NRC·CNRC Administrative Services and Property Management

SPECIFICATIONS

SOLICITATION #: 17-22098

BUILDING: M-19
1200 Montreal Road
Ottawa, Ontario

PROJECT: M19- Stores Amalgamation, Phase I

PROJECT #: M19-5463

Date: November 2017

National Research Council Canada | Conseil national de recherches Canada

Canada

SPECIFICATION

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NRC·CNRC

From **Discovery** to **Innovation...**

Directions to the Ottawa Research Facilities — Montreal Road

1200 Montréal Road
Ottawa, Ontario, Canada K1A 0R6

Tel: 613-993-9101

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By Road, from the OTTAWA International Airport

1. From the airport take the AIRPORT PARKWAY to RIVERSIDE DR EAST
2. Follow RIVERSIDE DR EAST to HIGHWAY 417 EAST
3. Take HIGHWAY 417 EAST, past the ST-LAURENT BLVD exit, where HIGHWAY 417 splits, continue LEFT on HIGHWAY 174 (ROCKLAND)
4. Exit HIGHWAY 174 on BLAIR RD NORTH
5. Proceed on BLAIR RD NORTH, cross OGILVIE RD, and continue on to the traffic lights at the intersection of BLAIR and MONTREAL RD
6. Turn left onto MONTREAL RD and take the first immediate right onto the ramp leading down to the traffic circle. Stop at Building M-1 on the north side of the traffic circle. Ask the commissionaires in M-1 for directions to the NRC building, institute or staff member you seek.

By Road, from MONTRÉAL

1. Take MÉTROPOLITAIN 40 WEST and follow signs for OTTAWA and HIGHWAY 417 WEST
2. Follow 417 WEST to reach OTTAWA
3. Exit at HIGHWAY 174 EAST (ROCKLAND) when entering OTTAWA
4. Follow 174 EAST and exit at BLAIR RD NORTH (first exit after entering 174 EAST)
5. Follow BLAIR RD NORTH, cross OGILVIE RD, and continue on to the traffic lights at the intersection of BLAIR and MONTREAL RD
6. Turn left onto MONTREAL RD and take the first immediate right onto the ramp leading down to the traffic circle. Stop at Building M-1 on the north side of the traffic circle. Ask the commissionaires in M-1 for directions to the NRC building, institute or staff member you seek.


1 Sussex Facilities
2 Montreal Road Facilities
3 Uplands Facilities
4 NRC-CSTT
N
GATINEAU
OTTAWA
QUÉBEC
ONTARIO
Outaouais
Aylmer
Taché
Rockcliffe
Montréal
Vanier
Aviation
Blair
Sussex
Wellington
Bank
Bronson
Island Park
Ottawa River
Carling
Fisher
Prince of Wales
Walkley
Heron
Hawthorne
Hunt Club
Baseline
Riverside
Conroy
Airport
Uplands
Lester
Davidson
Albion
Hunt Club (W)
Merivale
Woodroffe
Greenbank
Fallowfield
Leitrim
50
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148
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34
174
417
38
73
31
416
0 1 2 km
NRC Institute
Trans Canada HWY
Major HWY
Secondary HWY
Airport
Train Station
Ferry
Bus Station
Metro


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Howlett
Blair
Leggett
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Montréal
17B
Montréal
Mackenzie
Macallum
Lathe
Ballard
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Blair
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Bathgate
St. Laurent
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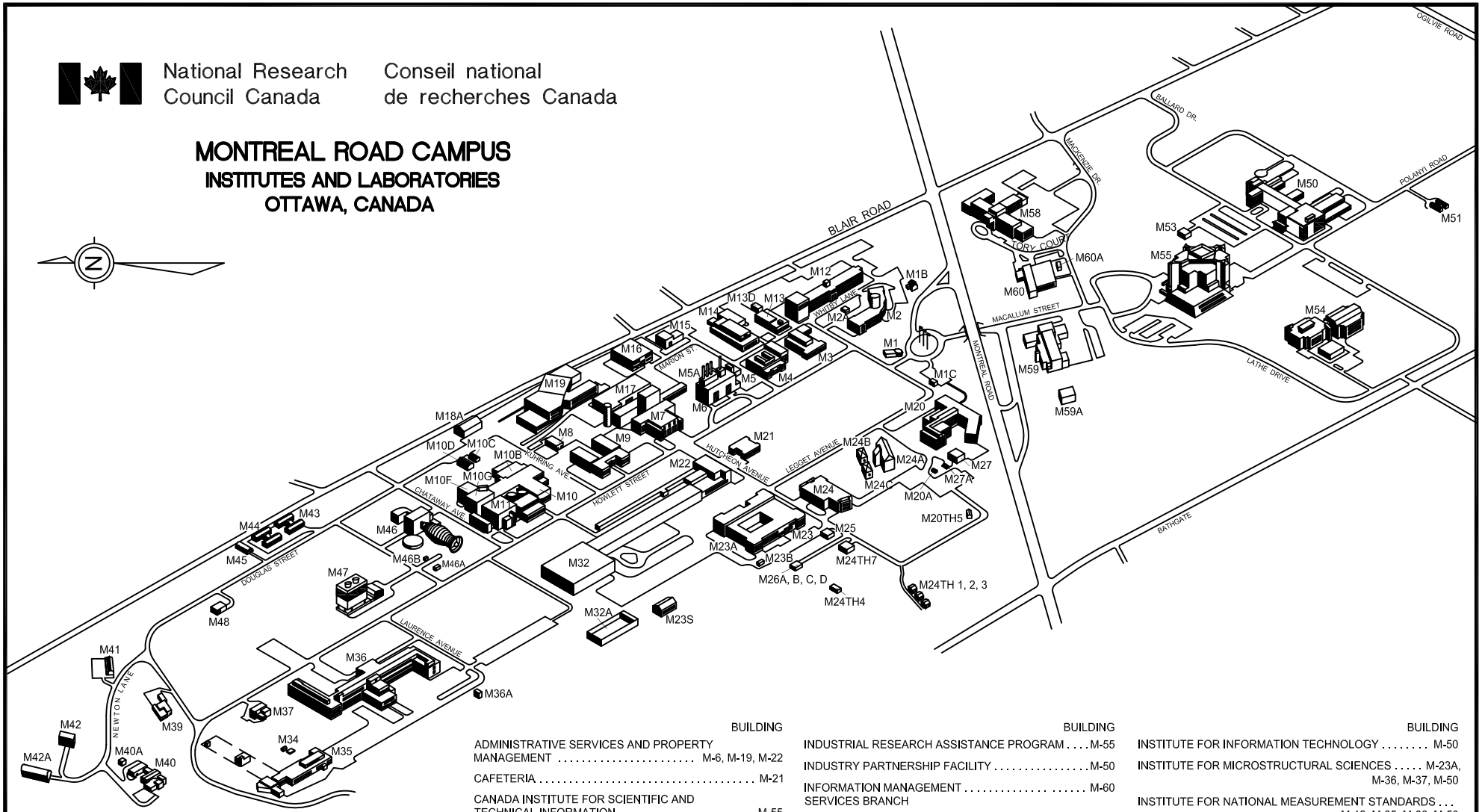
NRC Institute
Major HWY
Airport
Ferry
Metro
Trans Canada HWY
Secondary HWY
Train Station
Bus Station

National Research Council Canada | Conseil national de recherches Canada

MONTREAL ROAD CAMPUS
INSTITUTES AND LABORATORIES
OTTAWA, CANADA



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Updated: July 2008

National Research Council Canada	Conseil national de recherches Canada
Administrative Services & Property management Branch (ASPM)	Direction des services administratif et gestion de l'immobilier (SAGI)

Construction Tender Form

Project Identification **M19- Stores Almagamation Project, Phase I**

Tender No.: **17-22098**

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 servives 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 from 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

M19- Stores Amalgamation Project, Phase I

The National Research Council Canada, 1200 Montreal Road Ottawa, ON has a requirement for a project that includes:

STRUCTURAL: (work shall include, but is not limited to)

a: Modify existing mechanical platform to accommodate new mechanical equipment.

ARCHITECTURAL: Office fit-up (work shall include, but is not limited to)

a. Construct: new walls, new ceilings and new floor surfaces.

MECHANICAL: Modification to existing systems, including provision of new equipment to accommodate office fit-up. Work shall include but is not limited to the following:

a. Modify existing HVAC system to suit new layout.
b. Modify existing sprinkler head locations to suit new layout.
c. Provide new ductless split AC systems for off-season cooling complete with all required accessories and equipment.
d. Update existing building automation system and control sequences to incorporate HVAC modifications and addition of new supplemental cooling systems.

ELECTRICAL: Modification to existing systems, including provision of new equipment to accommodate office fit-up. Work shall include but is not limited to the following:

a. Provide new lighting fixtures and controls. .
b. Provide new receptacles and rough-ins for data outlets.
c. Provide new conduits for data cabling distribution.
d. Replace existing panel L10 with new 42cct panel.
e. Provide power supply new to mechanical equipment

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 November 22nd and November 24th , 2017 at **9:00** . Meet Janik Leroux at Building M19, Main Entrance, 1200 Montreal Road Ottawa, ON. Bidders who, for any reason, cannot attend at the specified date 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.**

As proof of attendance, at the site visit, the Contracting Authority will have an Attendance Form which MUST be signed by the bidder's representative. It is the responsibility of all bidders to ensure they have signed the Mandatory Site Visit Attendance form prior to leaving the site. Proposals submitted by bidders who have not attended the site visit or failed to sign the Attendance Form will be deemed non-responsive.

3. CLOSING DATE

Closing date is December 19th , 2017 at 14:00.

4. TENDER RESULTS

Following the Tender closing, the tender results will be sent by facsimile 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: http://ssi-iss.tpsgc-pwgsc.gc.ca/ssi-iss-services/eso-oss-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.

6.0 WSIB (WORKPLACE SAFETY AND INSURANCE BOARD)

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

7.0 OFFICE OF THE PROCUREMENT OMBUDSMAN

1 Dispute Resolution Services
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, on request or consent of the parties to participate in an alternative dispute resolution process to resolve any dispute between the parties respecting the interpretation or application of a term and condition of this contract and their consent to bear the cost of such process, provide to the parties a proposal for an alternative dispute resolution process to resolve their dispute. The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa-opo.gc.ca.

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 supplier or the contractor or the name of the entity awarded this contract*] respecting administration of this 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, and the interpretation and application of the terms and conditions and the scope of the work of this contract are not in dispute. The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa-opo.gc.ca.

3 The Office of the Procurement Ombudsman (OPO) was established by the Government of Canada to provide an independent avenue for suppliers to raise complaints regarding the award of contracts under $25,000 for goods and under $100,000 for services. You have the option of raising issues or concerns regarding the solicitation, or the award resulting from it, with the OPO

by contacting them by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa-opo.gc.ca. You can also obtain more information on the OPO services available to you at their website at www.opo-boa.gc.ca.

The Departmental Representative or his designate for this project is: **Janik Leroux**
Telephone: **613 993-9149.**

Contracting Authority for this project is: **Alain Leroux alain.leroux@nrc-cnrc.gc.ca**
Telephone**: 613 991-9980.**

INSTRUCTIONS TO BIDDERS

Article 1 – Receipt of Tender

1a) Tenders must be received not later than the specified tender 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 letter or printed telecommunication provided that such amendments are received not later than the specified tender closing time.

1d) Any amendments to the tender which are transmitted by telefax 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
Building M-22
Montreal Road, Ottawa, Ontario
K1A 0R6

Fax: (613) 991-3297

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 coloured 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.

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 in sealed envelopes to:
National Research Council Canada
Administrative Services and Property Management Branch
1200 Montreal Road
Building M-22
Ottawa, ON
K1A 0R6

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) a certified cheque payable to the Receiver General for Canada and drawn on a member of the Canadian Payments Association or a local cooperative credit society that is a member of a central cooperative credit society having membership in the Canadian Payments Association; **OR**

ii) bonds of the Government of Canada, or bonds unconditionally guaranteed as to principal and interest by the Government of Canada; **OR**

iii) 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.

2a) 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 in the ORIGINAL form. Fax or photocopies and NOT acceptable. FAILURE TO PROVIDE THE REQUIRED BID SECURITY SHALL INVALIDATE THE TENDER.

2b) If the tender is not accepted, the Bid Security submitted pursuant to Article 8 shall be returned to the tenderer.

3a) 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 amout 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.

3b) Should it not be possible to obtain a Labour Material Payment Bond as required under 3(a) above, on making application thereof to at least two acceptable Bonding Companies, an additional Security Deposit of a straight 10% of the amount payable under the contract must be furnished.

3c) Where a tender has been accompanied by a Security Deposit, as described in 1(b) above, the amount of the Security Deposit required under 3(a) above may be reduced by the amount of the Security Deposit which accompanied the tender.

3d) 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-22, Montreal Road, Ottawa, Ontario, K1A 0R6.

Article 6 – Interest On Security Deposits

1) Tenderers are notified that they must make their own arrangements with their bankers as to the interest, if any, on the amount of the certified cheque accompanying their tender. The Council will not pay interest on said cheque pending the awarding of the contract nor be responsible for the payments of interest under any arrangement made by the tenderers.

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.

2) 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-22, 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 in 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 × net book value at date of import × number of months in Ontario × 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 × 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)

Manufacturing for Own Use

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)

Contracts with the Federal Government

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.

Exemptions

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.

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

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

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.

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:

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_____
Position

Seal

of

on the_____

day of_____

END OF TABLE OF CONTENTS

1. SCOPE OF WORK

.1 Work under this contract covers the interior fit-up of rooms 317 and 319 in the Council's Building M-19 of the National Research Council.

2. DRAWINGS

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

.1	COVER SHEET	5463-A00
.2	PART SECOND FLOOR, RCP PLANS AND DETAILS	5463-A01
.3	ELEVATIONS ROOM 318	5463-A02
.4	PART SECOND FLOOR FINISHES PLAN	5463-A03
.5	STRUCTURAL FLOOR PLAN, ELEVATIONS & SECTIONS	5463-S01
.6	LEGEND AND FIRE PROTECTION – DEMOLITION AND NEW WORK	5463-M01
.7	HVAC - NEW WORK	5463-M02
.8	UTILITIES - NEW WORK, MISCELLANEOUS EQUIPMENT SCHEDULES	5463-M03
.9	HVAC - DEMOLITION AND NEW WORK	5463-M04
10.	NEW - LIGHTING, POWER & COMMUNICATION, COMMUNICATION ZONE CONDUIT	5463-E01

3. COMPLETION

.1 Complete all work within six (6) weeks 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, Vinyl Chloride, and Ethylene Oxide

.1 It is the responsibility of the general contractor to ensure that each prospective subcontractor for this project has received a copy of the above list.

.2 The general contractor is advised to take the following precautions when dealing with the above substances:

.3 Refer to attached Designated Substances Survey Building M-19, prepared by Oakhill Environmental, dated March 2007.

.4 Refer to attached ACM reports, prepared by DST Consulting Engineers, dated 14 November 2017.

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.

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 subcontractor 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.

.3 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.

Ten (10) days before the scheduled completion date, arrange to do an interim inspection with the Departmental Representative.

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 assume responsibility for recording and distributing minutes.

15. SHOP DRAWINGS

.1 Submit to Departmental Representative for review, shop drawings, product data and samples specified within two (2) weeks 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 two (2) 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 electronic copy of all shop drawings and product data and sample~~s~~ 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 ^{o}C (50 ^{o}F) or higher where specified as soon as finishing work is commenced and maintain until acceptance by the Departmental Representative. 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 English and two French maintenance manuals and one 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:

- .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 subcontractors 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 subcontractors 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**

4. When reporting a fire by phone, give the location of fire, building number and be prepared to verify location.
5. 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:

a. Kettle area - 1-20 lb. ABC Dry Chemical;
b. Roof - 1-20 lb. ABC Dry Chemical at each open flame location.

.3 Provide fire extinguishers equipped as below:

c. Pinned and sealed;
d. With a pressure gauge;
e. With an extinguisher tag signed by a fire extinguisher servicing company.

.4 Carbon Dioxide (C02) 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 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^{o}C (450 ^{o}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 ^{o}C (100 ^{o}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 and/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

NATIONAL RESEARCH COUNCIL CANADA
1200 MONTREAL ROAD
OTTAWA, ONTARIO
K1A 0R6

DESIGNATED SUBSTANCES SURVEY
BUILDING M-19
OTTAWA, ONTARIO

Prepared by:

OAKHILL ENVIRONMENTAL

Distribution:
2 copies - National Research Council Canada
1 copy - Oakhill Environmental

March 2007 PR-06-039

EXECUTIVE SUMMARY

Oakhill Environmental (Oakhill) was retained by National Research Council Canada (NRC) to conduct a designated substances survey within Building M-19 in Ottawa, Ontario. All site work was completed from January 12th thru to January 18th, 2007, and on March 23rd, 2007.

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 Recommendations

Issue	Comments	Recommendations
Asbestos	Room 110 (FS# G001)	
	Six damaged areas (one severely damaged area) were identified on the firewall.	Encapsulate the five damaged areas on the firewall ($1m^2$) and remove the one severely damaged section of firewall ($1m^2$)
	Five damaged areas of mud joint compound fitting insulation were identified on the steam system.	Encapsulate the five damaged areas on the steam system.
	One severely damaged area of mud joint compound fitting insulation was identified on the steam system.	Remove the severely damaged fitting on the steam system.
	Two areas of damaged aircell pipe insulation were identified on the steam system.	Encapsulate each section of damaged aircell (0.5 metres each) for a total of one metre on the steam system.
	Two areas of damaged aircell pipe insulation were identified on the domestic hot water system.	Encapsulate each section of damaged aircell (0.5 metres each) for a total of one metre on the domestic hot water system.
	Two damaged areas of mud joint compound fitting insulation were identified on the domestic hot water system.	Encapsulate the two damaged fittings on the domestic hot water system.
	Five damaged areas of mud joint compound fitting insulation were identified on the domestic cold water system.	Encapsulate the five damaged fittings on the domestic cold water system.

Issue	Comments	Recommendations
	One area of damaged aircell pipe insulation (0.5 metres) was identified on the condensate system.	Encapsulate the 0.5 metre section of damaged aircell pipe insulation on the condensate system.
	Room 112 (FS# G002)	
	Two damaged areas of mud joint compound fitting insulation were identified on the domestic cold water system.	Encapsulate the two damaged fittings on the domestic cold water system.
	One damaged area of mud joint compound fitting insulation was identified on the domestic hot water system.	Encapsulate the damaged fitting on the domestic hot water system.
	Two open ends of aircell pipe insulation were identified on the domestic hot water system.	Encapsulate each section of damaged aircell pipe insulation (0.1 metres each) for a total of 0.2 metres on the domestic hot water system.
	Two open ends of aircell pipe insulation were identified on the steam system.	Encapsulate each section of damaged aircell (0.1 metres each) for a total of 0.2 metres on the steam system.
	Room 116 & 117 (FS# G009)	
	One area of damaged aircell pipe insulation (0.2 metres) was identified on the domestic cold water system.	Encapsulate the 0.2 metre section of damaged aircell pipe insulation on the domestic cold water system.
	One area of damaged aircell pipe insulation (0.2 metres) was identified on the condensate system.	Encapsulate the 0.2 metre section of damaged aircell pipe insulation on the condensate system.
	One area of damaged mud joint compound fitting insulation was identified on the domestic cold water system.	Encapsulate one damaged fitting on the domestic cold water system.
	One area of damaged mud joint compound fitting insulation was identified on the condensate system.	Encapsulate one damaged fitting on the condensate system.
	One area of damaged mud joint compound fitting insulation was identified on the steam system.	Encapsulate one damaged fitting on the steam system.
	Room 211 (FS# 1002)	

Issue	Comments	Recommendations
	One area of damaged aircell pipe insulation (0.2 metres) was identified on the condensate system above the suspended ceiling.	Encapsulate the 0.2 metre section of damaged aircell pipe insulation on the condensate system.
	Room 205 (FS# 1014)	
	One damaged section of aircell pipe insulation was identified on the hot water heating system above the suspended ceiling.	Remove 0.1 metres of severely damaged aircell pipe insulation and encapsulate two open ends on the hot water heating system.
	Room 206 (FS# 1015)	
	One damaged section of aircell pipe insulation was identified on the hot water heating system above the suspended ceiling.	Encapsulate the damaged aircell pipe insulation (0.1 metres) on the hot water heating system.
	Two damaged areas of parging fitting insulation were identified on the chiller system above the suspended ceiling.	Remove the two damaged fittings on the chiller system.
	Room 329 (FS# 2002)	
	One damaged area of mud joint compound fitting insulation was identified on the condensate system.	Encapsulate the damaged fitting on the condensate system.
	Two damaged areas of mud joint compound fitting insulation were identified on the steam system.	Encapsulate the two damaged fittings on the steam system.
	Room 330 (FS# 2003)	
	One damaged area of mud joint compound fitting insulation was identified on the domestic cold water system.	Encapsulate the one damaged fitting on the domestic cold water system.
	Room 232 (FS# 2006)	
	One damaged area of mud joint compound fitting insulation was identified on the steam system.	Encapsulate the one damaged fitting on the steam system.
	Room 328c (FS# 2009)	
	One damaged area of mud joint compound fitting insulation was identified on the condensate system above the suspended ceiling.	Encapsulate the one damaged fitting on the condensate system.

Issue	Comments	Recommendations
	Room 328d (FS# 2010)	
	One damaged section of aircell pipe insulation was identified on the steam system.	Encapsulate the damaged aircell pipe insulation (0.1 metres) on the steam system.
	One damaged area of mud joint compound fitting insulation was identified on the condensate system.	Encapsulate the one damaged fitting on the condensate system.
	Three damaged areas of mud joint compound fitting insulation were identified on the steam system.	Encapsulate the three damaged fittings on the steam system.
	Stairwell 'D' (FS# SW02)	
	One damaged section of aircell pipe insulation was identified on the hot water heating system.	Encapsulate the damaged aircell pipe insulation (0.5 metres) on the hot water heating system.
Lead	Ten paint samples were submitted for lead analysis. Lead was detected in all of the samples submitted. However, only two of the paint samples submitted were found to contain significant levels of lead (i.e., equal to or greater than 5000 ppm). The red paint used over white paint on piping in room 110 had a reading of 18,200 ppm. The red paint used over a layer of green on the fire-hose cabinet in room 110 had a reading of 8,200 ppm. 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.	The draft Proposed Lead Regulation on Construction Projects, May 5, 1995, (enforced by the Ministry of Labour) does not require removal 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. Although not in use, the remainder of old metallic lead piping in the finance building should be removed following Reg. 843 and disposed of according to Reg. 558. 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^3 as prescribed by the OHSA.

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^3 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.
Mould	Mould is suspected to be present in functional space # 2015 (room 312) on the pipe insulation and duct insulation.	Recommend that initially, bulk fungal analysis be performed to the species level. Once the hazard can be qualified, the mouldy insulation can be removed and the source of the moisture can be mitigated.

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-19 in Ottawa, Ontario. Building M-19 was surveyed January 12th to January 18th, 2007, and on March 23rd, 2007.

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^3 of asbestos in air, 0.15 mg/m3 of lead in air, 4.3 mg/m^3 of acrylonitrile in air, 0.2 mg/m^3 of arsenic in air, 3.0 mg/m^3 of benzene in air and 0.2 mg/m^3 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/cm2) 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 ACMs were approximations only, not actual measurements were taken. Square metres or lineal metres were generally used for quantifying ACM. All ACMs 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 3 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-19 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-19 is shown in Table 2.

Table 2 – Homogeneous Materials List

Homo Mat. No.	Material Description	Asbestos Type & Conc.	Sample No.
01	2' x 4' Ceiling Tile (scattered divot pattern)	<0.5 %	M19-01
02	Drywall (with drywall mud)	<0.5 %	M19-02
03	Stucco	<0.5 %	M19-03
04	12" x 12" Floor Tile (grey)	<0.5 %	M19-04
05	2' x 4' Ceiling Tile (scattered dot pattern)	<0.5 %	M19-05
06	Mud joint compound (from 80's addition) Fitting Insulation	<0.5 %	M19-06
07	12" x 12" Floor Tile (beige with red and brown)	<0.5 %	M19-07
08	**Aircell Pipe Insulation**	**20% Chrysotile**	**M19-08**
09	Sweat Wrap (with tar paper layer) Pipe Insulation	<0.5 %	M19-09
10	**Mud Joint Compound Fitting Insulation (grey)**	**10% Chrysotile**	**M19-10**
11	**Firewall (transite with non-acm fibrous insulation core)**	**15% Chrysotile**	**M19-11**
12	**Parging Fitting Insulation (grey with no jacketing)**	**10% Chrysotile**	**M19-12**
13	12" x 12" Ceiling Tile (large dot pattern)	<0.5 %	M19-13
14	12" x 12" Floor Tile (off white with grey)	<0.5 %	M19-14
15	**Mud Joint Compound Fitting Insulation (grey)**	**10% Chrysotile**	**M19-15**
16	**12" x 12" Floor Tile (tan)**	**<0.5 %**	**M19-16**
17	Plaster	<0.5 %	M19-17
18	**Transite wall panel**	**12% Amosite**	**M19-18**
19	Mud Joint Compound Fitting Insulation (tan)	<0.5 %	M19-19
20	**Sweat Wrap (with white paper layer) Pipe Insulation**	**15% Chrysotile**	**M19-20**
21	Sweat Wrap (layers of cardboard) Pipe Insulation	<0.5 %	M19-21
22	Thermal Patch	<0.5 %	M19-22

Homo Mat. No.	Material Description	Asbestos Type & Conc.	Sample No.
23	Terracotta and Mortar Wall	<0.5 %	M19-23
24	Mud Joint Compound Fitting Insulation (tan)	<0.5 %	M19-24
25	Old Exterior Finish (from old exterior wall)	<0.5 %	M19-25
26	**9" x 9" Floor Tile (green)**	**2% Chrysotile**	**M19-26**
27	**ACM Cement Deck**	**20% Chrysotile**	**M19-27**
28	**9" x 9" Floor Tile (brown with white streaks)**	**2% Chrysotile**	**M19-28**
29	Linoleum (off white with grey square pattern)	<0.5 %	M19-29
30	**Floor Tile (red)**	**<0.5 %**	**M19-30**
31	Adhesive Backing (from previous ceiling tiles)	Non-Asbestos	M19-31
32	12" x 12" Ceiling Tile (large and small dot pattern)	Non-Asbestos	M19-32
33	12" x 12' Ceiling Tile (small dot pattern)	Non-Asbestos	M19-33
34	2' x 4' Ceiling Tile (horizontal divot pattern)	Non-Asbestos	M19-34

Homo. Mat. No. – Homogeneous Material Number Conc. – Concentration ND – Not Detected

5.1.1 Survey Findings

Suspect ACM building materials on the ceilings, floors, walls, mechanical, and structural systems were sampled throughout the facility. Of the thirty-four bulk materials that were sampled and compiled into the homogeneous list, eleven were found to contain asbestos. Please note that sample results of homogeneous material number 30 were negative, it is Oakhill's opinion that 9" by 9" floor tiles should be treated as ACM. This false negative is believed to be a result of the limitations of the laboratory methodology of Polarized Light Microscopy (PLM) with tightly bound materials.

The eleven building materials that contain asbestos are as follows:

1) Aircell pipe insulation on the domestic hot and cold water, hot water heating, condensate and steam systems.
2) Mud joint compound fitting insulation on the steam, domestic cold water, domestic hot water, condensate and hot water heating systems.
3) Firewall.
4) Parging fitting insulation on the chiller system.
5) Mud joint compound fitting insulation on the steam and condensate systems.
6) Transite panels used on walls in some areas.
7) Sweat wrap (with white paper layer) pipe insulation on the domestic cold water system.
8) 9" x 9" (green) floor tile.
9) ACM cement deck located throughout the second floor decking (excluding building additions).
10) 9" x 9" floor tile (brown with white streaks).

11) 9" x 9" floor tile (red).

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. No.	Material Description and Quantity	Response Measure
Ground Level				
G001	Rm. 110	13	12" x 12" transite ceiling tile – 1 m^2	O & M
		08	Aircell pipe insulation on the steam system – 56 LM	O & M
		08	Aircell pipe insulation on the steam system – 1 LM	2 Encaps.
		10	Mud joint compound fitting insulation on the steam system – 21 units	O & M
		10	Mud joint compound fitting insulation on the steam system – 6 units	5 Encaps, 1 Removal
		08	Aircell pipe insulation on the domestic hot-water system – 29 LM	O & M
		08	Aircell pipe insulation on the domestic hot-water system – 1 LM	2 Encaps.
		10	Mud joint compound fitting insulation on the domestic hot water system – 14 units	O & M
		10	Mud joint compound fitting insulation on the domestic hot water system – 2 units	2 Encaps.
		08	Aircell pipe insulation on the condensate system – 10 LM	O & M
		08	Aircell pipe insulation on the condensate system – 0.5 LM	1 Encap.
		10	Mud joint compound fitting insulation on the condensate system – 3 units	O & M
		11	Firewall – 83 m^2	O & M
		11	Firewall – 1 m^2	5 Encaps.
		11	Firewall – 1 m^2	1 removal
		12	Parging on fitting of the chiller system – 6 units	O & M
		10	Mud joint compound fitting insulation on the domestic cold water system – 6 units	O & M
		10	Mud joint compound fitting insulation on the domestic cold water system – 5 units	5 Encaps.
G002	Rm. 112	18	Transite wall panel – 17 m^2	O & M
		08	Aircell pipe insulation on the domestic hot water system – 13 LM	O & M
		08	Aircell pipe insulation on the domestic hot water system – 0.2 LM	2 Encaps.
		10	Mud joint compound fitting insulation on the domestic hot water system – 1 unit	1 Encap.
		08	Aircell pipe insulation on the steam system – 13 LM	O & M
		08	Aircell pipe insulation on the steam system – 0.2 LM	2 Encaps.
		10	Mud joint compound fitting insulation on the condensate system – 5 units	O & M
		10	Mud joint compound fitting insulation on the domestic cold-water system – 7 units	O & M

		10	Mud joint compound fitting insulation on the domestic cold-water system – 2 units	2 Encaps.
G004	Rm. 110b	18	Transite wall panel – 13 m^2	O & M
		08	Aircell pipe insulation on the condensate system – 4 LM	O & M
		15	Mud joint compound fitting insulation on the condensate system – 15 units	O & M
		15	Mud joint compound fitting insulation on the domestic cold water system – 6 units	O & M
		08	Aircell pipe insulation on the domestic hot water system – 3 units	O & M
		15	Mud joint compound fitting insulation on the steam system – 19 units	O & M
		08	Aircell pipe insulation on the steam system – 6 LM	O & M
G006	Rm. 110a	15	Mud joint compound fitting insulation on the steam system – 6 units	O & M
		15	Mud joint compound fitting insulation on the condensate system – 3 units	O & M
G007	Rm. 103	10	Mud joint compound fitting insulation on the steam system – 1 unit	O & M
		10	Mud joint compound fitting insulation on the condensate system – 1 unit	O & M
G008	Rm. 105	08	Aircell pipe insulation on the steam system – 4 LM	O & M
		08	Aircell pipe insulation on the condensate system – 4 LM	O & M
G009	Rms. 116, 117 & 102	10	Mud joint compound fitting insulation on the domestic cold-water system – 19 units	O & M
		20	Brown waffle paper with white paper pipe insulation on the domestic cold-water system – 15 LM	O & M
		08	Aircell pipe insulation on the domestic cold-water system – 15 LM	O & M
		08	Aircell pipe insulation on the domestic cold-water system – 0.2 LM	1 Encap.
		10	Mud joint compound fitting insulation on the domestic cold-water system – 1 unit	1 Encap.
		10	Mud joint compound fitting insulation on the condensate system – 6 units	O & M
		08	Aircell pipe insulation on the condensate system – 6 LM	O & M
		08	Aircell pipe insulation on the condensate system – 0.2 LM	1 Encap.
		10	Mud joint compound fitting insulation on the condensate system – 1 unit	1 Encap.
		10	Mud joint compound fitting insulation on the steam system – 11 units	O & M
		10	Mud joint compound fitting insulation on the steam system – 1 unit	1 Encap.
		08	Aircell pipe insulation on the domestic hot-water system – 38 LM	O & M
		10	Mud joint compound fitting insulation on the domestic hot water system – 10 units	O & M
1002	Rms. 210, 211	20	Sweat wrap (with white paper layer) pipe insulation on the domestic cold-water system – 4 LM	O & M
		10	Mud joint compound fitting insulation on the steam system – 8 units	O & M
		10	Mud joint compound fitting insulation on the condensate system – 6 units	O & M
		08	Aircell pipe insulation on the condensate system – 5 LM	O & M
		08	Aircell pipe insulation on the condensate system – 0.2 LM	1 Encap.
1007	Rms. 220, 221, 222, 224 (OSHA area)	08	Aircell pipe insulation on the hot water heating system – 59 LM	O & M
		10	Mud joint compound fitting insulation on the hot water heating system – 8 units	O & M
		12	Parging on fitting of chiller system – 4 units	O & M
1008	Rm. 228, 231, 231B,	08	Aircell pipe insulation on the hot-water heating system – 6 LM	O & M

	(Security area)	10	Mud joint compound fitting insulation on the hot-water heating system – 3 units	O & M
		12	Parging on fitting of chiller system – 8 units	O & M
1009	Rms. 230, 236, 237, 238 (Realty office area)	08	Aircell pipe insulation on the hot-water heating system – 84 LM	O & M
		10	Mud joint compound fitting insulation on the hot water heating system – 14 units	O & M
		12	Parging on fitting of chiller system – 16 units	O & M
1010	1st floor corridor & stairwells A, H	10	Mud joint compound fitting insulation on the hot water heating system – 12 units	O & M
		08	Aircell pipe insulation on the hot-water heating system – 20 LM	O & M
		12	Parging on fittings of chiller system – 6 units	O & M
1011	Rm. 203	10	Mud joint compound fitting insulation on the chiller system – 18 units	O & M
		08	Aircell pipe insulation on the hot-water heating system – 25 LM	O & M
		10	Mud joint compound fitting insulation on the hot-water heating system – 11 units	O & M
1012	Rm. 227	30	Red 9"x 9" floor tile – 0.5 m^2 (see FS form)	O & M
		30	Dark brown 9" x 9" floor tile – 0.5 m^2	O & M
		12	Parging on fitting of chiller system – 6 units	O & M
		08	Aircell pipe insulation on the hot water heating system – 2 LM	O & M
		10	Mud joint compound fitting insulation on the hot water heating system – 1 unit	O & M
1014	Rm. 205	12	Parging on fittings of chiller system – 2 units	O & M
		08	Aircell pipe insulation on the hot water heating system – 3 LM	O & M
		08	Aircell pipe insulation on the hot water heating system – 0.1 LM	1 removal & 2 Encaps.
1015	Rm. 206	10	Mud joint compound fitting insulation on the domestic cold water system – 9 units	O & M
		08	Aircell pipe insulation on the hot water heating system – 23 LM	O & M
		08	Aircell pipe insulation on the hot water heating system – 0.1 LM	1 Encap.
		12	Parging on fitting of chiller system – 4 units	O & M
		12	Parging on fitting of chiller system – 2 units	2 Removals
		10	Mud joint compound fitting insulation on the hot water heating system – 8 units	O & M
2002	Rm. 329	18	Transite wall panel – 80 m^2	O & M
		27	ACM cement deck – 564 m^2	O & M
		10	Mud joint compound fitting insulation on the condensate system – 18 units	O & M
		10	Mud joint compound fitting insulation on the condensate system – 1unit	1 Encap.
		10	Mud joint compound fitting insulation on the steam system – 27 units	O & M
		10	Mud joint compound fitting insulation on the steam system – 2 units	2 Encaps.
		10	Mud joint compound fitting insulation on the domestic cold water system – 4 units	O & M
		20	Sweat wrap (with white paper layer) pipe insulation on the domestic cold water system – 18 LM	O & M
2003	Rm. 330	18	Transite wall panel – 180 m^2	O & M
		20	Sweat wrap (with white paper layer) pipe insulation on the domestic cold water system – 10 LM	O & M
		10	Mud joint compound fitting insulation on the domestic cold water system – 5 units	O & M

		10	Mud joint compound fitting insulation on the domestic cold-water system – 1 unit	1 Encap.
		10	Mud joint compound fitting insulation on the condensate system – 4 units	O & M
		10	Mud joint compound fitting insulation on the steam system – 8 units	O & M
			ACM cement deck – 72 m^2	O & M
2005	Rm. 323a	26	Green with grey 9" x 9" floor tile – 27 m^2	O & M
		27	ACM cement deck – 27 m^2	O & M
2006	Rm. 232	18	Transite wall panel – 105 m^2	O & M
		27	ACM cement deck - 163 m^2	O & M
		08	Aircell pipe insulation on the condensate system – 6 LM	O & M
		08	Aircell pipe insulation on the steam system – 30 LM	O & M
		10	Mud joint compound fitting insulation on the domestic cold-water system – 3 units	O & M
		20	Sweat wrap (with white paper layer) pipe insulation on the domestic cold-water system – 14 LM	O & M
		10	Mud joint compound fitting insulation on the steam system – 8 units	O & M
		10	Mud joint compound fitting insulation on the steam system – 1 unit	1 Encap.
2007	Rms. 310, 301a, 303	27	ACM cement deck - 58 m^2	O & M
2008	Rms. 326, 326a, 326b	27	ACM cement deck - 45 m^2	O & M
		10	Mud joint compound fitting insulation on the condensate system – 6 units	O & M
		10	Mud joint compound fitting insulation on the steam system – 4 units	O & M
2009	Rm. 328	27	ACM cement deck - 110m^2	O & M
		10	Mud joint compound fitting insulation on the condensate system – 3 units	O & M
		10	Mud joint compound fitting insulation on the condensate system – 1 unit	1 Encap.
2010	Rms. 328 (d, e, f) & stairwell C	18	Transite wall panel – 55 m^2	O & M
		27	ACM cement deck - 129 m^2	O & M
		08	Aircell pipe insulation on the steam system – 34 LM	O & M
		08	Aircell pipe insulation on the steam system – 0.1 LM	1 Encap.
		10	Mud joint compound fitting insulation on the condensate system – 10 units	O & M
		10	Mud joint compound fitting insulation on the condensate system – 1 units	1 Encap.
		10	Mud joint compound fitting insulation on the steam system – 19 units	O & M
		10	Mud joint compound fitting insulation on the steam system – 3 units	3 Encaps.
2011	Rm. 304	27	ACM cement deck - 18m^2	O & M
2012	Rm. 305	27	ACM cement deck - 3 m^2	O & M
		28	Brown 9" x 9" floor tile – 3 m^2	O & M
2013	Front entrance and hallway	27	ACM cement deck - 85m^2	O & M
		28	Green 9" x 9" floor tile – 15 m^2	O & M
		28	White 9" x 9" floor tile – 15 m^2	O & M
2014	Men's washroom (Rm. 314)	27	ACM cement deck – no access above ceiling; ACM cement deck is likely present above the ceiling in this area	N/A
2015	Rms. 315,	27	ACM cement deck - 290 m^2	O & M

	313, 312, (312a, b, c, d), 308, 306	30	Red 9" x 9" floor tile – 283 m^2	O & M
2016	Rm. 317	26	Green 9" x 9" floor tile – 9 m^2	O & M
		27	ACM cement deck – no access above ceiling; ACM cement deck is likely present above the ceiling in this area	N/A
2017	Rm. 319a - Office	27	ACM cement deck - 14m^2	O & M
2018	Rm. 319b- Office	27	ACM cement deck - 15m^2	O & M
2019	Rm. 318	27	ACM cement deck - 49m^2	O & M
2020	Rm. 320	27	ACM cement deck - 24m^2	O & M
SW02	Stairwell 'D' and rm. 101	10	Mud joint compound fitting insulation on the condensate system – 6 units	O & M
		08	Aircell pipe insulation on the condensate system – 2 LM	O & M
		10	Mud joint compound fitting insulation on the steam system – 7 units	O & M
		08	Aircell pipe insulation on the steam system – 2 LM	O & M
		08	Aircell pipe insulation on the hot water heating system – 0.5 LM	1 Encap.
		08	Aircell pipe insulation on the hot water heating system –2 LM	O & M
		10	Mud joint compound fitting insulation on the hot water heating system – 1 unit	O & M
SW03	Stairwell 'E'	10	Mud joint compound fitting insulation on the hot-water heating system – 3 units	O & M
M001	Fitness room and stairwell 'B'	18	Transite wall panel – 18 m^2	O & M
		12	Parging fitting insulation on the chiller system – 2 units	O & M
M003	Rm. 324 and stairwell 'F'	27	ACM cement deck - 68 m^2	O & M
		20	Sweat wrap (with white paper layer) pipe insulation on the domestic cold-water system – 6 LM	O & M

LM – linear metre O&M – Operations & Maintenance Encap. – Encapsulation Homo. – Homogeneous Mat. - Materials

Asbestos was detected in eleven 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 (with white paper layer)

A representative photograph of sweat wrap with white paper layer 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.

