's obligation under TP4.7 that the Contractor has made and delivered to the Departmental Representative,
- 4.8.1 a statutory declaration described in TP4.9 in respect of an Interim Certificate of Completion referred to in GC44.2, and
  - 4.8.2 if so specified in the relevant sections of the Specifications, and update of the construction schedule referred to in TP4.5.2 and the updated schedule shall, in addition to the specified requirements, clearly show a detailed timetable that is acceptable to the Departmental Representative for the completion of any unfinished work and the correction of all defects.
- 4.9 A statutory declaration referred to in TP4.8 shall contain a deposition by the contractor that up to the date of the Interim Certificate of Completion the Contractor has
- 4.9.1 complied with all of the Contractor's lawful obligations with respect to the Labour Conditions;
  - 4.9.2 discharged all of the Contractor's lawful obligations to the subcontractors and suppliers of material in respect of the work under the contract; and
  - 4.9.3 discharged the Contractor's lawful obligations referred to in GC14.6.
- 4.10 Subject to TP1 and TP4.11, Her Majesty shall, not later than 60 days after the date of issue of a Final Certificate of Completion referred to in GC44.1, pay the Contractor the amount referred to in TP1 less the aggregate of
- 4.10.1 the sum of all payments that were made pursuant to TP4.4; and
  - 4.10.2 the sum of all payments that were made pursuant to TP4.7.
- 4.11 It is a condition precedent to Her Majesty's obligation under TP4.10 that the Contractor has made and delivered a statutory declaration described in TP4.12 to the Departmental Representative.



- 4.12 A statutory declaration referred to in TP4.11 shall, in addition to the depositions described in TP4.9, contain a deposition by the Contractor that all of the Contractor's lawful obligations and any lawful claims against the Contractor that arose out of the performance of the contract have been discharged and satisfied.

**TP5 Progress Report and Payment Thereunder Not Binding on Her Majesty**

- 5.1 Neither a progress report referred to in TP4.3 nor any payment made by Her Majesty pursuant to these Terms of Payment shall be construed as an admission by Her Majesty that the work, material or any part thereof is complete, is satisfactory or is in accordance with the contract.

**TP6 Delay in Making Payment**

- 6.1 Notwithstanding GC7 any delay by Her Majesty in making any payment when it is due pursuant to these Terms of Payment shall not be a breach of the contract by Her Majesty.
- 6.2 Her Majesty shall pay, without demand from the Contractor, simple interest at the Bank Rate plus 1 -1/4 per centum on any amount which is overdue pursuant to TP4.1.3, and the interest shall apply from and include the day such amount became overdue until the day prior to the date of payment except that
- 6.2.1 interest shall not be payable or paid unless the amount referred to in TP6.2 has been overdue for more than 15 days following
- 6.2.1.1 the date the said amount became due and payable, or
- 6.2.1.2 the receipt by the Departmental Representative of the Statutory Declaration referred to in TP4.5, TP4.8 or TP4.11,
- whichever is the later, and
- 6.6.2 interest shall not be payable or paid on overdue advance payments if any.

**TP7 Right of Set-off**

- 7.1 Without limiting any right of set-off or deduction given or implied by law or elsewhere in the contract, Her Majesty may set off any amount payable to Her Majesty by the Contractor under this contract or under any current contract against any amount payable to the Contractor under this contract.
- 7.2 For the purposes of TP7.1, "current contract" means a contract between Her Majesty and the Contractor
- 7.2.1 under which the Contractor has an undischarged obligation to perform or supply work, labour or material, or
- 7.2.2 in respect of which Her Majesty has, since the date of which the Articles of Agreement were made, exercised any right to take the work that is the subject of the contract out of the Contractor's hands.





**TP8 Payment in Event of Termination**

- 8.1 If the contract is terminated pursuant to GC41, Her Majesty shall pay the Contractor any amount that is lawfully due and payable to the Contractor as soon as is practicable under the circumstances.

**TP9 Interest on Settled Claims**

- 9.1 Her Majesty shall pay to the Contractor simple interest on the amount of a settled claim at an average Bank Rate plus 1 ¼ per centum from the date the settled claim was outstanding until the day prior to the date of payment.
- 9.2 For the purposes of TP9.1,
- 9.2.1 a claim is deemed to have been settled when an agreement in writing is signed by the Departmental Representative and the Contractor setting out the amount of the claim to be paid by Her Majesty and the items or work for which the said amount is to be paid.
- 9.2.2 an "average Bank Rate" means the discount rate of interest set by the Bank of Canada in effect at the end of each calendar month averaged over the period the settled claim was outstanding.
- 9.2.3 a settled claim is deemed to be outstanding from the day immediately following the date the said claim would have been due and payable under the contract had it not been disputed.
- 9.3 For the purposes of TP9 a claim means a disputed amount subject to negotiation between Her Majesty and the Contractor under the contract.



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## **GC1 Interpretation**

### **1.1 In the contract**

- 1.1.1 where reference is made to a part of the contract by means of numbers preceded by letters, the reference shall be construed to be a reference to the particular part of the contract that is identified by that combination of letters and numbers and to any other part of the contract referred to therein;
- 1.1.2 “contract” means the contract document referred to in the Articles of Agreement;
- 1.1.3 “contract security” means any security given by the Contractor to Her Majesty in accordance with the contract;
- 1.1.4 “Departmental Representative” means the officer or employee of Her Majesty who is designated pursuant to the Articles of Agreement and includes a person specially authorized by him to perform, on his behalf, any of his functions under the contract and is so designated in writing to the Contractor;
- 1.1.5 “material” includes all commodities, articles and things required to be furnished by or for the Contractor under the contract for incorporation into the work;
- 1.1.6 “Minister” includes a person acting for, or if the office is vacant, in place of the Minister and his successors in the office, and his or their lawful deputy and any of his or their representatives appointed for the purposes of the contract;
- 1.1.7 “person” includes, unless the context otherwise requires, a partnership, proprietorship, firm, joint venture, consortium and a corporation;
- 1.1.8 “plant” includes all animals, tools, implements, machinery, vehicles, buildings, structures, equipment and commodities, articles and things other than material, that are necessary for the due performance of the contract;
- 1.1.9 “subcontractor” means a person to whom the Contractor has, subject to GC4, subcontracted the whole or any part of the work;
- 1.1.10 “superintendent” means the employee of the Contractor who is designated by the Contractor to act pursuant to GC19;
- 1.1.11 “work includes, subject only to any express stipulation in the contract to the contrary, everything that is necessary to be done, furnished or delivered by the Contractor to perform the contract.

1.2 The headings in the contract documents, other than in the Plans and Specifications, form no part of the contract but are inserted for convenience of reference only.

1.3 In interpreting the contract, in the event of discrepancies or conflicts between anything in the Plans and Specifications and the General Conditions, the General Conditions govern.



- 1.4 In interpreting the Plans and Specifications, in the event of discrepancies or conflicts between
- 1.4.1 the Plans and Specifications, the Specifications govern;
  - 1.4.2 the Plans, the Plans drawn with the largest scale govern; and
  - 1.4.3 figured dimensions and scaled dimensions, the figured dimensions govern.

**GC2 Successors and Assigns**

- 2.1 The contract shall inure to the benefit of and be binding upon the parties hereto and their lawful heirs, executors, administrators, successors and assigns.

**GC3 Assignment of Contract**

- 3.1 The contract may not be assigned by the Contractor, either in whole or in part, without the written consent of the Minister.

**GC4 Subcontracting by Contractor**

- 4.1 Subject to this General Condition, the Contractor may subcontract any part of the work.
- 4.2 The Contractor shall notify the Departmental Representative in writing of his intention to subcontract.
- 4.3 A notification referred to in GC4.2 shall identify the part of the work, and the subcontractor with whom it is intended to subcontract.
- 4.4 The Departmental Representative may object to the intended subcontracting by notifying the Contractor in writing within six days of receipt by the Departmental Representative of a notification referred to in GC4.2.
- 4.5 If the Departmental Representative objects to a subcontracting pursuant to GC4.4, the Contractor shall not enter into the intended subcontract.
- 4.6 The contractor shall not, without the written consent of the Departmental Representative, change a subcontractor who has been engaged by him in accordance with this General Condition.
- 4.7 Every subcontract entered into by the Contractor shall adopt all of the terms and conditions of this contract that are of general application.
- 4.8 Neither a subcontracting nor the Departmental Representative's consent to a subcontracting by the Contractor shall be construed to relieve the Contractor from any obligation under the contract or to impose any liability upon Her Majesty.

**GC5 Amendments**



- 5.1 No amendment or change in any of the provisions of the contract shall have any force or effect until it is reduced to writing.

**GC6 No Implied Obligations**

- 6.1 No implied terms or obligations of any kind by or on behalf of Her Majesty shall arise from anything in the contract and the express covenants and agreements therein contained and made by Her Majesty are the only covenants and agreements upon which any rights against Her Majesty are to be founded.
- 6.2 The contract supersedes all communications, negotiations and agreements, either written or oral, relating to the work that were made prior to the date of the contract.

**GC7 Time of Essence**

- 7.1 Time is of the essence of the contract.

**GC8 Indemnification by Contractor**

- 8.1 The Contractor shall indemnify and save Her Majesty harmless from and against all claims, demand, losses, costs, damages, actions, suits, or proceedings by whomever made, brought or prosecuted and in any manner based upon, arising out of, related to, occasioned by or attributable to the activities of the Contractor, his servants, agents, subcontractors and sub-subcontractors in performing the work including an infringement or an alleged infringement of a patent of invention or any other kind of intellectual property.
- 8.2 For the purpose of GC8.1, "activities" includes any act improperly carried out, any omission to carry out an act and any delay in carrying out an act.

**GC9 Indemnification by Her Majesty**

- 9.1 Her Majesty shall, subject to the Crown Liability Act, the Patent Act, and any other law that affects Her Majesty's rights, powers, privileges or obligations, indemnify and save the Contractor harmless from and against all claims, demands, losses, costs, damage, actions, suits or proceedings arising out of his activities under the contract that are directly attributable to
- 9.1.1 lack of or a defect in Her Majesty's title to the work site whether real or alleged; or
- 9.1.2 an infringement or an alleged infringement by the Contractor of any patent of invention or any other kind of intellectual property occurring while the Contractor was performing any act for the purposes of the contract employing a model, plan or design or any other thing related to the work that was supplied by Her Majesty to the Contractor.

**GC10 Members of House of Commons Not to Benefit**



- 10.1 As required by the Parliament of Canada Act, it is an express condition of the contract that no member of the House of Commons shall be admitted to any share of part of the contract or to any benefit arising therefrom.