Parging

A representative photograph of parging fitting insulation. This material is a malleable grey insulation that has the appearance of granular mud. It appears smooth, round and soft. It is similar to mud joint compound (described above) but is softer and can be pulverized by hand pressure much easier.

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.

ACM Cement Deck
A representative photograph of ACM cement deck. This material is a composite of asbestos and cement that was a manufactured product at the time of installation. It is very similar to transite panel and was generally used in areas as a fire retardant.

9" x 9" Floor 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. They are sometimes found under carpeting.

5.1.4 Survey Recommendations

Under Ontario Regulation (O. Reg.) 278/05 damaged and exposed ACMs are required to be repaired or removed. In building M-19, the damaged/exposed 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 ten paint finishes. Samples were collected from the painted interior surfaces of building M-19 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				
M19-L1	Drain pipe in stockroom (FS# G001)	Beige paint.	1,800	No
M19-L2	Steel girder in stockroom (FS# G001)	Pale green paint	3,930	No
M19-L3	Stairs and railing in stockroom (FS# G001)	Grey paint	1,720	No
M19-L4	Pipe in publication department (FS# G003)	White paint	761	No
M19-L5	**Bldg M19 – Paint on pipe in stockroom (FS# G001)**	**Red paint over white paint.**	**18,200**	**Yes**
M19-L6	**Bldg M19 – Paint on fire-hose cabinet in stockroom (FS# G001)**	**Red paint over green paint.**	**8,200**	**Yes**
M19-L7	Door and door frame in stockroom (FS# G001)	Blue paint	68.4	No
M19-L8	Pipe in stockroom (FS# G001)	Black paint	<7.0	No
M19-L9	Pipe and wall (FS# 2002)	Peach paint	642	No
M19-L10	Pipe and wall (FS# 2003)	Green paint	252	No

***Note:** Ontario Ministry of Labour (MOL) considers 5,000ppm lead to be a lead-based paint (LBP).

5.2.2 Survey Recommendations

Based on the analytical results, two of the ten paints sampled contain greater than 5,000 ppm lead and are therefore classified as 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/m3. 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 (mg/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 mg Hg/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/m3 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 Isocyantes

5.5.1 Survey Findings

At the time of the site inspection, no evidence of isocyantes 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^3). 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 mg/m^3). To minimize potential arsenic exposure, apply paints and adhesives in well-ventilated areas.

5.11 Ethylene Oxide

5.11.1 Survey Findings

At the time of the site inspection, no evidence of ethylene oxide was noted in the survey.

5.12 Mould

5.12.1 Survey Findings

At the time of the site inspection, evidence of mould was noted on the chiller pipe and fitting insulation in functional space # 2015, which covers rooms; 315, 313, 312, 312A,B,C,D, 308 and 306.

5.12.2 Survey Recommendations

Oakhill recommend that fungal laboratory sampling be added to the scope of work for this project in the next fiscal year. It is important to identify the type of mould fungus present and 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 January 12th to January 18th, 2007, and on March 23rd, 2007. 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.

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 Heath 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^3).

Arsenic

Arsenic is regulated in Ontario under Regulation 836/90 of the Occupational Heath 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^3). 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, anthophylitte 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) ACMs 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 Heath 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^3. 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 Heath 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 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 Heath 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 Heath 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 (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^{o} C, as in welding and flame cutting or burning.

Mercury

Mercury is regulated in Ontario under Regulation 844/90 of the Occupational Heath 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^3.

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 Heath 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^3.

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^3) 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 Heath 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^3.

Human health effects from long-term exposure include: cancer of the liver, damage to the immune and reproductory systems.

Fungi

There is essentially no fungus-free environment in our daily lives. Fugal 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: 07T205636

PROJECT NO: PR-06-039

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Bill McGovern

Bulk Asbestos

DATE SAMPLED: **DATE RECEIVED:** January 17 2007 **DATE REPORTED:** January 29 2007 **SAMPLE TYPE:** Other

	Unit	G / S	M.D.L.	1A 645663	1B 645667	1C 645668	2A 645669	2B 645670	2C 645671	3A 645672	3B 645673
Asbestos	%		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

	Unit	G / S	M.D.L.	3C 645674	3D 645675	3E 645676	4A 645677	4B 645678	4C 645679	5A 645680	5B 645681
Asbestos	%		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

	Unit	G / S	M.D.L.	6A 645682	6B 645684	6C 646154	7A 646155	7B 646156	7C 646157	8 646158	9A 646159
Asbestos	%		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	20	<0.5

	Unit	G / S	M.D.L.	9B 646160	9C 646161	10 646162	11 646163	12 646164	13 646165	14A 646166	14B 646167
Asbestos	%		0.5	<0.5	<0.5	10	15	10	Trace	<0.5	<0.5

	Unit	G / S	M.D.L.	14C 646168	15 646169	16A 646170	16B 646171	16C 646172	17A 646173	17B 646175	18 646176
Asbestos	%		0.5	<0.5	10	<0.5	<0.5	<0.5	<0.5	<0.5	12

Certified By:

Certificate of Analysis

AGAT WORK ORDER: 07T205636

PROJECT NO: PR-06-039

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Bill McGovern

Bulk Asbestos

DATE SAMPLED: **DATE RECEIVED:** January 17 2007 **DATE REPORTED:** January 29 2007 **SAMPLE TYPE:** Other

Comments: M.D.L. - Method Detection Limit; G / S - Guideline / Standard

645663	Condition of sample was satisfactory at time of arrival in laboratory.
645667	Condition of sample was satisfactory at time of arrival in laboratory.
645668	Condition of sample was satisfactory at time of arrival in laboratory.
645669	Condition of sample was satisfactory at time of arrival in laboratory.
645670	Condition of sample was satisfactory at time of arrival in laboratory.
645671	Condition of sample was satisfactory at time of arrival in laboratory.
645672	Condition of sample was satisfactory at time of arrival in laboratory.
645673	Condition of sample was satisfactory at time of arrival in laboratory.
645674	Condition of sample was satisfactory at time of arrival in laboratory.
645675	Condition of sample was satisfactory at time of arrival in laboratory.
645676	Condition of sample was satisfactory at time of arrival in laboratory.
645677	Condition of sample was satisfactory at time of arrival in laboratory.
645678	Condition of sample was satisfactory at time of arrival in laboratory.
645679	Condition of sample was satisfactory at time of arrival in laboratory.
645680	Condition of sample was satisfactory at time of arrival in laboratory.
645681	Condition of sample was satisfactory at time of arrival in laboratory.
645682	Condition of sample was satisfactory at time of arrival in laboratory.
645684	Condition of sample was satisfactory at time of arrival in laboratory.
646154	Condition of sample was satisfactory at time of arrival in laboratory.
646155	Condition of sample was satisfactory at time of arrival in laboratory.
646156	Condition of sample was satisfactory at time of arrival in laboratory.
646157	Condition of sample was satisfactory at time of arrival in laboratory.
646158	Condition of sample was satisfactory at time of arrival in laboratory.
	Asbestos containing: chrysotile
646159	Condition of sample was satisfactory at time of arrival in laboratory.
646160	Condition of sample was satisfactory at time of arrival in laboratory.
646161	Condition of sample was satisfactory at time of arrival in laboratory.
646162	Condition of sample was satisfactory at time of arrival in laboratory.
	Asbestos containing: chrysotile
646163	Condition of sample was satisfactory at time of arrival in laboratory.
	Asbestos containing: chrysotile
646164	Condition of sample was satisfactory at time of arrival in laboratory.
	Asbestos containing: chrysotile
646165	Condition of sample was satisfactory at time of arrival in laboratory.

Certified By:

Certificate of Analysis

AGAT WORK ORDER: 07T205636

PROJECT NO: PR-06-039

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Bill McGovern

Bulk Asbestos

DATE SAMPLED: **DATE RECEIVED:** January 17 2007 **DATE REPORTED:** January 29 2007 **SAMPLE TYPE:** Other

646166	Condition of sample was satisfactory at time of arrival in laboratory.
646167	Condition of sample was satisfactory at time of arrival in laboratory.
646168	Condition of sample was satisfactory at time of arrival in laboratory.
646169	Condition of sample was satisfactory at time of arrival in laboratory.
	Asbestos containing: chrysotile
646170	Condition of sample was satisfactory at time of arrival in laboratory.
646171	Condition of sample was satisfactory at time of arrival in laboratory.
646172	Condition of sample was satisfactory at time of arrival in laboratory.
646173	Condition of sample was satisfactory at time of arrival in laboratory.
646175	Condition of sample was satisfactory at time of arrival in laboratory.
646176	Condition of sample was satisfactory at time of arrival in laboratory.
	Asbestos containing: amosite

Certified By:

Certificate of Analysis

AGAT WORK ORDER: 07T206733

PROJECT NO: PR-06-039

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Fil Barillo

Bulk Asbestos

DATE SAMPLED: January 17 2007 | **DATE RECEIVED: January 24 2007** | **DATE REPORTED: January 31 2007** | **SAMPLE TYPE: Other**

	Unit	G / S	M.D.L	M19 - 17C 648445	M19 - 17D 648446	M19 - 17E 648447	M19 - 17F 648448	M19 - 19 648449	M19 - 20A 648450	M19 - 21A 648453	M19 - 21B 648454
Asbestos	%		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	15	<0.5	<0.5

	Unit	G / S	M.D.L	M19 - 21C 648455	M19 - 22 648456	M19 - 23A 648457	M19 - 23B 648458	M19 - 23C 648459	M19 - 23D 648460	M19 - 23E 648461	M19 - 24A 648462
Asbestos	%		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

	Unit	G / S	M.D.L	M19 - 24B 648463	M19 - 24C 648464	M19 - 25A 648465	M19 - 25B 648466	M19 - 25C 648467	M19 - 25D 648468	M19 - 25E 648469	M19 - 25F 648470
Asbestos	%		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

	Unit	G / S	M.D.L	M19 - 25G 648471	M19 - 26A 648472	M19 - 27 648475	M19 - 28A 648476	M19 - 29A 648479	M19 - 29B 648480	M19 - 29C 648481	M19 - 30A 648482
Asbestos	%		0.5	<0.5	2	20	2	<0.5	<0.5	<0.5	Trace

	Unit	G / S	M.D.L	M19 - 31A 648485	M19 - 31B 648486	M19 - 31C 648487	M19 - 32A 648488	M19 - 32B 648489	M19 - 32C 648490	M19 - 17G 648540
Asbestos	%		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Certified By:

Certificate of Analysis

AGAT WORK ORDER: 07T206733

PROJECT NO: PR-06-039

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Fil Barillo

Bulk Asbestos

DATE SAMPLED: January 17 2007 | **DATE RECEIVED: January 24 2007** | **DATE REPORTED: January 31 2007** | **SAMPLE TYPE: Other**

Comments: M.D.L - Method Detection Limit; G / S - Guideline / Standard

648445	Condition of sample was satisfactory at time of arrival in laboratory.
648446	Condition of sample was satisfactory at time of arrival in laboratory.
648447	Condition of sample was satisfactory at time of arrival in laboratory.
648448	Condition of sample was satisfactory at time of arrival in laboratory.
648449	Condition of sample was satisfactory at time of arrival in laboratory.
648450	Condition of sample was satisfactory at time of arrival in laboratory.
	Asbestos containing: chrysotile
648453	Condition of sample was satisfactory at time of arrival in laboratory.
648454	Condition of sample was satisfactory at time of arrival in laboratory.
648455	Condition of sample was satisfactory at time of arrival in laboratory.
648456	Condition of sample was satisfactory at time of arrival in laboratory.
648457	Condition of sample was satisfactory at time of arrival in laboratory.
648458	Condition of sample was satisfactory at time of arrival in laboratory.
648459	Condition of sample was satisfactory at time of arrival in laboratory.
648460	Condition of sample was satisfactory at time of arrival in laboratory.
648461	Condition of sample was satisfactory at time of arrival in laboratory.
648462	Condition of sample was satisfactory at time of arrival in laboratory.
648463	Condition of sample was satisfactory at time of arrival in laboratory.
648464	Condition of sample was satisfactory at time of arrival in laboratory.
648465	Condition of sample was satisfactory at time of arrival in laboratory.
648466	Condition of sample was satisfactory at time of arrival in laboratory.
648467	Condition of sample was satisfactory at time of arrival in laboratory.
648468	Condition of sample was satisfactory at time of arrival in laboratory.
648469	Condition of sample was satisfactory at time of arrival in laboratory.
648470	Condition of sample was satisfactory at time of arrival in laboratory.
648471	Condition of sample was satisfactory at time of arrival in laboratory.
648472	Condition of sample was satisfactory at time of arrival in laboratory.
	Asbestos containing: chrysotile
648475	Condition of sample was satisfactory at time of arrival in laboratory.
	Asbestos containing: chrysotile
648476	Condition of sample was satisfactory at time of arrival in laboratory.
	Asbestos containing: chrysotile
648479	Condition of sample was satisfactory at time of arrival in laboratory.
648480	Condition of sample was satisfactory at time of arrival in laboratory.

Certified By:

Certificate of Analysis

AGAT WORK ORDER: 07T206733

PROJECT NO: PR-06-039

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Fil Barillo

Bulk Asbestos

DATE SAMPLED: January 17 2007 | **DATE RECEIVED: January 24 2007** | **DATE REPORTED: January 31 2007** | **SAMPLE TYPE: Other**

648481	Condition of sample was satisfactory at time of arrival in laboratory.
648482	Condition of sample was satisfactory at time of arrival in laboratory.
648485	Condition of sample was satisfactory at time of arrival in laboratory.
648486	Condition of sample was satisfactory at time of arrival in laboratory.
648487	Condition of sample was satisfactory at time of arrival in laboratory.
648488	Condition of sample was satisfactory at time of arrival in laboratory.
648489	Condition of sample was satisfactory at time of arrival in laboratory.
648490	Condition of sample was satisfactory at time of arrival in laboratory.
648540	Condition of sample was satisfactory at time of arrival in laboratory.

Certified By:

AGAT® Laboratories

5623 McADAM ROAD
MISSISSAUGA, ON
CANADA L4Z 1N9

PH: (905)501-9998
FAX: (905)501-0589
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 07T216831

PROJECT NO: PR-06-039

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Fil Barillo

Bulk Asbestos

DATE SAMPLED: Mar 23, 2007 | **DATE RECEIVED: Mar 26, 2007** | **DATE REPORTED: Apr 02, 2007** | **SAMPLE TYPE: Other**

	Unit	G / S	M.D.L	M19-05c 674208	M19-13b 674212	M19-13c 674215	M19-19b 674216	M19-19c 674217	M19-23f 674218	M19-23g 674219	M19-33a 674220
Asbestos	%		0.5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

	Unit	G / S	M.D.L	M19-33b 674221	M19-33c 674222	M19-34a 674223	M19-34b 674224	M19-34c 674225
Asbestos	%		0.5	N.D.	N.D.	N.D.	N.D.	N.D.

Comments: M.D.L - Method Detection Limit; G / S - Guideline / Standard

674208-674225 Condition of sample was satisfactory at time of arrival in laboratory.

"ND" - Not Detected

Certified By:

APPENDIX C

ANALYTICAL RESULTS – LEAD

Certificate of Analysis

AGAT WORK ORDER: 07T205700

PROJECT NO: NRC

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Bill McGovern

Lead in Paint

DATE SAMPLED: **DATE RECEIVED:** January 17 2007 **DATE REPORTED:** January 25 2007 **SAMPLE TYPE:** Other

	Unit	G / S	M.D.L.	L1 645856	L2 645857	L3 645858	L4 645859	L5 645860	L6 645861	L7 645862	L8 645863
Lead	µg/g		7.0	1800	3930	1720	761	18200	8200	68.4	<7.0

Comments: M.D.L. - Method Detection Limit; G / S - Guideline / Standard

Certified By:

Certificate of Analysis

AGAT WORK ORDER: 07T206732

PROJECT NO: PR-06-039

CLIENT NAME: OAKHILL ENVIRONMENTAL

ATTENTION TO: Fil Barillo

Lead in Paint

DATE SAMPLED: January 17 2007 **DATE RECEIVED:** January 24 2007 **DATE REPORTED:** February 02 2007 **SAMPLE TYPE:** Paint

	Unit	G / S	M.D.L.	M19 - L9 648551	M19 - L10 648554
Lead	µg/g		7.0	642	252

Comments: M.D.L. - Method Detection Limit; G / S - Guideline / Standard

Certified By: Jordy Takewell

APPENDIX D

PHOTOGRAPHS OF DAMAGED ACM

M-19 ASBESTOS PHOTOGRAPH LOG

Photo #	Photograph	Function Space #	Comments
01		G001	Damaged firewall. 5 encapsulations are required.
02		G001	Damaged firewall. Removal of approximately 1m^2.
03		G001	Damaged mud joint compound fitting insulation on the steam system. Two encapsulations are required.
04		G001	Damaged aircell pipe insulation on the steam system. Removal of 0.3 metres of aircell pipe insulation and 1 MJC elbow.
05		G001	Encapsulation of aircell pipe insulation is required on the steam system.
06		G001	Two minor encapsulations of 'cracked' aircell pipe insulation on the steam system.

Photo #	Photograph	Function Space #	Comments
07		G001	Damaged aircell pipe insulation and MJC fitting insulation on the domestic hot water system. Four encapsulations are required in G001.
08		G001	Damaged MJC fitting on the domestic cold water system. Five encapsulations are required in G001.
09		G001	Encapsulate open aircell pipe insulation end on condensate system.
10		G002	Encapsulate 1 damaged MJC fitting on the domestic hot-water system.
11		G002	Encapsulate 1 damaged MJC fitting on the domestic cold-water system
12		G002	Encapsulate 1 damaged MJC fitting on the domestic cold-water system

Photo #	Photograph	Function Space #	Comments
13		G002	Two encapsulations of open aircell pipe insulation ends on two steam lines.
14		G002	Two encapsulations of open aircell pipe insulation ends on two domestic hot-water lines.
15		G009	Encapsulation (1) of damaged MJC fitting on the steam system is required.
16		G009	Encapsulation of 0.2 metres of damaged aircell pipe insulation on the condensate system.
17		G009	Encapsulation (1) of damaged MJC fitting on the condensate system.
18		G009	Encapsulation of damaged aircell pipe insulation (0.2 metres) on the domestic cold water system.
19		G009	Encapsulation (1) of damaged MJC fitting on the domestic cold water system.

Photo #	Photograph	Function Space #	Comments
20		1002	Encapsulation of 0.2 metres of damaged aircell pipe insulation on the condensate system.
21		1014	Damaged area on the hot water heating system requires the removal of 0.1 metres of aircell pipe insulation and the encapsulation of (2) open ends.
22		1015	Damaged parging on chiller elbows requires (2) removals.
23		1015	Damaged aircell pipe insulation on the hot water heating system requires encapsulation of 0.1 metres.
24		2002	Damaged MJC fitting on the condensate system requires (1) encapsulation.
25		2002	Damaged MJC fitting on the steam system requires (1) encapsulation.

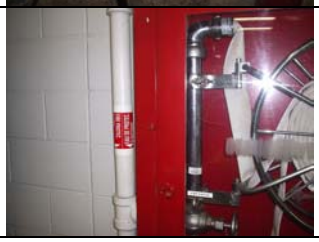
Photo #	Photograph	Function Space #	Comments
26		2003	Damaged MJC fitting on the domestic cold water system requires (1) encapsulation.
27		2002	Damaged MJC fitting on the steam system requires (1) encapsulation.
28		2006	Damaged MJC fitting on the steam system requires (1) encapsulation.
29		2009	Damaged MJC fitting on the condensate system requires (1) encapsulation.
30		2010	Damaged MJC fittings on the steam system requires (2) encapsulations.
31		2010	Damaged MJC fitting on the steam system requires (1) encapsulation.
32		2010	Damaged aircell pipe insulation (crack) on the steam system requires (1) encapsulation of a 0.1 metre area.

Photo #	Photograph	Function Space #	Comments
33		2010	Damaged MJC fitting on the condensate system requires (1) encapsulations.
34		SW002	Damaged aircell pipe insulation on the hot water heating system requires (1) encapsulation of a 0.5 metre area.

M-19 MOULD PHOTOGRAPH LOG

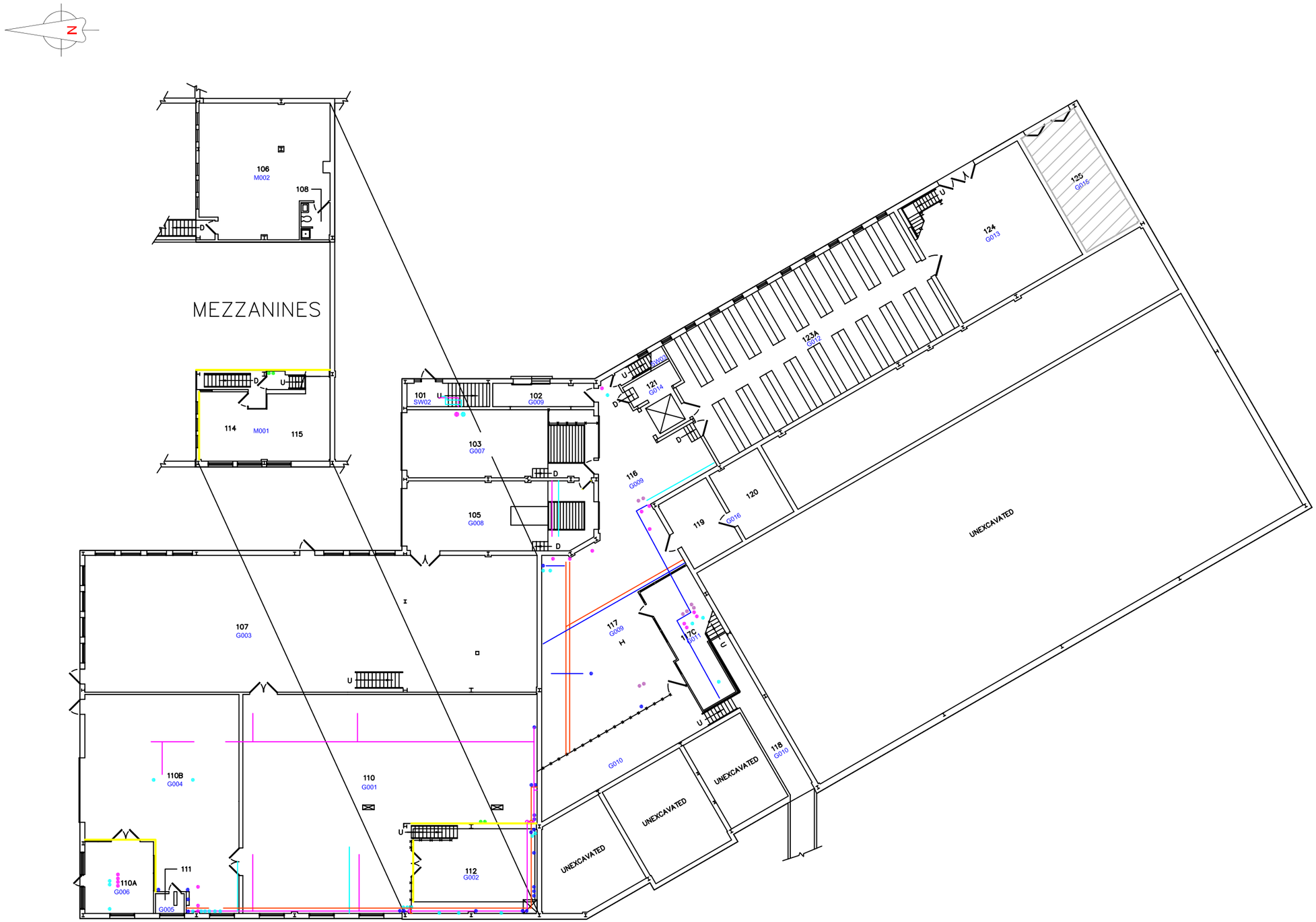
Photo #	Photograph	Function Space #	Comments
M01		2015	Mould on chiller pipe insulation.

M-19 LEAD PHOTOGRAPH LOG

Photo #	Photograph	Function Space #	Comments
L01		G001	Red paint on pipe in stockroom over white paint
L02		G001	Red paint on fire-hose cabinet in stockroom over green paint

APPENDIX E

FLOOR PLANS



OAKHILL
ENVIRONMENTAL

LEGEND

1001 FUNCTIONAL SPACE #

AREA NOT INSPECTED (INACCESSIBLE)

ACM PIPE INSULATION: DOMESTIC HW

ACM PIPE INSULATION: STEAM

ACM PIPE INSULATION: CONDENSATE

ACM FITTING INSULATION: DOMESTIC CW

ACM FITTING INSULATION: STEAM

ACM FITTING INSULATION: CONDENSATE

ACM FITTING INSULATION: HW HEATING

ACM FITTING INSULATION: DOMESTIC CW

ACM FITTING INSULATION: DOMESTIC HW

ACM FITTING INSULATION: CHILLER

ACM TRANSITE WALL 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-19

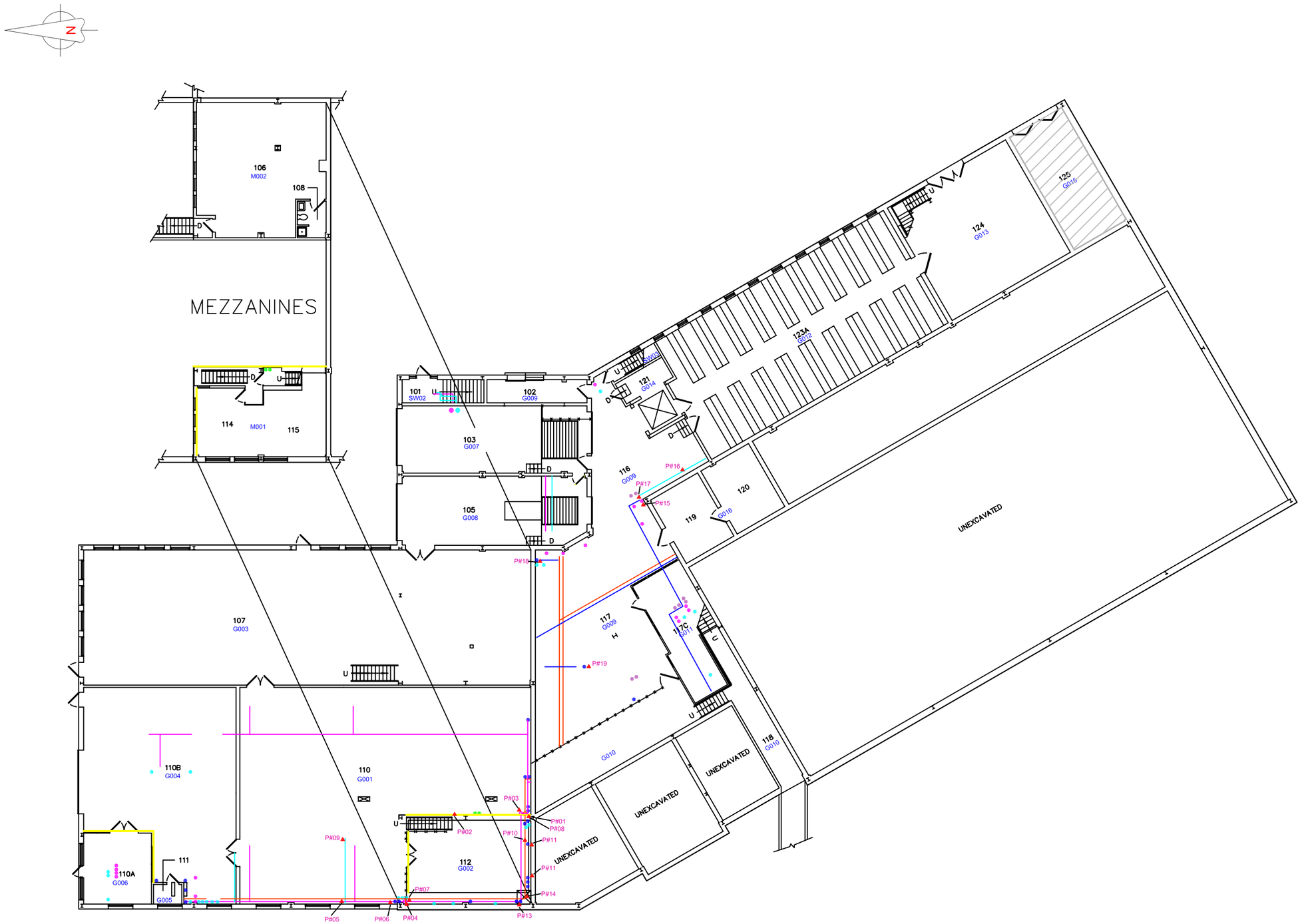
PROJECT NO.
PR-06-39

DATE
MARCH 2007

SCALE
NTS

TITLE
GROUND FLOOR ASBESTOS LOCATIONS

SHEET
G-1



OAKHILL ENVIRONMENTAL

LEGEND

- 1001 FUNCTIONAL SPACE #
- AREA NOT INSPECTED (INACCESSIBLE)
- DAMAGED ACM LOCATION
- P# PHOTOGRAPH #
- ACM PIPE INSULATION: DOMESTIC HW
- ACM PIPE INSULATION: STEAM
- ACM PIPE INSULATION: CONDENSATE
- ACM FITTING INSULATION: DOMESTIC CW
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE
- ACM FITTING INSULATION: HW HEATING
- ACM FITTING INSULATION: DOMESTIC CW
- ACM FITTING INSULATION: DOMESTIC HW
- ACM FITTING INSULATION: CHILLER
- ACM TRANSITE WALL PANEL

NOTE:
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DESIGNATED SUBSTANCES SURVEY
BUILDING M-19

PROJECT NO.
PR-06-39

DATE
MARCH 2007

SCALE
NTS

TITLE
GROUND FLOOR ASBESTOS SURVEY

SHEET
G-2

OAKHILL
ENVIRONMENTAL

LEGEND

1001 FUNCTIONAL SPACE #

AREA NOT INSPECTED (INACCESSIBLE)

SAMPLE LOCATION: NON-ACM

SAMPLE LOCATION: ACM

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DESIGNATED SUBSTANCES SURVEY
BUILDING M-19

PROJECT NO.
PR-06-39

DATE
MARCH 2007

SCALE
NTS

TITLE
GROUND FLOOR SAMPLE LOCATIONS

SHEET
G-2A

OAKHILL ENVIRONMENTAL

LEGEND

- LEAD SAMPLE LOCATION (<5000 ppm)
- LEAD SAMPLE LOCATION (>5000 ppm)
- AREA NOT INSPECTED (INACCESSIBLE)

CLIENT

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PROJECT

DESIGNATED SUBSTANCES SURVEY
BUILDING M-19

PROJECT NO.
PR-06-39

DATE
MARCH 2007

SCALE
NTS

TITLE

GROUND FLOOR
LEAD SAMPLE
LOCATIONS

SHEET
G-3

LEGEND

- 1001 FUNCTIONAL SPACE #
- AREA NOT INSPECTED (INACCESSIBLE)
- ACM PIPE INSULATION: HW HEATING
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE
- ACM FITTING INSULATION: HW HEATING
- ACM FITTING INSULATION: DOMESTIC CW
- ACM FITTING INSULATION: CHILLER

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.

OAKHILL ENVIRONMENTAL

CLIENT

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PROJECT

DESIGNATED SUBSTANCES SURVEY
BUILDING M-19

PROJECT NO.
PR-06-39

DATE
MARCH 2007

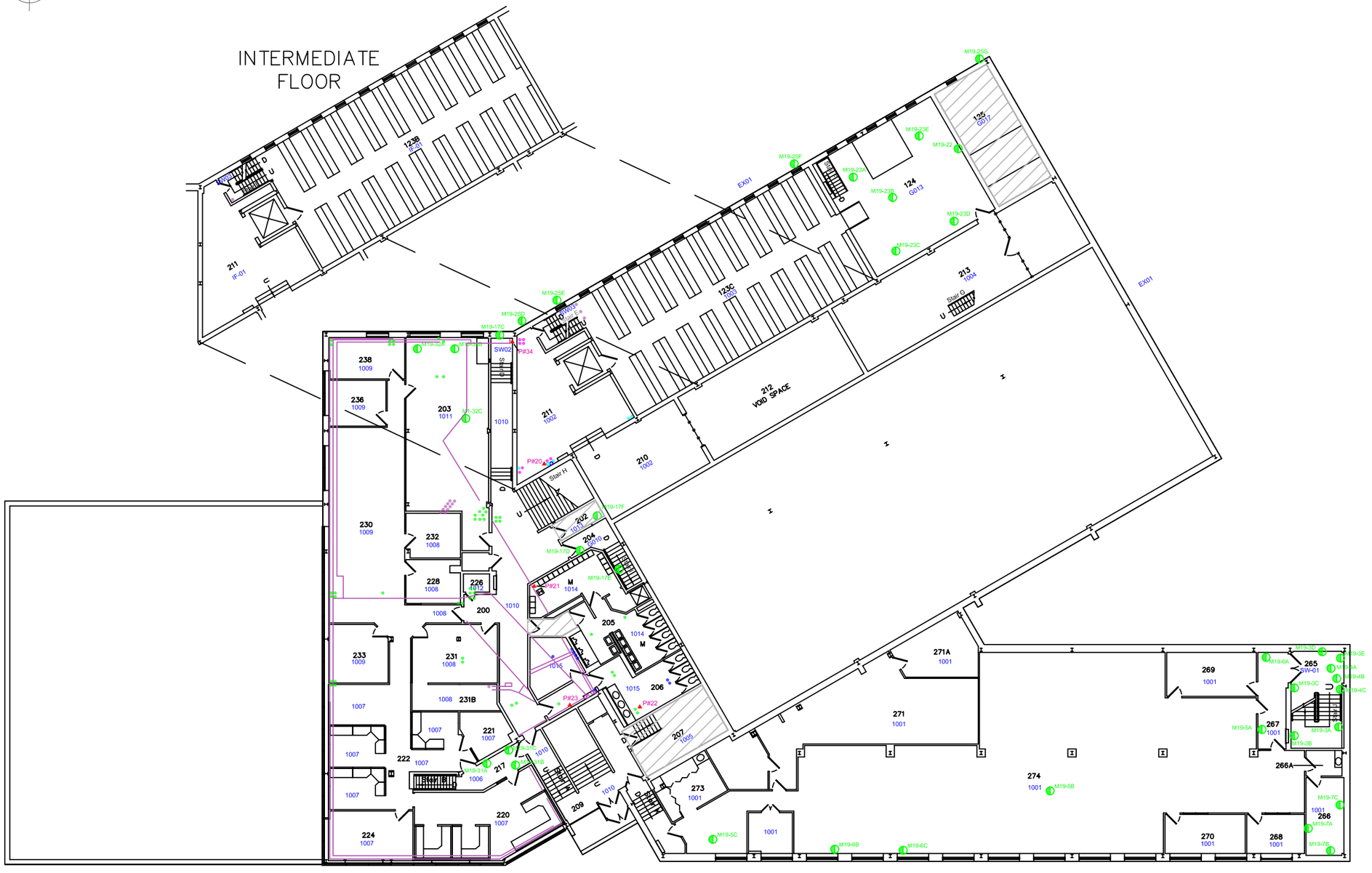
SCALE
NTS

TITLE
FIRST FLOOR ASBESTOS LOCATIONS

SHEET
1-1

N

INTERMEDIATE FLOOR



OAKHILL
ENVIRONMENTAL

LEGEND

- 1001 FUNCTIONAL SPACE #
- SAMPLE LOCATION: NON-ACM
- SAMPLE LOCATION: ACM
- DAMAGED ACM LOCATION
- P# PHOTOGRAPH #
- AREA NOT INSPECTED (INACCESSIBLE)
- ACM PIPE INSULATION: HW HEATING
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE
- ACM FITTING INSULATION: HW HEATING
- ACM FITTING INSULATION: DOMESTIC CW
- ACM FITTING INSULATION: DOMESTIC HW
- ACM FITTING INSULATION: CHILLER

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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DESIGNATED SUBSTANCES SURVEY
BUILDING M-19

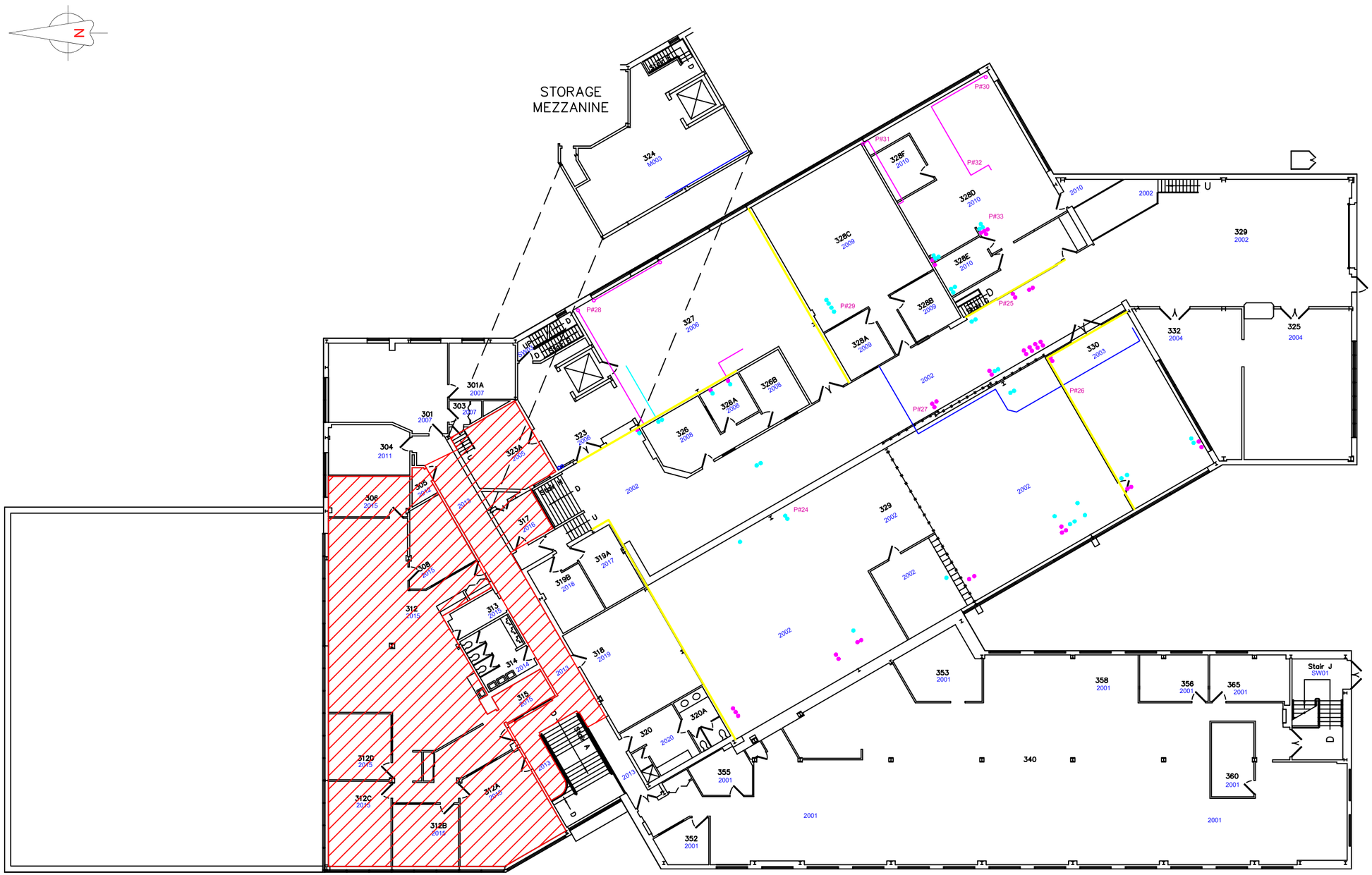
PROJECT NO.
PR-06-39

DATE
MARCH 2007

SCALE
NTS

TITLE
FIRST FLOOR ASBESTOS SURVEY

SHEET
1-2



OAKHILL
ENVIRONMENTAL

LEGEND

1001 FUNCTIONAL SPACE #

- ACM PIPE INSULATION: HW HEATING
- ACM PIPE INSULATION: STEAM
- ACM PIPE INSULATION: CONDENSATE
- ACM FITTING INSULATION: DOMESTIC CW
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE
- ACM FITTING INSULATION: HW HEATING
- ACM FITTING INSULATION: DOMESTIC CW
- ACM TRANSITE WALL PANEL
- ACM FLOOR 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: t's, valves, ends, hangers, etc.

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BUILDING M-19

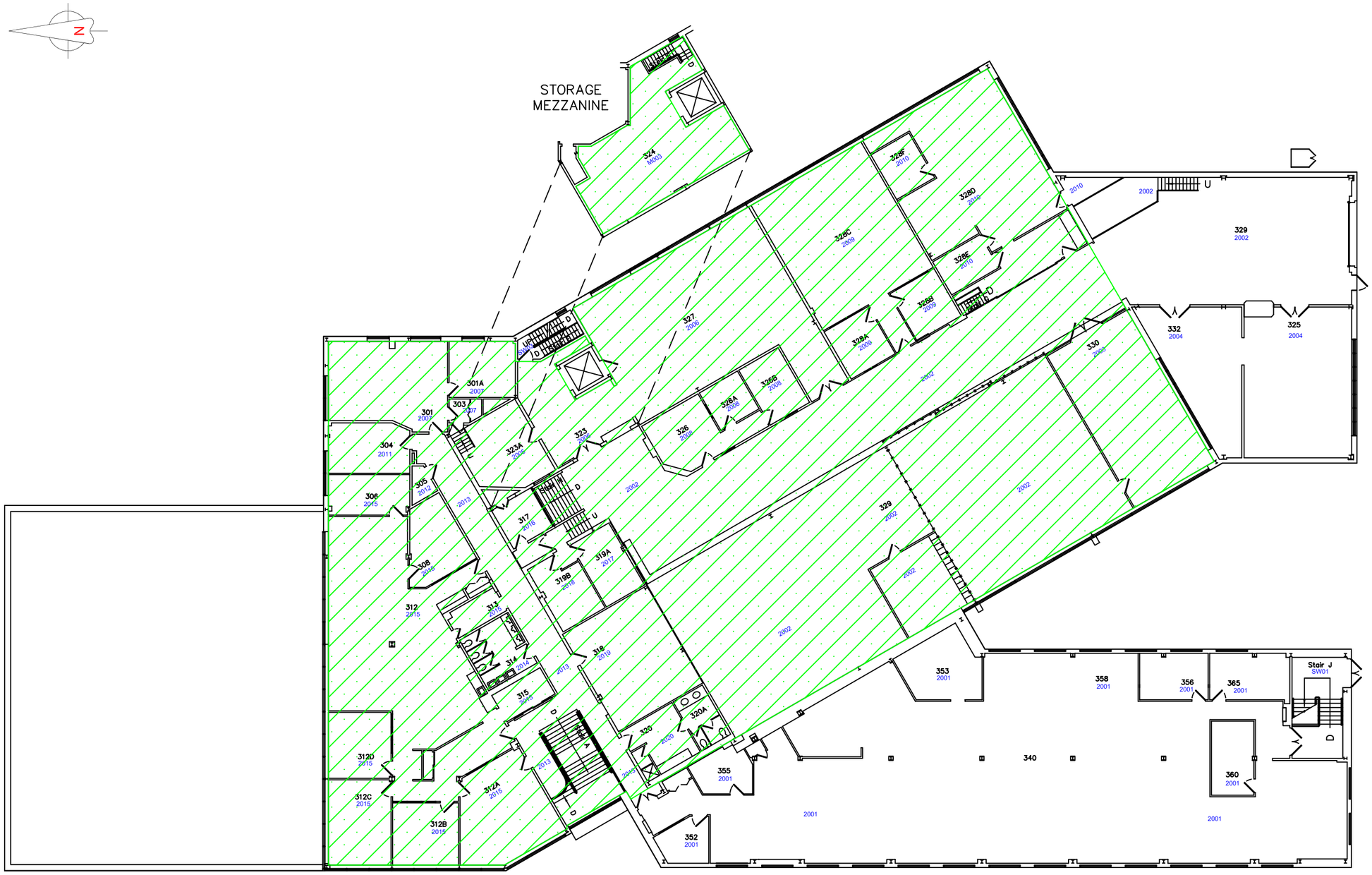
PROJECT NO.
PR-06-39

DATE
MARCH 2007

SCALE
NTS

TITLE
SECOND FLOOR ASBESTOS LOCATIONS

SHEET
2-1



OAKHILL
ENVIRONMENTAL

LEGEND

1001 FUNCTIONAL SPACE #

ACM CEMENT DECK

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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DESIGNATED SUBSTANCES SURVEY
BUILDING M-19

PROJECT NO.
PR-06-39

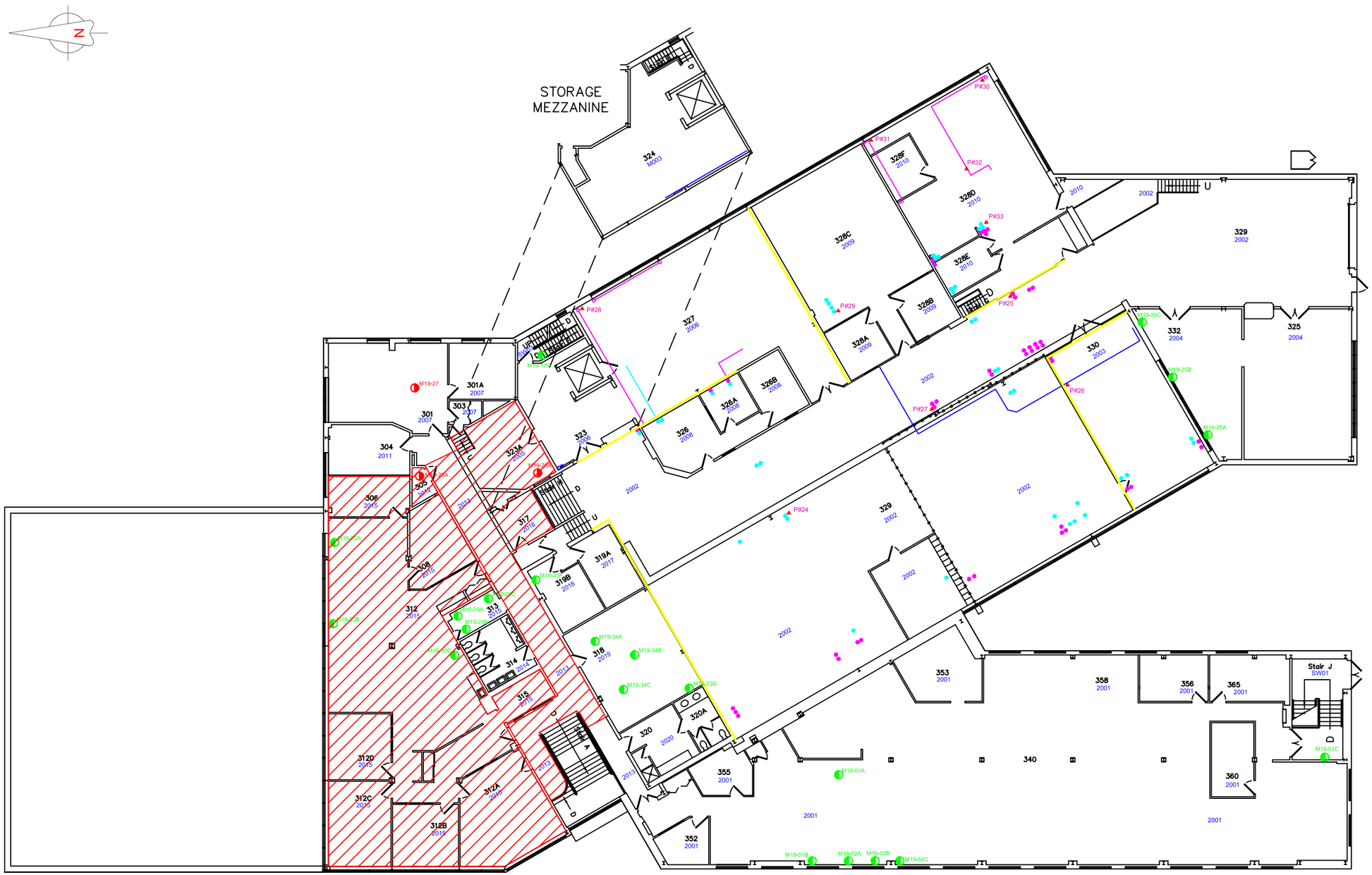
DATE
MARCH 2007

SCALE
NTS

TITLE

SECOND FLOOR ACM DECK LOCATIONS

SHEET
2-1A



OAKHILL
ENVIRONMENTAL

LEGEND

- 1001 FUNCTIONAL SPACE #
- SAMPLE LOCATION: NON-ACM
- SAMPLE LOCATION: ACM
- DAMAGED ACM LOCATION
- P# PHOTOGRAPH #
- ACM PIPE INSULATION: HW HEATING
- ACM PIPE INSULATION: STEAM
- ACM PIPE INSULATION: CONDENSATE
- ACM FITTING INSULATION: DOMESTIC CW
- ACM FITTING INSULATION: STEAM
- ACM FITTING INSULATION: CONDENSATE
- ACM FITTING INSULATION: HW HEATING
- ACM FITTING INSULATION: DOMESTIC CW
- ACM TRANSITE WALL PANEL
- ACM FLOOR 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: t's, valves, ends, hangers, etc.

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PROJECT

DESIGNATED SUBSTANCES SURVEY
BUILDING M-19

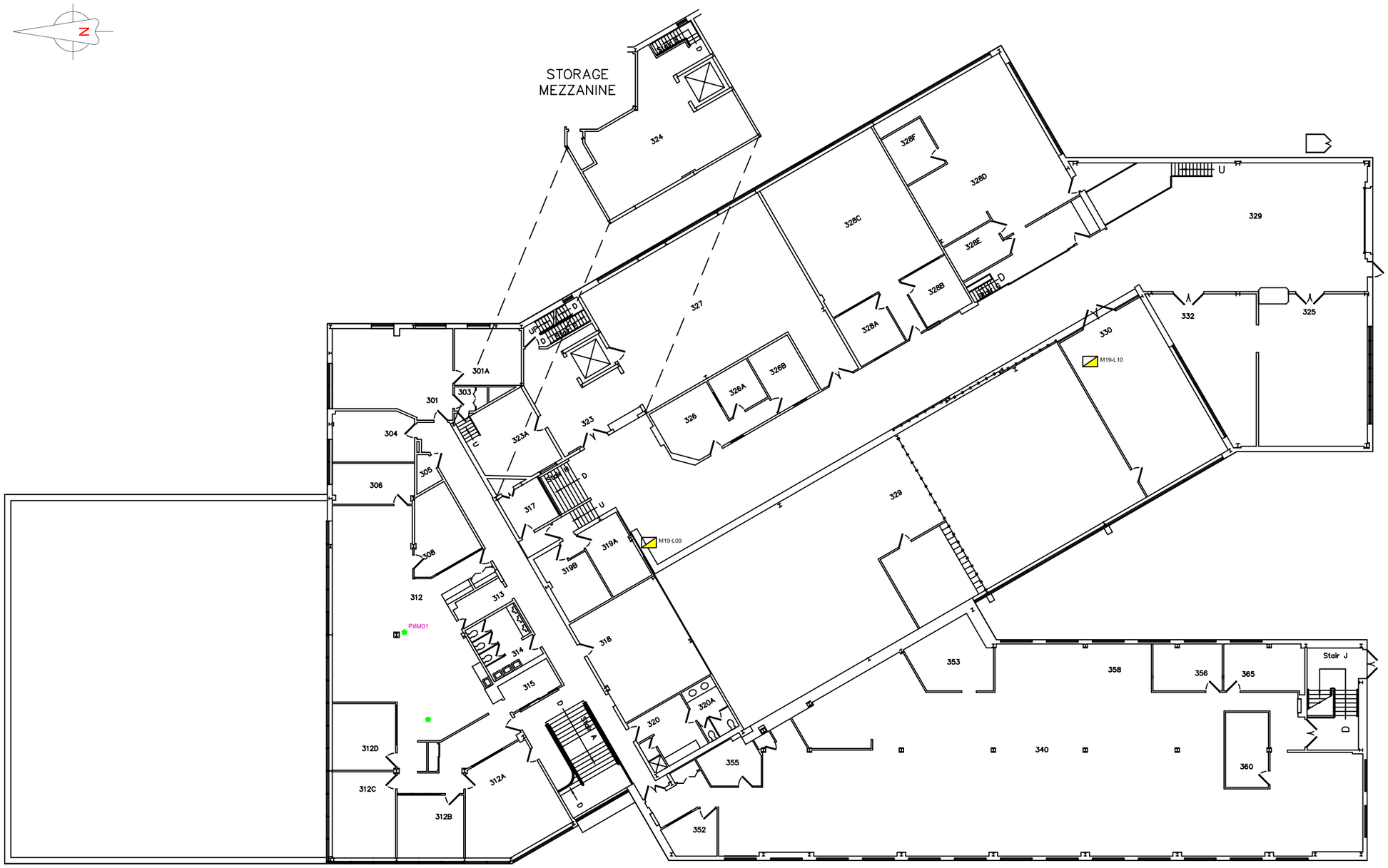
PROJECT NO.
PR-06-39

DATE
MARCH 2007

SCALE
NTS

TITLE
SECOND FLOOR ASBESTOS SURVEY

SHEET
2-2



OAKHILL
ENVIRONMENTAL

LEGEND

LEAD SAMPLE LOCATION (<5000 ppm)

MOULD LOCATION

P# PHOTOGRAPH #

CLIENT

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1200 MONTREAL RD.
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PROJECT

DESIGNATED SUBSTANCES SURVEY
BUILDING M-19

PROJECT NO.
PR-06-39

DATE
MARCH 2007

SCALE
NTS

TITLE

SECOND FLOOR
LEAD SAMPLES
&
MOULD
LOCATIONS

SHEET
2-3

APPENDIX F

FUNCTIONAL SPACE FORMS

Building: M-19 **Date:** January 12, 2007 **Job #:** PR-06-039	**Notes: Sheet 1 of 2** - Some areas of the steam system have been replaced with fibreglass. - Steam aircell pipe insulation requires 3 encapsulations and steam MJC fitting insulation requires 5 encapsulations and 1 removal. - Aircell pipe insulation on the condensate system requires 1 encapsulation. - The firewall requires 5 encapsulations for a total area of 1m^2 and removal of a bad damaged area of 1m^2.	**FS #:** G001 (sheet 1 of 2) **FS Area:** Room 110 storage **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	11	Firewall	Wall	Y	N	15% Chrysotile	83 m^2	X	--	--	--	X	--	O & M	G-1	01
	11	Firewall	Wall	Y	N	15% Chrysotile	1 m^2	--	X	--	--	X	--	5 encapsulations	G-2	01
	11	Firewall	Wall	Y	N	15% Chrysotile	1 m^2	--	X	--	--	X	--	1 removal	G-2	02
Ceil.	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Other	08	Aircell PI	Steam	Y	Y	20% Chrysotile	56 LM	X	--	--	--	X	--	O & M	G-1	--
	08	Aircell PI	Steam	Y	Y	20% Chrysotile	1 LM	--	--	X	--	X	--	3 encapsulations	G-2	05, 06
	10	MJC FI	Steam	Y	Y	10% Chrysotile	21 units	X	--	--	--	X	--	O & M	G-1	--
	10	MJC FI	Steam	Y	Y	10% Chrysotile	6 units	--	--	X	--	X	--	5 encapsulations & 1 removal	G-2	03, 04
	n/a	FG PI & FI	Steam	N	--	--	--	--	--	--	--	--	--	Re-insulated areas	--	--
	08	Aircell PI	DHW	Y	Y	20% Chrysotile	29 LM	X	--	--	--	X	--	O & M	G-1	--
	08	Aircell PI	DHW	Y	Y	20% Chrysotile	1 LM	--	--	X	--	X	--	2 encapsulations	G-2	07
	10	MJC FI	DHW	Y	Y	10% Chrysotile	14 units	X	--	--	--	X	--	O & M	G-1	--
	10	MJC FI	DHW	Y	Y	10% Chrysotile	5 units	--	--	X	--	X	--	2 encapsulations	G-2	07
	09	Sweat wrap (with tar paper layer) PI	DHW	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 12, 2007 **Job #:** PR-06-039	**Notes: Sheet 2 of 2** - Aircell pipe insulation on the condensate system requires 1 encapsulation of 0.5 LM. - MJC fitting insulation on the domestic hot water system requires 5 encapsulations. - MJC FI fitting insulation on the domestic cold water system requires 5 encapsulations. - Lead samples collected here: M19-L1, M19-L2, M19-L3, M19-L5, M19-L6 and M19-L7. - Asbestos samples collected here: M19-09 (a-c), M19-08, M19-10, M19-11 and M19-12.	**FS #:** G001 (sheet 2 of 2) **FS Area:** Room 110 storage **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Other	08	Aircell PI	Conden	Y	Y	20% Chrysotile	10 LM	X	--	--	--	X	--	O & M	G-1	--
	08	Aircell PI	Conden	Y	Y	20% Chrysotile	0.5 LM	--	X	--	--	X	--	1 encapsulation	G-2	09
	10	MJC FI	Conden	Y	Y	10% Chrysotile	3 units	X	--	--	--	X	--	O & M	G-1	--
	12	Parging on FI	Chiller	Y	Y	10% Chrysotile	6 units	X	--	--	--	X	--	O & M	G-1	--
	10	MJC FI	DCW	Y	Y	10% Chrysotile	6 units	X	--	--	--	X	--	O & M	G-1	--
	10	MJC FI	DCW	Y	Y	10% Chrysotile	5 units	--	--	X	--	X	--	5 encapsulations	G-2	08
	n/a	Styrofoam	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI & FI	Conden	N	--	--	--	--	--	--	--	--	--	Re-insulated areas	--	--

Criteria for Access to an area containing ACM:
***A**: All building occupants may have access to this area*
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***C**: Areas of the building behind walls or ceiling system*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** March 23, 2007 **Job #:** PR-06-039	**Notes:** - DCW: requires two encapsulations of aircell pipe insulation for a total of 0.2 LM and two encapsulations of damaged MJC fitting insulation (elbows) - Steam: requires two encapsulations of aircell pipe insulation for a total of 0.2 LM - DHW: requires one encapsulation of damaged MJC fitting insulation	**FS #:** G002 **FS Area:** Room 112 Storage **Inspector:** BM, RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Walls	N	--	--	--	--	--	--	--	--	--	--	--	--
	18	Transite panel	Wall	Y	N	12% Amosite	17 m^2	X	--	--	X	--	--	O & M	G-1	--
Ceil.	n/a	Concrete	Ceil.	N	--	--	--	--	--	--	--	--	--	--	--	--
Other	08	Aircell PI	DHW	Y	Y	20% Chrysotile	13 LM	X	--	--	X	--	--	O & M	G-1	--
	08	Aircell PI	DHW	Y	Y	20% Chrysotile	0.2 LM	--	X	--	X	--	--	2 encapsulations	G-2	14
	10	MJC FI	DHW	Y	Y	10% Chrysotile	1 unit	--	X	--	X	--	--	1 encapsulation	G-2	10
	08	Aircell PI	Steam	Y	Y	20% Chrysotile	13 LM	X	--	--	X	--	--	O & M	G-1	--
	08	Aircell PI	Steam	Y	Y	20% Chrysotile	0.2 LM	--	X	--	X	--	--	2 encapsulations	G-2	13
	n/a	FG PI	Conden.	N	--	--	--	--	--	--	--	--	--	--	--	--
	10	MJC FI	Conden.	Y	Y	10% Chrysotile	5 units	X	--	--	X	--	--	O & M	G-1	--
	n/a	FG PI + FI	DCW													
	10	MJC FI	DCW	Y	Y	10% Chrysotile	7 unit	X	--	--	X	--	--	O & M	G-1	--
	10	MJC FI	DCW	Y	Y	10% Chrysotile	2 unit	--	X	--	X	--	--	2 encapsulations	G-2	11, 12
	n/a	FG PI	DCW	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Styrofoam PI + FI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI + FI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 12, 2007 **Job #:** PR-06-039	**Notes:** - No ACM was observed. - Sample M19-014 (a-c) and M19-L4 were collected here.	**FS #:** G003 **FS Area**: Room 107 Publications/Sales & Distribution **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	14	12” x 12” FT beige	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete block	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Concrete	Deck	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceil.		n/a														
Other	n/a	FG PI	Steam	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI	Conden	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI	DCW	N	--	--	--	--	--	--	--	--	--	--	--	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 12, 2007 **Job #:** PR-06-039	**Notes:** -Samples M19-15 and M19-18 were collected here. - All ACM's in good condition.	**FS #:** G004 **FS Area:** Room 110B **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete block	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	18	Transite panel	Wall	Y	Y	12% Chrysotile	13 m^2	X	--	--	--	X	--	O & M	G-1	--
	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Concrete Deck	Deck	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceil.	08	Aircell PI	Conden	Y	Y	20% Chrysotile	4 LM	X	--	--	--	X	--	O & M	G-1	--
	n/a	FG PI	Conden	N	--	--	--	--	--	--	--	--	--	--	--	--
	15	MJC FI	Conden	Y	Y	10% Chrysotile	15 units	X	--	--	--	X	--	O & M	G-1	--
	09	Sweat wrap (with tar paper layer) PI	DCW	N	--	--	--	--	--	--	--	--	--	--	--	--
	15	MJC FI	DCW	Y	Y	10% Chrysotile	6 units	X	--	--	--	X	--	O & M	G-1	--
	n/a	FG PI	DCW	N	--	--	--	--	--	--	--	--	--	--	--	--
	08	Aircell PI	DHW	Y	Y	20% Chrysotile	3 LM	X	--	--	--	X	--	O & M	G-1	--
	n/a	FG	DHW	N	--	--	--	--	--	--	--	--	--	--	--	--
	15	MJC FI	Steam	Y	Y	10% Chrysotile	19 units	X	--	--	--	X	--	O & M	G-1	--
	08	Aircell PI	Steam	Y	Y	20% Chrysotile	6 LM	X	--	--	--	X	--	O & M	G-1	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 12, 2007 **Job #:** PR-06-039	**Notes:** - No ACM was observed.	**FS #:** G005 **FS Area:** Room 111 storage **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	16	12" x 12" FT tan	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete block	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 12, 2007 **Job #:** PR-06-039	**Notes:** - Samples M19-16 (a-c) were collected here. - All ACM is in good condition.	**FS #:** G006 **FS Area:** Room 110A Locker room **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	16	12" x 12" FT tan	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete block	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	n/a	FG PI	Steam	N	--	--	--	--	--	--	--	--	--	--	--	--
	15	MJC FI	Steam	Y	Y	10% Chrysotile	6 units	X	--	--	--	X	--	O & M	G-1	--
	15	MJC FI	Conden	Y	Y	10% Chrysotile	3 units	X	--	--	--	X	--	O & M	G-1	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 15, 2007 **Job #:** PR-06-039	**Notes:** - All ACM in good condition.	**FS #:** G007 **FS Area:** Loading dock area Room 103 **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Other	10	MJC FI	Steam	Y	Y	10% Chrysotile	1 unit	X	--	--	X	--	--	O & M	G-1	--
	n/a	FG PI	Steam	N	--	--	--	--	--	--	--	--	--	--	--	--
	10	MJC FI	Conden	Y	Y	10% Chrysotile	1 unit	X	--	--	X	--	--	O & M	G-1	--
	n/a	FG PI	Conden	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 15, 2007 **Job #:** PR-06-039	**Notes:** - All ACM is in good condition.	**FS #:** G008 **FS Area:** Room 105 Loading dock area **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Concrete block	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Other	08	Aircell PI	Steam	Y	Y	20% Chrysotile	4 LM	X	--	--	X	--	--	O & M	G-1	--
	n/a	FG with metal jacket	Steam	N	--	--	--	--	--	--	--	--	--	--	--	--
	08	Aircell PI	Conden	Y	Y	20% Chrysotile	4 LM	X	--	--	X	--	--	O & M	G-1	--
	n/a	FG with metal jacket	Conden	N	--	--	--	--	--	--	--	--	--	--	--	--

Criteria for <u>Access</u> to an area containing ACM:
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***C**: Areas of the building behind walls or ceiling system*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 15 & March 23, 2007 **Job #:** PR-06-039	**Notes: Sheet 1 of 2** - On the DCW system one encapsulation of 0.2 metres of damaged aircell is required. - On the DCW system one encapsulation of damaged elbow is required - On the condensate system one encapsulation of 0.2 metres of damaged aircell is required. - On condensate system one encapsulation of damaged elbow is required.	**FS #:** G009 (sheet 1 of 2) **FS Area:** Rooms 116, 117 & 102 **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Other																
	19	MJC FI	Chiller	N	--	--	--	--	--	--	--	--	--	Non-ACM MJC	--	--
	n/a	FG PI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	10	MJC FI	DCW	Y	Y	10% Chrysotile	21 units	X	--	--	X	--	--	O & M	G-1	--
	20	Sweat wrap (with white paper layer) PI	DCW	Y	Y	15% Chrysotile	15 LM	X	--	--	X	--	--	O & M	G-1	--
	21	Sweat wrap PI	DCW	N	--	--	--	--	--	--	--	--	--	Non-ACM type	--	--
	08	Aircell PI	DCW	Y	Y	20% Chrysotile	15 LM	X	--	--	X	--	--	O & M	G-1	--
	08	Aircell PI	DCW	Y	Y	20% Chrysotile	0.2 LM	--	--	X	X	--	--	1 encapsulation	G-2	18
	10	MJC FI	DCW	Y	Y	10% Chrysotile	1 unit	--	X	--	X	--	--	1 encapsulation	G-2	19
	10	MJC FI	Conden	Y	Y	10% Chrysotile	6 units	X	--	--	X	--	--	O & M	G-1	--
	08	Aircell PI	Conden	Y	Y	20% Chrysotile	6 LM	X	--	--	X	--	--	O & M	G-1	--
	08	Aircell PI	Conden	Y	Y	20% Chrysotile	0.2 LM	--	--	X	X	--	--	1 encapsulation	G-2	16
	10	MJC FI	Conden	Y	Y	10% Chrysotile	1 unit	--	X	--	X	--	--	1 encapsulation	G-2	17

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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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 15 & March 23, 2007 **Job #:** PR-06-039	**Notes: Sheet 2 of 2** - On the steam system one encapsulation of damaged elbow is required. - Samples M19-19 (b &c), M19-21 (a-c) and M19-20 were collected here.	**FS #:** G009 (sheet 2 of 2) **FS Area:** Rooms 116, 117 & 102 **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Other	10	MJC FI	Steam	Y	Y	10% Chrysotile	11 units	X	--	--	X	--	--	O & M	G-1	--
	10	MJC FI	Steam	Y	Y	10% Chrysotile	1 unit	--	X	--	X	--	--	1 encapsulation	G-2	15
	08	Aircell PI	DHW	Y	Y	20% Chrysotile	38 LM	X	--	--	X	--	--	O & M	G-1	--
	10	MJC FI	DHW	Y	Y	10% Chrysotile	10 units	X	--	--	X	--	--	O & M	G-1	--

Criteria for <u>Access</u> to an area containing ACM:
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Criteria for <u>Condition</u> of an ACM:
G: ACM is in GOOD condition; No damage
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MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: January 15, 2007

Job #: PR-06-039

Notes:
- All systems have been re-insulated with non-acm insulation.
- No ACM was observed.
- Sample M19-19a was collected here.

FS #: G010

FS Area: Mechanical room, room 204 and stairwell I

Inspector: BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Friable Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG insulation	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Other	n/a	FG PI & FI	DCW	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI & FI	HWH	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI	Conden	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI & FI	DHW	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI & FI	Steam	N	--	--	--	--	--	--	--	--	--	--	--	--
	19	MJC FI	Conden	N	--	--	--	--	--	--	--	--	--	--	--	--
	19	MJC FI	Steam	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - No ACM was observed within the room space. - Asbestos pipe insulation and fittings are present above the ceiling of this area but are accounted for in FS# G009.	**FS #:** G011 **FS Area:** Room 117C **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	14	12" x 12" FT off-white	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Partition	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Wood panel	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceiling		See notes														

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - No ACM was observed. - Samples M19-24 (a-c) were collected here.	**FS #:** G012 **FS Area:** Room 123A **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceil.	24	MJC FI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - Multi level area that includes the ground floor and first floor. - No ACM was observed. - Samples M19-22 and M19-23 (a-e) were collected here.	**FS #:** G013 **FS Area:** Room 124 **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	23	Terracotta with mortar	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Other	22	Thermal patch	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** March 23, 2007 **Job #:** PR-06-039	**Notes:** - No ACM was observed.	**FS #:** G014 **FS Area:** Room 121 elevator mechanical room **Inspector:** BM, RT

Building Materials				ACM Assessment												Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments		Dwg. #	Photo #
								G	F	P	A	B	C				
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--		--	--
Walls	n/a	Brick and mortar	Wall	N	--	--	--	--	--	--	--	--	--	--		--	--
Ceil.	n/a	Concrete	Ceil	N	--	--	--	--	--	--	--	--	--	--		--	--
Other	19	MJC FI	Chiller	N	--	--	--	--	--	--	--	--	--	--		--	--
	n/a	FG with metal jacketing	Chiller	N	--	--	--	--	--	--	--	--	--	--		--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** No access was possible to this area during the survey.	**FS #:** G015 **FS Area:** Room 125 **Inspector:** BM, RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor																
Walls																
Ceil.																
Above Ceil.																

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - No ACM was observed.	**FS #:** G016 **FS Area:** Rooms 119 + 120 Electrical rooms **Inspector:** BM & RT

Building Materials				ACM Assessment												Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments		Dwg. #	Photo #
								G	F	P	A	B	C				
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--		--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--		--	--
Ceil.	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--		--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 11, 2007 **Job #:** PR-06-039	**Notes:** - This was an early 1980's addition. - Area includes rooms: 266, 266A, 267, 268, 269, 270, 271, 271A, 273, 274 & stairwell K. - No ACM was observed. -Samples M19-6 (a-c), M19-5 (a-c) and M19-7 (a-c) were collected here	**FS #:** 1001 **FS Area:** First floor addition, cubicle office area **Inspector:** BM

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	07	12" x 12" FT beige with red	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Fabric/metal partition panel	Cubicle	N	--	--	--	--	--	--	--	--	--	--	--	--
	02	Drywall	Wall	N	--											--
Ceil.	05	2' x 4' CT strata	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Other	n/a	Fibreglass	HWT	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceil.	n/a	FG DI	HVAC	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI	HVAC	N	--	--	--	--	--	--	--	--	--	--	--	--
	02	Drywall	Wall	N												
	n/a	Concrete deck	Deck	N	--	--	--	--	--	--	--	--	--	--	--	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Oakhill Environmental *Functional Space Form*

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - The condensate system has damaged aircell pipe insulation of 0.2 LM that requires encapsulation.	**FS #:** 1002 **FS Area:** Rooms 210, 211 storage **Inspector:** BM, RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Other	20	Sweat wrap (with white paper layer) PI	DCW	Y	Y	15% Chrysotile	4 LM	X	--	--	--	X	--	O & M	1-1	--
Above Ceil.	10	MJC FI	Steam	Y	Y	10% Chrysotile	8 units	X	--	--	--	X	--	O & M	1-1	--
	n/a	FG PI	Steam	N	--	--	--	--	--	--	--	--	--	--	--	--
	10	MJC FI	Conden	Y	Y	10% Chrysotile	6 units	X	--	--	--	X	--	O & M	1-1	--
	n/a	FG PI	Conden	N	--	--	--	--	--	--	--	--	--	--	--	--
	08	Aircell PI	Conden	Y	Y	20% Chrysotile	5 LM	--	X	--	--	X	--	O & M	1-1	--
	08	Aircell PI	Conden	Y	Y	20% Chrysotile	0.2 LM	--	X	--	--	X	--	1 encapsulation	1-2	20

Criteria for Access to an area containing ACM:
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***C**: Areas of the building behind walls or ceiling system*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Oakhill Environmental *Functional Space Form*

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - No ACM was observed.	**FS #:** 1003 **FS Area:** Storage room **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Metal	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
	23	Terracotta with mortar	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Oakhill Environmental *Functional Space Form*

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - No ACM was observed.	**FS #:** 1004 **FS Area:** Room 213 work shop And stairwell 'G' **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Oakhill Environmental *Functional Space Form*

Building: M-19 **Date:** January 17, 2007 **Job #:** PR-06-039	**Notes:** No access was available to this room during the survey.	**FS #:** 1005 **FS Area:** Room 207 **Inspector:** BM, RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor																
Walls																
Ceil.																
Other																
Above Ceil.																

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: January 17, 2007

Job #: PR-06-039

Notes:
- Samples M19-31 (a-c) were collected here.
- No ACM was observed.

FS #: 1006

FS Area: Room 217 Hallway

Inspector: BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	04	12" x 12" FT grey	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	02	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT (4" square pattern)	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	31	Adhesive backing	Deck	N	--	--	--	--	--	--	--	--	--	From previous CT	--	--
	n/a	Concrete	Deck	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: January 17, 2007

Job #: PR-06-039

Notes:
- No access under carpet. It was reported that the floor tiles were removed 3 years ago.
- All ACM is in good condition.

FS #: 1007

FS Area: OHSA area, rooms: 220, 221, 222,224

Inspector: BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT (4" square pattern)	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	n/a	FG batting	On CT	N	--	--	--	--	--	--	--	--	--	Bulk insulation	--	--
	n/a	FG PI & FI	Steam	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI & FI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI & FI	DCW	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG DI	Duct	N	--	--	--	--	--	--	--	--	--	--	--	--
	08	Aircell PI	HWH	Y	Y	20% Chrysotile	59 LM	X	--	--	--	--	X	O & M	1-1	--
	31	Adhesive backing	Deck	N	--	--	--	--	--	--	--	--	--	--	--	--
	10	MJC FI	HWH	Y	Y	10% Chrysotile	8 units	X	--	--	--	--	X	O & M	1-1	--
	12	Parging FI	Chiller	Y	Y	10 % Chrysotile	4 units	X	--	--	--	--	X	O & M	1-1	--
	n/a	Concrete	Deck	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 17, 2007 **Job #:** PR-06-039	**Notes:** - All ACM in good condition.	**FS #:** 1008 **FS Area:** Rooms: 228, 231, 231B, 232 Security **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	14	12" x 12" FT off-white	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	17	Plaster	Wall	N												
Ceil.	n/a	2' x 4' CT (4" square pattern)	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	08	Aircell PI	HWH	Y	Y	20% Chrysotile	6 LM	X	--	--	--	--	X	O & M	1-1	--
	10	MJC FI	HWH	Y	Y	10 % Chrysotile	3 units	X	--	--	--	--	X	O & M	1-1	--
	12	Parging on FI	Chiller	Y	Y	10% Chrysotile	8 units	X	--	--	--	--	X	O & M	1-1	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
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FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 18, 2007 **Job #:** PR-06-039	**Notes:** - No access under carpet. It was reported that the floor tiles were removed 3 years ago during the installation of the carpet. - Some of the ceiling tiles have pink fibreglass insulation batting on lying on them. - All ACM's were observed in good condition.	**FS #:** 1009 **FS Area:** Realty office area; 230, 236, 237, 238 **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Partition	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	17	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT (4" square)	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceil.	n/a	FG PI & FI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG DI	Duct	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG batting	Ceiling	N	--	--	--	--	--	--	--	--	--	Bulk insulation	--	--
	08	Aircell PI	HWH	Y	Y	20% Chrysotile	84 LM	X	--	--	--	--	X	O & M	1-1	--
	10	MJC FI	HWH	Y	Y	10 % Chrysotile	14 units	X	--	--	--	--	X	O & M	1-1	--
	n/a	Styrofoam PI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	12	Parging FI	Chiller	Y	Y	10 % Chrysotile	16 units	X	--	--	--	--	X	O & M	1-1	--
	31	Adhesive backing	Deck	N	--	--	--	--	--	--	--	--	--	From previous CT	--	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: January 18, 2007

Job #: PR-06-039

Notes:
- ACM's were observed above the ceiling tiles. They are in good condition.