### **GC11 Notices**

- 11.1 Any notice, consent, order, decision, direction or other communication, other than a notice referred to in GC11.4, that may be given to the Contractor pursuant to the contract may be given in any manner.
- 11.2 Any notice, consent, order, decision, direction or other communication required to be given in writing, to any party pursuant to the contract shall, subject to GC11.4, be deemed to have been effectively given
- 11.2.1 to the Contractor, if delivered personally to the Contractor or the Contractor's superintendent, or forwarded by mail, telex or facsimile to the Contractor at the address set out in A4.1, or
- 11.2.2 to Her Majesty, if delivered personally to the Departmental Representative, or forwarded by mail, telex or facsimile to the Departmental Representative at the address set out in A1.2.1.
- 11.3 Any such notice, consent, order, decision, direction or other communication given in accordance with GC11.2 shall be deemed to have been received by either party
- 11.3.1 if delivered personally, on the day that it was delivered,
- 11.3.2 if forwarded by mail, on the earlier of the day it was received and the sixth day after it was mailed, and
- 11.3.3 if forwarded by telex or facsimile, 24 hours after it was transmitted.
- 11.4 A notice given under GC38.1.1, GC40 and GC41, if delivered personally, shall be delivered to the Contractor if the Contractor is doing business as sole proprietor or, if the Contractor is a partnership or corporation, to an officer thereof.

### **GC12 Material, Plant and Real Property Supplied by Her Majesty**

- 12.1 Subject to GC12.2, the Contractor is liable to Her Majesty for any loss of or damage to material, plant or real property that is supplied or placed in the care, custody and control of the Contractor by Her Majesty for use in connection with the contract, whether or not that loss or damage is attributable to causes beyond the Contractor's control.
- 12.2 The Contractor is not liable to Her Majesty for any loss or damage to material, plant or real property referred to in GC12.1 if that loss or damage results from and is directly attributable to reasonable wear and tear.
- 12.3 The Contractor shall not use any material, plant or real property referred to in GC12.1 except for



the purpose of performing this contract.

- 12.4 When the Contractor fails to make good any loss or damage for which he is liable under GC12.1 within a reasonable time after being required to do so by the Departmental Representative, the Departmental Representative may cause the loss or damage to be made good at the Contractor's expense, and the Contractor shall thereupon be liable to Her Majesty for the cost thereof and shall, on demand, pay to Her Majesty an amount equal to that cost.
- 12.5 The Contractor shall keep such records of all material, plant and real property referred to in GC12.1 as the Departmental Representative from time to time requires and shall satisfy the Departmental Representative, when requested, that such material, plant and real property are at the place and in the condition which they ought to be.

### **GC13 Material, Plant and Real Property Become Property of Her Majesty**

- 13.1 Subject to GC14.7 all material and plant and the interest of the Contractor in all real property, licenses, powers and privileges purchased, used or consumed by the Contractor for the contract shall, after the time of their purchase, use or consumption be the property of Her Majesty for the purposes of the work and they shall continue to be the property of Her Majesty.
- 13.1.1 in the case of material, until the Departmental Representative indicates that he is satisfied that it will not be required for the work, and
- 13.1.2 in the case of plant, real property, licenses, powers and privileges, until the Departmental Representative indicates that he is satisfied that the interest vested in Her Majesty therein is no longer required for the purposes of the work.
- 13.2 Material or plant that is the property of Her Majesty by virtue of GC13.1 shall not be taken away from the work site or used or disposed of except for the purposes of the work without the written consent of the Departmental Representative.
- 13.3 Her Majesty is not liable for loss of or damage from any cause to the material or plant referred to in GC13.1 and the Contractor is liable for such loss or damage notwithstanding that the material or plant is the property of Her Majesty.

### **GC14 Permits and Taxes Payable**

- 14.1 The Contractor shall, within 30 days after the date of the contract, tender to a municipal authority an amount equal to all fees and charges that would be lawfully payable to that municipal authority in respect of building permits as if the work were being performed for a person other than Her Majesty.
- 14.2 Within 10 days of making a tender pursuant to GC14.1, the Contractor shall notify the Departmental Representative of his action and of the amount tendered and whether or not the municipal authority has accepted that amount.
- 14.3 If the municipal authority does not accept the amount tendered pursuant to GC14.1 the Contractor shall pay that amount to Her Majesty within 6 days after the time stipulated in GC14.2.



- 14.4 For the purposes of GC14.1 to GC14.3 “municipal authority” means any authority that would have jurisdiction respecting permission to perform the work if the owner were not Her Majesty.
- 14.5 Notwithstanding the residency of the Contractor, the Contractor shall pay any applicable tax arising from or related to the performance of the work under the contract.
- 14.6 In accordance with the Statutory Declaration referred to in TP4.9, a Contractor who has neither residence nor place of business in the province in which work under the contract is being performed shall provide Her Majesty with proof of registration with the provincial sales tax authorities in the said province.
- 14.7 For the purpose of the payment of any applicable tax or the furnishing of security for the payment of any applicable tax arising from or related to the performance of the work under the contract, the Contractor shall, notwithstanding the fact that all material, plant and interest of the Contractor in all real property, licenses, powers and privileges, have become the property of Her Majesty after the time of purchase, be liable, as a user or consumer, for the payment or for the furnishing of security for the payment of any applicable tax payable, at the time of the use or consumption of that material, plant or interest of the Contractor in accordance with the relevant legislation.

#### **GC15 Performance of Work under Direction of Departmental Representative**

- 15.1 The Contractor shall
- 15.1.1 permit the Departmental Representative to have access to the work and its site at all times during the performance of the contract;
  - 15.1.2 furnish the Departmental Representative with such information respecting the performance of the contract as he may require; and
  - 15.1.3 give the Departmental Representative every possible assistance to enable the Departmental Representative to carry out his duty to see that the work is performed in accordance with the contract and to carry out any other duties and exercise any powers specially imposed or conferred on the Departmental Representative under the contract.

#### **CG16 Cooperation with Other Contractors**

- 16.1 Where, in the opinion of the Departmental Representative, it is necessary that other contractors or workers with or without plant and material, be sent onto the work or its site, the Contractor shall, to the satisfaction of the Departmental Representative, allow them access and cooperate with them in the carrying out of their duties and obligation.
- 16.2 If
- 16.2.1 the sending onto the work or its site of other contractors or workers pursuant to GC16.1 could not have been reasonably foreseen or anticipated by the Contractor when entering into the contract, and





16.2.2 the Contractor incurs, in the opinion of the Departmental Representative, extra expense in complying with GC16.1, and

16.2.3 The Contractor has given the Departmental Representative written notice of his claim for the extra expense referred to in GC16.2.2 within 30 days of the date that the other contractors or workers were sent onto the work or its site,

Her Majesty shall pay the Contractor the cost, calculated in accordance with GC48 to GC50, of the extra labour, plant and material that was necessarily incurred.

### **GC17 Examination of Work**

17.1 If, at any time after the commencement of the work but prior to the expiry of the warranty or guarantee period, the Departmental Representative has reason to believe that the work or any part thereof has not been performed in accordance with the contract, the Departmental Representative may have that work examined by an expert of his choice.

17.2 If, as a result of an examination of the work referred to in GC17.1, it is established that the work was not performed in accordance with the contract, then, in addition to and without limiting or otherwise affecting any of Her Majesty's rights and remedies under the contract either at law or in equity, the Contractor shall pay Her Majesty, on demand, all reasonable costs and expenses that were incurred by Her Majesty in having that examination performed.

### **GC18 Clearing of Site**

18.1 The Contractor shall maintain the work and its site in a tidy condition and free from the accumulation of waste material and debris, in accordance with any directions of the Departmental Representative.

18.2 Before the issue of an interim certificate referred to in GC44.2, the Contractor shall remove all the plant and material not required for the performance of the remaining work, and all waste material and other debris, and shall cause the work and its site to be clean and suitable for occupancy by Her Majesty's servants, unless otherwise stipulated in the contract.

18.3 Before the issue of a final certificate referred to in GC44.1, the Contractor, shall remove from the work and its site all of the surplus plant and material and any waste material and other debris.

18.4 The Contractor's obligations described in GC18.1 to GC18.3 do not extend to waste material and other debris caused by Her Majesty's servants or contractors and workers referred to in GC16.1.

### **GC19 Contractor's Superintendent**

19.1 The Contractor shall, forthwith upon the award of the contract, designate a superintendent.

19.2 The Contractor shall forthwith notify the Departmental Representative of the name, address and telephone number of a superintendent designate pursuant to GC19.1.



- 19.3 A superintendent designated pursuant to GC19.1 shall be in full charge of the operations of the Contractor in the performance of the work and is authorized to accept any notice, consent, order, direction, decision or other communication on behalf of the Contractor that may be given to the superintendent under the contract.
- 19.4 The Contractor shall, until the work has been completed, keep a competent superintendent at the work site during working hours.
- 19.5 The Contractor shall, upon the request of the Departmental Representative, remove any superintendent who, in the opinion of the Departmental Representative, is incompetent or has been conducting himself improperly and shall forthwith designate another superintendent who is acceptable to the Departmental Representative.
- 19.6 Subject to GC19.5, the Contractor shall not substitute a superintendent without the written consent of the Departmental Representative.
- 19.7 A breach by the Contractor of GC19.6 entitles the Departmental Representative to refuse to issue any certificate referred to in GC44 until the superintendent has returned to the work site or another superintendent who is acceptable to the Departmental Representative has been substituted.

#### **GC20 National Security**

- 20.1 If the Minister is of the opinion that the work is of a class or kind that involves the national security, he may order the Contractor
- 20.1.1 to provide him with any information concerning persons employed or to be employed by him for purposes of the contract; and
  - 20.1.2 to remove any person from the work and its site if, in the opinion of the Minister, that person may be a risk to the national security.
- 20.2 The Contractor shall, in all contracts with persons who are to be employed in the performance of the contract, make provision for his performance of any obligation that may be imposed upon him under GC19 to GC21.
- 20.3 The Contractor shall comply with an order of the Minister under GC20.1

#### **GC21 Unsuitable Workers**

- 21.1 The Contractor shall, upon the request of the Departmental Representative, remove any person employed by him for purposes of the contract who, in the opinion of the Departmental Representative, is incompetent or has conducted himself improperly, and the Contractor shall not permit a person who has been removed to return to the work site.

#### **GC22 Increased or Decreased Costs**



- 22.1 The amount set out in the Articles of Agreement shall not be increased or decreased by reason of any increase or decrease in the cost of the work that is brought about by an increase or decrease in the cost of labour, plant or material or any wage adjustment arising pursuant to the Labour Conditions.
- 22.2 Notwithstanding GC22.1 and GC35, an amount set out in the Articles of Agreement shall be adjusted in the manner provided in GC22.3, if any change in a tax imposed under the Excise Act, the Excise Tax Act, the Old Age Security Act, the Customs Act, the Customs Tariff or any provincial sales tax legislation imposing a retail sales tax on the purchase of tangible personal property incorporated into Real Property
- 22.2.1 occurs after the date of the submission by the Contractor of his tender for the contract,
- 22.2.2 applies to material, and
- 22.2.3 affects the cost to the Contractor of that material.
- 22.3 If a change referred to in GC22.2 occurs, the appropriate amount set out in the Articles of Agreement shall be increased or decreased by an amount equal to the amount that is established by an examination of the relevant records of the Contractor referred to in GC51 to be the increase or decrease in the cost incurred that is directly attributable to that change.
- 22.4 For the purpose of GC22.2, where a tax is changed after the date of submission of the tender but public notice of the change has been given by the Minister of Finance before that date, the change shall be deemed to have occurred before the date of submission of the tender.