FS #: 1010

FS Area: 1st floor corridor and Stairwells 'A' & 'H'

Inspector: BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Friable Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	14	12" x 12" FT off-white with grey	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	17	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT (4" square pattern)	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	08	Aircell PI	HWH	Y	Y	20% Chrysotile	20 LM	X	--	--	--	--	X	O & M	1-1	--
	10	MJC FI	HWH	N	Y	10% Chrysotile	12 units	X	--	--	--	--	X	O & M	1-1	--
	n/a	FG PI	HWH	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Styrofoam	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	12	Parging FI	Chiller	Y	Y	10% Chrysotile	6 units	X	--	--	--	--	X	O & M	1-1	--
	31	Adhesive backing	Deck	N	--	--	--	--	--	--	--	--	--	From previous CT	--	--
	n/a	Concrete deck	Deck	N	--	--	--	--	--	--	--	--	--	--	--	--

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PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 18, 2007 **Job #:** PR-06-039	**Notes:** - All ACM's are in good condition. - Samples M19-32 (a-c) were collected here. - Most ACM's are below the ceiling in the room space, but out of arms reach.	**FS #:** 1011 **FS Area**: Room 203 lunch room **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	12" x 12" FT off-white with grey	Floor	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Fabric panel	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	17	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT (4" square pattern)	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
	32	12" x 12" CT (lg. + sm. Dot pattern)	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceil.	10	MJC FI	Chiller	Y	Y	10% Chrysotile	14 units	X	--	--	--	--	X	O & M	1-1	--
	n/a	FG PI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	08	Aircell PI	HWH	Y	Y	20% Chrysotile	2 LM	X	--	--	--	--	X	O & M	1-1	--
	10	MJC FI	HWH	Y	Y	10% Chrysotile	10 units	X	--	--	--	--	X	O & M	1-1	--
	n/a	FG PI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
Other	n/a	FG PI	All	N	--	--	--	--	--	--	--	--	--	Re-insulated areas	--	--
	08	Aircell PI	HWH	Y	Y	20% Chrysotile	23 LM	X	--	--	X	--	--	O & M	1-1	--
	10	MJC FI	HWH	Y	Y	10% Chrysotile	5 units	X	--	--	X	--	--	O & M	1-1	--
	10	MJC FI	Chiller	Y	Y	10% Chrysotile	4 units	X	--	--	X	--	--	O & M	1-1	--

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Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 18, 2007 **Job #:** PR-06-039	**Notes:** - Metal casing on chiller system located below the ceiling. - All ACM's were observed in good condition.	**FS #:** 1012 **FS Area:** Room 227 Communications closet **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	30	9" x 9" FT red	Floor	Y	N	Suspect ACM	0.5 m^2	X	--	--	X	--	--	O & M	1-1	--
	16	12" x 12" FT beige	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	30	9" x 9" FT dark brown	Floor	Y	N	Suspect ACM	0.5 m^2	X	--		X	--	--	O & M	1-1	--
Walls	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Partitions	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceiling	17	Plaster	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceil.	n/a	Styrofoam PI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	12	Parging FI	Chiller	Y	Y	10% Chrysotile	6 units	X	--	--	--	--	X	O & M	1-1	--
	08	Aircell PI	HWH	Y	Y	20% Chrysotile	2 LM	X	--	--	--	--	X	O & M	1-1	--
	10	MJC FI	HWH	Y	Y	10% Chrysotile	1 unit	X	--	--	--	--	X	O & M	1-1	--
Other	n/a	Styrofoam PI & FI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--

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Criteria for <u>Condition</u> of an ACM:
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P: ACM is in POOR condition; Greater than 2% damage

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 18, 2007 **Job #:** PR-06-039	**Notes:** - No ACM's were observed. - No access possible above solid ceiling. - Sample M19-17f was collected here.	**FS #:** 1013 **FS Area:** Room 202 Cleaners room **Inspector:** BM & RT

Building Materials				**ACM Assessment**												**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments		Dwg. #	Photo #
								G	F	P	A	B	C				
Floor	14	12" x 12" FT off-white with grey	Floor	N	--	--	--	--	--	--	--	--	--	--		--	--
Walls	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--		--	--
Ceil.	17	Plaster	Ceiling	N	--	--	--	--	--	--	--	--	--	--		--	--
Above Ceil.		n/a															

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FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: January 18, 2007

Job #: PR-06-039

Notes:
- HWH system: requires the removal of 0.1 metres of severely damaged aircell pipe insulation and two encapsulations of aircell pipe insulation ends.
- Suspect ACM on the HWH system above plaster ceiling at entrance of room 205, could not access area above solid ceiling.

FS #: 1014

FS Area: Room 205 men's WC and locker room

Inspector: BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Friable Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	14	12" x 12" FT off-white with grey	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Terrazzo	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT (4"square pattern)	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
	17	Plaster	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceil.	12	Parging FI	Chiller	Y	Y	10% Chrysotile	2 units	X	--	--	--	--	X	O & M	1-1	--
	n/a	FG DI	Duct	N	--	--	--	--	--	--	--	--	--	--	--	--
	08	Aircell PI	HWH	Y	Y	20% Chrysotile	3 LM	X	--	--	--	--	X	O & M	1-1	--
	08	Aircell PI	HWH	Y	Y	20% Chrysotile	0.1 LM	--	--	X	--	--	X	See notes	1-2	21
	n/a	Styrofoam PI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--

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MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 18, 2007 **Job #:** PR-06-039	**Notes:** - Damage on aircell PI on HWH system requires 1 encapsulation of 0.1 metres. - Removal of 2 damaged chiller system elbows is required.	**FS #:** 1015 **FS Area**: Room 206 Woman's WC **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	14	12" x 12" FT off-white with grey	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	6" x 6" ceramic tile	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
		Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT (4"square pattern)	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	09	Sweat wrap (with tar paper layer) PI	DCW	N	--	--	--	--	--	--	--	--	--	--	--	--
	10	MJC FI	DCW	Y	Y	10% Chrysotile	9 units	X	--	--	--	--	X	O & M	1-1	--
	08	Aircell PI	HWH	Y	Y	20% Chrysotile	23 LM	X	--	--	--	--	X	O & M	1-1	--
	08	Aircell PI	HWH	Y	Y	20% Chrysotile	0.1 LM	--	X	--	--	--	X	1 encapsulation	1-2	23
	23	Terracotta with mortar	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Styrofoam PI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	12	Parging FI	Chiller	Y	Y	10% Chrysotile	4 units	X	--	--	--	--	X	O & M	1-1	--
	12	Parging FI	Chiller	Y	Y	10% Chrysotile	2 units	--	--	X	--	--	X	2 removals	1-2	22
	10	MJC FI	HWH	Y	Y	10% Chrysotile	8 units	X	--	--	--	--	X	O & M	1-1	--

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MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 11, 2007 **Job #:** PR-06-039	**Notes:** - No floor tile present under the carpet. - Samples M19-01 (a-c) and M19-02 (a-c) were collected here. - No ACM was observed in the area.	**FS #:** 2001 **FS Area:** Second floor (80's) addition; first floor open office area: (rms 352, 353, 355, 356, 360, 365 and 340) **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	02	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Metal partition with fabric	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	01	2' x 4' CT	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceil.	n/a	FG DI	HVAC	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI	HVAC	N	--	--	--	--	--	--	--	--	--	--	--	--
	02	Drywall with drywall compound	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Metal decking	Roof	N	--	--	--	--	--	--	--	--	--	--	--	--

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PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - The majority of ACM pipe insulation is located near the decking which is only reachable by mechanical lift. All determinations of ACM were made from the ground. - High density light fixtures (19 units) are suspect mercury containing. - Encapsulate 1 condensate elbow that is moderately damaged. - Encapsulate 2 steam line elbows that are moderately damaged. - Sample M19-L9 was collected here.	**FS #:** 2002 **FS Area:** Room 329 Machine shop **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete block	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	25	Old exterior finish	Wall	N	--	--	--	--	--	--	--	--	--	Previous exterior wall	--	--
	18	Transite wall panel	Wall	Y	N	12% Amosite	80 m^2	X	--	--	X	--	--	O & M	2-1	--
Ceil.	n/a	Metal	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
	27	ACM cement deck	Deck	Y	N	20% Chrysotile	564 m^2	X	--	--	X	--	--	O & M	2-1	--
Other	10	MJC FI	Conden	Y	Y	10% Chrysotile	1 units	--	--	X	X	--	--	1 encapsulation	2-2	24
	10	MJC FI	Conden	Y	Y	10% Chrysotile	18 units	X	--	--	X	--	--	O & M	2-1	--
	n/a	FG PI	Conden	N	--	--	--	--	--	--	--	--	--	--	--	--
	10	MJC FI	Steam	Y	Y	10% Chrysotile	2 units	--	--	X	X	--	--	2 encapsulations	2-2	25, 27
	10	MJC FI	Steam	Y	Y	10% Chrysotile	27 units	X	--	--	X	--	--	O & M	2-1	--
	10	MJC FI	DCW	Y	Y	10% Chrysotile	4 units	X	--	--	X	--	--	O & M	2-1	--
	20	Sweat wrap (with white paper layer) PI	DCW	Y	Y	15% Chrysotile	18 LM	X	--	--	X	--	--	O & M	2-1	--
	19	MJC FI	Chiller	N	--	--	--	--	--	--	--	--	--	Non-acm type	--	--
	n/a	FG PI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--

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FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: January 16, 2007

Job #: PR-06-039

Notes:
- Some steam lines and elbows are re-insulated with fibreglass.
- ACM transite wall panel used on north and east walls.
- Sample of green paint (L10) collected here.
- 1 encapsulation of damaged MJC FI elbow on the DCW required.

FS #: 2003

FS Area: Room 330
Welding room

Inspector: BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Metal	Floor	--	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	--	--	--	--	--	--	--	--	--	--	--	--	--
	18	Transite wall panel	Wall	Y	N	12% Amosite	180 m^2	X	--	--	--	X		O & M	2-1	--
Ceil.	n/a	Concrete	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other	20	Sweat wrap (with white paper layer) PI	DCW	Y	Y	15% Chrysotile	10 LM	X	--	--	--	X	--	O & M	2-1	--
	10	MJC FI	DCW	Y	Y	10% Chrysotile	5 units	X	--	--	--	X	--	O & M	2-1	--
	10	MJC FI	DCW	Y	Y	10% Chrysotile	1 unit	--	X	--	--	X	--	1 encapsulation	2-2	26
	10	MJC FI	Conden	Y	Y	10% Chrysotile	4 units	X	--	--	--	X	--	O & M	2-1	--
	10	MJC FI	Steam	Y	Y	10% Chrysotile	7 units	X	--	--	--	X	--	O & M	2-1	--
Above Ceil.	27	ACM cement deck	Deck	Y	N	20% Chrysotile	72 m^2	X	--	--	--	--	X	O & M	2-1	--

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***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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Oakhill Environmental *Functional Space Form*

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - This area is part of an addition from the 1980's. - North wall has the old exterior finish. - Old glass panels on north wall may contain lead. - Samples M19-25 (a-c) were collected here. - No ACM was observed in the area.	**FS #:** 2004 **FS Area:** Rooms 332 + 335 Tool crib **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete block	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	25	Exterior finish	Wall	N	--	--	--	--	--	--	--	--	--	Old exterior wall	--	--
Ceil.	n/a	Metal deck	Deck	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceil.		n/a														

Criteria for Access to an area containing ACM:
***A**: All building occupants may have access to this area*
***B**: Restricted to building staff only*
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Criteria for Condition of an ACM:
G: ACM is in GOOD condition; No damage
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P: ACM is in POOR condition; Greater than 2% damage

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: January 16, 2007

Job #: PR-06-039

Notes:
- All ACM is in good condition.

FS #: 2005

FS Area: Room 323A
Tool storage

Inspector: BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	26	9" x9" FT green-grey	Floor	Y	N	2% Chrysotile	27 m^2	X	--	--	--	X	--	O & M	2-1	--
Walls	17	Concrete with plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Wood wall panel	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	FG CT	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceiling	27	ACM cement deck	Deck	Y	N	20% Chrysotile	27 m^2	X	--	--	--	--	X	O & M	2-1	--

Criteria for Access to an area containing ACM:
***A**: All building occupants may have access to this area*
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***C**: Areas of the building behind walls or ceiling system*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - There is 1 encapsulation required on MJC FI of the steam system.	**FS #:** 2006 **FS Area:** Rooms 323 & 327 **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Wood	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	18	Transite wall panel	Wall	Y	N	12% Amosite	105 m^2	X	--	--	--	X	---	O & M	2-1	--
Ceil.	27	ACM cement deck	Deck	Y	N	20% Chrysotile	163 m^2	X	--	--	--	X	--	O & M	2-1	--
Other	08	Aircell PI	Cond	Y	Y	20% Chrysotile	6 LM	X	--	--	--	X	--	O & M	2-1	--
	n/a	FG PI	Cond	--	--	--	--	--	--	--	--	--	--	--		--
	10	MJC FI	DCW	Y	Y	10% Chrysotile	3 units	X	--	--	--	X	--	O & M	2-1	--
	20	Sweat wrap (with white paper layer) PI	DCW	Y	Y	15% Chrysotile	14 LM	X	--	--	--	X	--	O & M	2-1	--
	10	MJC FI	Steam	Y	Y	10% Chrysotile	8 units	X	--	--	--	X	--	O & M	2-1	--
	10	MJC FI	Steam	Y	Y	10% Chrysotile	1 unit	--	X	--	--	X	--	1 encapsulation	2-2	28
	08	Aircell PI	Steam	Y	Y	20% Chrysotile	30 LM	X	--	--	--	X	--	O & M	2-1	--

Criteria for <u>Access</u> to an area containing ACM:
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***C**: Areas of the building behind walls or ceiling system*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: January 16, 2007

Job #: PR-06-039

Notes:
- All ACM is in good condition.

FS #: 2007

FS Area: Rooms 301, 303, 301A

Inspector: BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	23	Terracotta with mortar	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI & FI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	27	ACM cement deck	Deck	Y	N	20% Chrysotile	58 m^2	X	--	--	--	--	X	O & M	2-1	--

Criteria for <u>Access</u> to an area containing ACM:
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***C**: Areas of the building behind walls or ceiling system*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Oakhill Environmental *Functional Space Form*

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - All ACM was observed in good condition.	**FS #:** 2008 **FS Area:** Rooms 326, 326A, 326B **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	14	12" x 12" FT off-white	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	n/a	FG PI FI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI	Conden	N	--	--	--	--	--	--	--	--	--	--	--	--
	10	MJC FI	Conden	Y	Y	10% Chrysotile	6 units	X	--	--	--	--	X	O & M	2-1	---
	n/a	FG PI	Steam	N	--	--	--	--	--	--	--	--	--	--	--	--
	10	MJC FI	Steam	Y	Y	10% Chrysotile	4 units	X	--	--	--	--	X	O & M	2-1	--
	27	ACM cement deck	Deck	Y	N	20% Chrysotile	$45m^2$	X	--	--	--	--	X	O & M	2-1	--

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Criteria for <u>Condition</u> of an ACM:
G: ACM is in GOOD condition; No damage
F: ACM is in FAIR condition; Less than 2% damage
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Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - On condensate system, 1 MJC elbow is cracked and requires encapsulation.	**FS #:** 2009 **FS Area:** Room 328 **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	14	12" x 12" FT off-white	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	27	ACM cement deck	Deck	Y	N	20% Chrysotile	110 m^2	X	--	--	--	--	X	O & M	2-1	--
	n/a	FG PI	Steam	--	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI	Conden	--	--	--	--	--	--	--	--	--	--	--	--	--
	10	MJC FI	Conden	Y	Y	10% Chrysotile	3 units	--	X	--	--	--	X	O & M	2-1	--
	10	MJC FI	Conden	Y	Y	10% Chrysotile	1 unit	--	X	--	--	--	X	1 encapsulation	2-2	29

Criteria for <u>Access</u> to an area containing ACM:
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G: ACM is in GOOD condition; No damage
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FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: January 16, 2007

Job #: PR-06-039

Notes:
- All observations were made from ground level.
- 1 encapsulation of MJC fitting insulation on the condensate system is required.
- 1 encapsulation of 0.1 metres of aircell pipe insulation on the steam system is required.
- 3 encapsulations of MJC fitting insulation is required on the steam system.

FS #: 2010

FS Area: Room, 328 (D,E,F) (ATCO) & Stairwell C

Inspector: BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Metal	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Metal/fabric partition	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	18	Transite wall panel	Wall	Y	N	12% Amosite	55 m^2	X	--	--	--	X	--	O & M	2-1	--
Ceil.	27	ACM cement deck	Deck	Y	N	20% Chrysotile	129 m^2	X	--	--	--	X	--	O & M	2-1	--
Other	08	Aircell PI	Steam	Y	Y	20% Chrysotile	34 LM	X	--	--	--	X	--	O & M	2-1	--
	08	Aircell PI	Steam	Y	Y	20% Chrysotile	0.1 LM	--	X	--	--	X	--	1 encapsulation	2-2	32
	n/a	FG PI	Steam	N	--	--	--	--	--	--	--	--	--	--	--	--
	10	MJC FI	Steam	Y	Y	10% Chrysotile	19 units	X	--	--	--	X	--	O & M	2-1	--
	10	MJC FI	Steam	Y	Y	10% Chrysotile	3 units	--	--	X	--	X	--	3 encapsulations	2-2	30, 31
	10	MJC FI	Con	Y	Y	10% Chrysotile	10 units	X	--	--	--	X	--	O & M	2-1	--
	10	MJC FI	Con	Y	Y	10% Chrysotile	1 units	--	X	--	--	X	--	1 encapsulation	2-2	33
	n/a	FG PI	Con	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI	Drain	N	--	--	--	--	--	--	--	--	--	--	--	--

Criteria for Access to an area containing ACM:
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***C**: Areas of the building behind walls or ceiling system*

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

MJC: Mud Joint Compound
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FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 17, 2007 **Job #:** PR-06-039	**Notes:** - All ACM is in good condition.	**FS #:** 2011 **FS Area:** Room 304 **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	27	ACM cement deck	Deck	Y	N	20% Chrysotile	18 m^2	X	--	--	--	--	X	O & M	2-1	--
	n/a	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	23	Terracotta with mortar	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--

Criteria for <u>Access</u> to an area containing ACM:
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FG: Fibreglass
DI: Duct Insulation

Oakhill Environmental *Functional Space Form*

Building: M-19

Date: January 17, 2007

Job #: PR-06-039

Notes:
- All ACM is in good condition.
- Samples M19-28 (a-c) were collected here.

FS #: 2012

FS Area: Room 305
Cleaners closet

Inspector: BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	28	9" x 9" FT brown	Floor	Y	N	2% Chrysotile	3 m^2	X	--	--	--	X	--	O & M	2-1	--
Walls	n/a	Concrete	Wall	--	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	27	ACM cement deck	Deck	Y	N	20% Chrysotile	3 m^2	X	--	--	--	--	X	O & M	2-1	--

Criteria for Access to an area containing ACM:
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Criteria for Condition of an ACM:
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F: ACM is in FAIR condition; Less than 2% damage
P: ACM is in POOR condition; Greater than 2% damage

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 17, 2007 **Job #:** PR-06-039	**Notes:** - All ACM is in good condition.	**FS #:** 2013 **FS Area:** Front entrance and hallway **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	26	9” x 9” FT green	Floor	Y	N	2% Chrysotile	15 m^2	X	--	--	X	--	--	O & M	2-1	--
	26	9” x 9” FT white	Floor	Y	N	2% Chrysotile	15 m^2	X	--	--	X	--	--	O & M	2-1	--
	n/a	Terrazzo	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2’ x 4’ CT	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	27	ACM cement deck	Deck	Y	N	20% Chrysotile	85 m^2	X	--	--	--	--	X	O & M	2-1	--
	23	Terracotta with mortar	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> of an ACM:
G: ACM is in GOOD condition; No damage
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FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: January 17, 2007

Job #: PR-06-039

Notes:
No access above solid ceiling. It is believed that ACM cement decking is present above the ceiling in this area.

FS #: 2014

FS Area: Room 314
Men's washroom

Inspector: BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Terrazzo	Floor	--	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	--	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Ceramic tile	Wall	--	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Drywall	Wall	--	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Drywall	Ceiling	--	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceiling	27	ACM cement deck	Deck	Y	N	20% Chrysotile	--	--	--	--	--	--	--	See notes	2-1	--

Criteria for Access to an area containing ACM:
***A**: All building occupants may have access to this area*
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FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: January 17, 2007

Job #: PR-06-039

Notes:
- Mould on chiller pipe insulation and duct insulation above ceiling.
- All mechanical insulation in this area is non-acm.
- All ACM was observed in good condition.

FS #: 2015

FS Area: Offices 315, 313, 312, (312A,B,C,D), 308 + 306

Inspector: BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Friable Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	29	Off-white linoleum	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	30	9" x 9" Floor Tile (under carpet)	Floor	Y	N	Suspect ACM	283 m^2	X	--	--	--	--	X	O & M	2-1	--
	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Metal/fabric partition	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	n/a	FG PI & FI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	27	ACM cement deck	Deck	Y	N	20% Chrysotile	290 m^2	X	--	--	--	--	X	O & M	2-1	--
	n/a	FG DI	Duct	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI & FI	HWH	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG batting	On CT	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Mould on PI and DI		n/a	--	--	--	--	--	--	--	--	--	See notes	2-3	M01
Other	n/a															

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** March 23, 2007 **Job #:** PR-06-039	**Notes:** - No access was possible above the solid ceiling. It is believed that ACM cement decking is present above the ceiling in this area.	**FS #:** 2016 **FS Area:** Room 317 Storage/office **Inspector:** BM, RT

Building Materials				**ACM Assessment**												**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments		Dwg. #	Photo #
								G	F	P	A	B	C				
Floor	26	9" x 9" FT green	Floor	Y	N	2% Chrysotile	9 m^2	X	--	--	X	--	--	O & M		2-1	--
Walls	17	Plaster	Walls	N	--	--	--	--	--	--	--	--	--	--		--	--
Ceil.	17	Plaster	Ceil.	N	--	--	--	--	--	--	--	--	--	--		--	--
Above Ceiling	27	ACM cement deck	Deck	Y	N	20% Chrysotile	--	--	--	--	--	--	--	See notes		2-1	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** March 23, 2007 **Job #:** PR-06-039	**Notes:** - ACM was observed in good condition.	**FS #:** 2017 **FS Area:** Room 319a Office **Inspector:** BM, RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	n/a	FG DI	Duct	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI + FI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	27	ACM cement deck	Deck	Y	N	20% Chrysotile	14 m^2	X	--	--	--	--	X	O & M	2-1	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: March 23, 2007

Job #: PR-06-039

Notes:
- ACM was observed in good condition.
- Sample M19-23f was collected here.

FS #: 2018

FS Area: Room 319b Office

Inspector: BM, RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	n/a	FG DI	Duct	N	--	--	--	--	--	--	--	--	--	--	--	--
	27	ACM cement deck	Deck	Y	N	20% Chrysotile	15 m^2	X	--	--	--	--	X	O & M	2-1	--
	23	Terracotta with mortar	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19

Date: March 23, 2007

Job #: PR-06-039

Notes:
- ACM was observed in good condition.
- Samples M19-34 (a-c) were collected here.
- Sample M19-23g was collected here.

FS #: 2019

FS Area: Room 318 Files office

Inspector: BM, RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	16	12" x 12" FT tan	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	17	Plaster	Walls	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Drywall	Wall													
Ceil.	n/a	2' x 4' CT	Ceil.	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
	34	2' x 4' CT horizontal divot	Ceil	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceil.	n/a	FG DI	Duct	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI + FI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	27	ACM cement deck	Deck	Y	N	20% Chrysotile	49 m^2	X	--	--	--	--	X	O & M	2-1	--
	23	Terracotta with mortar	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 17, 2007 **Job #:** PR-06-039	**Notes:** - All ACM is in good condition.	**FS #:** 2020 **FS Area:** Room 320 Women's washroom **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	29	Off-white linoleum	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	2' x 4' CT	Ceiling	N	--	--	--	--	--	--	--	--	--	Post 1986	--	--
Above Ceil.	n/a	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	27	ACM cement deck	Ceiling	Y	N	20% Chrysotile	24 m^2	X	--	--	--	--	X	O & M	2-1	--
	n/a	FG DI	Duct	N	--	--	--	--	--	--	--	--	--	--	--	--
	23	Terracotta with mortar	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 11, 2007 **Job #:** PR-06-039	**Notes:** - This stairwell was part of an early 1980's addition. - Samples M19-03 (a-e), M19-01C and M19-04 (a-c) were collected here. - No ACM was observed.	**FS #:** SW01 **FS Area:** Stairwell J **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	04	12" x 12" FT grey	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	03	Stucco	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
	01	2' x 4' CT scatter divot pattern	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Above Ceil.	n/a	Metal deck	Deck	N	--	--	--	--	--	--	--	--	--	--	--	--
	02	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 15, 2007 **Job #:** PR-06-039	**Notes:** - No access above the solid ceiling. - HWH system: damage of aircell pipe insulation (0.5 LM) that requires encapsulation. .	**FS #:** SW02 **FS Area:** Stairwell D & room 101 **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	14	12" x 12" FT off-white with grey	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	02	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	02	Drywall	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Other	10	MJC FI	Conden	Y	Y	10% Chrysotile	6 units	X	--	--	X	--	--	O & M	G-1	---
	08	Aircell PI	Conden	Y	Y	20% Chrysotile	2 LM	X	--	--	X	--	--	O & M	G-1	--
	10	MJC FI	Steam	Y	Y	10% Chrysotile	7 units	X	--	--	X	--	--	O & M	G-1	--
	08	Aircell PI	Steam	Y	Y	20% Chrysotile	2 LM	--	--	X	X	--	--	O & M	G-1	--
	08	Aircell PI	HWH	Y	Y	20% Chrysotile	2 LM	--	--	X	X	--	--	O & M	1-1	--
	08	Aircell PI	HWH	Y	Y	20% Chrysotile	0.5 LM	--	--	X	X	--	--	1 encapsulation	1-2	34
	10	MJC FI	HWH	Y	Y	10% Chrysotile	1 unit	--	--	X	X	--	--	O & M	1-1	--
Above Ceil.		n/a														

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - All ACM is in good condition. - Sample M19-17G was collected here.	**FS #:** SW03 **FS Area:** Stairwell E **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Metal	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	17	Plaster	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	Concrete	Ceiling	N	--	--	--	--	--	--	--	--	--	--	--	--
Other	n/a	FG PI	HWH	N	--	--	--	--	--	--	--	--	--	--	--	--
	10	MJC FI	HWH	Y	Y	10% Chrysotile	3 units	X	--	--	X	--	--	O & M	1-1	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** March 23, 2007 **Job #:** PR-06-039	**Notes:** - All ACM is in good condition. - No access above ceiling tiles, they are attached with adhesive. - Samples M19-13 (a-c) and M19-33 (a-c) were collected here.	**FS #:** M001 **FS Area:** Fitness room and stairwell B **Inspector:** BM & RT

Building Materials				**ACM Assessment**											**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
Walls	18	Transite panel	Wall	Y	N	12% Chrysotile	18 m^2	X	--	--	X	--	--	O & M	G-1	--
	n/a	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	33	12” x 12” CT with small holes	Ceil.	N	--	--	--	--	--	--	--	--	--	--	--	--
	13	12” x 12” CT	Ceil.	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	Concrete	Ceil	N	--	--	--	--	--	--	--	--	--	--	--	--
Other	12	Parging FI	Chiller	Y	Y	10% Chrysotile	2 units	X	--	--	X	--	--	O & M	G-1	--
	n/a	Styrofoam PI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG FI	Chiller	N	--	--	--	--	--	--	--	--	--	--	--	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 12, 2007 **Job #:** PR-06-039	**Notes:** - No ACM was observed.	**FS #:** M002 **FS Area:** Mezzanine Room 106 lockers, WC **Inspector:** BM & RT

Building Materials				**ACM Assessment**												**Report Reference**	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments		Dwg. #	Photo #
								G	F	P	A	B	C				
Floor	n/a	Carpet	Floor	N	--	--	--	--	--	--	--	--	--	--		--	--
	14	12” x 12” FT off-white with grey	Floor	N	--	--	--	--	--	--	--	--	--	--		--	--
Walls	02	Drywall	Wall	N	--	--	--	--	--	--	--	--	--	--		--	--
Ceil.	n/a	Concrete	Deck	N	--	--	--	--	--	--	--	--	--	--		--	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 17, 2007 **Job #:** PR-06-039	**Notes:** - All ACM is in good condition.	**FS #:** M003 **FS Area:** Mezzanine storage, room 324 & stairwell F **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	Concrete	Floor	N	--	--	--	--	--	--	--	--	--	--	--	--
					--	--	--	--	--	--	--	--	--	--	--	--
Walls	n/a	Concrete	Wall	N	--	--	--	--	--	--	--	--	--	--	--	--
					--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	27	ACM cement deck	Deck	Y	N	20% Chrysotile	68 m^2	X	--	--	--	--	X	O & M	2-1	--
Other	20	Sweat wrap (with white paper layer) PI	DCW	Y	Y	15% Chrysotile	6 LM	X	--	--	--	--	X	O & M	2-1	--
	n/a	FG FI	DCW	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI & FI	Conden	N	--	--	--	--	--	--	--	--	--	--	--	--
	n/a	FG PI & FI	Steam	N	--	--	--	--	--	--	--	--	--	--	--	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - No ACM was observed.	**FS #:** IF01 **FS Area:** Mezzanine storage room 123B **Inspector:** BM & RT

Building Materials				ACM Assessment												Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments		Dwg. #	Photo #
								G	F	P	A	B	C				
Floor	n/a	Metal		N	--	--	--	--	--	--	--	--	--	--		--	--
Walls	n/a	Concrete		N	--	--	--	--	--	--	--	--	--	--		--	--
	n/a	Glass (windows)		N	--	--	--	--	--	--	--	--	--	--		--	--
Ceil.	n/a	Metal		N	--	--	--	--	--	--	--	--	--	--		--	--

Criteria for <u>Access</u> 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*

Criteria for <u>Condition</u> 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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

Building: M-19 **Date:** January 16, 2007 **Job #:** PR-06-039	**Notes:** - No ACM was observed. - Roof area was not inspected.	**FS #:** EX01 **FS Area:** Exterior **Inspector:** BM & RT

Building Materials				ACM Assessment											Report Reference	
Location	Homg. Mat. #	Material Description	System	ACM Y/N	Fri-able Y/N	ACM Type	Qty.	Condition			Access			Response / Comments	Dwg. #	Photo #
								G	F	P	A	B	C			
Floor	n/a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Walls	25	Exterior Finish	Exterior Walls	N	--	--	--	--	--	--	--	--	--	--	--	--
Ceil.	n/a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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*

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

MJC: Mud Joint Compound
PI: Pipe Insulation
FI: Fitting Insulation
FG: Fibreglass
DI: Duct Insulation

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.

Hebb, Stephen

From: Andrew Cooney <acooney@dstgroup.com>
Sent: Tuesday, November 14, 2017 11:09 AM
To: Hebb, Stephen
Cc: Nicolas Strang
Subject: NRC M19
Attachments: M19 Sample Locations.pdf; M19 Laboratory Results.pdf

Good Morning Stephen,

DST was onsite at the NRC M-19 Building on November 10, 2017 to collect a total of twenty-four (24) bulk samples of building materials for analysis of asbestos content. Samples were submitted to Paracel Laboratories for analysis.

A summary of the laboratory analysis and associated recommendations are as follows:

Sample ID	Location	Material	Result
31268-M19-01A-C	Corridor Outside of Room 318	Plaster- White and Grey Layers	None Detected
31268-M19-02A-C	Room 318 Ceiling	2'X4' Ceiling Tiles- Deep Fissures	None Detected
31268-M19-03A-C	Room 318 Ceiling	2'X4' Ceiling Tiles- Shallow Fissures	None Detected
31268-M19-04A-C	Room 318- Interior Wall	Plaster- White and Grey Layers	None Detected
31268-M19-05A-C	Room 328C- Ceiling	2'X4' Ceiling Tiles- Off White with Random Fissures	None Detected
31268-M19-06A-C	Room 328C- Ceiling	2'X4' Ceiling Tiles- White with Random Fissures	None Detected
31268-M19-07A-C	Room 328C- Bulkhead	Drywall Joint Compound	None Detected
31268-M19-08A-C	**Room 332- Partition Wall Between Room 332 and 325**	**Drywall Joint Compound**	**1% Chrysotile Asbestos**

***Transite panels were also identified by the client using the existing building DSR.**

Sample locations can be found on the attached M19 Sample Locations. Laboratory results are also attached.

Recommendations:

The disturbance of asbestos-containing materials on construction and demolition projects in the province of Ontario is governed by *O. Reg. 278/05, Asbestos on Construction Projects and in Buildings and Repair Operations* enabled under the *Occupational Health and Safety Act (R.S.O. 1990, Chapter 0.1),* as amended. This regulation classifies all asbestos disturbances as either Low Risk (Type 1), Moderate Risk (Type 2), or High Risk (Type 3), each of which has defined precautionary measures. All asbestos materials are subject to specific handling and disposal precautions, and must be removed prior to demolition or renovation. The Ontario Ministry of Labour (MOL) must be notified of any project involving removal of more than a minor amount (e.g. typically one square metre) of friable asbestos material.

The removal of less than one square metre of drywall in which joint-filling compounds are asbestos-containing can be performed following Type 1 asbestos precautionary measures, as applicable as per O.Reg 278/05, as amended. The removal of one square metre or more of drywall in which joint-filling compounds are asbestos-containing must be performed following Type 2 asbestos removal procedures, as a minimum.

The removal or disturbance of non-friable ACMs such as transite panels can be completed using Type 1 asbestos precautionary measures, provided the material is wetted and only non-powered hand-held tools are used. If these conditions cannot be met, than more stringent (Type 2 or Type 3) procedures are required.

For federal projects, abatement of asbestos-containing materials must comply with the requirements of the Public Services and Procurement Canada *Asbestos Management Directive* as well as the *Regulations Amending Certain Regulations Made Under the Canada Labour Code*. These documents include requirements for air monitoring during Type 2 and 3 asbestos abatement operations.

The time weight average exposure limit (TWAEL) for airborne asbestos is prescribed by Ontario Regulation 490/09 *Designated Substances*, as amended. Work procedures and personal protective equipment must be used to ensure that workers are not exposed to airborne asbestos levels that exceed this TWAEL.

The following recommendations apply to ACMs:

1. In general, materials must be maintained in good condition;
2. The condition of material(s) identified in this report must be inspected at least annually, and this record must be updated accordingly;
3. Appropriate work procedures and precautionary measures must be used, as outlined in O. Reg. 278/05, as amended, when performing work that may disturb ACMs or suspected ACMs, including prior to building demolition;
4. If ACMs or suspected ACMs become damaged and worker exposure to the material is likely to occur, the damaged material must be repaired or removed following work procedures outlined in O. Reg. 278/05, as amended; and
5. Disposal of asbestos waste is controlled by the Ontario Environmental Protection Act, R.R.O., 1990, Regulation 347, *General – Waste Management,* as amended. This regulation requires that asbestos waste be sealed in double containers resistant to puncture and tears, and appropriately labelled. The waste must be disposed at a licensed waste disposal site. Proper notification must be issued to the site representative prior to transportation of waste. The transport of the waste to the disposal site is controlled by the federal *Transportation of Dangerous Goods Act*, 1992 (TDGA).

Materials that have not been analyzed, but are visibly similar to other materials identified as asbestos-containing, must be considered asbestos-containing unless proven otherwise by laboratory analysis.

If you have any questions or concerns please contact our office.

Thank you,

Andrew Cooney
Scientist

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Certificate of Analysis

DST Consulting Engineers Inc. (Ottawa)

203-2150 Thurston Dr.
Ottawa, ON K1G5T9
Attn: Andrew Cooney

Client PO: NRC - M19 ACM Sampling
Project: GV OT 031268
Custody:

Report Date: 13-Nov-2017
Order Date: 10-Nov-2017

Order #: 1746020

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1746020-01	31268-M19-01A (Grey Plaster)
1746020-02	31268-M19-01B (Grey Plaster)
1746020-03	31268-M19-01C (Grey Plaster)
1746020-04	31268-M19-01A (White Plaster)
1746020-05	31268-M19-01B (White Plaster)
1746020-06	31268-M19-01C (White Plaster)
1746020-07	31268-M19-02A
1746020-08	31268-M19-02B
1746020-09	31268-M19-02C
1746020-10	31268-M19-03A
1746020-11	31268-M19-03B
1746020-12	31268-M19-03C
1746020-13	31268-M19-04A (White Plaster)
1746020-14	31268-M19-04B (White Plaster)
1746020-15	31268-M19-04C (White Plaster)
1746020-16	31268-M19-04A (Grey Plaster)
1746020-17	31268-M19-04B (Grey Plaster)
1746020-18	31268-M19-04C (Grey Plaster)
1746020-19	31268-M19-05A
1746020-20	31268-M19-05B
1746020-21	31268-M19-05C
1746020-22	31268-M19-06A
1746020-23	31268-M19-06B
1746020-24	31268-M19-06C
1746020-25	31268-M19-07A
1746020-26	31268-M19-07B

Approved By:

Emma Diaz
Senior Analyst

1746020-27	31268-M19-07C
1746020-31	31268-M19-08A (Drywall Joint Compound)
1746020-32	31268-M19-08B (Drywall Joint Compound)
1746020-33	31268-M19-08C (Drywall Joint Compound)

Certificate of Analysis
Client: DST Consulting Engineers Inc. (Ottawa)
Client PO: NRC - M19 ACM Sampling

Report Date: 13-Nov-2017
Order Date: 10-Nov-2017
Project Description: GV OT 031268

Asbestos, PLM Visual Estimation **MDL - 0.5%**

Paracel I.D.	*Sample Date*	*Layers Analyzed*	*Colour*	*Description*	*Asbestos Detected:*	*Material Identification*	*% Content*
1746020-01	10-Nov-17	sample homogenized	Grey	Plaster	No	**Client ID: 31268-M19-01A (Grey Plaster)**	
						Non-Fibers	100
1746020-02	10-Nov-17	sample homogenized	Grey	Plaster	No	**Client ID: 31268-M19-01B (Grey Plaster)**	
						Non-Fibers	100
1746020-03	10-Nov-17	sample homogenized	Grey	Plaster	No	**Client ID: 31268-M19-01C (Grey Plaster)**	
						Non-Fibers	100
1746020-04	10-Nov-17	sample homogenized	White	Plaster	No	**Client ID: 31268-M19-01A (White Plaster)**	
						Non-Fibers	100
1746020-05	10-Nov-17	sample homogenized	White	Plaster	No	**Client ID: 31268-M19-01B (White Plaster)**	
						Non-Fibers	100
1746020-06	10-Nov-17	sample homogenized	White	Plaster	No	**Client ID: 31268-M19-01C (White Plaster)**	
						Non-Fibers	100
1746020-07	10-Nov-17	sample homogenized	White/Grey	Ceiling Tile	No	**Client ID: 31268-M19-02A**	
						Cellulose	40
						MMVF	10
						Non-Fibers	50
1746020-08	10-Nov-17	sample homogenized	White/Grey	Ceiling Tile	No	**Client ID: 31268-M19-02B**	
						Cellulose	40
						MMVF	10
						Non-Fibers	50
1746020-09	10-Nov-17	sample homogenized	White/Grey	Ceiling Tile	No	**Client ID: 31268-M19-02C**	
						Cellulose	40
						MMVF	10
						Non-Fibers	50
1746020-10	10-Nov-17	sample homogenized	White/Grey	Ceiling Tile	No	**Client ID: 31268-M19-03A**	
						Cellulose	40
						MMVF	10
						Non-Fibers	50
1746020-11	10-Nov-17	sample homogenized	White/Grey	Ceiling Tile	No	**Client ID: 31268-M19-03B**	
						Cellulose	40
						MMVF	10
						Non-Fibers	50

Certificate of Analysis
Client: DST Consulting Engineers Inc. (Ottawa)
Client PO: NRC - M19 ACM Sampling

Report Date: 13-Nov-2017
Order Date: 10-Nov-2017
Project Description: GV OT 031268

Asbestos, PLM Visual Estimation **MDL - 0.5%**

Paracel I.D.	Sample Date	Layers Analyzed	Colour	Description	Asbestos Detected:	Material Identification	% Content
1746020-12	10-Nov-17	sample homogenized	White/Grey	Ceiling Tile	No	**Client ID: 31268-M19-03C**	
						Cellulose	40
						MMVF	10
						Non-Fibers	50
1746020-13	10-Nov-17	sample homogenized	White	Plaster	No	**Client ID: 31268-M19-04A (White Plaster)**	
						Non-Fibers	100
1746020-14	10-Nov-17	sample homogenized	White	Plaster	No	**Client ID: 31268-M19-04B (White Plaster)**	
						Non-Fibers	100
1746020-15	10-Nov-17	sample homogenized	White	Plaster	No	**Client ID: 31268-M19-04C (White Plaster)**	
						Non-Fibers	100
1746020-16	10-Nov-17	sample homogenized	Grey	Plaster	No	**Client ID: 31268-M19-04A (Grey Plaster)**	
						Non-Fibers	100
1746020-17	10-Nov-17	sample homogenized	Grey	Plaster	No	**Client ID: 31268-M19-04B (Grey Plaster)**	
						Non-Fibers	100
1746020-18	10-Nov-17	sample homogenized	Grey	Plaster	No	**Client ID: 31268-M19-04C (Grey Plaster)**	
						Non-Fibers	100
1746020-19	10-Nov-17	sample homogenized	White/Grey	Ceiling Tile	No	**Client ID: 31268-M19-05A**	
						Cellulose	40
						MMVF	10
						Non-Fibers	50
1746020-20	10-Nov-17	sample homogenized	White/Grey	Ceiling Tile	No	**Client ID: 31268-M19-05B**	
						Cellulose	40
						MMVF	10
						Non-Fibers	50
1746020-21	10-Nov-17	sample homogenized	White/Grey	Ceiling Tile	No	**Client ID: 31268-M19-05C**	
						Cellulose	40
						MMVF	10
						Non-Fibers	50
1746020-22	10-Nov-17	sample homogenized	White/Grey	Ceiling Tile	No	**Client ID: 31268-M19-06A**	
						Cellulose	40
						MMVF	20
						Non-Fibers	40

PARACEL LABORATORIES LTD.

Order #: 1746020

Certificate of Analysis
Client: DST Consulting Engineers Inc. (Ottawa)
Client PO: NRC - M19 ACM Sampling

Report Date: 13-Nov-2017
Order Date: 10-Nov-2017
Project Description: GV OT 031268

Asbestos, PLM Visual Estimation **MDL - 0.5%**

Paracel I.D.	Sample Date	Layers Analyzed	Colour	Description	Asbestos Detected:	Material Identification	% Content
1746020-23	10-Nov-17	sample homogenized	White/Grey	Ceiling Tile	No	**Client ID: 31268-M19-06B**	
						Cellulose	40
						MMVF	20
						Non-Fibers	40
1746020-24	10-Nov-17	sample homogenized	White/Grey	Ceiling Tile	No	**Client ID: 31268-M19-06C**	
						Cellulose	40
						MMVF	20
						Non-Fibers	40
1746020-25	10-Nov-17	sample homogenized	Grey	Drywall Joint Compound	No	**Client ID: 31268-M19-07A**	
						Non-Fibers	100
1746020-26	10-Nov-17	sample homogenized	Grey	Drywall Joint Compound	No	**Client ID: 31268-M19-07B**	
						Non-Fibers	100
1746020-27	10-Nov-17	sample homogenized	Grey	Drywall Joint Compound	No	**Client ID: 31268-M19-07C**	
						Non-Fibers	100
1746020-31	10-Nov-17	sample homogenized	Grey	Drywall Joint Compound	**Yes**	**Client ID: 31268-M19-08A (Drywall Joint Compound)**	
						Chrysotile	1
						Non-Fibers	99
1746020-32	10-Nov-17					**Client ID: 31268-M19-08B (Drywall Joint Compound)**	
						not analyzed	
1746020-33	10-Nov-17					**Client ID: 31268-M19-08C (Drywall Joint Compound)**	
						not analyzed	

** MMVF: Man Made Vitreous Fibers: Fiberglass, Mineral Wool, Rockwool, Glasswool*

**** Analytes in bold indicate asbestos mineral content.**

Analysis Summary Table

Analysis	Method Reference/Description	Lab Location	NVLAP Lab Code *	Analysis Date
Asbestos, PLM Visual Estimation	by EPA 600/R-93/116	2 - Ottawa West Lab	200812-0	13-Nov-17

** Reference to the NVLAP term does not permit the user of this report to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.*

Work Order Revisions / Comments

None

PARACEL LABORATORIES LTD.

Paracel ID: 1746020

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:eleparacellabs.com

Chain of Custody
(Lab Use Only)

Page 1 of 1

Client Name:	DST Consulting Engineers	Project Reference: GVOT-031268	**Turnaround Time:**
Contact Name:	Andrew Cooney	Quote #: 16-117	☐ Immediate ☑ 1 Day
Address:	2150 Thurston Drive, Ottawa, ON	PO #: NRC- M19 ACM Sampling	☐ 4 Hour ☐ 2 Day
		Email Address: acooney@dstgroup.com	☐ 8 Hour ☐ 3 Day
Telephone:	613-290-0101 / 613-748-1415	nstrang@dstgroup.com	☐ Regular
			Date Required: Before COB Nov 13/2017

ASBESTOS & MOLD ANALYSIS

Matrix: ☐ Air ☑ Bulk ☐ Tape Lift ☐ Swab ☐ Other **Regulatory Guideline:** ☑ ON ☐ QC ☐ AB ☐ SK ☐ Other:____

Analyses: ☐ Microscopic Mold ☐ Culturable Mold ☐ Bacteria GRAM ☐ PCM Asbestos ☑ PLM Asbestos ☐ Chatfield Asbestos ☐ TEM Asbestos

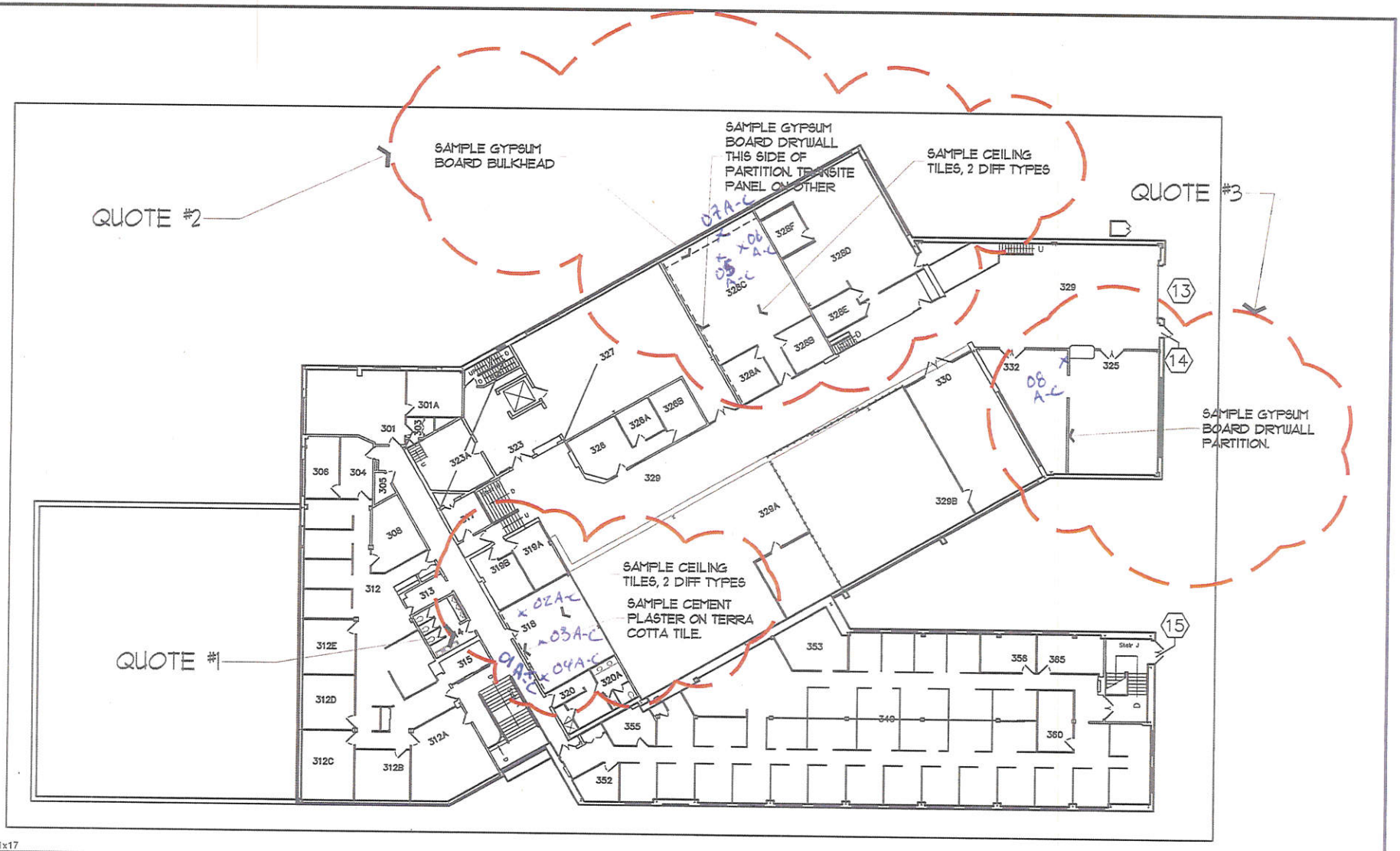
	Paracel Order Number: 1746020 / Sample ID	Sampling Date	Air Volume (L)	Analysis Required	Asbestos - Bulk: Identify Distinct Building Materials to Be Analyzed * see below	Combine Identified Materials? **see below	Positive Stop?
1	31268-M19-01A-C	11/10/2017		PLM	Analyze all layers	☐	☑
2	31268-M19-02A-C	11/10/2017		PLM	Analyze all layers	☐	☑
3	31268-M19-03A-C	11/10/2017		PLM	Analyze all layers	☐	☑
4	31268-M19-04A-C	11/10/2017		PLM	Analyze all layers	☐	☑
5	31268-M19-05A-C	11/10/2017		PLM	Analyze all layers	☐	☑
6	31268-M19-06A-C	11/10/2017		PLM	Analyze all layers	☐	☑
7	31268-M19-07A-C	11/10/2017		PLM	Analyze all layers	☐	☑
8	31268-M19-08A-C	11/10/2017		PLM	Analyze all layers	☐	☑
9						☐	☐
10						☐	☐
11						☐	☐
12						☐	☐

* If left blank, Paracel will analyze all materials identified during analysis ** If left blank, Paracel will analyze all materials as individual samples **(at additional cost)** per EPA 600/R -93/116

Comments:

Method of Delivery: Walk-in.

Relinquished By (Sign):	Received at Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Andrew Cooney	Rachel Subject	Kaun Cull	Kaun Cull
Date/Time: 11/10/2017	Date/Time: NOV 10/17. 4:05	Date/Time: Nov 13/17 9:22	Date/Time: Nov 13/17 10:12



ASPM 11x17

National Research Council Canada | Conseil national de recherches Canada
Administrative Services and Property Management Branch | Division des services administratifs et gestion de l'immobilier
NRC · CNRC

project / projet: MONTREAL ROAD CAMPUS

drawing / dessin

designed / conçu | checked / vérifié
drawn / dessiné | approved / approuvé
W.O.no. | D.T.no. | sheet / feuille of/de
date | scale / échelle
dwg.no. / dessin no.

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 1/2" x 4'-0" x 8'-0" wood sheathing.

.2 3-5/8" metal studding.

.3 3-1/2" spruce wood, construction grade studding.

.4 6 mil. polyethylene.

.5 Vinyl reinforced tarps.

2.2 Erection

.1 Construct a solid barrier in all locations where window, A/C, or roof modifications are to occur.

.2 Construct barriers full height and line with polyethylene to ensure dust and watertightness.

.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.

.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 Reinstate the interior finishes affected by this work to the satisfaction of the Departmental Representative.

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES

.1 CSA International

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

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

1.3 SITE CONDITIONS

.1 Review "Designated Substance Report" and take precautions to protect environment.

.2 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Departmental Representative immediately.

.3 Proceed only after receipt of written instructions have been received from Departmental Representative.

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

Part 2 PRODUCTS

2.1 NOT USED

.1 Not used.

Part 3 EXECUTION

3.1 EXAMINATION

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

.2 Cooperate with and coordinate all trades in marking out required locations of floor and wall penetrations necessary to accommodate installation of new services.

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

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

.5 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.

.6 Immediately notify Departmental Representative and utility company concerned in case of damage to any utility or service, designated to remain in place.

.7 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PREPARATION

.1 Protection of In-Place Conditions:

.1 Prevent movement, settlement, or damage to adjacent structures, utilities, and landscaping features and parts of building to remain in place. Provide bracing and shoring required.

.2 Keep noise, dust, and inconvenience to occupants to minimum.

.3 Protect building systems, services and equipment.

.4 Provide temporary dust screens, covers, railings, supports and other protection as required.

.2 Demolition/Removal:

.1 Remove parts of existing building to permit new construction.

3.3 CUTTING AND CORING

.1 Coordinate layout and marking of all required coring and cutting locations of existing slabs and walls with all sub-trades.

.2 Locate existing reinforcement and conduit before coring or cutting existing slabs and walls. Retain an independent testing company to locate existing reinforcement and conduit in the areas of proposed openings and to mark locations on the surfaces of slabs on which the cores and cuts are to be started. X-ray concrete unless other methods can be shown by Contractor to accurately locate reinforcement and conduit. Mark locations and sizes of cores and openings and locations of reinforcement and conduit using indelible markers with red for top bars, green for bottom bars and black for cores, openings and conduit.

.3 Coring: Do not cut existing reinforcement and conduit when coring existing concrete unless approved in advance by the Departmental Representative. Save the complete length of all cores. Label each core with location taken. Make all cores available for review by Departmental Representative. Dispose of cores only with approval of Departmental Representative.

.4 Cutting: Do not cut existing reinforcement and conduit when cutting existing concrete unless approved in advance by the Departmental Representative. Core the corners of all openings prior to cutting sides. Saw cut sides. Do not over cut openings. Chip corners square if necessary.

.5 Wet coring is not acceptable in normally occupied areas of building.

.6 Carry out all cutting, coring, and drilling activities after normal business hours. Provide minimum 10 days notification to Departmental Representative for such work.

3.4 DISPOSAL

.1 Dispose of removed materials, to appropriate recycling facilities or reuse facilities except where specified otherwise, in accordance with authority having jurisdiction.

3.5 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

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 2010 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

NOT USED.

Part 2 PRODUCTS

2.1 INSULATION

.1 Sound batt insulation: fabricated from friction fit batts, mineral fibre, 89 mm and 140 mm thickness, to fill stud cavity.

.2 Safe'n'Sound Fire & Soundproofing Insulation by Roxul Inc. (or approved equal).

2.2 ACCESSORIES

.1 Sealant: to CAN/CGSB-19.21-M87.

.2 Tape for sealing as recommended by manufacturer.

Part 3 EXECUTION

3.1 WORKMANSHIP

.1 Install insulation after building substrate materials are dry.

.2 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.3 Fit insulation closely around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.

.4 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.

.5 Offset both vertical and horizontal joints in multiple layer applications.

.6 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Fire stopping and smoke seals within mechanical assemblies (i.e., inside of ducts, dampers) and electrical assemblies (i.e., inside cable trays) are specified in Division 23 Heating Ventilating and Air Conditioning, and 26 Electrical, respectively.

1.2 REFERENCES

.1 Underwriters Laboratories of Canada (ULC)

.1 ULC-S115-11, Fire Tests of Firestop Systems.

1.3 DEFINITIONS

.1 Firestop: Sealant or other closure assembly with fire resistance rating of ½ to 4 hours.

.2 Smokeseal: Sealant or other closure assembly with no fire resistance rating.

1.4 SAMPLES

.1 Upon request of Departmental Representative, submit samples in accordance with submittal procedures of Section 01 10 00.

.2 Submit duplicate 300 x 300 mm samples showing actual firestop material proposed for project.

1.5 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data for each typical firestopping assembly in accordance with submittal procedures of Section 01 10 00.

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

1.6 PRODUCT DATA

.1 Submit product data in accordance with submittal procedures of Section 01 10 00.

.2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation. Include the following:

.1 proof of labelling and listing by an accredited Certification Organization;
.2 the required F, FT, and FTH ratings;
.3 primers;
.4 supports and damming materials;
.5 reinforcement, anchors and fastenings.

1.7 QUALITY ASSURANCE

.1 Provide the Work of this section executed by installers having minimum 5 years experience in the application in the application of firestopping and smoke seals, and trained and certified by the manufacturer of the products, systems and assemblies specified and proposed for use.

.2 Arrange for the manufacturer's representative to review the drawings and site conditions prior to commencement of the installation of firestopping and smoke sealing materials, including inspection of substrate surfaces around penetrations and openings and recommendation of solutions for unique or peculiar situations.

.3 Arrange for the manufacturer's representative to periodically visit the site to inspect installations prior to concealment, to advise on materials and procedures, and to report unsatisfactory conditions to Contractor.

.4 Manufacturer's representative shall attend the final inspection and submit written certification that the products, systems and assemblies have been installed in accordance with the applicable ULC listing and the manufacturer's instructions.

Part 2 Products

2.1 MATERIALS

.1 Fire stopping for concealed spaces: 12.7 mm thick gypsum board or 0.38 mm thick steel sheet, including all necessary supports and fasteners.

.2 Fire stopping and smoke seal systems: tested and certified in accordance with CAN4-S115 for ratings specified or indicated, by an organization accredited by Standards Council of Canada.

.1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of ULC-S115 and not to exceed opening sizes for which they are intended [and conforming to special requirements specified in 3.5].

.2 Firestop system rating: in accordance with applicable building code and as follows:

.1 F rating: all locations except as follows.

.3 Service penetration assemblies: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.

.4 Service penetration firestop components: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.13 and ULC Guide No.40 U19.15 under the Label Service of ULC.

.5 Fire-resistance rating of installed fire stopping assembly in accordance with [NBC] [OBC].

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

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

.8 Sealants for vertical joints: non-sagging.

2.2 SMOKE SEALS

.1 Smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.1 Vertical joints: non-sagging type.

.2 Horizontal joints: self-levelling type.

2.3 ACCESSORIES

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

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

.3 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.

Part 3 Execution

3.1 PREPARATION

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

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

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

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

3.2 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

.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 a neat finish.

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

3.3 INSPECTION

.1 Notify Consultant when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.4 SCHEDULE

.1 Firestops and smokeseals in architectural and structural assemblies:

.1 Openings through firewall:

.1 Type JF:

.2 FT Rating: [4] hours.

.2 Edge of floor slabs at exterior wall:

.1 Type: PJ

.2 F rating: to match floor assembly rating.

.3 Maximum allowable firestop joint width: to suit joint condition.

.4 Movement capability: [NTD: indicate compression and/or extension design conditions].

.3 Opening at junction of floor and interior wall:

.1 Type: JF.

.2 F rating: to match floor assembly rating.

.3 Maximum allowable firestop joint width: to suit joint condition.

.4 Movement capability: [NTD: indicate compression and/or extension design conditions].

.4 Static floor openings:

.1 Type: JF.

.2 F rating: to match floor assembly rating.

.3 Maximum allowable firestop joint width: to suit joint condition.

.5 Dynamic floor openings between separate floor structures:

.1 Type: JF.

.2 F rating: to match floor assembly rating.

.3 Maximum allowable firestop joint width: to suit joint condition.

.4 Movement capability: [NTD: indicate expected compression or extension design condition].

.6 Top of fire-resistance rated masonry and gypsum board partitions.

.1 Type: HW

.2 F rating: to match partition rating.

.3 Maximum allowable firestop joint width: to suit joint condition.

.4 Movement capability to suit expected deflection:

.1 Expected floor deflection: [__] mm.

.2 Expected roof deflection: [__] mm.

.7 Intersection of fire-resistance rated masonry and gypsum board partitions.

.1 Type: WW

.2 F rating: to match partition rating.

.8 Static partition wall openings

.1 Type: JF

.2 F rating: to match partition wall rating.

.3 Maximum allowable firestop joint width: to suit joint condition.

.9 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.

.1 Type: WW

.2 F rating: to match partition rating.

.3 Maximum allowable firestop joint width: to suit joint condition.

.4 Movement capability: [NTD: indicate expected compression or extension design condition].

.2 Refer to mechanical and electrical specifications for firestops and smoke seals at service penetrations.

3.5 CLEAN UP

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

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

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 windows on exterior and interior side

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 08 80 50 Glazing: Glass surface to receive film application.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM E84-15a Standard Test Method for Surface Burning Characteristics of Building Materials

.2 International Window Film Association (IWFA)

.1 IWFA Visual Quality Standard for Applied Window Film 1999.

.3 National Fire Protection Association

.1 NFPA 101-2015 Life Safety Code

1.3 SUBMITTALS

.1 Submittals in accordance with submittal procedures of Section 01 10 00.

.2 Product Data: submit WHMIS MSDS - Material Data Sheets in accordance with submittal procedures of Section 01 10 00.

.3 Submit shop drawings and product data in accordance with submittal procedures of Section 01 10 00.

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

.1 Submit duplicate 300 x 300 mm samples of film and release sheet or backing material.

.2 Submit one [500] x [500] x mm sample of film installed on [6] mm thick clear plate glass.

.5 Submit test reports in accordance with submittal procedures of Section 01 10 00.

.1 Submit test reports from approved independent testing laboratory, certifying film's compliance with specified requirements.

.6 Submit closeout submittals in accordance with closeout procedures of Section 01 10 00.

.1 Provide operation and maintenance data for window film.

.2 Follow manufacturers written instructions for care and maintenance of decorative film.

.3 Use only cleaning solution recommended by manufacturer for regularly scheduled cleaning of decorative film.

1.4 MOCK-UP

.1 Construct mock-up in accordance with submittal procedures of Section 01 10 00.

.2 Construct mock-up of one of each typical installation. Mock-up may be part of finished work.

.3 Allow 24 h for inspection of mock-up by Consultant before proceeding with waterproofing work.

1.5 QUALITY ASSURANCE

.1 Film applicator: applied by applicator trained and approved by manufacturer for application of its products.

.2 Applicators: minimum 5 years proven experience.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in original sealed packaging with manufacturer’s labels legible and seals intact.

.2 Store materials elevated from contact with the ground, and protected from moisture and direct sunlight. Store materials in accordance with manufacturers written instructions.

.3 Provide and maintain dry, off-ground weatherproof storage.

.4 Store rolls of film flat on cross supports. Do not stand rolls of film on end.

.5 Remove from storage, in quantities required for same day use.

1.7 ENVIRONMENTAL AND SAFETY REQUIREMENTS

.1 Comply with requirements of Workplace hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada.

.2 Conform to manufacturer’s recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Do not apply film until all dust generating operations are completed and the area has been cleaned.

1.8 WARRANTY

.1 For Work of this Section, the 12 months warranty period prescribed in subsection GC 32.1 of General Conditions "C" is extended to 10 years.

.2 Ensure warranty includes items as follows:

.1 Maintaining adhesion properties without blistering, bubbling or delaminating from glass surface.

.2 Maintaining appearance without discolouration.

.3 Removing, replace and reapply defective materials.

.4 In event of product failure under warranty terms, remove and re-apply film without glass replacement at no cost to NRC.

Part 2 Products

2.1 PRODUCTS

.1 Decorative Graphic Window Film: Polyester film, pressure sensitive with visible light transmittance and reflectance of 50% and 20% respectively when measured on 6 mm thick clear glass. Pattern: horizontal bars 60 mm long by 3 mm wide, spaced 1.5 mm vertically and 3 mm horizontally. Fire performance Type A as defined in NFPA 101 when tested to ASTM E84.

.1 Acceptable product and manufacturer: Fasara Paracell as manufactured by the 3M Company.

2.2 SHOP FABRICATION

.1 Apply and attach film to glass in accordance with manufacturer's written instructions.

.2 Use only water and film slip solution on glass to facilitate positioning of film.

.3 Clean glass before beginning installation using neutral cleaning solution.

.4 Ensure no deleterious material adheres to glass by scraping surface of glass using industrial razors.

.5 Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.

.6 Lay out film on glass to ensure film edges will captured behind window stops.

.7 Cut film edges straight and square to within 3 mm of edge of panel..

.8 Splicing:

.1 Splice film only when glass is greater in width than film.

.2 Splice film only after receipt of written approval from Consultant.

.3 Use butt factory edges only.

.9 Install decorative film to glass panels ensuring no blisters, bubbles, scratches, edge defects or distortions.

.10 Ensure removal of excess water from between film and glass.

.11 Examine film applied to glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate, or cause vision transparency or distortion problems.

.12 Deliver glass panels complete with decorative film installed and labels intact and legible to site in accordance with manufacturer's recommendations for handling, transportation and storage.

Part 3 Execution

3.1 INSTALLATION

.1 Install glass panels with applied film in glazing frames as indicated and in accordance with manufacturer's instructions and requirements of Section 08 80 50.

.2 Installed glass and film shall have orientation of film level and properly aligned with surrounding frame.

3.2 INSTALLER'S INSPECTION

.1 Perform visual Inspection at time of installation in accordance with IWFA - Visual Quality Standard for Applied Window Film.

.2 Return to work place after 30 days but no longer than 40 days for final cleaning and inspection of installed film.

.3 Remove and replace glass panel or film that continues to show blisters, bubbles, tears, scratches, edge defects or vision distortion in film when viewed under natural daylight from 2.0 m after 30 day period.

.1 Replace film that exhibits defects with newly installed film

.2 Re-inspect as specified.

3.3 FINAL CLEANING

.1 Wash both sides of each glass panel and film using cleaning solution recommended by film manufacturer.

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"), 152mm (6") 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 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

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.

.12 Install continuous insulating strips at end of walls at demountable office partitions to isolate studs from perimeter wall construction.

.13 Install two continuous beads of acoustical sealant at end of walls at demountable office partitions to isolate studs from perimeter wall construction.

END OF SECTION

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 Regular board: to CAN/CSA A82.27-M91 12.5mm (1/2") x 1200 mm (4'-0") wide x maximum practical length, edges tapered with round edge (at perimeter and non-demountable partition walls).

.2 Regular board: to CAN/CSA A82.27-M91 12.5mm (1/2") x 1200 mm (4'-0") wide x maximum practical length, square edge (at demountable partition walls).

2.2 Metal Furring

.1 Metal furring, runners, hangers, clips, tie wires & suspension to CSA A82.30-M1980, galvanized systems.

.2 Hangers: self-drilling type anchors similar to Phillips "Red Head" T-32.

.3 Drywall furring channels: 0.5 mm (0.02") core thickness galvanized steel channels for screw attachment of gypsum board.

2.3 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.

2.4 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 Acoustic sealant: to CAN/CGSB-19.21-M87.

.3 Sealants acceptable for use on this project must be listed on CGSB Qualified Products List issued by CGSB Qualification Panel for joint sealants.

.4 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.

.5 Joint compound: to CAN/CSA-A82.31-M91, asbestos-free.

.6 Battens for wall board installations: Factory finished battens for square edge gypsum board, anodized aluminum material to match aluminum door frames.

.7 Batten concealed clips: Continuous back up metal clip behind battens screen applied to back up components.

.8 Wall base for demountable partitions: Preformed, extruded anodized aluminum to match door frames, 4” high, clip on type complete with back-up clips, manufactured corners.

.9 Access doors: Non-rated access doors for existing equipment installations, 16 ga door, 18 ga mounting frame, door flush to frame, rounded safety corners, continuous concealed hinge, screwdriver operated cam latch, paintable steel

Part 3 EXECUTION

3.1 Wall Furring

.1 Install wall furring for gypsum board wall finishes in accordance with CAN/CSA-A82.31-M91, except where specified otherwise.

.2 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.3 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

3.2 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.

3.3 Batten and Preformed Floor Base Application

.1 Do not apply until gypsum board finish has been completed and painted and flooring has been installed.

.2 Install base using applicable continuous backing clip system.

.3 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.

3.4 Sound Attenuation Blanket

.1 Sound insulation as noted under Section 072000 Insulation.

3.5 Control Joints

.1 N/A.

3.6 Access Doors

.1 N/A

3.7 Taping and Filling

.1 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.2 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.3 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after painting is completed.

.4 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.5 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Division 22 Plumbing: Plumbing work above ceilings.

.2 Division 23 Heating, Ventilating and Air Conditioning: HVAC work above ceilings.

.3 Division 26 Electrical: Electrical work above ceilings; trim for recessed light fixtures: sound masking system.

.4 Division 27 Communications: Work above ceilings; trim for recessed fixtures.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C423-09a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

.2 ASTM C635-07, Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.

.3 ASTM C636-08, Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

.4 ASTM E1264-08, Standard Classification for Acoustical Ceiling Products.

.5 ASTM E1414-11ae1 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.

.6 ASTM E1477-98a(2008), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.

.3 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S102-2007, Surface Burning Characteristics of Building Materials and Assemblies.

1.3 DESIGN REQUIREMENTS

.1 Maximum deflection: 1/360th of span to ASTM C635 deflection test.

1.4 SEISMIC DESIGN CRITERIA

.1 Provide seismic restraint for ceiling suspension systems in accordance with the requirements of the NBC, and in accordance with requirements of ASTM E580 and good engineering practice.

.1 Contractor to provide third party seismic design and installation review by a professional Engineer licensed to practice in Ontario.

.2 Include provisions for all fixtures incorporated into or suspended from ceiling suspension system.

.2 Provide ceiling suspension systems capable of withstanding effects of earthquake motions determined in accordance with NBC for site specific conditions.

.1 Provide connections and bracing as required to satisfy seismic criteria.

1.5 SUBMITTALS

.1 Provide all listed submittals in accordance with submittal procedures of Section 01 10 00.

.2 Submit triplicate 150 mm x 150 mm samples of each type of acoustical units, except as follows.

.1 Submit triplicate full size samples of acoustical unit type .

.3 Submit one representative model of each type ceiling suspension system.

.4 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.

1.6 QUALITY ASSURANCE

.1 Mock-up:

.1 Construct mock-ups in accordance with quality assurance requirements of Section 01 10 00.

.2 Construct ceiling suspension system mockup to show basic construction and assembly, treatment at walls, recessed fixtures, sound masking devices, splicing, interlocking, finishes, acoustical unit installation.

.3 Submit mock-up of each combination of suspension system and acoustical ceiling panel, in two typical application areas such as offices, meeting rooms, corridors, special areas.

.1 Construct mock-up 10 m2 minimum of each type acoustical panel ceiling including one inside corner and one outside corner where applicable.

.2 Construct mock-ups where directed.

.4 Allow 48 hours for inspection of mock-up by Departmental Representative before proceeding with ceiling work.

.5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in original unopened packaging with labels intact.

.2 Label cartons and packages indicating contents and locations for which each item is intended.

.3 Do not deliver panels to job site until shortly before installation.

.4 Protect on site stored or installed absorptive material from moisture and all other forms of damage.

.5 Remove damaged or deteriorated materials from the site.

.6 Store extra materials required for maintenance, where directed by Owner's representative Departmental Representative.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Permit wet work to dry before beginning to install.

.2 Maintain uniform minimum temperature of 15 degrees C and humidity of 20- 40% before and during installation.

.3 Store materials in work area 48 hours prior to installation.

1.9 EXTRA MATERIALS

.1 Provide extra materials of acoustic units in accordance with closeout requirements of Section 01 10 00.

.2 Provide suspension system components amounting to 2% of gross ceiling area for each type required for project. Extra materials are from same production run as installed materials. Clearly identify each type.

.3 Provide twenty (20) ceiling tiles for each pattern and type on project. Extra material shall be from the same production run as installed materials, in unopened packages. Clearly identify each type of acoustic unit, including colour and texture.

.4 Deliver to Departmental Representative, upon completion of the work of this section.

1.10 SEQUENCING AND SCHEDULING

.1 Do not install acoustical panels and tiles until work above ceiling has been inspected by Departmental Representative.

.2 Do not commence installation until mechanical and electrical work above ceiling is complete.

1.11 COORDINATION

.1 Coordinate installation of suspended ceiling system with construction of ceiling bulkheads.

.2 Coordinate installation of suspended ceiling system with mechanical, electrical and other work so that interference is prevented and items such as diffusers, grilles, lights, fixtures and other items are properly located and supported as indicated or as directed by Departmental Representative.

.3 Coordinate installation of ceiling suspension system and curved trim with erection of partition framing and installation of wallboard to ensure uniform width of reveal between curved trim and partition.

.1 Manufacturer recommends installation of ceiling suspension system and curved trim prior to erection of adjacent partition and bulkhead framing to allow adjustment of curved partition to pre-fabricated curved trim.

Part 2 Products

2.1 SOURCE OF SUPPLY

.1 Provide all suspension systems and acoustic panels as products of the same single manufacturer.

2.2 ACOUSTICAL SUSPENSION SYSTEM

.1 Provide intermediate duty system to ASTM C635, as specified for each respective system.

.2 Basic materials for suspension system: commercial quality cold rolled steel, zinc coated.

.3 Provide acoustical suspension system specified for each respective acoustical ceiling panel, and as follows.

.4 Exposed tee bar grid components: Components die cut. Main tee with double web, rectangular bulb and 25 mm rolled cap on exposed face, colour white. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.

.5 Hanger wire: galvanized soft annealed steel wire, 2.6 mm diameter.

.6 Hanger inserts: purpose made drilled threaded twist-expanded sleeve anchors suitable for rod or hanger wire installation, as applicable. Do not use inserts or anchors requiring powder activated driver.

.7 Carrying channels: 38 x 12.7 mm channel, of 3 mm thick painted galvanized steel.

.8 Accessories: splices, clips, wire ties, retainers and wall moulding as indicated complete with pre-fabricated corners, to complement suspension system components, as recommended by system manufacturer.

2.3 ACOUSTIC CEILING PANEL (ACP) AND SUSPENSION

.1 Acoustic ceiling panel for suspended ceiling system: to CAN2-92.1.

.1 Flame spread rating of 25 or less.

.2 Noise reduction coefficient (NRC) designation of 0.70 to 0.75.

.3 Ceiling Attenuation Class (CAC): minimum 35.

.4 Light reflectance range: Actual LR of 0.85.

.5 Edge type: square.

.6 Colour: white.

.7 Standard size: 610 mm x 1 220 mm x 19 mm thick and 610 mm x 610 mm x 19 mm thick, as indicated.

.8 Custom size: to be field cut and edge finished as required and as indicated.

.9 Shape: flat.

.10 Acceptable products and manufacturers:

.1 Armstrong Ultima;

.2 CGC Mars.

.3 Certainteed Symphony M.

.2 Suspension Systems for Use with ACP:

.1 Acceptable products and manufacturers:

.1 Prelude XL as manufactured by Armstrong.

.2 Donn DX/DXL as manufactured by CGC Inc.,

.3 Classic Stab as manufactured by Certainteed

.2 Colour: flat white

2.4 SUSPENSION SYSTEM TRIM

.1 Suspension trim system, straight and custom curved to suit installation, as indicated and as specified:

.1 Acceptable product and manufacturer: Compasso Suspension Trim as manufactured by CGC.

.2 Acceptable alternate product and manufacturer: Axiom Perimeter Trim as manufactured by Armstrong World Industries.

.3 Acceptable alternate product and manufacturer: Cloud Perimeter Trim as manufactured by Certainteed.

.2 Trim: vertical face width to suit application unless indicated otherwise, with horizontal legs to match ceiling grid, with hems formed for attachment to mounting clips, complete with all necessary manufacturer’s standard trim and accessories.

.3 Splice plate: steel finished to match trim, snap-in fit.

.4 Attachment clips: Hot dipped galvanized and finished to match trim, snap-in fit.

2.5 SEISMIC SUPPORT COMPONENTS

.1 Provide all necessary seismic components in accordance with approved shop drawings, including but not limited to compression posts, stainless steel aircraft cable, turnbuckles, eyebolts, clips, cross-tee connections and anchors.

Part 3 Execution

3.1 EXAMINATION

.1 Prior to beginning ceiling installation work, examine the installation areas and identify all areas of potential interference between ceiling components and components of other trades. Report all areas so designated to the Departmental Representative Departmental Representative.