### **GC23 Canadian Labour and Material**

- 23.1 The Contractor shall use Canadian labour and material in the performance of the work to the full extent to which they are procurable, consistent with proper economy and expeditious carrying out of the work.
- 23.2 Subject to GC23.1, the Contractor shall, in the performance of the work, employ labour from the locality where the work is being performed to the extent to which it is available, and shall use the offices of the Canada Employment Centres for the recruitment of workers wherever practicable.
- 23.3 Subject to GC23.1 and GC23.2, the Contractor shall, in the performance of the work, employ a reasonable proportion of persons who have been on active service with the armed forces of Canada and have been honourably discharged therefrom.

### **GC24 Protection of Work and Documents**

- 24.1 The Contractor shall guard or otherwise protect the work and its site, and protect the contract, specifications, plans, drawings, information, material, plant and real property, whether or not they are supplied by Her Majesty to the Contractor, against loss or damage from any cause, and he shall not use, issue, disclose or dispose of them without the written consent of the Minister, except as may be essential for the performance of the work.



- 24.2 If any document or information given or disclosed to the Contractor is assigned a security rating by the person who gave or disclosed it, the Contractor shall take all measures directed by the Departmental Representative to be taken to ensure the maintenance of the degree of security that is ascribed to that rating.
- 24.3 The Contractor shall provide all facilities necessary for the purpose of maintaining security, and shall assist any person authorized by the Minister to inspect or to take security measures in respect of the work and its site.
- 24.4 The Departmental Representative may direct the Contractor to do such things and to perform such additional work as the Departmental Representative considers reasonable and necessary to ensure compliance with or to remedy a breach of GC24.1 to GC24.3.

### **GC25 Public Ceremonies and Signs**

- 25.1 The Contractor shall not permit any public ceremony in connection with the work without the prior consent of the Minister.
- 25.2 The Contractor shall not erect or permit the erection of any sign or advertising on the work or its site without the prior consent of the Departmental Representative.

### **GC26 Precautions against Damage, Infringement of Rights, Fire, and Other Hazards**

- 26.1 The Contractor shall, at his own expense, do whatever is necessary to ensure that
- 26.1.1 no person, property, right, easement or privilege is injured, damaged or infringed by reasons of the Contractor's activities in performing the contract;
  - 26.1.2 pedestrian and other traffic on any public or private road or waterway is not unduly impeded, interrupted or endangered by the performance or existence of the work or plant;
  - 26.1.3 fire hazards in or about the work or its site are eliminated and, subject to any direction that may be given by the Departmental Representative, any fire is promptly extinguished;
  - 26.1.4 the health and safety of all persons employed in the performance of the work is not endangered by the method or means of its performance;
  - 26.1.5 adequate medical services are available to all persons employed on the work or its site at all times during the performance of the work;
  - 26.1.6 adequate sanitation measures are taken in respect of the work and its site; and
  - 26.1.7 all stakes, buoys and marks placed on the work or its site by or under the authority of the Departmental Representative are protected and are not removed, defaced, altered or destroyed.
- 26.2 The Departmental Representative may direct the Contractor to do such things and to perform such additional work as the Departmental Representative considers reasonable and necessary to ensure



compliance with or to remedy a breach of GC26.1.

- 26.3 The Contractor shall, at his own expense, comply with a direction of the Departmental Representative made under GC26.2.

#### **GC27 Insurance**

- 27.1 The Contractor shall, at his own expense, obtain and maintain insurance contracts in respect of the work and shall provide evidence thereof to the Departmental Representative in accordance with the requirements of the Insurance Conditions "E".

- 27.2 The insurance contracts referred to in GC27.1 shall

27.2.1 be in a form, of the nature, in the amounts, for the periods and containing the terms and conditions specified in Insurance Conditions "E", and

27.2.2 provide for the payment of claims under such insurance contracts in accordance with GC28.

#### **GC28 Insurance Proceeds**

- 28.1 In the case of a claim payable under a Builders Risk/Installation (All Risks) insurance contract maintained by the Contractor pursuant to GC27, the proceeds of the claim shall be paid directly to Her Majesty, and

28.1.1 the monies so paid shall be held by Her Majesty for the purposes of the contract, or

28.1.2 if Her Majesty elects, shall be retained by Her Majesty, in which event they vest in Her Majesty absolutely.

- 28.2 In the case of a claim payable under a General Liability insurance contract maintained by the Contractor pursuant to GC27, the proceeds of the claim shall be paid by the insurer directly to the claimant.

- 28.3 If an election is made pursuant to GC28.1, the Minister may cause an audit to be made of the accounts of the Contractor and of Her Majesty in respect of the part of the work that was lost, damaged or destroyed for the purpose of establishing the difference, if any, between

28.3.1 the aggregate of the amount of the loss or damage suffered or sustained by Her Majesty, including any cost incurred in respect of the clearing and cleaning of the work and its site and any other amount that is payable by the Contractor to Her Majesty under the contract, minus any monies retained pursuant to GC28.12, and

28.3.2 the aggregate of the amounts payable by Her Majesty to the Contractor pursuant to the contract up to the date of the loss or damage.

- 28.4 A difference that is established pursuant to GC28.3 shall be paid forthwith by the party who is determined by the audit to be the debtor to the party who is determined by the audit to be the



creditor.

- 28.5 When payment of a deficiency has been made pursuant to GC28.4, all rights and obligations of Her Majesty and the Contractor under the contract shall, with respect only to the part of the work that was the subject of the audit referred to in GC28.3, be deemed to have been expended and discharged.
- 28.6 If an election is not made pursuant to GC28.1.2 the Contractor shall, subject to GC28.7, clear and clean the work and its site and restore and replace the part of the work that was lost, damaged or destroyed at his own expense as if that part of the work had not yet been performed.
- 28.7 When the Contractor clears and cleans the work and its site and restores and replaces the work referred to in GC 28.6, Her Majesty shall pay him out of the monies referred to in GC28.1 so far as they will thereunto extend.
- 28.8 Subject to GC28.7, payment by Her Majesty pursuant to GC28.7 shall be made in accordance with the contract but the amount of each payment shall be 100% of the amount claimed notwithstanding TP4.4.1 and TP4.4.2.

### **GC29 Contract Security**

- 29.1 The Contractor shall obtain and deliver contract security to the Departmental Representative in accordance with the provisions of the Contract Security Conditions.
- 29.2 If the whole or a part of the contract security referred to in GC29.1 is in the form of a security deposit, it shall be held and disposed of in accordance with GC43 and GC45.
- 29.3 If a part of the contract security referred to in GC29.1 is in the form of a labour and material payment bond, the Contractor shall post a copy of that bond on the work site.

### **GC30 Changes in the Work**

- 30.1 Subject to GC5, the Departmental Representative may, at any time before he issues his Final Certificate of Completion,
- 30.1.1 order work or material in addition to that provided for in the Plans and Specifications;  
and
- 30.1.2 delete or change the dimensions, character, quantity, quality, description, location or position of the whole or any part of the work or material provided for in the Plans and Specifications or in any order made pursuant to GC30.1.1,
- if that additional work or material, deletion, or change is, in his opinion, consistent with the general intent of the original contract.
- 30.2 The Contractor shall perform the work in accordance with such orders, deletions and changes that are made by the Departmental Representative pursuant to GC30.1 from time to time as if they had appeared in and been part of the Plans and Specifications.



- 30.3 The Departmental Representative shall determine whether or not anything done or omitted by the Contractor pursuant to an order, deletion or change referred to in GC30.1 increased or decreased the cost of the work to the Contractor.
- 30.4 If the Departmental Representative determines pursuant to GC30.3 that the cost of the work to the Contractor has been increased, Her Majesty shall pay the Contractor the increased cost that the Contractor necessarily incurred for the additional work calculated in accordance with GC49 or GC50.
- 30.5 If the Departmental Representative determines pursuant to GC30.3 that the cost of the work to the Contractor has been decreased, Her Majesty shall reduce the amount payable to the Contractor under the contract by an amount equal to the decrease in the cost caused by the deletion or change referred to in GC30.1.2 and calculated in accordance with GC49.
- 30.6 GC30.3 to GC30.5 are applicable only to a contract or a portion of a contract for which a Fixed Price Arrangement is stipulated in the contract.
- 30.7 An order, deletion or change referred to in GC30.1 shall be in writing, signed by the Departmental Representative and given to the Contractor in accordance with GC11.

### **GC31 Interpretation of Contract by Departmental Representative**

- 31.1 If, at any time before the Departmental Representative has issued a Final Certificate of Completion referred to in GC44.1, any question arises between the parties about whether anything has been done as required by the contract or about what the Contractor is required by the contract to do, and, in particular but without limiting the generality of the foregoing, about
- 31.1.1 the meaning of anything in the Plans and Specification,
  - 31.1.2 the meaning to be given to the Plans and Specifications in case of any error therein, omission therefrom, or obscurity or discrepancy in their working or intention,
  - 31.1.3 whether or not the quality or quantity of any material or workmanship supplied or proposed to be supplied by the Contractor meets the requirements of the contract,
  - 31.1.4 whether or not the labour, plant or material provided by the Contractor for performing the work and carrying out the contract are adequate to ensure that the work will be performed in accordance with the contract and that the contract will be carried out in accordance with its terms,
  - 31.1.5 what quantity of any kind of work has been completed by the Contractor, or
  - 31.1.6 the timing and scheduling of the various phases of the performance of the work,
- the question shall be decided by the Departmental Representative whose decision shall be final and conclusive in respect of the work.
- 31.2 The Contractor shall perform the work in accordance with any decisions of the Departmental



Representative that are made under GC31.1 and in accordance with any consequential directions given by the Departmental Representative.

### **GC32 Warranty and Rectification of Defects in Work**

32.1 Without restricting any warranty or guarantee implied or imposed by law or contained in the contract documents, the Contractor shall, at his own expense,

32.1.1 rectify and make good any defect or fault that appears in the work or comes to the attention of the Minister with respect to those parts of the work accepted in connection with the Interim Certificate of Completion referred to GC44.2 within 12 months from the date of the Interim Certificate of Completion;

32.1.2 rectify and make good any defect or fault that appears in or comes to the attention of the Minister in connection with those parts of the work described in the Interim Certificate of Completion referred to in GC44.2 within 12 months from the date of the Final Certificate of Completion referred to in GC44.1.

32.2 The Departmental Representative may direct the Contractor to rectify and make good any defect or fault referred to in GC32.1 or covered by any other expressed or implied warranty or guarantee.

32.3 A direction referred to in GC32.2 shall be in writing, may include a stipulation in respect of the time within which a defect or fault is required to be rectified and made good by the Contractor, and shall be given to the Contractor in accordance with GC11.

32.4 The Contractor shall rectify and make good any defect or fault described in a direction given pursuant to GC32.2 within the time stipulated therein.

### **GC33 Non-Compliance by Contractor**

33.1 If the Contractor fails to comply with any decision or direction given by the Departmental Representative pursuant to GC18, GC24, GC26, GC31 or GC32, the Departmental Representative may employ such methods as he deems advisable to do that which the Contractor failed to do.

33.2 The Contractor shall, on demand, pay Her Majesty an amount that is equal to the aggregate of all cost, expenses and damage incurred or sustained by Her Majesty by reason of the Contractor's failure to comply with any decision or direction referred to in GC33.1, including the cost of any methods employed by the Departmental Representative pursuant to GC33.1.

### **GC34 Protesting Departmental Representative's Decisions**

34.1 The Contractor may, within ten days after the communication to him of any decision or direction referred to in GC30.3 or GC33.1, protest that decision or direction.

34.2 A protest referred to in GC34.1 shall be in writing, contain full reasons for the protest, be signed





by the Contractor and be given to Her Majesty by delivery to the Departmental Representative.

- 34.3 If the Contractor gives a protest pursuant to GC34.2, any compliance by the Contractor with the decision or direction that was protested shall not be construed as an admission by the Contractor of the correctness of that decision or direction, or prevent the Contractor from taking whatever action he considers appropriate in the circumstances.
- 34.4 The giving of a protest by the Contractor pursuant to GC34.2 shall not relieve him from complying with the decision or direction that is the subject of the protest.
- 34.5 Subject to GC34.6, the Contractor shall take any action referred to in GC34.3 within three months after the date that a Final Certificate of Completion is issued under GC44.1 and not afterwards.
- 34.6 The Contractor shall take any action referred to in GC34.3 resulting from a direction under GC32 within three months after the expiry of a warranty or guarantee period and not afterwards.
- 34.7 Subject to GC34.8, if Her Majesty determines that the Contractor's protest is justified, Her Majesty shall pay the Contractor the cost of the additional labour, plant and material necessarily incurred by the Contractor in carrying out the protested decision or direction.
- 34.8 Costs referred to in GC34.7 shall be calculated in accordance with GC48 to GC50.

### **GC35 Changes in Soil Conditions and Neglect or Delay by Her Majesty**

35.1 Subject to GC35.2 no payment, other than a payment that is expressly stipulated in the contract, shall be made by Her Majesty to the Contractor for any extra expense or any loss or damage incurred or sustained by the Contractor.

35.2 If the Contractor incurs or sustains any extra expense or any loss or damage that is directly attributable to

35.2.1 a substantial difference between the information relating to soil conditions at the work site that is contained in the Plans and Specifications or other documents supplied to the Contractor for his use in preparing his tender or a reasonable assumption of fact based thereon made by the Contractor, and the actual soil conditions encountered by the Contractor at the work site during the performance of the contract, or

35.2.2 any neglect or delay that occurs after the date of the contract on the part of Her Majesty in providing any information or in doing any act that the contract either expressly requires Her Majesty to do or that would ordinarily be done by an owner in accordance with the usage of the trade,

he shall, within ten days of the date the actual soil conditions described in GC35.2.1 were encountered or the neglect or delay described in GC35.2.2 occurred, give the Departmental Representative written notice of his intention to claim for that extra expense or that loss or damage.

35.3 When the Contractor has given a notice referred to in GC35.2, he shall give the Departmental Representative a written claim for extra expense or loss or damage within 30 days of the date that



a Final Certificate of Completion referred to in GC44.1 is issued and not afterwards.

- 35.4 A written claim referred to in GC35.3 shall contain a sufficient description of the facts and circumstances of the occurrence that is the subject of the claim to enable the Departmental Representative to determine whether or not the claim is justified and the Contractor shall supply such further and other information for that purpose as the Departmental Representative requires from time to time.
- 35.5 If the Departmental Representative determines that a claim referred to in GC35.3 is justified, Her Majesty shall make an extra payment to the Contractor in an amount that is calculated in accordance with GC47 to GC50.
- 35.6 If, in the opinion of the Departmental Representative, an occurrence described in GC35.2.1 results in a savings of expenditure by the Contractor in performing the contract, the amount set out in the Articles of Agreement shall, subject to GC35.7, be reduced by an amount that is equal to the saving.
- 35.7 The amount of the saving referred to in GC35.6 shall be determined in accordance with GC47 to GC49.
- 35.8 If the Contractor fails to give a notice referred to in GC35.2 and a claim referred to in GC35.3 within the times stipulated, an extra payment shall not be made to him in respect of the occurrence.

### **GC36 Extension of Time**

- 36.1 Subject to GC36.2, the Departmental Representative may, on the application of the Contractor made before the day fixed by the Articles of Agreement for completion of the work or before any other date previously fixed under this General Condition, extend the time for its completion by fixing a new date if, in the opinion of the Departmental Representative, causes beyond the control of the Contractor have delayed its completion.
- 36.2 An application referred to in GC36.1 shall be accompanied by the written consent of the bonding company whose bond forms part of the contract security.

### **GC37 Assessments and Damages for Late Completion**

- 37.1 For the purposes of this General Condition
- 37.1.1 the work shall be deemed to be completed on the date that an Interim Certificate of Completion referred to in GC44.2 is issued, and
- 37.1.2 "period of delay" means the number of days commencing on the day fixed by the Articles of Agreement for completion of the work and ending on the day immediately preceding the day on which the work is completed but does not include any day within a period of extension granted pursuant to GC36.1, and any other day on which, in the opinion of the Departmental Representative, completion of the work was delayed for reasons beyond the control of the Contractor.



- 37.2 If the Contractor does not complete the work by the day fixed for its completion by the Articles of Agreement but completes it thereafter, the Contractor shall pay Her Majesty an amount equal to the aggregate of
- 37.2.1 all salaries, wages and travelling expenses incurred by Her Majesty in respect of persons overseeing the performance of the work during the period of delay;
  - 37.2.2 the cost incurred by Her Majesty as a result of the inability to use the completed work for the period of delay; and
  - 37.2.3 all other expenses and damages incurred or sustained by Her Majesty during the period of delay as a result of the work not being completed by the day fixed for its completion.
- 37.3 The Minister may waive the right of Her Majesty to the whole or any part of the amount payable by the Contractor pursuant to GC37.2 I, in the opinion of the Minister, it is in the public interest to do so.

#### **GC38 Taking the Work Out of the Contractor's Hands**

- 38.1 The Minister may, at his sole discretion, by giving a notice in writing to the Contractor in accordance with GC11, take all or any part of the work out of the Contractor's hands, and may employ such means as he sees fit to have the work completed if the Contractor
- 38.1.1 Has not, within six days of the Minister or the Departmental Representative giving notice to the Contractor in writing in accordance with GC11, remedied any delay in the commencement or any default in the diligent performance of the work to the satisfaction of the Departmental Representative;
  - 38.1.2 has defaulted in the completion of any part of the work within the time fixed for its completion by the contract;
  - 38.1.3 has become insolvent;
  - 38.1.4 has committed an act of bankruptcy;
  - 38.1.5 has abandoned the work;
  - 38.1.6 has made an assignment of the contract without the consent required by GC3.1; or
  - 38.1.7 has otherwise failed to observe or perform any of the provisions of the contract.
- 38.2 If the whole or any part of the work is taken out of the Contractor's hands pursuant to GC38.1,
- 38.2.1 the Contractor's right to any further payment that is due or accruing due under the contract is, subject only to GC38.4, extinguished, and
  - 38.2.2 the Contractor is liable to pay Her Majesty, upon demand, an amount that is equal to the amount of all loss and damage incurred or sustained by Her Majesty in respect of the



Contractor's failure to complete the work.

- 38.3 If the whole or any part of the work that is taken out of the Contractor's hands pursuant to GC38.1 is completed by Her Majesty, the Departmental Representative shall determine the amount, if any, of the holdback or a progress claim that had accrued and was due prior to the date on which the work was taken out of the Contractor's hands and that is not required for the purposes of having the work performed or of compensating Her Majesty for any other loss or damage incurred or sustained by reason of the Contractor's default.
- 38.4 Her Majesty may pay the Contractor the amount determined not to be required pursuant to GC38.3.

**GC39 Effect of Taking the Work Out of the Contractor's Hands**

- 39.1 The taking of the work or any part thereof out of the Contractor's hands pursuant to GC38 does not operate so as to relieve or discharge him from any obligation under the contract or imposed upon him by law except the obligation to complete the performance of that part of the work that was taken out of his hands.
- 39.2 If the work or any part thereof is taken out of the Contractor's hands pursuant to GC38, all plant and material and the interest of the Contractor is all real property, licenses, powers and privileges acquired, used or provided by the Contractor under the contract shall continue to be the property of Her Majesty without compensation to the Contractor.
- 39.3 When the Departmental Representative certifies that any plant, material, or any interest of the Contractor referred to in GC39.2 is no longer required for the purposes of the work, or that it is not in the interest of Her Majesty to retain that plant, material or interest, it shall revert to the Contractor.

**G40 Suspension of Work by Minister**

- 40.1 The Minister may, when in his opinion it is in the public interest to do so, require the Contractor to suspend performance of the work either for a specified or an unspecified period by giving a notice of suspension in writing to the Contractor in accordance with GC11.
- 40.2 When a notice referred to in GC40.1 is received by the Contractor in accordance with GC11, he shall suspend all operations in respect of the work except those that, in the opinion of the Departmental Representative, are necessary for the care and preservation of the work, plant and material.
- 40.3 The Contractor shall not, during a period of suspension, remove any part of the work, plant or material from its site without the consent of the Departmental Representative.
- 40.4 If a period of suspension is 30 days or less, the Contractor shall, upon the expiration of that period, resume the performance of the work and he is entitled to be paid the extra cost, calculated in accordance with GC48 to GC50, of any labour, plant and material necessarily incurred by him as a result of the suspension.



- 40.5 If, upon the expiration of a period of suspension of more than 30 days, the Minister and the Contractor agree that the performance of the work will be continued by the Contractor, the Contractor shall resume performance of the work subject to any terms and conditions agreed upon by the Minister and the Contractor.
- 40.6 If, upon the expiration of a period of suspension of more than 30 days, the Minister and the Contractor do not agree that performance of the work will be continued by the Contractor or upon the terms and conditions under which the Contractor will continue the work, the notice of suspension shall be deemed to be a notice of termination pursuant to GC41.