.2 Do not commence installation work in areas of interference until interference has been resolved or accepted. Commencement of the work in areas of interference signifies acceptance of the conditions.

3.2 SUSPENSION SYSTEM INSTALLATION

.1 Installation: in accordance with ASTM C636 except where specified otherwise.

.2 Install suspension system to manufacturer's instructions and Certification Organizations tested design requirements.

.3 Do not erect ceiling suspension system until work above ceiling has been inspected by Departmental Representative.

.4 Secure hangers to overhead structure using attachment methods as indicated acceptable to Departmental Representative.

.1 Do not use powder actuated fastening devices at any time or place in this Work.

.5 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.

.6 Lay out centre line of ceiling both ways, to provide balanced borders at room perimeter with border units not less than 50% of standard unit width system according to reflected ceiling plan.

.7 Ensure suspension system is co-ordinated with location of related components.

.8 Install wall moulding to provide correct ceiling height.

.9 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles and speakers.

.10 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.11 Interlock cross member to main runner to provide rigid assembly.

.12 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

.13 Finished ceiling system to be square with adjoining walls and level within 1:1000.

3.3 EXPANSION JOINTS.

.1 Erect two main runners parallel, 50 mm apart, on building expansion joint line and where indicated.

.2 Do not extend ceiling panels across building expansion joints.

.3 At joint in ceiling suspension system, lay in strip of acoustic panel, 25% narrower than space between two “T” bars.

3.4 INSTALLATION OF TRIM

.1 Install in accordance with approved shop drawings and manufacturer's instructions.

.2 Use attachment clips to secure trim to each main tee.

.3 Use splice plates for joining adjacent trim pieces.

.4 Use 90 degree corner trim pieces at corners.

.5 Finished installation to be smoothly curving line to accurate radius, free of distortion and kinks, and shall form a reveal of uniform width at partitions and bulkheads.

3.5 SEISMIC RESTRAINT

.1 Install seismic restraint for suspended ceiling system and all associated fixtures in accordance with approved shop drawings.

.2 Minimum seismic tension bracing for ceilings shall be installed as follows:

.1 At perimeter of each suspended ceiling and at the end of each grid run, install additional hanger wire splayed upward at 45 degrees and attached to structure.

.2 In field of ceiling, install hanger wires at points 12 feet OC in both directions splayed upward 45 degrees from each point in four directions and secured to the underside of the structure.

.3 Tighten bracing wires without deforming the ceiling grid beyond specified tolerances.

.4 Seismic tension bracing is not required in areas in which the maximum horizontal dimension is less than or equal to 12 feet and which are bounded on all sides by partitions anchored to floor slab and underside of structural deck with seismic anchorage.

.5 The professional engineer responsible for the production of the shop drawings setting out the requirements for seismic restraint of the suspension systems shall provide periodic field review during construction and shall submit reports in accordance with quality assurance requirements of this specification. The cost of this field inspection shall be included in the Guaranteed Price.

3.6 ACOUSTICAL PANEL INSTALLATION

.1 Install acoustical panels in ceiling suspension system, supported on all edges, in accordance with manufacturer's current printed instructions.

.2 Touch up edges of panels cut to fit site conditions to conceal core and to match face.

3.7 INTERFACE WITH OTHER WORK

.1 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, to be built into acoustical ceiling components.

3.8 TOUCH-UP AND CLEANING

.1 Touch up scratches, abrasions, voids and other defects in surfaces.

.2 Replace damaged units that cannot be touched up to satisfaction of Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 09 29 00 Gypsum Board: Wall repairs at surfaces to receive resilient base.

.2 Section 09 68 13 Tile Carpeting: Floor finish.

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 submittal procedures of Section 01 10 00.

.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 01 10 00.

.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 18°C and 24°C 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 for incorporation into manual specified in Section01 10 00.

1.9 EXTRA MATERIALS

.1 Provide extra materials of each type of resilient base materials and adhesives in accordance with closeout procedures of Section01 10 00.

.2 Provide 5% of each colour, pattern and type of resilient base material required for project for maintenance use.

.3 Extra materials to be in one piece and from same production run as installed materials.

.4 Clearly identify each resilient base product and each container of adhesive.

.5 Deliver to Departmental Representative, upon completion of the work of this section.

.6 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 (RB)

.1 Resilient base: to ASTM F1861, Type TS or TP, rubber, Style B-cove minimum for resilient floor, Style A-straight toeless for carpeted areas, in maximum practical length, 3 mm thick, 100mm high.

.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.

.1 Similar to Johnsonite, Traditional Wall Base

.1 Colour: 48 Grey.

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.

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 29 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 ¼ 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 Install toeless type base before installation of carpet on floors.

.11 Heat weld base joints in accordance with manufacturer's printed instructions.

3.3 CLEANING

.1 Remove excess adhesive from floor, base and wall surfaces without damage.

.2 Clean, floor and base surface to flooring manufacturer's printed instructions.

.3 Departmental Representative will arrange for NRC Cleaners to seal and wax floor.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 09 65 13 Resilient Base and Accessories: Resilient base for carpeted areas.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-4.2 No.27.6-M91(R2013), Textile Test Methods - Flame Resistance - Methemine Tablet Test for Textile Floor Coverings.

.2 CAN/CGSB-4.129-93, Carpet for Commercial Use.

.2 Carpet and Rug Institute (CRI)

.1 CRI-104-96, Standard Installation of Commercial Carpet.

.2 IAQ Carpet Testing Program.

.3 National Floor Covering Association (NFCA)

.1 Floor Covering Specification Manual.

.4 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102.2-10, Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

1.3 SUBMITTALS

.1 Submit the following in accordance with submittal procedures of Section 01 10 00.

.2 Submit verification to demonstrate compliance with CAN/ULCS102.2 for floor covering.

.3 Submit proof that carpet has been tested and passed the Indoor Air Quality (IAQ) Carpet Testing Program requirements of the Carpet and Rug Institute (CRI) and the Canadian Carpet Institute (CCI).

.4 Submit carpet schedule using same room designations indicated on drawings.

.5 Submit carpet manufacturer's installation instructions: Indicate special procedures and perimeter conditions requiring special attention.

.6 Submit certification and description of carpet reclamation and/or recycling process.

1.4 PRODUCT DATA

.1 Submit product data in accordance with submittal procedures of Section 01 10 00.

.2 Submit product data sheet for each carpet, undercushion, adhesive, carpet protection and subfloor patching compound.

.3 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada and Health Canada for carpet adhesive and seam adhesive. Indicate VOC content.

.4 Submit data on specified products, describing physical and performance characteristics, sizes, patterns, colours, and methods of installation.

1.5 SAMPLES

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

.2 Submit duplicate pieces of each type, size and colour of carpet tile specified.

1.6 CLOSEOUT SUBMITTALS

.1 Submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Submit maintenance data: Include maintenance procedures, recommendations for maintenance materials and equipment, and suggested schedule for cleaning.

1.7 QUALIFICATIONS

.1 Installer Qualifications:

.1 Flooring contractor requirements.

.1 Specialty contractor normally engaged in this type of work, with prior experience in installation of these types of materials.

.2 Certified by carpet manufacturer prior to bid submission.

.3 Must not sub-contract labour without written approval of Departmental Representative.

.2 Be responsible for proper product installation, including floor testing and preparation as specified and in accordance with carpet manufacturers written instructions.

1.8 REGULATORY REQUIREMENTS

.1 Carpet tile shall be tested to CAN/ULC-S102.2 and have a maximum flame spread rating of 300 and maximum smoke developed rating of 450 in accordance with NBC requirements

.2 Indoor Air Quality: compliance with CRI/CCI Green Label Indoor Air Quality Program, CRI/CCI-IAQ requirements for maximum total volatile chemicals released into air. Label each carpet product with CRI/CCI-IAQ label.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Label packaged materials.

.2 Store packaged materials in original containers or wrapping with manufacturer's seals and labels intact.

.3 Store carpeting and accessories in location as directed by Departmental Representative. Store carpet and adhesive at minimum temperature of 18oC and relative humidity of maximum 65% for minimum of 48 hours before installation.

.4 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.

.5 Store materials in area of installation for minimum period of 48 hours prior to installation.

.6 Modular carpet: store on pallet form as supplied by Manufacturer. Do not stack pallets.

1.10 ENVIRONMENTAL REQUIREMENTS

.1 Moisture: Ensure substrate is within moisture limits and alkalinity limits prescribed by manufacturer. Prepare moisture testing and provide report to Departmental Representative.

.2 Temperature: Maintain ambient temperature of not less than 18°C from [48] hours before installation to at least 48 hours after completion of work.

.3 Relative humidity: Maintain relative humidity between 10 and 65% RH for 48 hours before, during and 48 hours after installation.

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

.5 Ventilation:

.1 Arrange with Departmental Representative to operate existing building ventilation system to provide continuous ventilation during and after carpet application. 24 hours per day during installation and for 7 days after completion of carpet installation.

1.11 EXTRA MATERIALS

.1 Provide extra materials of carpet, carpet base, and adhesives in accordance with closeout requirements of Section 01 10 00.

.2 Provide modular tile maintenance material in quantity equivalent to minimum 5% of each colour, pattern and type of carpeting installed. Minimum one full box of each.

.3 Extra materials to be from same production run as installed materials.

.4 Identify each package of carpet and each container of adhesive.

.5 Deliver to site and store where directed by Departmental Representative.

Part 2 Products

2.1 MANUFACTURERS

.1 Specification is based on products of Shaw Contract Group. Products of other modular carpet manufacturers may be acceptable subject to review and acceptance by the Departmental Representative for conformance to design concept and specifications.

.2 Certified to Carpet and Rug Institute's and the Canadian Carpet Institute IAQ requirements.

2.2 MODULAR CARPET (CPT)

.1 Provide carpet tile in dimensions, patterns and colours as specified.

.2 Construction: tufted.

.3 Pile Surface Appearance:

.1 Multi-level pattern loop.

.4 Pile fibre: to CAN/CGSB-4.129.

.1 Nylon.

.5 Gauge: 1/12.

.6 Stitch Rate: 10 per inch.

.7 Tuft Density: 6,511 ounces per square yard.

.8 Finished Pile Thickness: 0.094 inch.

.9 Yarn Dye Method: 100% solution dyed.

.10 Colourization: multiple colour tones.

.11 Colourfastness to light: to CAN/CGSB-4.2No.18.3.

.12 Primary Backing: woven.

.13 Secondary Backing: synthetic.

.14 Soil protection: manufacturer’s protective treatment.

2.3 INSTALLATION ACCESSORIES

.1 Adhesive:

.1 Pressure sensitive type: recommended by carpet manufacturer for direct glue down installation of modular carpet or speciality backed carpets.

.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 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.

.5 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.

.6 Carpet protection: non-staining heavy duty kraft paper.

.7 Subfloor patching compound: Portland cement base filler, mix with latex and water to form a cementitious paste.

2.4 CARPET TILE SCHEDULE

.1 CPT-1: (main colour): Ignite Tile, Colour: Oxidize 48531, Size: 460mm x 915mm by Shaw Contract Group.

.2 CPT-2: Colour: glowing 81211 (yellow), Size: 215mm x 915mm by Shaw Contract Group.

.3 CPT-3: Colour: purple 81991 (purple), Size: 215mm x 915mm by Shaw Contract Group.

.4 CPT-4: Colour: hyper green 81326 (green), Size: 215mm x 915mm by Shaw Contract Group.

.5 CPT: Colour: hyper blue 81436 (blue), Size: 215mm x 915mm by Shaw Contract Group.

Part 3 Execution

3.1 SUB-FLOOR TREATMENT

.1 Concrete shall be inspected to determine special care required to make it a suitable foundation for carpet. Fill cracks 3 mm wide and level protrusions over 0.8 mm with appropriate and compatible latex or polymer fortified patching compound.

.2 Do not exceed manufacturer's recommendations for patch thickness.

.3 Large patch areas are to primed with a compatible primer.

.4 Concrete substrates shall be cured, clean and dry.

.5 Concrete substrates shall be free of paint, dirt, grease, oil, curing or parting agents, and other contaminates, including sealers, that may interfere with the bonding of the adhesive.

.6 Wherever a powdery or porous concrete surface is encountered, a primer compatible with the adhesive shall be used to provide a suitable surface for glue-down installation.

3.2 PREPARATION

.1 Prepare floor surfaces in accordance with CRI 104 Standard for Installation of Commercial Carpet.

.2 Pre-condition carpeting following 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.

3.4 INSTALLATION OF ADHESIVE

.1 Review substrate and environmental conditions to ensure they are in accordance with adhesive manufacturer's written requirements.

.2 Mix and apply adhesives in strict accordance with manufacturer's written instructions, observing recommended application techniques and spread rates, open times and safety precautions.

.3 Apply adhesive to fully cover substrate using appropriate notched trowel. Use new trowels when existing trowels become worn. Self-adhesive carpet tile installation shall be in accordance with manufacturer's recommendations.

3.5 INSTALLATION OF CARPET TILE

.1 Install modular carpet in accordance with manufacturer's printed instructions and in accordance with NFCA guidelines using tools, materials, methods and sequence of work as recommended

.2 Install carpet tile as indicated in areas and patterns detailed on drawings and/or indicated on the project Finish Schedule.

.3 Install carpet tile adhered to substrate in accordance with NFCA requirements and carpet tile manufacturer's recommendations.

.4 Install carpet tile starting in the centre of the room and working outwards towards perimeter walls. Other acceptable commercial practices can be substituted as the starting point to provide a border width equal to at least half a tile.

.5 Install carpet tile with butted joints straight, in true plane with carpet nap in pattern indicated. Ensure dye lot, pattern, and texture match within any one area. All patterns shall be pre-approved by Departmental Representative.

.6 Border tiles shall be scribed to vertical surfaces and around architectural, mechanical, electrical and furniture fixtures, fitments and floor projections, and cut and fitted into place after the field tile has been laid and before wall base has been installed.

.7 Install carpet tile into recesses and closets adjacent to carpeted areas and continuous through doorways and other openings for a uniform appearance.

.8 Do not bridge building expansion joints with carpet tile; provide for movement.

.9 Tiles should be carefully rolled in each direction with a roller of size and weight as recommended by carpet tile manufacturer to ensure full adhesion of tile to the substrate and again when entire room is complete to ensure uniform adhesion.

.10 Clean excess adhesive off of tiles after installation using methods and materials recommended by flooring and adhesive manufacturer.

3.6 COMPLETION

.1 On completion of work, trim all loose pieces of face yarn with scissors, remove all carpet tile scraps and other refuse from areas and rooms worked in and from job site, and inspect and correct other apparent defects.

.2 Vacuum carpet tile with a beater type vacuum to remove dirt. Remove any soiled spots with proper cleaner recommended by carpet tile manufacturer for each type of carpet tile installed.

3.7 PROTECTION OF FINISHED WORK

.1 Prohibit traffic on carpet for a period of 24 hours until adhesive is cured.

.2 Install carpet protection to satisfaction of Departmental Representative.

END OF SECTION

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 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 01 10 00

.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 EXTRA MATERIALS:

.1 Submit maintenance materials in accordance with closeout submittals requirements of Section 01 10 00.

.2 Deliver extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels.

.3 Quantity: provide one one-litre can of each type and colour of primer and finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

.4 Delivery, storage and protection: comply with Departmental Representative requirements for delivery and storage of extra materials.

1.11 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, Dynamic Blue, SW 6958.
.3 P3: Sherwin Williams, Gauntlet Grey, SW 7019.
.4 P4: Sherwin Williams, Overt Green, SW 6718.
.5 P5: Sherwin Williams, Bee, SW 6683.
.6 P6: Sherwin Williams, Verve Violet, SW 6975.

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 @ 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 Galvanized metal: New interior doors, frames.

.1 INT 5.3M – Waterborne Light Industrial Coating, MPI gloss level 5 (semi-gloss) finish.

.2 Dressed lumber: including doors, door and window frames, casings, mouldings:

.1 INT 6.3BB - Waterborne alkyd MPI gloss level 5 (semi-gloss) finish for interior doors in non-humid locations only.

.3 Electrical backer boards.

.1 INT 6.4P – Intumescent fire retardant alkyd coating, gloss level 1 (flat) finish, ULC listed.

.4 Plaster and gypsum board walls: gypsum wallboard and textured finishes:

.1 INT 9.2B - High performance architectural latex, gloss level 5 (semi-gloss) finish.

.5 Plaster and gypsum board ceilings, soffits and bulkheads: plaster, gypsum wallboard and textured finishes:

.1 INT 9.2B - High performance architectural latex, gloss level 1 (flat) finish.

.6 Plastic laminate door trim and edges:

.1 INT 6.4E Polyurethane varnish over semi-transparent stain, gloss level 5.

.7 Concrete horizontal surfaces: Mechanical room floor and housekeeping pads:

.1 INT 3.2L - Waterborne epoxy floor finish.

2.6 EXISTING PAINTED STEEL SURFACES

.1 Paint system applicable to:

.1 Existing painted steel windows.

.2 Existing steel door frames to remain.

.2 Provide specified paint system products or approved equal:

.1 De-greaser: non-flammable, biodegradable synthetic safety solvent based on N-methyl 2-pyrrolidone containing no methylene chloride, methanol or benzenes, in gel and liquid form.

.1 Acceptable product and manufacturer: Green Solve as manufactured by Cyndan Chemicals.

.2 Primer: Pro-Cryl Universal Primer B66W00310 Off-White as manufactured by Sherwin Williams.

.3 Top coat: Water Based Catalyzed Epoxy Part A B73-300 Series (Gloss) with Part B B73V300 Hardener as manufactured by Sherwin Williams.

.4 Colour: as indicated on drawings.

.1 Tint first coat lighter than top finish coat.

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 spatters, 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 EXISTING PAINTED STEEL SURFACES

.1 In addition to the requirements specified, prepare and apply coatings to the following surfaces:

- .1 Stair railings, guardrails, stringers, risers and nosings.
- .2 Hollow steel doors and frames to remain.
- .3 Existing heat register louvered covers.
  - .1 At option of Contractor, register covers may be removed from site to paint shop for surface preparation and finish painting.
  - .2 For materials taken off site:
    - .1 Prepare inventory of items removed and submit to Departmental Representative.
    - .2 Transport, store and handled all items taken off site protected from all loss, deterioration and damage.
    - .3 Re-finish as specified, including testing.
    - .4 Transport to site and re-install.

.2 Testing Requirements:

- .1 Prior to complete application, prepare surfaces and apply coatings as specified, for three test areas.
- .2 Allow paint to dry one week and test for adhesion in presence of Departmental Representative.
- .3 If adhesion is poor, perform additional abrasion and re-test.
- .4 Repeat until adhesion is acceptable.

.3 Abrade existing painted metal surfaces to provide required surface texture.

.4 Grind all weld burn marks down to smooth, clean, bare metal.

.5 Clean all particulate matter from surface.

.6 De-grease existing painted and new bare metal surfaces with specified de-greaser in liquid and/or gel form to suit surface.

.7 Apply specified primer to all painted and bare metal surfaces in strict accordance with manufacturer’s instructions.

.8 Apply two coats of specified top coat to primed surfaces in strict accordance with manufacturer’s instructions.

3.7 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.5 Do not paint over nameplates.

.6 Keep sprinkler heads free of paint.

.7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.8 Paint fire protection piping red.

.9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.10 Paint natural gas piping yellow.

.11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.12 Do not paint interior transformers and substation equipment.

3.8 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.

3.9 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.

3.10 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 SUBMITTALS

.1 Submittals: in accordance with Section 01 10 00 – General Instructions.

.2 Shop drawings; submit drawings stamped and signed by Contractor registered or licensed in Province of Ontario, Canada.

.3 Shop drawings to show:

- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.4 Shop 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.

.5 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 10 00 – General Instructions.
- .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
- .3 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.
- .4 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.
- .5 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.

.6 Approvals:

.1 Submit one (1) draft copy of 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.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.8 Site records:

.1 Departmental Representative will provide one (1) set of reproducible mechanical drawings. Provide sets of 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 weekly 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.

.9 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.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.2 MAINTENANCE

.1 Furnish spare parts in accordance with Section 01 10 00 – General Instructions as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One glass for each gauge glass.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 10 00 – General Instructions.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with generally accepted industry best practices.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers.

3.3 FIELD QUALITY CONTROL

.1 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.

3.4 DEMONSTRATION

.1 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.

.2 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.3 Instruction duration time requirements as specified in appropriate sections.

.4 Departmental Representative may record these demonstrations on video tape for future reference.

3.5 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 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 B209M-[04], Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate [Metric].

.2 ASTM C335-[04], Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.

.3 ASTM C411-[04], Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.4 ASTM C449/C449M-[00], Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.5 ASTM C533-[2004], Calcium Silicate Block and Pipe Thermal Insulation.

.6 ASTM C547-[2003], Mineral Fiber Pipe Insulation.

.7 ASTM C795-[03], Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

.8 ASTM C921-[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.

.2 CAN/CGSB-51.53-[95], Poly (Vinyl Chloride) Jacketting Sheet, for Insulated Pipes, Vessels and Round Ducts

.4 Department of Justice Canada (Jus)

.1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.

.2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.6 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).

.7 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102-[03], Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-[01], Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.3 CAN/ULC-S702-[1997], Thermal Insulation, Mineral Fibre, for Buildings

.4 CAN/ULC-S702.2-[03], Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.2 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.

1.3 SUBMITTALS

.1 Submittals: in accordance with Section 01 10 00 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 10 00 – General Instructions. Include product characteristics, performance criteria, and limitations.

.3 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 10 00 – General Instructions.

.4 Samples:

.1 Submit samples in accordance with Section 01 10 00 – General Instructions.

.2 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix label beneath sample indicating service.

.5 Quality assurance submittals: submit following in accordance with Section 01 10 00 – General Instructions.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: specialist in performing work of this Section, and have at least three (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 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 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 and recycling in accordance with Section 01 10 00 – General Instructions.

.2 Place excess or unused insulation and insulation accessory materials in designated containers.

.3 Divert unused metal materials from landfill to metal recycling facility.

.4 Dispose of unused adhesive material at official hazardous material collections site.

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 C335.

.3 TIAC Code A-6: flexible unicellular tubular elastomer.

.1 Insulation: with vapour retarder jacket or built in vapour barrier.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to ASTM C177 and ASTM C518.

.4 Flame Spread and Smoke Development Index: 25/50 rated to CAN/ULC-S102.

.5 Standard of Acceptance: Armacell AP Armaflex Tube Insulation or approved equivalent.

2.3 INSULATION SECUREMENT

.1 Tape: self-adhesive, aluminum, reinforced, 50mm wide minimum.

.2 Contact adhesive: quick setting.

.3 Canvas adhesive: washable.

.4 Tie wire: 1.5mm diameter stainless steel.

.5 Bands: stainless steel, 19mm wide, 0.5mm thick.

2.4 CEMENT

.1 Thermal insulating and finishing cement:

.1 Hydraulic setting on mineral wool, to ASTM C449/C449M.

2.5 VAPOUR RETARDER LAP ADHESIVE

.1 Water based, fire retardant type, compatible with insulation.

2.6 INDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 OUTDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: fibrous glass, untreated 305 g/m^2.

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 manufacturer's instructions and this specification.

.3 Use two (2) layers with staggered joints when required nominal wall thickness exceeds 75mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Install hangers, supports outside vapour retarder jacket.

.5 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 INSTALLATION OF ELASTOMERIC INSULATION

.1 Insulation to remain dry. Overlaps in accordance with manufacturer's instructions.

.2 Provide vapour retarder in accordance with manufacturer's instructions.

3.5 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 TIAC Code: A-6.

.1 Insulation securements: per manufacturer recommendations.

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: in accordance with TIAC requirements and manufacturer's recommendations.

.3 Thickness of insulation as listed in following table.

.1 Run-outs to individual units and equipment not exceeding 4m long.

.2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)					
		Run out	to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8 & over
Refrigerant Piping	A-6	25	25	25	25	25	25
Cooling Unit / Cooling Coil Condensate	A-6	25	25	25	25	25	25

.4 Finishes:

.1 Exposed Indoors: PVC jacket.

.2 Exposed Indoors, Mechanical Rooms: canvas jacket.

.3 Concealed, Indoors: canvas jacket.

.4 Outdoors: water-proof aluminum jacket.

.5 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.

.6 Finish attachments: stainless steel bands, at 150 mm on centre. Seals: wing closed.

.7 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.6 CLEANING

.1 Proceed in accordance with Section 01 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 REFERENCES

.1 American National Standards Institute/National Fire Prevention Association (ANSI/NFPA)

.1 ANSI/NFPA 13-[02], Installation of Sprinkler Systems.

.2 ANSI/NFPA 24-[02], Installation of Private Fire Service Mains and Their Appurtenances.

.3 ANSI/NFPA 25-[02], Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 Underwriter's Laboratories of Canada (ULC)

.1 CAN4 S543-[M984], Standard for Internal Lug Quick Connect Couplings for Fire Hose.

1.2 SAMPLES

.1 Submit samples of following:

.1 Each type of sprinkler head.

1.3 DESIGN REQUIREMENTS

.1 Include with each system materials, accessories, and equipment inside and outside building to provide each system complete and ready for use.

.2 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.

.3 Locate sprinkler heads in consistent pattern with ceiling grid, lights, and air supply diffusers.

.4 Devices and equipment for fire protection service: ULC approved for use in wet pipe sprinkler systems.

.5 Design systems for earthquake protection for buildings in seismic zones for Ottawa as outlined in the Ontario Building Code.

.6 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 ordinary occupancy.

.2 Uniformly space sprinklers on branch.

1.4 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 10 00 – General Instructions.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 10 00 – General Instructions.

.3 Quality assurance submittals: submit following in accordance with Section 01 10 00 – General Instructions.

.1 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.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Instructions: submit manufacturer's installation instructions.

.2 Manufacturer's Field Reports: manufacturer's field reports specified.

.4 Closeout Submittals:

.1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 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. Show point to point electrical wiring diagrams.

.2 Electrical wiring diagrams.

.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 with title block similar to full size contract drawings.

.6 Operation and Maintenance Manuals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 10 00 – General Instructions.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company or person specializing in wet sprinkler systems with documented experience.

1.6 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 10 00 – General Instructions.

.2 Provide spare sprinklers and tools as required by ANSI/NFPA 13.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 10 00 – General Instructions.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Storage and Protection:

.1 Store materials indoors, in dry location.

.2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

.3 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 10 00 – General Instructions.

Part 2 Products

2.1 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.

.3 Conceal piping in areas with suspended ceiling.

2.2 PIPE, FITTINGS AND VALVES

.1 Pipe:

.1 Ferrous: to ANSI/NFPA 13.

.2 Copper tube: to ANSI/NFPA 13.

.2 Fittings and joints to ANSI/NFPA 13:

.1 Ferrous: screwed, welded, flanged or roll grooved.

.2 Copper tube: screwed, soldered, brazed.

.3 Provide threaded or grooved-end type fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.

.4 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.

.5 Rubber gasketed grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32mm (1-1/4”) and larger.

.6 Fittings: ULC approved for use in wet pipe sprinkler systems.

.7 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.

.8 Side outlet tees using rubber gasketed fittings are not permitted.

.9 Sprinkler pipe and fittings: metal.

.3 Valves:

.1 ULC listed for fire protection service.

.2 Gate valves: open by counter-clockwise rotation.

.3 Provide rising stem OS & Y valve beneath each alarm valve in each riser when more than one alarm valve is supplied from same water supply pipe.

.4 Check valves: flanged clear opening swing-check type with flanged inspection and access cover plate for sizes 10cm and larger.

.5 Provide gate valve in piping protecting elevator hoistways, machine rooms, and machinery spaces.

.4 Pipe hangers:

.1 ULC listed for fire protection services in accordance with NFPA.

2.3 SPRINKLER HEADS

.1 General: to ANSI/NFPA 13 and ULC listed for fire services.

.2 Sprinkler Head Type:

.1 Type A: pendant chrome glass bulb type.

.1 For installation in all areas with suspended ceilings.

.2 Type B: upright bronze type complete with sprinkler guard.

.1 For installation in all areas with exposed ceiling (ie. storage areas, workshop, etc.).

.3 Provide sprinkler heads with orifice sized to match existing.

.1 Release element of each head to be of intermediate temperature rating or higher as suitable for specific application, and match existing sprinkler head ratings.

.2 Provide polished chromium-plated pendent sprinklers below suspended ceilings.

.3 Provide corrosion-resistant sprinkler heads and sprinkler head guards in accordance with NFPA 13.

.4 Provide sprinkler heads as indicated.

.5 Deflector: not more than 75mm below suspended ceilings.

.6 Ceiling plates: not more than 25mm deep.

.7 Ceiling cups: not permitted.

2.4 PIPE SLEEVES

.1 Provide pipe sleeves where piping passes through walls, floors, and roofs.

.2 Secure sleeves in position and location during construction.

.3 Provide sleeves of sufficient length to pass through entire thickness of walls, floors, and roofs.

.4 Provide 2.5cm minimum clearance between exterior of piping and interior of sleeve or core-drilled hole.

.1 Firmly pack space with mineral wool insulation.

.2 Seal space at both ends of sleeve or core-drilled hole with mechanically adjustable segmented elastomeric seal.

.3 In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with ULC listed fill, void, or cavity material.

.5 Sleeves in Masonry and Concrete Walls, Floors, and Roofs:

.1 Provide hot-dip galvanized steel sleeves.

.2 Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in core-drilled hole are completely grouted smooth.

.6 Sleeves in materials other than masonry and concrete walls, floors and roofs:

.1 Provide 0.61mm thick galvanized steel sheet.

2.5 ESCUTCHEON PLATES

.1 Provide split hinge type metal plates for piping passing through walls, floors, and ceilings in exposed spaces.

.2 Provide polished stainless steel plates in finished spaces.

.3 Provide paint finish on metal plates in unfinished spaces.

2.6 SPARE PARTS CABINET

.1 Provide metal cabinet with extra sprinkler heads and sprinkler head wrench adjacent to each alarm valve. Number and types of extra sprinkler heads as specified in NFPA 13.

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 ANSI/NFPA 13 and ANSI/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 DISINFECTION

.1 Disinfect new piping.

.2 Fill piping systems with solution containing minimum of 50 parts per million of chlorine and allow solution to stand for minimum of 24h.

.3 Flush solution from systems with clean water until maximum residual chlorine content is not greater than 0.2 parts per million or residual chlorine content of domestic water supply.

.4 Obtain at least two (2) consecutive satisfactory bacteriological samples from piping, analyzed by certified laboratory, and submit results prior to piping being placed into service.

3.5 FIELD PAINTING

.1 Clean, pre-treat, prime, and paint new systems including valves, piping, conduit, 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 one (1) coat of pre-treatment primer applied to minimum dry film thickness of 0.3mil, and one (1) coat of zinc chromate primer applied to minimum dry film thickness of 1.0mil.

.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 two (2) coats of paint to match adjacent surfaces.

.2 Provide valves and operating accessories with one (1) coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0mil.

.3 Provide piping with 50mm wide red self-adhering red plastic bands spaced at maximum of 6m intervals throughout piping systems.

.2 Piping in Unfinished Areas:

.1 Provide primed surfaces with one (1) coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0mil in spaces above suspended ceilings, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.

.2 Provide piping with 50mm wide red self-adhering red plastic bands spaced at maximum of 6 m intervals.

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 2h 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.

.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.

3.7 CLEANING

.1 Proceed in accordance with Section 01 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 SUBMITTALS

.1 Submittals: in accordance with Section 01 10 00 – General Instructions.

.2 Shop drawings; submit drawings stamped and signed by Contractor registered or licensed in Province of Ontario, Canada.

.3 Shop drawings to show:

- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.4 Shop 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.

.5 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 10 00 – General Instructions.
- .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
- .3 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.
- .4 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.
- .5 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.

.6 Approvals:

.1 Submit one (1) draft copy of 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.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.8 Site records:

.1 Departmental Representative will provide one (1) set of reproducible mechanical drawings. Provide sets of 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 weekly 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.

.9 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.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.2 MAINTENANCE

.1 Furnish spare parts in accordance with Section 01 10 00 – General Instructions as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One glass for each gauge glass.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 10 00 – General Instructions.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with generally accepted industry best practices.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers.

3.3 FIELD QUALITY CONTROL

.1 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.

3.4 DEMONSTRATION

.1 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.

.2 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.3 Instruction duration time requirements as specified in appropriate sections.

.4 Departmental Representative may record these demonstrations on video tape for future reference.

3.5 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 REFERENCES

.1 ASTM International Inc.

.1 ASTM B32-[08], Standard Specification for Solder Metal.

.2 ASTM B306-[02], Standard Specification for Copper Drainage Tube (DWV).

.3 ASTM C564-[03a], Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.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.

.3 Green Seal Environmental Standards (GSES)

.1 Standard GS-36-[00], Commercial Adhesives.

.4 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168-[A2005], Adhesive and Sealant Applications.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 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.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 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 and return or recycling of pallets, crates, paddling and packaging materials in accordance with Section 01 10 00 – General Instructions.

Part 2 Products

2.1 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: to ASTM B32.

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 National Plumbing Code and local authority having jurisdiction.

3.3 TESTING

.1 Pressure test buried systems before backfilling.

.2 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 Storm water drainage:

.1 Verify domes are secure.

.2 Ensure weirs are correctly sized and installed correctly.

.3 Verify provisions for movement of roof system.

.4 Ensure that fixtures are properly anchored, connected to system and effectively vented.

.5 Affix applicable label (storm, sanitary, vent, condensate, pump discharge etc.) complete with directional arrows every floor or 4.5m (whichever is less).

3.5 CLEANING

.1 Clean in accordance with Section 01 10 00 – General Instructions.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 10 00 – General Instructions.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

.1 Submittals: in accordance with Section 01 10 00 – General Instructions.

.2 Shop drawings; submit drawings stamped and signed by Contractor registered or licensed in Province of Ontario, Canada.

.3 Shop drawings to show:

- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.4 Shop 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.

.5 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 10 00 – General Instructions.
- .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
- .3 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.
- .4 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.

.5 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.

.6 Approvals:

.1 Submit one (1) draft copy of the 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.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.8 Site records:

.1 Departmental Representative will provide one (1) set of reproducible mechanical drawings. Provide sets of 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 weekly 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.

.9 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.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.2 MAINTENANCE

.1 Furnish spare parts in accordance as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One head gasket set for each heat exchanger.

.4 One glass for each gauge glass.

.5 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 10 00 – General Instructions.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with generally accepted industry best practices.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.3 FIELD QUALITY CONTROL

.1 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.

3.4 DEMONSTRATION

.1 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.

.2 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.3 Instruction duration time requirements as specified in appropriate sections.

.4 Departmental Representative may record these demonstrations on video tape for future reference.

3.5 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 SUBMITTALS

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

1.2 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with manufacturer’s recommendations.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, paddling and packaging materials in accordance with Section 01 10 00 – General Instructions.

Part 2 Products

2.1 NOT USED

.1 Not Used.

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.

.4 Provide flexible connectors complete with all accessories for air handling units, heat exchangers, pumps, chillers, cooling towers, etc.

3.3 CLEARANCES

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.

.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer or as indicated (whichever is greater) without interrupting operation of other system, equipment, and 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. Discharge to be visible.

.4 Drain valves: NPS ½ or ¾ gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

.5 Drawings do not show all valves. Contractor shall be responsible to provide all drain valves required.

3.5 DIELECTRIC COUPLINGS, UNIONS & FLANGE KITS

.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.

.4 NPS 2 & Over: isolating flange kits to suit temperature, pressure and working fluid.

3.6 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 Pipe routing on drawings is only indicative and does not show all valves, fittings supports and accessories. Contractor shall verify site conditions prior to commencement of work, and allow for all required piping accessories and supports.

.5 Assemble piping using fittings manufactured to ANSI standards.

.6 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.

.7 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.8 Install concealed pipework to minimize furring space, maximize headroom, conserve space.

.9 Slope piping, except where indicated, in direction of flow for positive drainage and venting.

.10 Install, except where indicated, to permit separate thermal insulation of each pipe.

.11 Group piping wherever possible.

.12 Ream pipes, remove scale and other foreign material before assembly.

.13 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

.14 Provide for thermal expansion as indicated.

.15 Valves:

.1 Install in accessible locations.

.2 Remove interior parts before soldering.

.3 Install with stems above horizontal position unless otherwise indicated.

.4 Valves accessible for maintenance without removing adjacent piping.

.5 Install globe valves in bypass around control valves.

.6 Use ball valves at branch take-offs for isolating purposes except where otherwise specified.

.7 Use chain operators on valves NPS 2-1/2 and larger where installed more than 2400mm (95 inches) above floor in Mechanical Rooms.

.16 Check Valves:

.1 Install silent check valves on discharge of pumps and in vertical pipes with downward flow and elsewhere as indicated.

.2 Install swing check valves in horizontal lines on discharge of pumps and elsewhere as indicated.

.17 Provide flexible connectors complete with accessories on all equipment.

3.7 SLEEVES

.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and elsewhere as indicated.

.2 Material: schedule 40 black steel pipe.

.3 Construction: foundation walls and where sleeves extend above finished floors to have annular fins continuously welded on at mid-point.

.4 Sizes: 6mm (1/4 inch) minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Installation:

.1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.

.2 Other floors: terminate 25mm (1 inch) above finished floor.

.3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.

.6 Sealing:

.1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.

.2 Elsewhere: Provide space for firestopping. Maintain fire rating integrity.

.3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.

.4 Ensure no contact between copper pipe or tube and sleeve.

3.8 ESCUTCHEONS

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

.2 Construction: one piece type with set screws. Chrome or nickel plated brass or type 302 stainless steel.

.3 Sizes: outside diameter to cover opening or sleeve. Inside diameter to fit around pipe or outside of insulation if so provided.

3.9 PREPARATION FOR FIRESTOPPING

.1 Material and installation within annular space between pipes, ducts, insulation and adjacent fire separation to be fire stopped.

.2 Uninsulated unheated pipes not subject to movement: No special preparation.

.3 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe movement without damaging fires topping material or installation.

.4 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

3.10 FLUSHING OUT OF PIPING SYSTEMS

.1 Flush system in accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

.2 Before start-up, clean interior of piping systems in accordance with requirements of Section 01 10 00 – General Instructions supplemented as specified in relevant mechanical sections.

.3 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.11 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

.1 Advise Departmental Representative 48h minimum prior to performance of pressure tests.

.2 Pipework: test as specified in relevant sections of mechanical specification.

.3 Maintain specified test pressure without loss for 4h 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.

3.12 EXISTING SYSTEMS

.1 Connect into existing piping systems at times approved by Departmental Representative.

.2 Request written approval 10 days minimum, prior to commencement of work.

.3 Be responsible for damage to existing plant by this work.

.4 Ensure daily clean-up of existing areas.