#### **GC41 Termination of Contract**

- 41.1 The Minister may terminate the contract at any time by giving a notice of termination in writing to the Contractor in accordance with GC11.
- 41.2 When a notice referred to in GC41.1 is received by the Contractor in accordance with GC11, he shall, subject to any conditions stipulated in the notice, forthwith cease all operations in performance of the contract.
- 41.3 If the contract is terminated pursuant to GC41.1, Her Majesty shall pay the Contractor, subject to GC41.4, an amount equal to
- 41.3.1 the cost to the contractor of all labour, plant and material supplied by him under the contract up to the date of termination in respect of a contract or part thereof for which a Unit Price Arrangement is stipulated in the contract, or
  - 41.3.2 the lesser of
    - 41.3.2.1 an amount, calculated in accordance with the Terms and Payment, that would have been payable to the Contractor had he completed the work, and
    - 41.3.2.2 an amount that is determined to be due to the Contractor pursuant to GC49 in respect of a contract or part thereof for which a Fixed Price Arrangement is stipulated in the contract
- less the aggregate of all amounts that were paid to the Contractor by Her Majesty and all amounts that are due to Her Majesty from the Contractor pursuant to the contract.
- 41.4 If Her Majesty and the Contractor are unable to agree about an amount referred to in GC41.3 that amount shall be determined by the method referred to in GC50.

#### **GC42 Claims Against and Obligations of the Contractor or Subcontractor**

- 42.1 Her Majesty may, in order to discharge lawful obligations of and satisfy claims against the Contractor or a subcontractor arising out of the performance of the contract, pay any amount that is due and payable to the Contractor pursuant to the contract directly to the obligees of and the claimants against the Contractor or the subcontractor but such amount if any, as is paid by Her Majesty, shall not exceed that amount which the Contractor would have been obliged to pay to



such claimant had the provisions of the Provincial or Territorial lien legislation, or, in the Province of Quebec, the law relating to privileges, been applicable to the work. Any such claimant need not comply with the provisions of such legislation setting out the steps by way of notice, registration or otherwise as might have been necessary to preserve or perfect any claim for lien or privilege which claimant might have had;

42.2 Her Majesty will not make any payment as described in GC42.1 unless and until that claimant shall have delivered to Her Majesty:

42.2.1 a binding and enforceable Judgment or Order of a court of competent jurisdiction setting forth such amount as would have been payable by the Contractor to the claimant pursuant to the provisions of the applicable Provincial or Territorial lien legislation, or, in the Province of Quebec, the law relating to privileges, had such legislation been applicable to the work; or

42.2.2 a final and enforceable award of an arbitrator setting forth such amount as would have been payable by the Contractor to the claimant pursuant to the provisions of the applicable Provincial or Territorial lien legislation, or, in the Province of Quebec, the law relating to privileges, had such legislation been applicable to the work; or

42.2.3 the consent of the Contractor authorizing a payment.

For the purposes of determining the entitlement of a claimant pursuant to GC42.2.1 and GC42.2.2, the notice required by GC42.8 shall be deemed to replace the registration or provision of notice after the performance of work as required by any applicable legislation and no claim shall be deemed to have expired, become void or unenforceable by reason of the claimant not commencing any action within the time prescribed by any applicable legislation.

42.3 The Contractor shall, by the execution of his contract, be deemed to have consented to submit to binding arbitration at the request of any claimant those questions that need be answered to establish the entitlement of the claimant to payment pursuant to the provisions of GC42.1 and such arbitration shall have as parties to it any subcontractor to whom the claimant supplied material, performed work or rented equipment should such subcontractor wish to be adjoined and the Crown shall not be a party to such arbitration and, subject to any agreement between the Contractor and the claimant to the contrary, the arbitration shall be conducted in accordance with the Provincial or Territorial legislation governing arbitration applicable in the Province or Territory in which the work is located.

42.4 A payment made pursuant to GC42.1 is, to the extent of the payment, a discharge of Her Majesty's liability to the Contractor under the contract and may be deducted from any amount payable to the Contractor under the contract.

42.5 To the extent that the circumstances of the work being performed for Her Majesty permit, the Contractor shall comply with all laws in force in the Province or Territory where the work is being performed relating to payment period, mandatory holdbacks, and creation and enforcement of mechanics' liens, builders' liens or similar legislation or in the Province of Quebec, the law relating to privileges.

42.6 The Contractor shall discharge all his lawful obligations and shall satisfy all lawful claims against him arising out of the performance of the work at least as often as the contract requires Her



Majesty to pay the Contractor.

- 42.7 The Contractor shall, whenever requested to do so by the Departmental Representative, make a statutory declaration deposing to the existence and condition of any obligations and claims referred to in GC42.6.
- 42.8 GC42.1 shall only apply to claims and obligations
- 42.8.1 the notification of which has been received by the Departmental Representative in writing before payment is made to the Contractor pursuant to TP4.10 and within 120 days of the date on which the claimant
- 42.8.1.1 should have been paid in full under the claimant's contract with the Contractor or subcontractor where the claim is for money that was lawfully required to be held back from the claimant; or
- 42.8.1.2 performed the last of the services, work or labour, or furnished the last of the material pursuant to the claimant's contract with the Contractor or subcontractor where the claim is not for money referred to in GC42.8.1.1, and
- 42.8.2 the proceedings to determine the right to payment of which, pursuant to GC42.2. shall have commenced within one year from the date that the notice referred to in GC42.8.1 was received by the Departmental Representative, and
- the notification required by GC42.8.1 shall set forth the amount claimed to be owing and the person who by contract is primarily liable.
- 42.9 Her Majesty may, upon receipt of a notice of claim under GC42.8.1, withhold from any amount that is due and payable to the Contractor pursuant to the contract the full amount of the claim or any portion thereof.
- 42.10 The Departmental Representative shall notify the Contractor in writing of receipt of any claim referred to in GC42.8.1 and of the intention of Her Majesty to withhold funds pursuant to GC42.9 and the Contractor may, at any time thereafter and until payment is made to the claimant, be entitled to post, with Her Majesty, security in a form acceptable to Her Majesty in an amount equal to the value of the claim, the notice of which is received by the Departmental Representative and upon receipt of such security Her Majesty shall release to the Contractor any funds which would be otherwise payable to the Contractor, that were withheld pursuant to the provisions of GC42.9 in respect of the claim of any claimant for whom the security stands.

### **GC43 Security Deposit – Forfeiture or Return**

- 43.1 If
- 43.1.1 the work is taken out of the Contractor's hands pursuant to GC38,
- 43.1.2 the contract is terminated pursuant to GC41, or
- 43.1.3 the Contractor is in breach of or in default under the contract,



Her Majesty may convert the security deposit, if any, to Her own use.

- 43.2 If Her Majesty converts the contract security pursuant to GC43.1, the amount realized shall be deemed to be an amount due from Her Majesty to the Contractor under the contract.
- 43.3 Any balance of an amount referred to in GC43.2 that remains after payment of all losses, damage and claims of Her Majesty and others shall be paid by Her Majesty to the Contractor if, in the opinion of the Departmental Representative, it is not required for the purposes of the contract.

#### **GC44 Departmental Representative's Certificates**

44.1 On the date that

44.1.1 the work has been completed, and

44.1.2 the Contractor has complied with the contract and all orders and directions made pursuant thereto,

both to the satisfaction of the Departmental Representative, the Departmental Representative shall issue a Final Certificate of Completion to the Contractor.

44.2 If the Departmental Representative is satisfied that the work is substantially complete he shall, at any time before he issues a certificate referred to in GC44.1, issue an Interim Certificate of Completion to the Contractor, and

44.2.1 for the purposes of GC44.2 the work will be considered to be substantially complete,

44.2.1.1 when the work under the contract or a substantial part thereof is, in the opinion of the Departmental Representative, ready for use by Her Majesty or is being used for the purpose intended; and

44.2.1.2 when the work remaining to be done under the contract is, in the opinion of the Departmental Representative, capable of completion or correction at accost of not more than

44.2.1.2.1 -3% of the first \$500,000, and

44.2.1.2.2 -2% of the next \$500,000, and

44.2.1.2.3 -1% of the balance

of the value of the contract at the time this cost is calculated.

44.3 For the sole purpose of GC44.2.1.2, where the work or a substantial part thereof is ready for use or is being used for the purposes intended and the remainder of the work or a part thereof cannot be completed by the time specified in A2.1, or as amended pursuant to GC36, for reasons beyond the control of the Contractor or where the Departmental Representative and the Contractor agree not to complete a part of the work within the specified time, the cost of that part of the work





which was either beyond the control of the Contractor to complete or the Departmental Representative and the Contractor have agreed not to complete by the time specified shall be deducted from the value of the contract referred to GC44.2.1.2 and the said cost shall not form part of the cost of the work remaining to be done in determining substantial completion.

44.4 An Interim Certificate of Completion referred to in GC44.2 shall describe the parts of the work not completed to the satisfaction of the Departmental Representative and all things that must be done by the Contractor

44.4.1 before a Final Certificate of Completion referred to in GC44.1 will be issued, and

44.4.2 before the 12-month period referred to in GC32.1.2 shall commence for the said parts and all the said things.

44.5 The Departmental Representative may, in addition to the parts of the work described in an Interim Certificate of Completion referred to in GC44.2, require the Contractor to rectify any other parts of the work not completed to his satisfaction and to do any other things that are necessary for the satisfactory completion of the work.

44.6 If the contract or a part thereof is subject to a Unit Price Arrangement, the Departmental Representative shall measure and record the quantities of labour, plant and material, performed, used and supplied by the Contractor in performing the work and shall, at the request of the Contractor, inform him of those measurements.

44.7 The Contractor shall assist and co-operate with the Departmental Representative in the performance of his duties referred to in GC44.6 and shall be entitled to inspect any record made by the Departmental Representative pursuant to GC44.6.

44.8 After the Departmental Representative has issued a Final Certificate of Completion referred to in GC44.1, he shall, if GC44.6 applies, issue a Final Certificate of Measurement.

44.9 A Final Certificate of Measurement referred to in GC44.8 shall

44.9.1 contain the aggregate of all measurements of quantities referred to in GC44.6, and

44.9.2 be binding upon and conclusive between Her Majesty and the Contractor as to the quantities referred to therein.

#### **GC45 Return of Security Deposit**

45.1 After an Interim Certificate of Completion referred to in GC44.2 has been issued, Her Majesty shall, if the Contractor is not in breach of or in default under the contract, return to the Contractor all or any part of the security deposit that, in the opinion of the Departmental Representative, is not required for the purposes of the contract.

45.2 After a Final Certificate of Completion referred to in GC44.1 has been issued, Her Majesty shall return to the Contractor the remainder of any security deposit unless the contract stipulates otherwise.



- 45.3 If the security deposit was paid into the Consolidated Revenue Fund of Canada, Her Majesty shall pay interest thereon to the Contractor at a rate established from time to time pursuant to section 21(2) of the Financial Administration Act.

#### **GC46 Clarification of Terms in GC47 to GC50**

- 46.1 For the purposes of GC47 to GC50,
- 46.1.1 "Unit Price Table" means the table set out in the Articles of Agreement, and
- 46.1.2 "plant" does not include tools customarily provided by a tradesman in practicing his trade.

#### **GC47 Additions or Amendments to Unit Price Table**

- 47.1 Where a Unit Price Arrangement applies to the contract or a part thereof the Departmental Representative and the Contractor may, by an agreement in writing,
- 47.1.1 add classes of labour or material, and units of measurement, prices per unit and estimated quantities to the Unit Price Table if any labour, plant or material that is to be included in the Final Certificate of Measurement referred to in GC44.8 is not included in any class of labour, plant or material set out in the Unit Price Table; or
- 47.1.2 subject to GC47.2 and GC47.3, amend a price set out in the Unit Price Table for any class of labour, plant or material included therein if the Final Certificate of Measurement referred to in GC44.8 shows or is expected to show that the total quantity of that class of labour, plant or material actually performed, used or supplied by the Contractor in performing the work is
- 47.1.2.1 less than 85% of that estimated total quantity, or
- 47.1.2.2 in excess of 115% of that estimated total quantity.
- 47.2 In no event shall the total cost of an item set out in the Unit Price Table that has been amended pursuant to GC47.1.2.1 exceed the amount that would have been payable to the Contractor had the estimated total quantity actually been performed, used or supplied.
- 47.3 An amendment that is made necessary by GC47.1.2.2 shall apply only to the quantities that are in excess of 115%.
- 47.4 If the Departmental Representative and the Contractor do not agree as contemplated in GC47.1, the Departmental Representative shall determine the class and the unit of measurement of the labour, plant or material and, subject to GC47.2 and GC47.3, the price per unit therefore shall be determined in accordance with GC50.

#### **GC48 Determination of Cost – Unit Price Table**



- 48.1 Whenever, for the purposes of the contract, it is necessary to determine the cost of labour, plant or material, it shall be determined by multiplying the quantity of that labour, plant or material expressed in the unit set out in column 3 of the Unit Price Table by the price of that unit set out in column 5 of the Unit Price Table.

**GC49 Determination of Cost – Negotiation**

- 49.1 If the method described in GC48 cannot be used because the labour, plant or material is of a kind or class that is not set out in the Unit Price Table, the cost of that labour, plant or material for the purposes of the contract shall be the amount agreed upon from time to time by the Contractor and the Departmental Representative.
- 49.2 For the purposes of GC49.1, the Contractor shall submit to the Departmental Representative any necessary cost information requested by the Departmental Representative in respect of the labour, plant and material referred to in GC49.1

**GC50 Determination of Cost – Failing Negotiation**

- 50.1 If the methods described in GC47, GC48 or GC49 fail for any reason to achieve a determination of the cost of labour, plant and material for the purposes referred to therein, that cost shall be equal to the aggregate of
- 50.1.1 all reasonable and proper amounts actually expended or legally payable by the Contractor in respect of the labour, plant and material that falls within one of the classes of expenditure described in GC50.2 that are directly attributable to the performance of the contract,
  - 50.1.2 an allowance for profit and all other expenditures or costs, including overhead, general administration cost, financing and interest charges, and every other cost, charge and expenses, but not including those referred to in GC50.1.1 or GC50.1.3 or a class referred to in GC50.2, in an amount that is equal to 10% of the sum of the expenses referred to in GC50.1.1, and
  - 50.1.3 interest on the cost determined under GC50.1.1 and GC50.1.2, which interest shall be calculated in accordance with TP9,

provide that the total cost of an item set out in the Unit Price Table that is subject to the provisions of GC47.1.2.1 does not exceed the amount that would have been payable to the Contractor had the estimated total quantity of the said item actually be performed, used or supplied.

- 50.2 For purposes of GC50.1.1 the classes of expenditure that may be taken into account in determining the cost of labour, plant and material are,
- 50.2.1 payments to subcontractors;
  - 50.2.2 wages, salaries and travelling expenses of employees of the Contractor while they are actually and properly engaged on the work, other than wages, salaries, bonuses, living



and travelling expenses of personnel of the Contractor generally employed at the head office or at a general office of the Contractor unless they are engaged at the work site with the approval of the Departmental Representative,

- 50.2.3 assessments payable under any statutory authority relating to workmen's compensation, unemployment insurance, pension plan or holidays with pay;
- 50.2.4 rent that is paid for plant or an amount equivalent of the said rent if the plant is owned by the Contractor that is necessary for and used in the performance of the work, if the rent of the equivalent amount is reasonable and use of that plant has been approved by the Departmental Representative;
- 50.2.5 payments for maintaining and operating plant necessary for and used in the performance of the work, and payments for effecting such repairs thereto as, in the opinion of the Departmental Representative, are necessary to the proper performance of the contract other than payments for any repairs to the plant arising out of defects existing before its allocation to the work;
- 50.2.6 payments for material that is necessary for and incorporated in the work, or that is necessary for and consumed in the performance of the contract;
- 50.2.7 payments for preparation, delivery, handling, erection, installation, inspection protection and removal of the plant and material necessary for and used in the performance of the contract; and
- 50.2.8 any other payments made by the Contractor with the approval of the Departmental Representative that are necessary for the performance of the contract.

#### **GC51 Records to be kept by Contractor**

##### **51.1 The Contractor shall**

- 51.1.1 maintain full records of his estimated and actual cost of the work together with all tender calls, quotations, contracts, correspondence, invoices, receipts and vouchers relating thereto.
- 51.1.2 make all records and material referred to in GC5.1.1 available to audit and inspection by the Minister and the Deputy Receiver General for Canada or by persons acting on behalf of either of both of them, when requested;
- 51.1.3 allow any of the person referred to in GC51.1.2 to make copies of and to take extracts from any of the records and material referred to in GC51.1.1; and
- 51.1.4 furnish any person referred to in GC51.1.2 with any information he may require from time to time in connection with such records and material.

- 51.2 The records maintained by the Contractor pursuant to GC51.1.1 shall be kept intact by the Contractor until the expiration of two years after the date that a Final Certificate of Completion referred to in GC44.1 was issued or until the expiration of such other period of time as the



Minister may direct.

- 51.3 The Contractor shall cause all subcontractors and all other persons directly or indirectly controlled by or affiliated with the Contractor and all persons directly or indirectly having control of the Contractor to comply with GC51.1 and GC51.2 as if they were the Contractor.

**GC52 Conflict of Interest**

- 52.1 It is a term of this contract that no former public office holder who is not in compliance with the Conflict of Interest and Post-Employment Code for Public Office Holders shall derive a direct benefit from this contract.

**GC53 Contractor Status**

- 53.1 The Contractor shall be engaged under the contract as an independent contractor.
- 53.2 The Contractor and any employee of the said Contractor is not engaged by the contract as an employee, servant or agent of Her Majesty.
- 53.3 For the purposes of GC53.1 and GC53.2 the Contractor shall be solely responsible for any and all payments and deductions required to be made by law including those required for Canada or Quebec Pension Plans, Unemployment Insurance, Worker's Compensation or Income Tax.



## **GENERAL CONDITONS**

- IC 1 Proof of Insurance**
- IC 2 Risk Management**
- IC 3 Payment of Deductible**
- IC 4 Insurance Coverage**

## **GENERAL INSUANCE COVERAGES**

- GCI 1 Insured**
- GIC 2 Period of Insurance**
- GIC 3 Proof of Insurance**
- GIC 4 Notification**

## **COMMERCIAL GENERAL LIABILITY**

- CGL 1 Scope of Policy**
- CGL 2 Coverages/Provisions**
- CGL 3 Additional Exposures**
- CGL 4 Insurance Proceeds**
- CGL 5 Deductible**

## **BUILDER'S RISK – INSTALLATION FLOATER – ALL RISKS**

- BR 1 Scope of Policy**
- BR 2 Property Insured**
- BR 3 Insurance Proceeds**
- BR 4 Amount of Insurance**
- BR 5 Deductible**
- BR 6 Subrogation**
- BR 7 Exclusion Qualifications**

## **INSURER'S CERTIFICATE OF INSURANCE**



## **General Conditions**

### **IC 1 Proof of Insurance (02/12/03)**

Within thirty (30) days after acceptance of the Contractor's tender, the Contractor shall, unless otherwise directed in writing by the Contracting Officer, deposit with the Contracting Officer an Insurer's Certificate of Insurance in the form displayed in this document and, if requested by the Contracting Officer, the originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the Insurance Coverage Requirements shown hereunder.

### **IC 2 Risk Management (01/10/94)**

The provisions of the Insurance Coverage Requirements contained hereunder are not intended to cover all of the Contractor's obligations under GC8 of the General Conditions "C" of the contract. Any additional risk management measures or additional insurance coverages the Contractor may deem necessary to fulfill its obligations under GC8 shall be at its own discretion and expense.

### **IC 3 Payment of Deductible (01/10/94)**

The payment of monies up to the deductible amount made in satisfaction of a claim shall be borne by the Contractor.

### **IC 4 Insurance Coverage (02/12/03)**

The Contractor has represented that it has in place and effect the appropriate and usual liability insurance coverage as required by these Insurance Conditions and the Contractor has warranted that it shall obtain, in a timely manner and prior to commencement of the Work, the appropriate and usual property insurance coverage as required by these Insurance Conditions and, further, that it shall maintain all required insurance policies in place and effect as required by these Insurance Conditions.



## INSURANCE COVERAGE REQUIREMENTS

### PART I GENERAL INSURANCE COVERAGES (GIC)

#### **GCI 1 Insured (02/12/03)**

Each insurance policy shall insure the Contractor, and shall include, as an Additional Named Insured, Her Majesty the Queen in right of Canada, represented by the National Research Council Canada.

#### **GIC 2 Period of Insurance (02/12/03)**

Unless otherwise directed in writing by the Contracting Officer or otherwise stipulated elsewhere in these Insurance Conditions, the policies required hereunder shall be in force and be maintained from the date of the contract award until the day of issue of the Departmental Representative's Final Certificate of Completion.

#### **GIC 3 Proof of Insurance (01/10/94)**

Within twenty five (25) days after acceptance of the Contractor's tender, the Insurer shall, unless otherwise directed by the Contractor, deposit with the Contractor an Insurer's Certificate of Insurance in the form displayed in the document and, if requested, the originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the requirements of these Insurance Coverages.

#### **GIC 4 Notification (01/10/94)**

Each Insurance policy shall contain a provision that (30) days prior written notice shall be given by the Insurer to Her Majesty in the event of any material change in or cancellation of coverage. Any such notice received by the Contractor shall be transmitted forthwith to Her Majesty.