3.13 CLEANING

.1 Clean in accordance with Section 01 10 00 – General Instructions. Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 10 00 – General Instructions.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

.1 ANSI/ASME B31.1-[04], Power Piping.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A125-[1996(R2001)], Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A307-[04], Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A563-[04a], Specification for Carbon and Alloy Steel Nuts.

.3 Factory Mutual (FM).

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.5 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP58-[02], Pipe Hangers and Supports - Materials, Design and Manufacture.

.2 ANSI/MSS SP69-[03], Pipe Hangers and Supports - Selection and Application.

.3 MSS SP89-[03], Pipe Hangers and Supports - Fabrication and Installation Practices.

.6 Underwriter's Laboratories of Canada (ULC).

1.2 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 MSS SP58.ASME B31.1 or:

.1 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.

.3 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.

.4 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.

.5 Provide all other bases, hangers and supports as per manufacturer’s requirements.

.2 Performance Requirements:

.1 Design supports, platforms, catwalks and hangers to withstand seismic events as specified in the Ontario Building Code for geographic region.

1.3 SUBMITTALS

.1 Submittals: in accordance with specification Section 01 10 00 – General Instructions.

.2 Shop drawings: submit drawings stamped and signed by Contractor registered or licensed in the Province of Ontario, Canada.

.3 Submit shop drawings and product data for the following items:

.1 Bases, hangers and supports.

.2 Connection to equipment and structure.

.3 Structural assemblies.

.4 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in specification Section 01 10 00 – General Instructions.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 10 00 – General Instructions.

Part 2 Products

2.1 GENERAL

.1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP58.

.2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.2 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 epoxy coated.

.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.

.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 and FM approved to MSS-SP58 and MSS-SP69.

.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 and FM approved to MSS SP69.

.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 and 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 6mm (1/4”) minimum greater than rod diameter.

.2 Concrete inserts: wedge shaped body with knockout protector plate UL listed and FM approved to MSS SP69.

.5 Shop and field-fabricated assemblies:

.1 Trapeze hanger assemblies: to MSS SP89.

.2 Steel brackets: to MSS SP89.

.3 Sway braces for seismic restraint: in accordance with Ontario Building Code and Section 23 05 48 – Vibration and Seismic Control for HVAC Piping and Equipment.

.6 Hanger rods: threaded rod material to MSS SP58:

.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 (3/4”) rod.

.7 Pipe attachments: material to MSS SP58:

.1 Attachments for steel piping: carbon steel black.

.2 Attachments for copper piping: copper plated black steel.

.3 Use insulation protection saddles for hot pipework.

.4 Oversize pipe hangers and supports.

.8 Adjustable clevis: material to MSS SP69 UL listed and 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 SP69.

.10 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.

.1 Finishes for steel pipework: black.

.2 Finishes for copper, glass, brass or aluminum pipework: black], with formed portion epoxy coated.

.11 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP69. Shop and field fabricated assemblies:

.1 Trapeze Hanger Assemblies: to MSS SP-89.

.2 Steel Brackets: to MSS SP-89.

.3 Sway Braces for Seismic Restraint Systems: to MSS SP-89.

2.3 RISER CLAMPS

.1 Steel or cast iron pipe: black carbon steel to MSS SP58, type 42, UL listed and FM approved.

.2 Copper pipe: carbon steel copper plated to MSS SP58, type 42.

.3 Bolts: to ASTM A307.

.4 Nuts: to ASTM A563.

2.4 INSULATION PROTECTION SHIELDS

.1 Insulated cold piping:

.1 64 kg/m^3 density insulation plus insulation protection shield to: MSS SP69, galvanized sheet carbon steel. Length designed for maximum 3m span.

.2 Insulated hot piping:

.1 Curved plate 300mm long, with edges turned up, for pipe sizes NPS 2-1/2 and over, carbon steel to comply with MSS SP69.

.2 Curved plate 300mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP69.

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 25mm 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: 13mm minimum, 50mm maximum, use single spring pre-compressed variable spring hangers.

.2 Vertical movement greater than 50mm: 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. Provide certificate of calibration for each hanger.

.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 SUPPORTS

.1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel. Submit calculations with shop drawings.

2.8 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 Vibration Control Devices:

.1 Install on piping systems at pumps, boilers, chillers, cooling towers, and as indicated.

.3 Clamps on riser piping:

.1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.

.2 Bolt-tightening torques to industry standards.

.3 Steel pipes: install below coupling or shear lugs welded to pipe.

.4 Cast iron pipes: install below joint.

.4 Clevis plates:

.1 Attach to concrete with 4 minimum concrete inserts, one at each corner.

.5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

.6 Use approved constant support type hangers where:

.1 vertical movement of pipework is 13mm or more,

.2 transfer of load to adjacent hangers or connected equipment is not permitted.

.7 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, Provincial Code and authority having jurisdiction.

.2 Fire protection: to applicable fire code.

.3 Gas and fuel oil piping: up to NPS 1/2: every 1.8 m.

.4 Copper piping: up to NPS 1/2: every 1.5 m.

.5 Flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.

.6 Within 300mm of each elbow.

Maximum Pipe Size : NPS	Maximum Spacing Steel	Maximum Spacing Copper
up to 1-1/4	2.1 m	1.8 m
1-1/2	2.7 m	2.4 m
2	3.0 m	2.7 m
2-1/2	3.6 m	3.0 m
3	3.6 m	3.0 m
3-1/2	3.9 m	3.3 m
4	4.2 m	3.6 m
5	4.8 m	
6	5.1 m	
8	5.7 m	
10	6.6 m	
12	6.9 m	

.7 Pipe work greater than NPS 12: to MSS SP69.

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.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Gas Association (CGA)

.1 CSA/CGA B149.1-[05], Natural Gas and Propane Installation Code.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.60-[97], Interior Alkyd Gloss Enamel.

.2 CAN/CGSB-24.3-[92], Identification of Piping Systems.

.3 National Fire Protection Association (NFPA)

.1 NFPA 13-[2002], Standard for the Installation of Sprinkler Systems.

.2 NFPA 14-[2003], Standard for the Installation of Standpipe and Hose Systems.

1.2 SUBMITTALS

.1 Product Data:

.2 Submittals: in accordance with Section 01 10 00 – General Instructions.

.3 Product data to include paint colour chips, other products specified in this section.

.4 Samples:

.1 Submit samples in accordance with Section 01 10 00 – General Instructions

.2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 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 and recycling in accordance with Section 01 10 00 – General Instructions.

.2 Dispose of unused paint and coating material at official hazardous material collections site.

.3 Do not dispose of unused paint and 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 3mm 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.

.5 Identification for PWGSC Preventive Maintenance Support System (PMSS):

.1 Use arrangement of Main identifier, Source identifier, Destination identifier.

.2 Equipment in Mechanical Room:

.1 Main identifier: size #9.

.2 Source and Destination identifiers: size #6.

.3 Terminal cabinets, control panels: size #5.

.3 Equipment elsewhere: sizes as appropriate.

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 Standpipe and hose systems: to NFPA 14.

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 75mm: 100mm long x 50mm high.

.2 Outside diameter of pipe or insulation 75mm and greater: 150mm long x 50mm 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 20mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 Other pipes: pressure sensitive vinyl 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:

** Add design temperature
++ Add design temperature and pressure

Contents	Background Colour Markings	Legend
Refrigeration Liquid	Yellow	REF. LIQUID
Refrigeration Hot Gas	Yellow	REF. HOT GAS
Sanitary Drain	Green	SAN
Sprinklers	Red	SPRINKLERS
Fire Protection Water	Red	FIRE PROTECTION WATER

2.6 IDENTIFICATION DUCTWORK SYSTEMS

.1 50mm high stencilled letters and directional arrows 150mm long x 50mm high.

.2 Colours: back, or co-ordinated with base colour to ensure strong contrast.

2.7 VALVES, CONTROLLERS

.1 Brass tags with 12mm stamped identification data filled with black paint.

.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

2.8 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.

2.9 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 any required painting has been completed.

3.3 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Provide ULC or CSA registration plates as required by respective agency.

.3 Identify systems, equipment to conform to PWGSC PMSS.

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 17m 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 VALVES, CONTROLLERS

.1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: secure tags with non-ferrous chains or closed "S" hooks.

.2 Install one (1) copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Departmental Representative. Provide one (1) copy (reduced in size if required) in each operating and maintenance manual.

.3 Number valves in each system consecutively.

3.7 CLEANING

.1 Proceed in accordance with Section 01 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 15 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 seven (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 Filters in place, clean.

.2 Duct systems clean.

.3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.

.4 Correct fan rotation.

.5 Fire, smoke, volume control dampers installed and open.

.6 Coil fins combed, clean.

.7 Access doors, installed, closed.

.8 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 three (3) months of TAB. Provide certificate of calibration to Departmental Representative.

1.13 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 standards.

.2 TAB report to show results in SI units and to include:

.1 Project record drawings.

.2 System schematics.

.3 Submit one (1) electronic and three (3) printed copies of TAB Report to Departmental Representative for verification and approval, in English.

1.16 VERIFICATION

.1 Reported results subject to verification by Departmental Representative.

.2 Provide personnel and instrumentation to verify up to 30% 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, SMACNA or ASHRAE.

.2 Do TAB of systems, equipment, components, controls specified Division 23. Systems, equipment, components, controls as follows:

.1 Supply and return air systems serving room 1028.

.3 Qualifications: personnel performing TAB current member in good standing of AABC or NEBB and 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).

1.20 POST-OCCUPANCY TAB

.1 Measure DBT, WBT (or %RH), air velocity, air flow patterns, NC levels, in occupied zone of following areas: Flexible Cabin Laboratory (FCL).

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 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 B209M-[07], Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

.2 ASTM C335-[05ae1], Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.3 ASTM C411-[05], Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.4 ASTM C449/C449M-[00], Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.5 ASTM C547-[07e1], Standard Specification for Mineral Fiber Pipe Insulation.

.6 ASTM C553-[02e1], Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.7 ASTM C612-[04e1], Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

.8 ASTM C795-[03], Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

.9 ASTM C921-[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 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (2005).

.5 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102-[03], Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-[05], Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 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 Shop Drawings:

.1 Provide drawings stamped and signed Contractor registered or licensed in Province of Ontario, Canada.

.4 Samples:

.1 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed.

.2 Mount sample on 12mm plywood board.

.3 Affix typewritten label beneath sample indicating service.

.5 Manufacturer’s Instructions:

.1 Provide manufacturer's written duct insulation jointing recommendations. and special handling criteria, installation sequence, and cleaning procedures.

1.3 QUALITY ASSURANCE

.1 Qualifications:

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 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 and return to manufacturer of pallets, crates, paddling and packaging materials.

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 Mineral fibre: as 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 C335.

.3 TIAC Code C-1: Rigid mineral fibre board to ASTM C612, with or without factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).

.4 TIAC Code C-2: Mineral fibre blanket to ASTM C553 faced with or without factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this section).

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to ASTM C553.

2.3 JACKETS

.1 Canvas:

.1 220gm/m^2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.2 Lagging adhesive: compatible with insulation.

.1 Maximum VOC limit 200g/L to SCAQMD Rule 1168.

2.4 ACCESSORIES

.1 Vapour retarder lap adhesive:

.1 Water based, fire retardant type, compatible with insulation.

.1 Maximum VOC limit 200g/L to SCAQMD Rule 1168.

.2 Indoor Vapour Retarder Finish:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.

.4 ULC Listed Canvas Jacket:

.1 220gm/m^2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.5 Outdoor Vapour Retarder Mastic:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: Fibrous glass, untreated 305g/m^2.

.6 Tape: self-adhesive, aluminum, reinforced, 50mm wide minimum.

.7 Contact adhesive: quick-setting

.1 Maximum VOC limit 200g/L to SCAQMD Rule 1168.

.8 Canvas adhesive: washable.

.1 Maximum VOC limit 200g/L to SCAQMD Rule 1168.

.9 Tie wire: 1.5mm stainless steel.

.10 Banding: 12mm wide, 0.5mm thick stainless steel.

.11 Facing: 25mm stainless steel hexagonal wire mesh stitched on one face of insulation with expanded metal lath on other face.

.12 Fasteners: 4mm diameter pins with 35mm diameter clips, length to suit thickness of insulation.

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 manufacturer’s instructions and as indicated.

.3 Use two (2) layers with staggered joints when required nominal thickness exceeds 75mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Ensure hangers, and supports are outside vapour retarder jacket.

.5 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.

.6 Fasteners: install at 300mm on centre in horizontal and vertical directions, minimum two (2) rows each side.

.7 Fasteners: install at 300mm on centre in horizontal and vertical directions, minimum 2 rows each side.

3.4 DUCTWORK INSULATION SCHEDULE

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

	TIAC Code	Vapour Retarder	Thickness (mm)
Rectangular supply air ducts	C-1	yes	25
Round supply air ducts	C-2	yes	25

.2 Exposed round ducts 600mm and larger, smaller sizes where subject to abuse:

.1 Use TIAC code C-1 insulation, scored to suit diameter of duct.

.1 Finishes: conform to following table:

	TIAC Code	
	Rectangular	Round
Indoor, concealed	none	none
Indoor, exposed within mechanical room	CRF/1	CRD/2
Indoor, exposed elsewhere	CRF/2	CRD/3
Outdoor, exposed to precipitation	CRF/3	CRD/4
Outdoor, elsewhere	CRF/4	CRD/5

3.5 CLEANING

.1 Clean in accordance with Section 01 10 00 – General Instructions.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 10 00 – General Instructions.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B16.22-[01], Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings.

.2 ASME B16.24-[02], Cast Copper Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500.

.3 ASME B16.26-[88], Cast Copper Alloy Fittings for Flared Copper Tubes.

.4 ASME B31.5-[01], Refrigeration Piping and Heat Transfer Components.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A307-[04], Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 ASTM B280-[03], Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

.3 Canadian Standards Association (CSA International)

.1 CSA B52-[99], Mechanical Refrigeration Code.

.4 Environment Canada (EC)

.1 EPS 1/RA/1-[96], Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

.5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

.1 Submittals in accordance with Section 00 10 0 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet for piping, fittings and equipment.

.2 Submit WHMIS MSDS in accordance with Section 01 10 00 – General Instructions. Indicate VOC's for adhesive and solvents during application and curing.

.3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance 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 Instructions: submit manufacturer's installation instructions.

.6 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 10 00 – General Instructions.

1.3 QUALITY ASSURANCE

.1 Pre-Installation Meeting:

.1 Convene pre-installation meeting one (1) week prior to beginning on-site installations in accordance with Section 01 10 00 – General Instructions.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 10 00 – General Instructions.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 10 00 – General Instructions.

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

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

.4 Separate for reuse and recycling and place in designated containers steel, metal, and plastic waste in appropriate on-site bins for recycling.

.5 Divert unused metal materials from landfill to metal recycling facility as approved by NRC Departmental Representative.

Part 2 Products

2.1 TUBING

.1 Processed for refrigeration installations, deoxidized, dehydrated and sealed.

.1 Hard copper: to ASTM B280, type ACR.

.2 Annealed copper: to ASTM B280, with minimum wall thickness as per CSA B52 and ASME B31.5.

2.2 FITTINGS

.1 Service: design pressure 2070kPa and temperature 121 degrees C.

.2 Brazed:

.1 Fittings: wrought copper to ASME B16.22.

.2 Joints: silver solder, 15% Ag-80% Cu-5%P and non-corrosive flux.

.3 Flanged:

.1 Bronze or brass, to ASME B16.24, Class 150 and Class 300.

.2 Gaskets: suitable for service.

.3 Bolts, nuts and washers: to ASTM A307, heavy series.

.4 Flared:

.1 Bronze or brass, for refrigeration, to ASME B16.26.

2.3 PIPE SLEEVES

.1 Hard copper or steel, sized to provide 6mm clearance around between sleeve and uninsulated pipe or between sleeve and insulation.

2.4 VALVES

.1 22mm and under: Class 500, 3.5MPa, globe or angle non-directional type, diaphragm, packless type, with forged brass body and bonnet, moisture proof seal for below freezing applications, brazed connections.

.2 Over 22mm: Class 375, 2.5MPa, globe or angle type, diaphragm, packless type, back-seating, cap seal, with cast bronze body and bonnet, moisture proof seal for below freezing applications, brazed connections.

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 GENERAL

.1 Install in accordance with CSA B52, EPS1/RA/1 and ASME B31.5 Section 23 05 01 - Installation of Pipework.

3.3 BRAZING PROCEDURES

.1 Bleed inert gas into pipe during brazing.

.2 Remove valve internal parts, solenoid valve coils, sight glass.

.3 Do not apply heat near expansion valve and bulb.

3.4 PIPING INSTALLATION

.1 General:

.1 Hard drawn copper tubing: do not bend. Minimize use of fittings.

.2 Hot gas lines:

.1 Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.

.2 Provide trap at base of risers greater than 2400mm high and at each 7600mm thereafter.

.3 Provide inverted deep trap at top of risers.

.4 Provide double risers for compressors having capacity modulation.

.1 Large riser: install traps as specified.

.2 Small riser: size for 5.1m/s at minimum load. Connect upstream of traps on large riser.

3.5 PRESSURE AND LEAK TESTING

.1 Close valves on factory charged equipment and other equipment not designed for test pressures.

.2 Leak test to CSA B52 before evacuation to 2MPa and 1MPa on high and low sides respectively.

.3 Test Procedure: build pressure up to 35kPa with refrigerant gas on high and low sides. Supplement with nitrogen to required test pressure. Test for leaks with electronic or halide detector. Repair leaks and repeat tests.

3.6 FIELD QUALITY CONTROL

.1 Site Tests/Inspection:

.1 Close service valves on factory charged equipment.

.2 Ambient temperatures to be at least 13 degrees C for at least 6 hours before and during dehydration.

.3 Use copper lines of largest practical size to reduce evacuation time.

.4 Use two-stage vacuum pump with gas ballast on 2nd stage capable of pulling 5Pa absolute and filled with dehydrated oil.

.5 Measure system pressure with vacuum gauge. Take readings with valve between vacuum pump and system closed.

.6 Triple evacuate system components containing gases other than correct refrigerant or having lost holding charge as follows:

.1 Twice to 14Pa absolute and hold for 4h.

.2 Break vacuum with refrigerant to 14kPa.

.3 Final to 5Pa absolute and hold for at least 12h.

.4 Isolate pump from system, record vacuum and time readings until stabilization of vacuum.

.5 Submit test results to NRC Departmental Representative.

.7 Charging:

.1 Charge system through filter-drier and charging valve on high side. Low side charging not permitted.

.2 With compressors off, charge only amount necessary for proper operation of system. If system pressures equalize before system is fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.

.3 Re-purge charging line if refrigerant container is changed during charging process.

.8 Checks:

.1 Make checks and measurements as per manufacturer's operation and maintenance instructions.

.2 Record and report measurements to NRC Departmental Representative.

.9 Manufacturer's Field Services:

.1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports, in acceptable format, to verify compliance of Work with Contract.

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

.3 Schedule site visits, to review Work, at stages listed:

.1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of the Work, after cleaning is carried out.

.4 Obtain reports, within three (3) days of review, and submit, immediately, to NRC Departmental Representative.

3.7 DEMONSTRATION

.1 Instructions:

.1 Post instructions in frame with glass cover in accordance with Section 01 10 00 – General Instructions and CSA B52.

3.8 CLEANING

.1 Perform cleaning operations as specified in Section 01 10 00 – General Instructions and in accordance with manufacturer's recommendations.

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

.2 American Society for Testing and Materials International, (ASTM).

.1 ASTM A480/A480M-[03c], Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

.2 ASTM A635/A635M-[02], Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.

.3 ASTM A653/A653M-[03], Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.3 Department of Justice Canada (Jus).

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33 .

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.5 National Fire Protection Association (NFPA).

.1 NFPA 90A-[02], Standard for the Installation of Air-Conditioning and Ventilating Systems.

.2 NFPA 90B-[02], Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

.3 NFPA 96-[01], Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.

.6 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

.1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2nd Edition [1995] and Addendum No. 1, [1997].

.2 SMACNA HVAC Air Duct Leakage Test Manual, [1985], 1st Edition.

.3 IAQ Guideline for Occupied Buildings Under Construction [1995], 1st Edition.

.7 Transport Canada (TC).

.1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

.1 Certification of Ratings:

.1 Catalogue or published ratings shall 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 Protect on site stored or installed absorptive material from moisture damage.

.2 Store and manage hazardous materials in accordance with Section 01 10 00 – General Instructions.

.3 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 10 00 – General Instructions.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling off site by Contractor.

.4 Separate for reuse and recycling and place in designated containers steel, metal and plastic.

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

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

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

Part 2 Products

2.1 SEAL CLASSIFICATION

.1 Classification as follows:

Maximum Pressure [Pa]	SMACNA Seal Class
500	C
250	C
125	C
125	Unsealed

.2 Seal classification:

.1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.

.2 Class B: longitudinal seams, transverse joints and connections made airtight with sealant.

.3 Class C: transverse joints and connections made air tight with gaskets, sealants or combination thereof. Longitudinal seams unsealed.

.4 Unsealed seams and joints.

2.2 SEALANT

.1 Sealant: oil resistant, 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, 50mm 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: centerline 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.

.2 Over 400 mm: with double thickness turning vanes.

.4 Branches:

.1 Rectangular main and branch: with radius on branch at 1.5 times width of duct.

.2 Round main and branch: enter main duct at 45 degrees with conical connection.

.3 Provide volume control damper in branch duct near connection to main duct.

.4 Main duct branches: with splitter damper.

.5 Transitions:

.1 Diverging: 20 degrees maximum included angle.

.2 Converging: 30 degrees maximum included angle.

.6 Offsets:

.1 Full radiused elbows.

.7 Obstruction deflectors: maintain full cross-sectional area.

.1 Maximum included angles: as for transitions.

2.6 FIRE STOPPING

.1 Retaining angles around duct, on both sides of fire separation.

.2 Fire stopping material and installation must not distort duct.

2.7 GALVANIZED STEEL

.1 Lock forming quality: to ASTM A653/A653M, Z90 zinc coating.

.2 Thickness, fabrication and reinforcement: to SMACNA.

.3 Joints: to ASHRAE & SMACNA. Proprietary manufactured duct joint to be considered to be a Class A seal.

2.8 ALUMINUM

.1 To ASHRAE & SMACNA. Aluminum type: 3003-H-14.

.2 Thickness, fabrication and reinforcement: to SMACNA.

.3 Joints: to ASHRAE & SMACNA to be continuous weld.

2.9 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 ASHRAE & SMACNA.

.3 Hangers: galvanized steel angle with galvanized steel rods to ASHRAE & SMACNA per the 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.

.3 For steel beams: manufactured beam clamps.

Part 3 Execution

3.1 GENERAL

.1 Do work in accordance with SMACNA.

.2 Do not break continuity of insulation vapour barrier with hangers or rods.

.1 Insulate strap hangers 100mm beyond insulated duct. Ensure diffuser is fully seated]

.3 Support risers in accordance with SMACNA.

.4 Install breakaway joints in ductwork on sides of fire separation.

.5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

.6 Manufacture duct in lengths and diameter to accommodate installation of acoustic duct lining for all locations indicated.

3.2 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

3.3 WATERTIGHT DUCT

.1 Provide watertight duct for:

.1 All exterior ductwork.

.2 Form bottom of horizontal duct without longitudinal seams.

.1 Weld joints of bottom and side sheets.

.2 Seal other joints with duct sealer.

.3 Fit base of riser with 150mm deep drain sump and 32 mm drain connected, with deep seal trap and valve and discharging to grade.

3.4 SEALING AND TAPING

.1 Apply sealant in accordance with SMACNA.

.2 Bed tape in sealant and recoat with minimum of one (1) coat of sealant to manufacturer’s recommendations.

3.5 LEAKAGE TESTS

.1 In accordance with SMACNA HVAC Duct Leakage Test Manual.

.2 Do leakage tests in sections.

.3 Zero leakage ductwork testing shall be entire duct segment with all flanged equipment in place and blind flanges at ends of runs.

.4 Make trial leakage tests as instructed to demonstrate workmanship.

.5 Do not install additional ductwork until trial test has been passed.

.6 Complete test before performance insulation or concealment work.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.2 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

.1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible, [95].

1.2 SUBMITTALS

.1 Submittals in accordance with Section 01 10 00 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet. Indicate the following:

.1 Flexible connections.

.2 Duct access doors.

.3 Instrument test ports.

.3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.1 Certification of ratings: catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Instructions: submit manufacturer's installation instructions.

.6 Manufacturer's Field Reports: manufacturer's field reports specified.

.7 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 10 00 – General Instructions.

1.3 QUALITY ASSURANCE

.1 Pre-Installation Meetings:

.1 Convene pre-installation meeting one (1) week prior to beginning on-site installations.

.1 Verify project requirements.

.2 Review installation conditions.

.3 Co-ordination with other building sub-trades.

.4 Review manufacturer's installation instructions and warranty requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 10 00 – General Instructions.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling off site.

.4 Separate for reuse and recycling and place in designated containers steel, metal, and plastic in accordance with Section 01 10 00 – General Instructions.

.5 Divert unused metal materials from landfill to approved metal recycling facility.

Part 2 Products

2.1 GENERAL

.1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame with fabric clenched by means of double locked seams.

.2 Material:

.1 Fire resistant, self-extinguishing, neoprene coated glass fabric, temperature rated at minus 40 degrees C to plus 90 degrees C, density of 1.3kg/m^2.

2.3 ACCESS DOORS IN DUCTS

.1 Non-Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6mm thick complete with sheet metal angle frame.

.2 Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6mm 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 300mm: two sash locks complete with safety chain.

.2 301 to 450 mm: four sash locks complete with safety chain.

.3 451 to 1000 mm: piano hinge and minimum two sash locks.

.4 Doors over 1000 mm: piano hinge and two handles operable from both sides.

.5 Hold open devices.

.6 300 x 300mm glass viewing panels.

2.4 INSTRUMENT TEST

.1 1.6mm thick steel zinc plated after manufacture.

.2 Cam lock handles with neoprene expansion plug and handle chain.

.3 28mm minimum inside diameter. Length to suit insulation thickness.

.4 Neoprene mounting gasket.

2.5 SPIN-IN COLLARS

.1 Conical galvanized sheet metal spin-in collars with lockable butterfly damper.

.2 Sheet metal thickness to co-responding round duct standards.

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 Flexible Connections:

.1 Install in following locations:

.1 Inlets and outlets to air handling units and fans.

.2 Inlets and outlets of exhaust and return air fans.

.3 As indicated.

.2 Length of connection: 100mm.

.3 Minimum distance between metal parts when system in operation: 75 mm.

.4 Install in accordance with recommendations of SMACNA.

.5 When fan is running:

.1 Ducting on sides of flexible connection to be in alignment.

.2 Ensure slack material in flexible connection.

.2 Access Doors and Viewing Panels:

.1 Size:

.1 600 x 1200 mm for person size entry.

.2 900 x 900mm for servicing entry.

.3 450 x 450mm for viewing.

.4 As indicated.

.2 Locations:

.1 Fire and smoke dampers.

.2 Control dampers.

.3 Devices requiring maintenance.

.4 Required by code.

.5 Reheat coils.

.6 Elsewhere as indicated.

.3 Instrument Test Ports:

.1 General:

.1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.2 Locate to permit easy manipulation of instruments.

.3 Install insulation port extensions as required.

.4 Locations:

.1 For traverse readings:

.1 Ducted inlets to roof and wall exhausters.

.2 Inlets and outlets of other fan systems.

.3 Main and sub-main ducts.

.4 And as indicated.

.2 For temperature readings:

.1 At outside air intakes.

.2 In mixed air applications in locations as approved by Departmental Representative.

.3 At inlet and outlet of coils and duct reheat.

.4 Downstream of junctions of two converging air streams of different temperatures.

.5 Elsewhere as indicated.

.4 Spin-in Collars:

.1 General:

.1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

3.3 CLEANING

.1 Perform cleaning operations as specified in Section 01 10 00 – General Instructions and in accordance with manufacturer's recommendations.

.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 REFERENCES

.1 Sheet Metal and Air Conditioning National Association (SMACNA)

.1 SMACNA HVAC Duct Construction Standards, Metal and Flexible-[1985].

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 10 00 – General Instructions. Include product characteristics, performance criteria, and limitations.

.1 Submit one (1) copy of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 10 00 – General Instructions.

.2 Quality assurance submittals: submit following in accordance with Section 01 10 00 – General Instructions .

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

.1 Health and Safety Requirements:

.1 Do construction occupational health and safety in accordance with Section 01 10 00 – General Instructions.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 10 00 – General Instructions.

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 10 00 – General Instructions.

Part 2 Products

2.1 GENERAL

.1 Manufacture to SMACNA standards.

2.2 SINGLE BLADE DAMPERS

.1 Fabricate from same material as duct, but one sheet metal thickness heavier. V-groove stiffened.

.2 Size and configuration to recommendations of SMACNA, except maximum height 100mm.

.3 Locking quadrant with shaft extension to accommodate insulation thickness.

.4 Inside and outside nylon end bearings.

.5 Channel frame of same material as adjacent duct, complete with angle stop.

2.3 MULTI-BLADED DAMPERS

.1 Factory manufactured of material compatible with duct.

.2 Opposed blade: configuration, metal thickness and construction to recommendations of SMACNA.

.3 Maximum blade height: 100mm.

.4 Bearings: self-lubricating nylon.

.5 Linkage: shaft extension with locking quadrant.

.6 Channel frame of same material as adjacent duct, complete with angle stop.

.7 Maximum leakage: 4% at 250Pa.

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 where indicated.

.2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.3 Locate balancing dampers in each branch duct, for supply, return and exhaust systems.

.4 Runouts to registers and diffusers: install single blade damper located as close as possible to main ducts.

.5 Dampers: vibration free.

.6 Ensure damper operators are observable and accessible.

.7 Corrections and adjustments conducted by NRC Departmental Representative.

3.3 FIELD QUALITY CONTROL

.1 Tests:

.1 Tests to cover period of not less than five (5) days and demonstrate that system is functioning as specified.

3.4 CLEANING

.1 Proceed in accordance with Section 01 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 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

.2 Department of Justice Canada (Jus).

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.2 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.4 National Fire Protection Association (NFPA).

.1 NFPA 90A-[12], Standard for the Installation of Air-Conditioning and Ventilating Systems.

.2 NFPA 90B-[15], Standard for Installation of Warm Air Heating and Air-Conditioning Systems.

.5 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA).

.1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, [95] (Addendum No.1, November 1997).

.2 SMACNA IAQ Guideline for Occupied Buildings under Construction, 1st Edition [95].

.6 Underwriters' Laboratories Inc. (UL).

.1 UL 181-[96], Standard for Factory-Made Air Ducts and Air Connectors.

.7 Underwriters' Laboratories of Canada (ULC).

.1 CAN/ULC-S110-[1986(R2001)], Fire Tests for Air Ducts.

1.2 SUBMITTALS

.1 Make submittals in accordance with Section 01 10 00 – General Instructions.

.2 Show Drawings: at a minimum, include information on the following items as part of the shop drawing submission for review by Departmental Representative:

.1 Thermal Properties.

.2 Friction Loss.

.3 Acoustical Loss.

.4 Leakage.

.5 Fire Rating.

1.3 QUALITY ASSURANCE

.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 Protect on site stored or installed absorptive material from moisture damage.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling. Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling.

.3 Place materials defined as hazardous or toxic in designated containers. Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.

.4 Ensure emptied containers are sealed and stored safely.

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

Part 2 Products

2.1 NON-METALLIC INSULATED

.1 General:

.1 Factory fabricated to CAN/ULC-181 and complies with NFPA90A & NFPA90B.

.2 Core material shall not support mold and mildew growth.

.3 Fully lined for efficient air delivery.

.4 Large diameter, heavy, spring steel wire helix for stability and mechanical abuse resistance.

.5 Acoustically rated CPE core for quiet performance. Core shall be constructed in such a manner it shall not unravel when cut.

.6 All components shall be self-extinguishing.

.2 Performance Characteristics:

.1 Operating Pressure: 2.49kPa (10 IN WC) for 100mm through 300mm diameter.

.2 Operating Temperature Range: -29^{o}C through 121^{o}C (-20^{o}F through 250^{o}F)

.3 Velocity (maximum): 25.4 m/s (500 FPM).

.4 R-Value: 4.2

.5 Surface Burning Characteristics:

.1 Maximum Flame Spread: 25.

.2 Maximum Smoke Development: 50.

.6 Oxygen Index Ratings:

.1 CPE Core: 3.13.

.2 Metalized Jacked: 45.7

.7 Vapour Transmission Rating (U.S. Perm): 0.05.

.3 Standard of Acceptance: Thermaflex M-KE, or approved equivalent.

Part 3 Execution

3.1 DUCT INSTALLATION

.1 Install in accordance with: CAN/ULC-S110, UL-181, NFPA 90A, NFPA 90B and SMACNA.

.2 Install as final duct branch connection to diffuser in order to assist with noise attenuation. Flexible ductwork section of each duct branch shall not exceed 3.1m (10ft).

END OF SECTION

Part 1 General

1.1 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.

1.2 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 10 00 – General instructions. Include product characteristics, performance criteria, and limitations.

.2 Indicate following:

.1 Capacity.

.2 Throw and terminal velocity.

.3 Noise criteria.

.4 Pressure drop.

.5 Neck velocity.

.2 Quality assurance submittals: submit following in accordance with Section 01 10 00 – General Instructions.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 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 and recycling in accordance with Section 01 10 00 – General Instructions.

1.4 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 10 00 – General Instructions.

.2 Include:

.1 Keys for volume control adjustment.

.2 Keys for air flow pattern adjustment.

Part 2 Products

2.1 GENERAL

.1 To meet capacity, pressure drop, terminal velocity, throw, noise level, and 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 Colour: as directed by Departmental Representative and as indicated.

2.2 MANUFACTURED UNITS

.1 Grilles, registers and diffusers of same generic type, products of one manufacturer.

2.3 SUPPLY DIFFUSERS

.1 Type SDF-1:

.1 Size: as indicated on drawings.

.2 Construction: aluminum, directional modular core, perforated face diffusers consisting of louvered pattern control modules, heavy gauge backpans, and a hinged perforated face screen. Perforated face screen shall have a free area of no less than 51%. An extended inlet collar of sufficient length to accommodate connection of round flexible ductwork shall be an integral part of the frame assembly along with volume control damper.

.3 Mounting Type: T-bar lay-in.

.4 Finish: B12 white powder coat in accordance with ASTM D1654 per ASTM D610 & ASTM D714.

.5 Standard of Acceptance: EH Price 200/600x600/APDMC-BN/3/B12, or approved equivalent.

2.4 RETURN GRILLES

.1 Type RGR-1:

.1 Size: as indicated on drawings.

.2 Construction: aluminum , square inlet collars, perforated air distribution face with heavy gauge backpan. Perforated face screen shall have a free area of no less than 51%.

.3 Mounting Type: T-bay lay-in.

.4 Finish: B12 white powder coat in accordance with ASTM D1654 per ASTM D610 & ASTM D714.

.5 Standard of Acceptance: EH Price 550x550/600x600/APDDR/3/B12 or approved equivalent.

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 manufacturer’s instructions.

.2 Install with flat head, stainless steel screws in countersunk holes where fastenings are visible.

.3 Bolt grilles, registers and diffusers in place.

3.3 CLEANING

.1 Proceed in accordance with Section 01 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 REFERENCES

.1 Air-Conditioning and Refrigeration Institute (ARI)

.1 ARI 210/240-1994, Standard for Unitary Air Conditioning and Air-Source Heat Pump Equipment.

.2 ARI 325-98, Standard for Ground Water - Source Heat Pumps.

.2 American National Standards Institute/Air-Conditioning and Refrigeration Institute (ANSI/ARI)

.1 ANSI/ARI 320-1993, Standard for Water-Source Heat Pumps.

.3 American National Standards Institute/National Fire Protection Association (ANSI/NFPA)

.1 ANSI/NFPA 90A-1999, Installation of Air Conditioning and Ventilating Systems.

.4 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)

.1 ASHRAE Standard 15-2001, Safety Standard for Refrigeration Systems.

.5 Underwriters Laboratories (UL)

.1 UL1995, Heating and Cooling Equipment Standard for Safety.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Sections 01 10 00 – General Instructions.

.2 Indicate:

.1 Capacities.
.2 ARI Ratings.
.3 Sound Power Levels.
.4 Installation instructions.
.5 Start-up Instructions.
.6 O&M, Instructions.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 10 00 – General Instructions.

1.4 WARRANTY

.1 For Split Systems, the 12 months warranty period prescribed in subsection GC 32.1 of General Conditions "C" shall be extended to 5 years.

Part 2 Products

2.1 GENERAL

.1 Split Systems: CSA approved and carry ARI or CSA certification seal.

.2 Systems shall be of a variable capacity, direct expansion (DX) heat pump engineered system consisting of a single outdoor unit, and at a minimum of at least two (2) indoor units. The outdoor unit shall have a single inverted compressor connected to the multiple indoor units via a network of piping and control wiring. Each unit shall be equipped with individual control. The multi-zone system required indoor units to be piped with the outdoor unit to complete the refrigerant circuit.

2.2 PACKAGED MULTI-ZONE DX UNITS

.1 General:

.1 System shall consist of air-to-air outdoor condensing unit and multiple indoor evaporators units, for use with R-410A refrigerant.

.2 System components shall be designed and manufactured in production facilities maintaining ISO certifications:

.1 ISO 9001 Quality Management Systems; and

.2 ISO 14001 Environmental Management Systems.

.3 System components shall comply with:

.1 UL1995 Heating and Cooling Equipment Standard for Safety; and

.2 Bear Electrical Testing Laboratories label (ETL).

.4 System components shall have electrical power wiring installed according to National Electrical Code (NEC) and all applicable local Codes and standards.

.2 Performance Data:

.1 Electrical: 208 V, 1 pH, 60 Hz.

.2 Cooling Capacity:

.1 Refer to schedule on drawing 5463-M03.

.3 Evaporators (Indoor Units) 19PAS10A, 19PAS10B & 19PAS10C:

.1 General:

.1 Unit shall be factory assembled, wired, piped and run tested.

.2 Unit shall be designed to be installed for indoor applications.

.3 Unit shall be attached to an installation plate or bracket that secures the unit to the wall.

.4 Depth of the unit shall not exceed 0.25m (10 inches).

.2 Casing:

.1 Unit case shall be manufactured of heavy duty Acrylonitrile Butadiene Styrene (ABS) and High Impact Polystyrene (HIPS) plastic.

.2 Unit case shall have a pearl white finish.

.3 Front face of unit shall have an architectural curved panel with white pearl finish.

.3 Cabinet Assembly:

.1 Unit shall have one (1) supply air outlet and one (1) return air inlet.

.2 Unit shall be equipped with factory installed temperature thermistors for:

.1 Return air;

.2 Refrigerant entering coil; and

.3 Refrigerant leaving coil.