### PART II COMMERCIAL GENERAL LIABILITY

#### **CGL 1 Scope of Policy (01/10/94)**

The policy shall be written on a form similar to that known and referred to in the insurance industry as IBC 2100 – Commercial General Liability policy (Occurrence form) and shall provide for limit of liability of not less than \$2,000,000 inclusive for Bodily Injury and Property Damage for any one occurrence or series of occurrences arising out of one cause. Legal or defence cost incurred in respect of a claim or claims shall not operate to decrease the limit of liability.

#### **CGL 2 Coverages/Provisions (01/10/94)**





The policy shall include but not necessarily be limited to the following coverages/provisions.

- 2.1 Liability arising out of or resulting from the ownership, existence, maintenance or use of premises by the Contractor and operations necessary or incidental to the performance of this contract.
- 2.2 "Broad Form" Property Damage including the loss of use of property.
- 2.3 Removal or weakening of support of any building or land whether such support be natural or otherwise.
- 2.4 Elevator liability (including escalators, hoists and similar devices).
- 2.5 Contractor's Protective Liability
- 2.6 Contractual and Assumed Liabilities un this contact.
- 2.7 Completed Operations Liability – The insurance, including all aspects of this Part II of these Insurance Conditions shall continue for a period of at least one (1) year beyond the date of the Departmental Representative's Final Certificate of Completion for the Completed Operations.
- 2.8 Cross Liability – The Clause shall be written as follows:

Cross Liability – The insurance as is afforded by this policy shall apply in respect to any claim or action brought against any one Insured by any other Insured. The coverage shall apply in the same manner and to the same extent as though a separate policy had been issued to each Insured. The inclusion herein of more than one Insured shall not increase the limit of the Insurer's liability.

- 2.9 Severability of Interests – The Clause shall be written as follows:

Severability of Interests – This policy, subject to the limits of liability stated herein, shall apply separately to each Insured in the same manner and to the same extent as if a separate policy had been issued to each. The inclusion herein of more than one insured shall not increase the limit of the Insurer's liability.

### **CGL 3 Additional Exposures (02/12/03)**

The policy shall either include or be endorsed to include the following exposures of hazards if the Work is subject thereto:

- 3.1 Blasting
- 3.2 Pile driving and calsson work
- 3.3 Underpinning
- 3.4 Risks associated with the activities of the Contractor on an active airport



- 3.5 Radioactive contamination resulting from the use of commercial isotopes
- 3.6 Damage to the portion of an existing building beyond that directly associated with an addition, renovation or installation contract.
- 3.7 Marine risks associated with the contraction of piers, wharves and docks.

**CGL 4 Insurance Proceeds  
(01/10/94)**

Insurance Proceeds from this policy are usually payable directly to a Claimant/Third Party.

**CGL 5 Deductible  
(02/12/03)**

This policy shall be issued with a deductible amount of not more than \$10,000 per occurrence applying to Property Damage claims only.

**PART III  
BUILDER'S RISK – INSTALLATION FLOATER – ALL RISKS**

**BR 1 Scope of Policy  
(01/10/94)**

The policy shall be written on an "All Risks" basis granting coverages similar to those provided by the forms known and referred to in the insurance industry as "Builder's Risk Comprehensive Form" or "Installation Floater – All Risks".

**BR 2 Property Insured  
(01/10/94)**

The property insured shall include:

- 2.1 The Work and all property, equipment and materials intended to become part of the finished Work at the site of the project while awaiting, during and after installation, erection or construction including testing.
- 2.2 Expenses incurred in the removal from the construction site of debris of the property insured, including demolition of damaged property, de-icing and dewatering, occasioned by loss, destruction or damage to such property and in respect of which insurance is provided by this policy.

**BR 3 Insurance Proceeds  
(01/10/94)**

- 3.1 Insurance proceeds from this policy are payable in accordance with GC28 of the General Conditions "C" of the contract.
- 3.2 This policy shall provide that the proceeds thereof are payable to Her Majesty or as the Minister may direct.



- 3.3 The Contractor shall do such things and execute such documents as are necessary to effect payment of the proceeds.

**BR 4 Amount of Insurance**  
(01/10/94)

The amount of insurance shall not be less than the sum of the contract value plus the declared value (if any) set forth in the contract documents of all material and equipment supplied by Her Majesty at the site of the project to be incorporated into and form part of the finished Work.

**BR 5 Deductible**  
(02/12/03)

The Policy shall be issued with a deductible amount of not more than \$10,000.

**BR 6 Subrogation**  
(01/10/94)

The following Clause shall be included in the policy:

"All rights of subrogation or transfer of rights are hereby waived against any corporation, firm, individual or other interest, with respect to which, insurance is provided by this policy".

**BR 7 Exclusion Qualifications**  
(01/10/94)

The policy may be subject to the standard exclusions but the following qualifications shall apply:

- 7.1 Faulty materials, workmanship or design may be excluded only to the extent of the cost of making good thereof and shall not apply to loss or damage resulting therefrom.
- 7.2 Loss or damage caused by contamination by radioactive material may be excluded except for loss or damage resulting from commercial isotopes used for industrial measurements, inspection, quality control radiographic or photographic use.
- 7.3 Use and occupancy of the project or any part of section thereof shall be permitted where such use and occupancy is for the purpose for which the project is intended upon completion.



**INSURER'S CERTIFICATE OF INSURANCE**

(TO BE COMPLETED BY INSURER (NOT BOKER) AND DELIVERD TO NATIONAL RESEARCH COUNCIL CANADA WITH 30 DAYS FOLLOWING ACCEPTANCE OF TENDER)

**CONTRACT**

DESCRIPTION OF WORK	CONTRACT NUMBER	AWARD DATE
LOCATION		

**INSURER**

NAME
ADDRESS

**BROKER**

NAME
ADDRESS

**INSURED**

NAME OF CONTRACTOR
ADDRESS

**ADDITIONAL INSURED**

HER MAJESTY THE QUEEN IN RIGHT OF CANADA AS REPRESENTED BY THE NATIONAL RESEARCH COUNCIL CANADA
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THIS DOCUENT CERTIFIES THAT THE FOLLOWING POLICES OF INSURANCE ARE AT PRESENT IN FORCE COVERING ALL OPERATIONS OF THE INSURE IN CONNECTION WITH THE CONTRACT MADE BETWEEN THE NAMED INSURED AND THE NATIONAL RESEARCH COUNCIL CANADA AND IN ACCORDANCE WITH THE INSURANCE CONDITIONS "E"

POLICY					
TYPE	NUMBER	INCEPTION DATE	EXPIRY DATE	LIMITS OF LIABILITY	DEDUCTIBLE
COMMERCIAL GENERAL LIABILITY					
BUILDERS RISK "AL RISKS"					
INSTALLATION FLOATER "ALL RISKS"					

THE INSURER AGREES TO NOTIFY THE NATIONAL RESEARCH COUNCIL CANADA IN WRITING 30 DAYS PRIOR TO ANY MATERIAL CHANGE IN OR CANCELLATION OF ANY POLICY OR COVERAGE SPECIFICALLY RELATED TO THE CONTRACT

NAME OF INSURER'S OFFICER OR AUTHORIZED EMPLOYEE	SIGNATURE	DATE:
		TELEPHONE NUMBER:

ISSUANCE OF THIS CERTIFIATE SHALL NOT LIMIT OR RESTRICT THE RIGHT OF THE NATIONAL RESEARCH COUNCIL CANADA TO REQUEST AT ANY TIME DUPLICATE COPIES OF SAID INSURANCE POLICIES



### **CS1 Obligation to provide Contract Security**

- 1.1 The Contractor shall, at the Contractor's own expense, provide one or more of the forms of contract security prescribed in CS2.
- 1.2 The Contractor shall deliver to the Departmental Representative the contract security referred to in CS1.1 within 14 days after the date that the Contractor receives notice that the Contractor's tender or offer was accepted by Her Majesty.

### **CS2 Prescribed Types and Amounts of Contract Security**

- 2.1 The Contractor shall deliver to the Departmental Representative pursuant to CS1
  - 2.1.1 a performance bond and a labour and material payment bond each in an amount that is equal to not less than 50% of the contract amount referred to in the Articles of Agreement, or
  - 2.1.2 a labour and material payment bond in an amount that is equal to not less than 50% of the contract amount referred to in the Articles of Agreement, and a security deposit in an amount that is equal to
    - 2.1.2.1 not less than 10% of the contract amount referred to in the Articles of Agreement where that amount does not exceed \$250,000, or
    - 2.1.2.2 \$25,000 plus 5% of the part of the contract amount referred to in the Articles of Agreement that exceeds \$250,000, or
  - 2.1.3 a security deposit in an amount prescribed by CS2.12 plus an additional amount that is equal to 10% of the contract amount referred to in the Articles of Agreement.
- 2.2 A performance bond and a labour and material payment bond referred to in CS2.1 shall be in a form and be issued by a bonding or surety company that is approved by Her Majesty.
- 2.3 The amount of a security deposit referred to in CS2.1.2 shall not exceed \$250,000 regardless of the contract amount referred to in the Articles of Agreement.
- 2.4 A security deposit referred to in CS2.1.2 and CS2.1.3 shall be in the form of
  - 2.4.1 a bill of exchange made payable to the Receiver General of Canada and certified by an approved financial institution or drawn by an approved financial institution on itself, or
  - 2.4.2 bonds of or unconditionally guaranteed as to principal and interest by the Government of Canada.
- 2.5 For the purposes of CS2.4
  - 2.5.1 a bill of exchange is an unconditional order in writing signed by the Contractor and addressed to an approved financial institution, requiring the said institution to pay, on demand, at a fixed or determinable future time a sum certain of money to, or to the order



of, the Receiver General for Canada, and

- 2.5.2 If a bill of exchange is certified by a financial institution other than a chartered bank then it must be accompanied by a letter or stamped certification confirming that the financial institution is in at least one of the categories referred to in CS2.5.3
- 2.5.3 an approved financial institution is
  - 2.5.3.1 any corporation or institution that is a member of the Canadian Payments Association,
  - 2.5.3.2 a corporation that accepts deposits that are insured by the Canada Deposit Insurance Corporation or the Régie de l'assurance-dépôts du Québec to the maximum permitted by law,
  - 2.5.3.3 a credit union as defined in paragraph 137(6)(b) of the *Income Tax Act*,
  - 2.5.3.4 a corporation that accepts deposits from the public, if repayment of the deposit is guaranteed by Her Majesty in right of a province, or
  - 2.5.3.5 The Canada Post Corporation.
- 2.5.4 the bonds referred to in CS2.4.2 shall be
  - 2.5.4.1 made payable to bearer, or
  - 2.5.4.2 accompanied by a duly executed instrument of transfer of the bonds to the Receiver General for Canada in the form prescribed by the Domestic Bonds of Canada Regulations, or
  - 2.5.4.3 registered, as to principal or as to principal and interest in the name of the Receiver General for Canada pursuant to the Domestic Bonds of Canada Regulations, and
  - 2.5.4.4 provided on the basis of their market value current at the date of the contract.