.3 Unit shall have a built-in control panel to communicate with the outdoor unit.

.4 Unit shall have the following functions as standard:

.1 Self-diagnostic function;

.2 Auto re-start function;

.3 Auto operation function;

.4 Auto clean function;

.5 Dehumidifying function;

.6 Forced operation;

.7 Hot start; and

.8 Sleep mode.

.5 Unit shall be capable of accepting refrigerant piping routed from four (4) different directions.

.6 Unit shall be capable of accepting drain piping routed in two (2) different directions.

.4 Fan Assembly:

.1 Unit shall have a direct drive, cross flow fan made of high strength Acrylonitrile Butadiene Styrene (ABS) plastic.

.2 Fan motor shall be brushless digitally controlled (BDLC) with permanently lubricated and sealed ball bearings.

.3 Fan/motor assembly shall be mounted on vibration attenuating rubber grommets.

.4 Fan speed shall be controlled using microprocessor based on direct digitally controlled algorithm.

.5 In cooling mode, the indoor fan shall have the following settings:

.1 Low;

.2 Medium;

.3 High;

.4 Power Cool; and

.5 Auto.

.6 In heating mode, the indoor fan shall have the following settings:

.1 Low;

.2 Medium;

.3 High; and

.4 Auto.

.7 Auto fan setting shall adjust the fan speed to the most effective speed to achieve desired setpoint.

.8 Unit shall have factory installed motorized louver to provide flow of air in up and down direction for uniform air flow.

.9 Unit shall have factory installed motorized guide vane to control the direction of flow of air from side to side.

.5 Filter Assembly:

.1 Return air inlet shall have a factory supplied primary removable, washable filter.

.2 Unit shall be equipped with factory supplied secondary plasma filter or 3M HAF filter.

.3 Filter access shall be from the front of the unit.

.6 Coil Assembly:

.1 Unit shall have factory built coil comprised of aluminum fins mechanically bonded to copper tubing.

.2 Unit shall have a minimum 2-row coil.

.3 Unit shall have factory supplied condensate drain pan below coil.

.4 Unit shall be designed for gravity drain.

.5 Unit shall have a factory insulated drain hose to handle condensate.

.6 Unit shall have provision for 45-degree flare refrigerant pipe connections.

.7 Coil shall be factory pressure tested at a minimum of 551psig.

.8 All refrigerant piping from outdoor unit to indoor unit shall be field insulated.

.7 Condensate Sensor Connection:

.1 Unit shall include a factory installed condensate sensor connection compatible with the AquaGuard® condensate sensor.

.8 Microprocessor Control:

.1 Unit shall have a factory installed microprocessor controller capable of performing functions necessary to operate the system.

.2 Unit shall be able to communicate with the outdoor unit using a field supplied minimum 19AWG, 4-conductor, stranded, shielded or unshielded power/communication cable. If shielded cable is used, it must be grounded to the chassis at the outdoor unit only.

.3 Unit controls shall operate the indoor unit using one (1) of five (5) operating modes:

.1 Auto operation;

.2 Heating;

.3 Cooling;

.4 Dry; and

.5 Fan only.

.9 Electrical:

.1 Unit electrical power shall be 208-230V, 1-phase, 60Hz.

.2 Unit shall be capable of operating within voltage limits of ± 10% of rated voltage.

.10 Controls:

.1 Indoor unit shall be equipped with wired controller.

.4 Condenser (Outdoor Unit) 19PAS10:

.1 General:

.1 Outdoor unit shall be capable of the following operating ambient range:

.1 Cooling: -10°C to 48°C (14°F DB to 118°F DB).

.2 Heating: -20°C to 18°C (-4°F to 64°F DB).

.2 Refrigerant circuit for multi-zone system shall be:

.1 Field piped to the various indoor units to effectively and efficiently control the heating/cooling operating of the multiple zones; and

.2 All refrigerant piping from the outdoor to indoor units shall be field insulated.

.3 Factory installed microprocessor controls in the outdoor unit and indoor units shall perform functions to efficiently operate the multi-zone system and communicate in a tree configuration from outdoor unit to indoor units via minimum 18AWG. 4-conductor, stranded, shielded or unshielded power/communication cable. If shielded wiring is used, it must be grounded to chassis at outdoor unit only.

.4 The multi-zone piping system shall have the ability to connect between two (2) and four (4) indoor units.

.5 System shall be capable of performing continuous operation even when power is turned off to an individual indoor unit.

.6 Outdoor unit shall be internally assembled, wired and piped from the factory.

.7 Factory assembled system shall have outdoor unit fitted with refrigerant strainer, check valves, oil separator, accumulator, 4-way reversing valve, electronic expansion valves, high side and low side refrigerant charging ports, and a service port.

.2 Piping Capabilities:

.1 Outdoor unit shall be capable of operating at an elevation of 15m (49.2ft) above or below the indoor units.

.2 Outdoor unit shall be capable of operating with up to 75m (246ft) of total equivalent refrigerant piping length.

.3 Outdoor unit shall be capable of operating with up to 25m (82ft) of equivalent refrigerant piping length to the farthest indoor unit.

.3 Defrost Operations:

.1 Outdoor unit shall be capable of auto defrost operation to melt accumulated ice off heat exchanger. Defrost cycle control shall be based on outdoor ambient temperatures and outdoor unit heat exchanger temperatures.

.4 Oil Management:

.1 Outdoor unit shall have an oil injection mechanism to ensure a consistent film of oil on all moving compressor parts at low speed.

.2 Outdoor unit shall have an oil separator to separate oil mixed with refrigerant gas during compression and return oil to the compressor.

.5 Cabinet:

.1 Outdoor unit cabinet shall be made of pre-coated metal (PCM).

.2 Front and side panels of the outdoor unit shall be removable for access to internal components.

.3 Outdoor unit cabinet shall be testing in accordance with ASTM B-117 salt spray test procedures for a minimum of 1000 hours.

.6 Fan Assembly:

.1 Each outdoor unit, up to 3T capacity shall be equipped with one direct drive variable speed propeller fan with brushless digitally controlled (BDCL) motor with horizontal discharge.

.2 Fan blades shall be made of Acrylonitrile Butadiene Styrene (ABS) material.

.3 Fan shall be equipped with permanently lubricated bearings.

.4 Fan motor shall have variable speed to a maximum of 950RPM.

.5 Fan shall have a raised guard to help prevent contact with moving parts.

.7 Outdoor Coil:

.1 Outdoor unit shall have a factory built coil comprised of aluminium fins mechanically bonded to copper tubing.

.1 Aluminum fins shall have factory applied corrosion resistant GoldFin™ material.

.2 Coil coating shall be tested in accordance with ASTM B-117 salt spray test procedure for a minimum of 1000 hours.

.2 Outdoor unit coil shall be factory tested to a pressure of 600psig.

.3 Coil shall have a minimum of 14 fins per inch (FPI).

.4 Coil shall have a 2-row heat exchanger.

.5 Outdoor unit cabinet shall have a coil guard.

.8 Compressor:

.1 Outdoor unit shall be equipped with one hermetically sealed, digitally controlled, inverter driven twin-rotary compressor.

.2 Inverter driven, digitally controlled compressor shall be capable of operating in a frequency range from 20Hz to 100Hz with control in 1Hz increments.

.3 Compressor shall be mounted on vibration attenuating rubber grommets.

.4 Compressor shall use a factory charge of polyvinyl ether (PVE) oil.

.5 Compressor bearings shall have Teflon™ coating.

.6 Compressor shall be equipped with over-current protection.

.9 Sound Level:

.1 Outdoor unit shall have sound level not exceeding 56dB(A) tested in an anechoic chamber under ISO1996 standard.

.10 Sensors:

.1 Outdoor unit shall be equipped with the following:

.1 Suction temperature sensor.

.2 Discharge temperature sensor.

.3 High pressure sensor.

.4 Low pressure sensor.

.5 Outdoor temperature sensor.

.6 Outdoor unit heat exchanger temperature sensor.

.5 Refrigeration Piping:

.1 Complete with refrigerant metering devices and valves.

.2 Refer to Section 23 23 00 – Refrigerant Piping.

.6 Control Accessories:

.1 Controls Interface Type: dry contact for 3rd party thermostat controller.

.2 Electrical Features:

.1 Power supply 12VDC from indoor unit.

.2 Contact Rating: 3A @ 125VAC.

.3 Standard Control Features:

.1 Controls indoor unit operation with 3rd party thermostat or room temperature controller.

.2 Inputs for control of unit ON/OFF, Thermo ON/OFF, Mode (Cool/Heat/Fan) and Fan Speed (Low/Med/High).

.3 Outputs for operation and error status.

.4 Standard of Acceptance: LG Electronics PDRYCB300 or approved equivalent.

.7 Condensate Pumps 19CNP10A, 19CNP10B & 19CNP10B:

.1 General:

.1 Complete condensate removal pump assembly designed for use in removing condensate from wall mounted ductless split air conditioning indoor units.

.2 Pump can be installed above the indoor unit, behind the unit, or in plastic conduit line-set channels. Reservoir features a clear tank and connects to the condensate gravity drain.

.3 Condensate pump assembly components are connected via a convenient communications wire and suction tube located within 1m (3.3ft) of each other.

.2 Pump-Controller:

.1 Equipment Sound Level: 21dB(A).

.2 Pump discharge outlet: ¼".

.3 Elastomeric mounting grommets on pump housing bracket.

.4 Elastomeric passive vibration isolator used to dampen pump vibration.

.5 Electrical Features:

.1 Normally-closed related rated 8A resistive -250V alarm.

.2 1.5m (60") power cable.

.3 1m (3.3ft) communication cable (pump to reservoir).

.4 Thermal protection: 80°C (176°F).

.6 Ambient temperature range: 0°C to 60°C (32°F to 140°F)

.7 Maximum water temperature: 60°C (140°F).

.3 Reservoir:

.1 Clear reservoir for instant visual inspection of water level, float and filter.

.2 Hall effect ON/OFF level sensors with high water safety sensor feature.

.3 Extra-large filter screen for longer intervals between cleaning and simple to open reservoir for easy maintenance

.4 Multi-step drain hose adapter (1/2", 5/8" and 3/4").

.4 Standard of Acceptance: Little Giant EC-1 Series or approved equivalent.

.8 Standard of Acceptance: LG Electric outdoor unit LMU30CHV and indoor units LMN078HVT and LSN120HSV as indicated on drawing schedule c/w dry contact 3rd party control interface PDRYCB300 and condensate pump removal systems Little Giant EC-1 Series or approved equivalents.

Part 3 Execution

3.1 INSTALLATION

.1 Install where indicated on drawings and in accordance with manufacturer's instructions.

.2 Install condenser on galvanized steel support angles.

.3 Make all required piping connections.

3.2 DRAIN PANS

.1 Install so that no water can accumulate and arrange for easy access for cleaning.

3.3 START-UP AND COMMISSIONING

.1 Manufacturer to certify installation.

.2 Manufacturer to provide verbal and written instructions to operating personnel.

.3 Submit written report to NRC Departmental Representative.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute (ANSI).

.1 ANSI C12.7-[1993(R1999)], Requirements for Watthour Meter Sockets.

.2 ANSI/IEEE C57.13-[93], Standard Requirements for Instrument Transformers.

.2 American Society for Testing and Materials International, (ASTM).

.1 ASTM B148-[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.

1.2 SUBMITTALS

.1 Submit shop drawings and manufacturer’s installation instructions in accordance with Section 01 10 00 – General Instructions for equipment and devices.

.2 Pre-Installation Tests: submit samples at random from equipment shipped, as requested by Departmental Representative for testing before installation. Replace devices not meeting specified performance and accuracy.

1.3 EXISTING CONDITIONS

.1 Cutting & Patching: in accordance with Section 01 10 00 – General Instructions and as supplemented herein.

.2 Repair surfaces damaged during execution of Work.

.3 Turn over to Departmental Representative existing materials removed during construction and not identified for reuse.

Part 2 Products

2.1 GENERAL

.1 Control devices of each category shall be of single manufacturer and same type.

.2 External trim materials to be corrosion resistant. Internal parts to be assembled in watertight assembly.

.3 Operating conditions: 0°C through 32°C with 10 – 90% RH (non-condensing) unless otherwise specified.

.4 Terminations: use standard conduit box with slot screwdriver, twist on connections or connector blocks unless otherwise specified.

.5 Transmitters and sensors to be unaffected by external transmitters including walkie-talkies.

.6 Account for hysteresis, relation 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 shall not exceed Noise Criteria (NC) of 35. Noise generated by any device shall not be detectable above space ambient conditions.

2.2 TEMPERATURE SENSORS

.1 Room Temperature Sensors & Display Wall Modules:

.1 Room Temperature Sensors and Display Wall Modules

.2 To be similar to existing room temperature sensors and displace wall modules installed throughout building.

.3 Requirements:

.1 LCD display to show space temperature and temperature setpoint.

.2 Buttons for occupant selection of temperature setpoint and occupied/unoccupied mode.

.3 Jack connection for plugging in laptop personal computer, contractor supplied zone terminal unit and contactor supplied palm compatible handheld device for access to zone bus.

.4 Integral thermistor sensing element 10 000 ohms at 24°C.

.5 Accuracy: 0.2°C over range of 0 to 70°C.

.6 Stability: 0.02°C drift per year.

.7 Separate mounting base for ease of installation.

.4 Standard of Acceptance: Schneider Electric SE8300 or approved equivalent.

2.3 WIRING

.1 In accordance with this specification section unless otherwise specified.

.2 For wiring under 70V use FT6 rated wiring where wiring is no run in conduit. Other cases use FT4 wiring.

.3 Wiring must be continuous without joints.

.4 Conduit colour coding shall meet NRC Standards.

.5 Sizes:

.1 Field wiring to digital device: #18AWG or #20AWG stranded twisted pair.

.2 Analog input & output: shielded #18 minimum solid copper or #20 minimum stranded twisted pair.

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 equipment, components so that manufacturer’s and CSA labels are visible and legible after commission is complete.

.2 Install field control devices in accordance with manufacturer’s recommended methods, procedures and instructions.

.3 Provide fire stopping where required in order to maintain fire rating integrity.

.4 Electrical:

.1 Complete installation in accordance with CSA C22.1-[09], Canadian Electrical Code, Part 1 (21st Edition), Safety Standard for Electrical Installations.

.2 Terminate wires with screw terminal type connectors suitable for wire size and number of terminations.

.3 All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.

.4 All wiring and cabling including that within factory-fabricated panels shall be labeled at each end within 5cm (2”) of termination with EMCS point name.

.5 Install Low Voltage Control Wiring EMT in the following circumstances:

.1 Mechanical rooms, electrical rooms, service rooms and exposed wiring. All wiring in mechanical rooms, electrical rooms, service rooms and exposed wiring, or where wiring is subject to damage shall be in EMT.

.2 Communication wiring shall be installed in EMT. Communication wiring to mean all wiring linking building controllers, field panels and Operator Work Stations (OWS).

.3 All wiring supplying power to all levels of controllers shall be in EMT.

.4 All wiring between building controllers, field panels and OWS shall be installed in EMT. Field panels to mean all panels not considered building controllers (ie. panels with I/P transducers).

.6 EMT Installation:

.1 EMT size to suit wiring requirements and to allow for future expansion capabilities specified for systems.

.2 Maximum EMT fill not to exceed 40%.

.3 Minimum EMT size is 1.905cm (3/4") unless it is to a final device where 1.27cm (1/2") shall be acceptable.

.4 Include one pull string in each EMT 1.905cm (3/4") or larger.

.5 Wherever possible, all wiring in EMT shall be installed as continuous lengths, with no splices permitted between termination points or junction boxes.

.6 Conceal all EMT, except within mechanical rooms, electrical rooms and service rooms. Install EMT to maintain minimum clearance of 15cm (6") from high-temperature equipment (ie. steam piping or flues).

.7 Flexible metal conduits and liquid-tight shall not exceed 0.3048m (1ft) in length and shall be supported at each end. Flexible metal conduits less than 1.27cm (1/2") electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal conduits shall be used.

.8 EMT shall be adequately supported, properly reamed at both ends, and left clean and free of obstructions. EMT sections shall be joined with steel set-screw connectors and couplings specific to EMT. Terminations must be made with fittings at boxes, and ends not terminating in boxes shall have bushing installed

.9 Design drawings do not show conduit layout.

.10 Do not run exposed conduits in normally occupied spaces unless otherwise indicated or unless impossible to do otherwise. Departmental Representative to review prior to work commencement.

.5 Communication Wiring:

.1 Contractor shall adhere to NRC Standard practices.

.2 Do not install communications wiring in raceway and enclosures containing Class 1 wiring.

.3 Maximum pulling, tension and bend radius for cable installation, as specified by cable manufacturer, shall not be exceeded during installation.

.4 Contractor shall verify the integrity of the entire network following cable installation. Use appropriate test measure for each particular cable.

.5 When a cable enters or exists a building, a lightning arrestor must be installed between the lines and ground. The lightning arrestor shall be installed according to manufacturer's instructions.

.6 All runs of communication wiring shall be unspliced length when that length is commercially available.

.7 All communication wiring shall be labelled to indicate origination and destination data.

3.3 TEMPERATURE SENSORS

.1 Stabilize to ensure minimum field adjustments or calibrations.

.2 Readily accessible and adaptable to each type of application to allow for quick easy replacement and servicing without special tools or skills.

3.4 PANELS

.1 Arrange for conduit and tubing entry from top, bottom or either side.

.2 Wiring and tubing within panels: locate in trays or individually clipped to back of panel.

.3 Identify wiring and conduit clearly.

3.5 IDENTIFICATION

.1 Identify field devices in accordance with NRC Standards.

3.6 TESTING AND COMMISSIONING

.1 Calibrate and test field devices for accuracy and performance.

.2 Make any and all necessary changes required to ensure devices function as per intended performance criteria.

END OF SECTION

Part 1 General

1.1 CONTROL DESIGN SCHEMATICS (CDS)

.1 Prepare control schematic drawings for incorporation, using a drawing format approved by NRC Departmental Representative.

.2 Ensure that the control schematic drawings are also suitable for use as graphic displays in the Operator Work Stations.

.3 On control schematic drawings used as graphic displays in the Operator Work Stations, indicate the physical location i.e. the building room number, of each system and major piece of equipment.

.4 Provide an overall EMCS Architecture Schematic, showing all systems, all network communication devices, all Operator Work Stations (OWS), etc.

.5 Prepare an electrical wiring schematic for each system and for each motor linked to the EMCS installation. Preferably these schematics shall be regrouped with the Control Design Schematic CDS-xx of the system they represent. They must form part of the shop drawing submission and final maintenance manual documents.

.6 All components in the electrical wiring schematic shall match the Input/Output Point Summary Table.

.7 When the electrical wiring schematic is completed, coordinate closely with mechanical and electrical Divisions to eliminate duplication and ensure full completeness.

.8 Prepare a separate control design schematic for each system and sub-system in the entire facility, showing schematics of all basic components forming part of the system. For example, for a typical HVAC system the CDS must show mixing chambers (plenums), dampers, filters, coils, control valves, circulating pumps, humidifiers, air washers and pumps, fans, variable inlet vanes, variable speed drives, air flow stations, location of relays and contacts for digital output points, etc.

.9 The CDS must also show the relative location of all sensors and controlled devices.

.10 The unique identifier for each system, point and type of point (AO, AI, DO, DI) must appear on each CDS.

.11 Include pertinent additional operational information points as required such as calculated, duplicate or virtual points as well as fail safe position of output points.

.12 Control Design Schematics and Input/Output Point Summary Tables should form part of final maintenance manual submissions.

1.2 INPUT/OUTPUT (I/O) POINT SUMMARY TABLES

.1 The I/O Point Summary shall supplement the shop drawings and final maintenance manual deliverables. They must provide all details not included in the sequences of operation. A legend describing symbols and abbreviations used throughout the I/O Point Summary must be produced for each project.

.2 Boxes which are irrelevant to the project shall not be left blank but shall be filled in with a symbol such as an oblique or an "x" to indicate that no entry is required.

.3 If, during the design phase, information is unavailable to accurately complete this schedule, the unfilled boxes shall be completed by the control system designer with values that are estimated to most closely represent the true value. These values must, however, be identified as such in the table. Certain values that absolutely cannot be defined at design time (such as low amperage settings for adjustable current relays used to confirm motor status) may be identified as field (F) assignable at TAB/Commissioning time.

.4 Naming convention to follow the NRC standard for point naming convention.

1.3 SEQUENCES OF OPERATION

.1 Provide a detailed sequence of operation, based on the preliminary sequence of operations included in this specification and as outlined on the drawings to describe the functioning of the system including pertinent details relating to the intended control concept and, interactions with other systems. The sequence must detail conditions in the following modes:

.1 Stopped Mode.

.2 Start-up Process.

.3 Normal Operation – Winter and Summer Modes.

.4 Operation under emergency conditions, when applicable.

.5 Emergency power mode, when applicable.

.2 The following is a sample sequence used to demonstrate the required format, and also provides the preliminary sequence of operations for project

M-19 ROOM 317 & ROOM 318 PROPOSED SEQUENCE OF OPERATION

.1 General:

.1 A combination of existing chilled water fan coil unit(s) and supplemental ductless split AC unit(s) shall be interlocked to control space temperature.

.2 Normal Operation:

.1 Winter Mode:

.1 When room space temperature is above setpoint (adjustable), the ductless split AC units shall be commanded to start to maintain space temperature.

.1 When room space temperature falls below setpoint (adjustable), below deadband of 3°C (adjustable) for an excess of 5 minutes (adjustable), ductless split AC units shall be disabled, and existing fan coil unit cooling coil control valves shall modulate to maintain space temperature.

.2 Summer Mode:

.1 When room space temperature is above setpoint (adjustable) and the cooling coil control valves for all existing fan coil units that service the space are confirmed 100% open, the ductless split AC units shall be commanded to start to maintain space temperature.

.1 When room space temperature falls below setpoint (adjustable), below deadband of 3°C (adjustable) for an excess of 5 minutes (adjustable), ductless split AC units shall be disabled, and existing fan coil unit cooling coil control valves shall modulate to maintain space temperature.

.3 The EMCS will monitor several points, and initiate an alarm condition on the OWS when a fault is detected for any of the following:

.1 Ductless split AC unit fault.

.2 High room temperature alarm.

.3 Low room temperature alarm.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

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 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.

6 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.

7 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, 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 Light fixtures are the only exceptions for electrical equipment identification (except as noted in 7.13 below). They are not to be identified.

.3 Identify with lamicoid 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.

.4 Coordinate names of equipment and systems with other Divisions to ensure that names and numbers match.

.5 Wording on lamicoid nameplates to be approved by the NRC Departmental Representative prior to fabrication.

.6 Provide two sets of lamicoid nameplates for each piece of equipment; one in English and one in French.

.7 Lamicoid 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

.8 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.

.9 Lamicoid nameplates shall be rigid lamicoid, 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.

.10 For all interior lamicoid nameplates, mount nameplates using two-sided tape.

.11 For all exterior lamicoid 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 lamicoid nameplates to be 3.7 mm (3/16") diameter to allow for expansion of lamicoid 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.

.12 All lamicoid nameplates shall have a minimum border of 3 mm (1/8"). Characters shall be 9 mm (3/8") in size unless otherwise specified.

.13 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.

.14 Provide neatly typed updated circuit directories in a plastic holder on the inside door of new panelboards.

.15 Carefully update panelboard circuit directories whenever adding, deleting, or modifying existing circuitry.

.16 Identify molded case breaker with lamicoid nameplate.

8 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.

9 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 Security system – green conduit

.7 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 Security system – green

.7 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 need not be coloured.

10 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.

11 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.

12 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.

13 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.

14 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.

15 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.

16 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.

17 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.

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 Where 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** BX cable only under the following conditions:
  - .1 Wiring from a junction box to a recessed lighting fixture in suspended ceilings. Cable length not to exceed 1.5 m (5'), or
  - .2 Wiring or switches or 15 amp receptacles in partitions having removable wall panels, or
  - .3 When specifically called for on drawings.
- .7 Use stranded wire no smaller than No. 12 AWG for lighting and power and no smaller than No. 16 AWG for control wiring.
- .8 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.

.8 For fire alarm wiring refer to Section 28 31 00.

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 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.

.2 Bushings and Connectors:

.1 Insulated type, with the insulation an integral part of the fitting.

.3 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.

.4 Pull Cord:

.1 Polypropylene cord in empty conduit.

.5 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).

.6 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.

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 SHOP DRAWINGS AND PRODUCT DATA

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

1.2 IDENTIFICATION

.1 Identification as per Section 26 05 00.

Part 2 Products

2.1 DISCONNECT SWITCHES, FUSED AND NON-FUSED

.1 Fusible and non-fusible disconnect switches in EEMAC Enclosure as indicated.

.2 Provision for padlocking in "OFF" switch position.

.3 Mechanical voidable door interlock in "ON" position.

.4 Fuses: size and type as indicated.

.5 Fuseholders in each switch to be suitable without adaptors, for type and size of fuse indicated.

.6 Quick-make, quick-break action.

.7 "ON-OFF" switch position indication on switch enclosure cover.

.8 Standard of acceptance: Square D, or approved equal.

2.2 GROUNDING

.1 Insulated grounding conductors in accordance with Section 26 05 00.

.2 Compression connectors for grounding to equipment provided with lugs.

2.3 PANELBOARDS

.1 600 volt rated power panelboards: bus and breakers rated for 25,000 amp r.m.s. symmetrical interrupting capacity at 600V or as indicated.

.2 250 volt lighting panelboards to have minimum interrupting capacity of 10,000 amp r.m.s. symmetrical.

.3 Panelboards that have a main breaker indicated in plan shall be service entranced approved (i.e. barrier to separate main breaker from remainder of panels).

.4 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

.5 Panelboards: mains, number of circuits, number and size of branch circuit breakers as indicated.

.6 Two keys for each panelboard and all panelboards to be keyed alike.

.7 Copper bus, neutral and ground bar with neutral of same ampere rating as mains.

.8 Suitable for: plug-in breaker for molded case circuit breaker, bolt-on breakers for miniature circuit breaker

.9 Hinged door, trim finish: baked grey enamel.

.10 Drip shield.

.11 Surface mount with hinge door, unless otherwise indicated on drawing.

.12 Complete circuit directory with typewritten legend showing description of each circuit.

.13 Manufacturer: Square D or approved equal.

2.4 MOLDED CASE CIRCUIT BREAKER

.1 Thermal-magnetic moulded case circuit breakers, quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.

.2 Common-trip breakers with single handle for multiple applications.

.3 All new 120V to 600V circuit breakers installed on this project are to include the handle accessory, "Handle Padlock Attachment", which locks breakers on or off.

.4 Magnetic instantaneous trip elements in circuit breakers, to operate only when the value of current reaches 10 times their setting.

.5 Circuit breaker and panel to be of same manufacturer.

Circuit breakers minimum interrupt rating: 25KA for 600/347V or greater if indicated.

.6 Electronic trip unit as indicated by drawing.

LI: long time and instantaneous

LSI: long time, short time and instantaneous

LSIG: long time, short time , instantaneous and grounding

A: with Ammeter

E: with energy meter

.7 On board control power for trip unit

.8 Standard of acceptance: Square D or approved equal.

2.5 FUSES

.1 250V and 600V time delay, rejection style, HRC-I, Class RK5.

.2 Standard of acceptance: Gould-Shawmut or approved equal.

Part 3 Execution

3.1 DISCONNECT SWITCHES

.1 Install disconnect switches complete with fuses as indicated.

3.2 GROUNDING

.1 Install complete permanent, continuous, system and circuit, equipment, grounding systems including, conductors, compression connectors, accessories, as indicated, to conform to requirements of Engineer, and local authority having jurisdiction over installation. Where EMT is used, run ground wire in conduit.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Soldered joints not permitted.

3.3 PANELBOARDS

.1 Locate panelboards as indicated and mount securely, plumb, and square, to adjoining surfaces.

.2 Mount panels to height specified in section 26 27 26 or as indicated.

.3 Connect loads to circuits as indicated.

.4 Connect neutral conductors to common neutral bus.

3.4 MOLDED CASE CIRCUIT BREAKERS

.1 Install circuit breakers as indicated.

3.5 FUSES

.1 Install fuses in mounting devices immediately before energizing circuit.

.2 Install fuses correctly sized to assigned electrical circuits.

.3 Provide 3 spare fuses for each rating supplied.

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 LED Dimming Switches:

- .1 0-10VDC, electronic, suitable for use with installed light fixture.
- .2 Rated for 1200W.
- .3 Suitable for use in “3-way” configuration where indicated.
- .4 Standard of acceptance:
  - .1 Philips SR1200ZTUNV or equivalent approved by NRC Departmental Representative.
  - .2 3-way style to be Philips SR3W or equivalent approved by NRC Departmental Representative.

.2 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.

.3 LED dimmable motion switches:

.1 Dimmer with passive infrared sensors to control LED fixtures.
.2 180° sensor field-of-view.
.3 Up to 30’x30’ major motion coverage and 20’x20’ minor motion coverage.
.4 Occupancy sensor can be set too auto-on/auto-off or manual-on/auto-off.
.5 Adjustable timeout and high/low sensitivity adjustment.
.6 Adjustable settings for auto-on light level: 100%, 50%, last light level, or locked pre-set light level.
.7 Off warning fades lights to off over a period of 10 seconds.
.8 120V.
.9 5 year warranty.
.10 Standard of acceptance: Lutron MSCL-OP153M-WH.

.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.

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 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Include schematic, wiring, interconnection diagrams.

.3 Indicate:

.1 Mounting method and dimensions.
.2 Starter size and type.
.3 Layout of identified internal and front panel components.
.4 Enclosure types.
.5 Wiring diagram for each type of starter.
.6 Interconnection diagrams.

.4 Motors specified and supplied with mechanical equipment. Refer to Division 23.

1.3 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for motor starters for incorporation into manual specified in Section 01 10 00.

.2 Include operation and maintenance data for each type and style of starter.

Part 2 Products

2.1 MATERIALS

.1 Starters:

.1 IEC rated starters not acceptable.

2.2 MANUAL MOTOR STARTERS

.1 Single and three phase manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:

.1 Switching mechanism, quick make and break.
.2 One and three overload heaters as indicated, manual reset, trip indicating handle.

.2 Accessories:

.1 Toggle switch, key switch or pushbutton as specified.
.2 Indicating light: type and colour as indicated.
.3 Locking tab to permit padlocking in "ON" or "OFF" position.

.3 Standard of acceptance: Square D, Class 2510 or approved equal.

2.3 FINISHES

.1 Apply finishes to enclosure in accordance with Section 26 05 00.

2.4 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 260500.

Part 3 Execution

3.1 INSTALLATION

.1 Install starters, connect power and control as indicated.

.2 Install control devices and relay panels and interconnect as indicated.

.3 Install correct fuses and overload device elements.

.4 Megger all motors. Dry out motor if dampness is present in accordance with manufacturer's recommendations.

.5 For installation of motor with mechanical equipment refer to Division 23.

.6 Make connection to motor as indicated. Use liquid-tight PVC jacketted flexible conduit between rigid conduit and motor.

.7 Make flexible conduit long enough to permit movement of motor.

3.2 TESTS

.1 Perform tests in accordance with Section 26 05 00 and Manufacturer's instructions.

.2 Operate switches, contactors to verify correct functioning.

.3 Perform starting and stopping sequences of contactors and relays.

.4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate 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 Refer to luminaire schedule on drawing.

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.

3.5 PHOTOELECTRIC LIGHTING CONTROL

.1 Install photoelectric controls in accordance with manufacturer's instructions.

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 Telecommunications Industry Association (TIA)

.1 ANSI/TIA/EIA 569-D, Commercial Building Standard for Telecommunications Pathways and Spaces.

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.

Part 2 Products

2.1 MATERIALS

.1 Raceways: Minimum 19mm (3/4") EMT larger sizes as indicated on drawing. Factory painted blue as per section 26 05 00.

.2 Tele-Power poles/Jiffy poles: type as indicated on drawings.

.3 Floor mounted outlets: type as indicated on drawings.

Part 3 Execution

3.1 CONDUIT SYSTEM

.1 Conduit and cable pathways installation shall comply with ANSI/TIA/EIA 569-D.

.2 Run conduit from wall outlets to pull box above false ceiling or to a point indicated on drawings.

.3 Install a steel pull box after every two 90° bends, or equivalent; or where there is a (U-shaped) bend in the run.

.4 Install additional steel pull boxes where necessary so that throughout the entire system, wires may be pulled in or withdrawn with reasonable ease. No section of conduit shall be longer than 30m (100ft) between pull points.

.5 Pull boxes shall be placed in a straight section of conduit and shall not be used in lieu of a bend. The corresponding conduit ends shall be aligned with each other.

.6 Where a pull box is required with conduits equal or smaller than 27mm (1”), an outlet box may be used as a pull box. For conduits above 27mm (1”), the pull box shall be size as per ANSI/TIA/EIA 569-D or as noted on the drawings.

.7 Bending radius for conduits equal or less than 50mm (2”) shall be no less than 6 times the internal diameter of the conduit. Bending radius for conduits more than 50mm (2”) shall be no less 10 times the internal diameter.

.8 No conduit body (Condulet), LB type or other, shall be used unless otherwise indicated on the drawings or pre-approved by the departmental representative.

.9 Conduits shall be reamed to eliminate sharp edges and terminated with insulating nylon bushings.

.10 Install nylon pull-cords in all empty conduits.

.11 Clearly identify conduits at each end.

.12 Paint all elbows and pull box covers blue. (This identifies the conduit as conduit dedicated to voice/data wiring.)

.13 Do not run communications cables in the same raceway as power and lighting conductors.

.14 Grounding and bonding to the Canadian Electrical Code (CEC).

3.2 MOUNTING

.1 Recess mount wall outlets unless otherwise indicated. Mount wall outlets to height specified in section 26 27 26 or as indicated.

3.3 WORK BY OTHERS

.1 Cables and terminations.

END OF SECTION

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 be 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 Nothwithstanding 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 that 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.

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 or 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 "superintendant" 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 ths 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 o 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 proved 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 GC303.3 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, ar 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 wiring 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 that

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 n 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 Contactor.

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 INSUANCE 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

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 a t 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.

Government of Canada / Gouvernement du Canada

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780266
Security Classification / Classification de sécurité UNCLASSIFIED

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: NRC	2. Branch or Directorate / Direction générale ou Direction: ASPM/SAGI
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: M19 Rms #318, 329B, 329C Renovation	

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 ☑	NATO / OTAN ☐	Foreign / Étranger ☐

7. b) Release restrictions / Restrictions relatives à la diffusion

No release restrictions / Aucune restriction relative à la diffusion ☑	All NATO countries / Tous les pays de l'OTAN ☐	No release restrictions / Aucune restriction relative à la diffusion ☐
Not releasable / À ne pas diffuser ☐		
Restricted to: / Limité à : ☐	Restricted to: / Limité à : ☐	Restricted to: / Limité à : ☐
Specify country(ies): / Préciser le(s) pays :	Specify country(ies): / Préciser le(s) pays :	Specify country(ies): / Préciser le(s) pays :

7. c) Level of information / Niveau d'information

PROTECTED A / PROTÉGÉ A ☐	NATO UNCLASSIFIED / NATO NON CLASSIFIÉ ☐	PROTECTED A / PROTÉGÉ A ☐
PROTECTED B / PROTÉGÉ B ☐	NATO RESTRICTED / NATO DIFFUSION RESTREINTE ☐	PROTECTED B / PROTÉGÉ B ☐
PROTECTED C / PROTÉGÉ C ☐	NATO CONFIDENTIAL / NATO CONFIDENTIEL ☐	PROTECTED C / PROTÉGÉ C ☐
CONFIDENTIAL / CONFIDENTIEL ☐	NATO SECRET / NATO SECRET ☐	CONFIDENTIAL / CONFIDENTIEL ☐
SECRET / SECRET ☐	COSMIC TOP SECRET / COSMIC TRÈS SECRET ☐	SECRET / SECRET ☐
TOP SECRET / TRÈS SECRET ☐		TOP SECRET / TRÈS SECRET ☐
TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) ☐		TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) ☐

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PART A *(continued)* / PARTIE A *(suite)*

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets? — ☑ No / Non ☐ Yes / Oui
Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS?
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? — ☑ No / Non ☐ Yes / Oui
Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate?

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

☑ RELIABILITY STATUS / COTE DE FIABILITÉ	☐ CONFIDENTIAL / CONFIDENTIEL	☐ SECRET / SECRET	☐ TOP SECRET / TRÈS SECRET
☐ TOP SECRET– SIGINT / TRÈS SECRET – SIGINT	☐ NATO CONFIDENTIAL / NATO CONFIDENTIEL	☐ NATO SECRET / NATO SECRET	☐ COSMIC TOP SECRET / COSMIC TRÈS SECRET
☐ SITE ACCESS / ACCÈS AUX EMPLACEMENTS			

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? — ☐ No / Non ☑ Yes / Oui
Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail?
If Yes, will unscreened personnel be escorted? — ☐ No / Non ☑ Yes / Oui
Dans l'affirmative, le personnel en question sera-t-il escorté?

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? — ☑ No / Non ☐ Yes / Oui
Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS?

11. b) Will the supplier be required to safeguard COMSEC information or assets? — ☑ No / Non ☐ Yes / Oui
Le fournisseur sera-t-il tenu de protéger des renseignements ou des biens COMSEC?

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? — ☑ No / Non ☐ Yes / Oui
Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ?

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? — ☑ No / Non ☐ Yes / Oui
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?

11. e) Will there be an electronic link between the supplier's IT systems and the government department or agency? — ☑ No / Non ☐ Yes / Oui
Disposera-t-on d'un lien électronique entre le système informatique du fournisseur et celui du ministère ou de l'agence gouvernementale?

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 A	PROTECTED / PROTÉGÉ B	PROTECTED / PROTÉGÉ C	CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET
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?
La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE?

☑ No / Non ☐ Yes / Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification".
Dans l'affirmative, classifier 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?
La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE?

☑ No / Non ☐ Yes / 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, classifier le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire et indiquer qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).

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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
Denis Labelle	Construction Project Manager	

Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
613-993-4923	613-957-9828	denis.labelle@nrc-cnrc.gc.ca	Nov. 9/17

14. Organization Security Authority / Responsable de la sécurité de l'organisme

Name (print) - Nom (en lettres moulées)	Title - Titre	Signature
Richard Bramucci	Analyst, Security in Contracting	

Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
(613) 991-1093	(613) 990-0946	richard.bramucci@nrc-cnrc.gc.ca	NOV 09 2017

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?

☑ No / Non ☐ Yes / Oui

16. Procurement Officer / Agent d'approvisionnement

Name (print) - Nom (en lettres moulées)	Title - Titre	Signature
Alain Lebrun	Senior Proc. Officer	

Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
613 991-9911			16-11-2017

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