Contract Number / Numéro du contrat
Security Classification / Classification de sécurité

**SECURITY REQUIREMENTS CHECK LIST (SRCL)  
LISTE DE VÉRIFICATION DES EXIGENCES RELATIVES À LA SÉCURITÉ (LVERS)**

**PART A - CONTRACT INFORMATION / PARTIE A - INFORMATION CONTRACTUELLE**

1. Originating Government Department or Organization / Ministère ou organisme gouvernemental d'origine	2. Branch or Directorate / Direction générale ou Direction
3. a) Subcontract Number / Numéro du contrat de sous-traitance	3. b) Name and Address of Subcontractor / Nom et adresse du sous-traitant

4. Brief Description of Work / Brève description du travail

5. a) Will the supplier require access to Controlled Goods?  
Le fournisseur aura-t-il accès à des marchandises contrôlées?  No / Non  Yes / Oui

5. b) Will the supplier require access to unclassified military technical data subject to the provisions of the Technical Data Control Regulations?  
Le fournisseur aura-t-il accès à des données techniques militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques?  No / Non  Yes / Oui

6. Indicate the type of access required / Indiquer le type d'accès requis

6. a) Will the supplier and its employees require access to PROTECTED and/or CLASSIFIED information or assets?  
Le fournisseur ainsi que les employés auront-ils accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS?  
(Specify the level of access using the chart in Question 7. c)  
(Préciser le niveau d'accès en utilisant le tableau qui se trouve à la question 7. c)  No / Non  Yes / Oui

6. b) Will the supplier and its employees (e.g. cleaners, maintenance personnel) require access to restricted access areas? No access to PROTECTED and/or CLASSIFIED information or assets is permitted.  
Le fournisseur et ses employés (p. ex. nettoyeurs, personnel d'entretien) auront-ils accès à des zones d'accès restreintes? L'accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS n'est pas autorisé.  No / Non  Yes / Oui

6. c) Is this a commercial courier or delivery requirement with **no** overnight storage?  
S'agit-il d'un contrat de messagerie ou de livraison commerciale **sans** entreposage de nuit?  No / Non  Yes / Oui

7. a) Indicate the type of information that the supplier will be required to access / Indiquer le type d'information auquel le fournisseur devra avoir accès

Canada <input type="checkbox"/>	NATO / OTAN <input type="checkbox"/>	Foreign / Étranger <input type="checkbox"/>
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7. b) Release restrictions / Restrictions relatives à la diffusion

No release restrictions Aucune restriction relative à la diffusion <input type="checkbox"/>  Not releasable À ne pas diffuser <input type="checkbox"/>  Restricted to: / Limité à : <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays :	All NATO countries Tous les pays de l'OTAN <input type="checkbox"/>  Restricted to: / Limité à : <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays :	No release restrictions Aucune restriction relative à la diffusion <input type="checkbox"/>  Restricted to: / Limité à : <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays :
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7. c) Level of information / Niveau d'information

PROTECTED A PROTÉGÉ A <input type="checkbox"/> PROTECTED B PROTÉGÉ B <input type="checkbox"/> PROTECTED C PROTÉGÉ C <input type="checkbox"/> CONFIDENTIAL CONFIDENTIEL <input type="checkbox"/> SECRET SECRET <input type="checkbox"/> TOP SECRET TRÈS SECRET <input type="checkbox"/> TOP SECRET (SIGINT) TRÈS SECRET (SIGINT) <input type="checkbox"/>	NATO UNCLASSIFIED NATO NON CLASSIFIÉ <input type="checkbox"/> NATO RESTRICTED NATO DIFFUSION RESTREINTE <input type="checkbox"/> NATO CONFIDENTIAL NATO CONFIDENTIEL <input type="checkbox"/> NATO SECRET NATO SECRET <input type="checkbox"/> COSMIC TOP SECRET COSMIC TRÈS SECRET <input type="checkbox"/>	PROTECTED A PROTÉGÉ A <input type="checkbox"/> PROTECTED B PROTÉGÉ B <input type="checkbox"/> PROTECTED C PROTÉGÉ C <input type="checkbox"/> CONFIDENTIAL CONFIDENTIEL <input type="checkbox"/> SECRET SECRET <input type="checkbox"/> TOP SECRET TRÈS SECRET <input type="checkbox"/> TOP SECRET (SIGINT) TRÈS SECRET (SIGINT) <input type="checkbox"/>
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Security Classification / Classification de sécurité
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Contract Number / Numéro du contrat
Security Classification / Classification de sécurité

**PART A (continued) / PARTIE A (suite)**

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets?  
 Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS?  No / Non  Yes / Oui  
 If Yes, indicate the level of sensitivity:  
 Dans l'affirmative, indiquer le niveau de sensibilité :

9. Will the supplier require access to extremely sensitive INFOSEC information or assets?  
 Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate?  No / Non  Yes / Oui  
 Short Title(s) of material / Titre(s) abrégé(s) du matériel :  
 Document Number / Numéro du document :

**PART B - PERSONNEL (SUPPLIER) / PARTIE B - PERSONNEL (FOURNISSEUR)**

10. a) Personnel security screening level required / Niveau de contrôle de la sécurité du personnel requis

<input type="checkbox"/> RELIABILITY STATUS COTE DE FIABILITÉ	<input type="checkbox"/> CONFIDENTIAL CONFIDENTIEL	<input type="checkbox"/> SECRET SECRET	<input type="checkbox"/> TOP SECRET TRÈS SECRET
<input type="checkbox"/> TOP SECRET-SIGINT TRÈS SECRET - SIGINT	<input type="checkbox"/> NATO CONFIDENTIAL NATO CONFIDENTIEL	<input type="checkbox"/> NATO SECRET NATO SECRET	<input type="checkbox"/> COSMIC TOP SECRET COSMIC TRÈS SECRET
<input type="checkbox"/> SITE ACCESS ACCÈS AUX EMBLEMES			

Special comments:  
 Commentaires spéciaux : \_\_\_\_\_

NOTE: If multiple levels of screening are identified, a Security Classification Guide must be provided.  
 REMARQUE : Si plusieurs niveaux de contrôle de sécurité sont requis, un guide de classification de la sécurité doit être fourni.

10. b) May unscreened personnel be used for portions of the work?  
 Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail?  No / Non  Yes / Oui  
 If Yes, will unscreened personnel be escorted?  
 Dans l'affirmative, le personnel en question sera-t-il escorté?  No / Non  Yes / Oui

**PART C - SAFEGUARDS (SUPPLIER) / PARTIE C - MESURES DE PROTECTION (FOURNISSEUR)**

**INFORMATION / ASSETS / RENSEIGNEMENTS / BIENS**

11. a) Will the supplier be required to receive and store PROTECTED and/or CLASSIFIED information or assets on its site or premises?  
 Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS?  No / Non  Yes / Oui

11. b) Will the supplier be required to safeguard COMSEC information or assets?  
 Le fournisseur sera-t-il tenu de protéger des renseignements ou des biens COMSEC?  No / Non  Yes / Oui

**PRODUCTION**

11. c) Will the production (manufacture, and/or repair and/or modification) of PROTECTED and/or CLASSIFIED material or equipment occur at the supplier's site or premises?  
 Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ?  No / Non  Yes / Oui

**INFORMATION TECHNOLOGY (IT) MEDIA / SUPPORT RELATIF À LA TECHNOLOGIE DE L'INFORMATION (TI)**

11. d) Will the supplier be required to use its IT systems to electronically process, produce or store PROTECTED and/or CLASSIFIED information or data?  
 Le fournisseur sera-t-il tenu d'utiliser ses propres systèmes informatiques pour traiter, produire ou stocker électroniquement des renseignements ou des données PROTÉGÉS et/ou CLASSIFIÉS?  No / Non  Yes / Oui

11. e) Will there be an electronic link between the supplier's IT systems and the government department or agency?  
 Disposera-t-on d'un lien électronique entre le système informatique du fournisseur et celui du ministère ou de l'agence gouvernementale?  No / Non  Yes / Oui





**PART C - (continued) / PARTIE C - (suite)**

For users completing the form **manually** use the summary chart below to indicate the category(ies) and level(s) of safeguarding required at the supplier's site(s) or premises.

Les utilisateurs qui remplissent le formulaire **manuellement** doivent utiliser le tableau récapitulatif ci-dessous pour indiquer, pour chaque catégorie, les niveaux de sauvegarde requis aux installations du fournisseur.

For users completing the form **online** (via the Internet), the summary chart is automatically populated by your responses to previous questions.

Dans le cas des utilisateurs qui remplissent le formulaire **en ligne** (par Internet), les réponses aux questions précédentes sont automatiquement saisies dans le tableau récapitulatif.

**SUMMARY CHART / TABLEAU RÉCAPITULATIF**

Category / Catégorie	PROTECTED / PROTÉGÉ			CLASSIFIED / CLASSIFIÉ			NATO				COMSEC					
	A	B	C	CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET	NATO RESTRICTED / NATO DIFFUSION RESTREINTE	NATO CONFIDENTIAL / NATO CONFIDENTIEL	NATO SECRET	COSMIC TOP SECRET / COSMIC TRÈS SECRET	PROTECTED / PROTÉGÉ			CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET
											A	B	C			
Information / Assets / Renseignements / Biens / Production																
IT Media / Support TI																
IT Link / Lien électronique																

12. a) Is the description of the work contained within this SRCL PROTECTED and/or CLASSIFIED?  No /  Yes  
 La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE?  Non /  Oui

**If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification".**  
**Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire.**

12. b) Will the documentation attached to this SRCL be PROTECTED and/or CLASSIFIED?  No /  Yes  
 La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE?  Non /  Oui

**If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification" and indicate with attachments (e.g. SECRET with Attachments).**  
**Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire et indiquez qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).**



Contract Number / Numéro du contrat
Security Classification / Classification de sécurité

**PART D - AUTHORIZATION / PARTIE D - AUTORISATION**

13. Organization Project Authority / Chargé de projet de l'organisme			
Name (print) - Nom (en lettres moulées)		Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
14. Organization Security Authority / Responsable de la sécurité de l'organisme			
Name (print) - Nom (en lettres moulées)		Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
15. Are there additional instructions (e.g. Security Guide, Security Classification Guide) attached? Des instructions supplémentaires (p. ex. Guide de sécurité, Guide de classification de la sécurité) sont-elles jointes?			<input type="checkbox"/> No / Non <input type="checkbox"/> Yes / Oui
16. Procurement Officer / Agent d'approvisionnement			
Name (print) - Nom (en lettres moulées)		Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
17. Contracting Security Authority / Autorité contractante en matière de sécurité			
Name (print) - Nom (en lettres moulées)		Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date

Security Classification / Classification de sécurité
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