



SPECIFICATIONS

SOLICITATION #: 24-58025

BUILDING: 1200 Montreal Road,
Ottawa, Ontario

PROJECT: M24 Room 111 Renovations

PROJECT #: 6218

Date: April 2024

SPECIFICATION

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Construction Tender Form

Project Identification **M24 Room 111 Renovations**

Tender No.: **24-58025**

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 His Majesty the King in Right of Canada (hereinafter referred to as "His 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.

National Research Council Canada	Conseil national de recherches Canada
Finance and Procurement Services Branch	Direction des services financiers et d'approvisionnement

1.3.1 Offer (continued)

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

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

1.4 Acceptance and Entry into Contract

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

1.5 Construction Time

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

1.6 Bid Security

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

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

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

National Research Council Conseil national de recherches
Canada Canada

Finance and Procurement Direction des services financiers
Services Branch et d'approvisionnement

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)

National Research Council Canada	Conseil national de recherches Canada
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Finance and Procurement Services Branch	Direction des services financiers et d'approvisionnement
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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

M24 Room 111 Renovations

You are invited to submit **one** electronic Technical Proposal and **one** electronic Tender Form in two separate attachments to fulfil the following requirement forming part of this Request for Proposal. One attachment **must** be clearly marked 'Technical Proposal' and the other attachment **must** be marked 'Tender Form'. All financial information **must** be fully contained in the Tender Form, and only in the Tender Form. Vendors who provide financial information in the technical proposal will be disqualified. **All proposals should include the front page of this RFP duly completed.**

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

The proposed scope of work includes Lab Renovations in Building M-24 Room 111 of the National Research Council. The renovation involves Type 3 abatement of the existing HVAC system and replacing it with a new system, replacing the o/h garage door and motor with new, repairing the concrete floor slab, and retrofitting overall space for future CBI use

Tender Destination

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

NRC.BidReceiving-ReceptiondesSoumissions.CNRC@nrc-cnrc.gc.ca

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

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

Selection Criteria

Potential bidders will be rated in a combination of technical score and price rating. For this project the total score will be established as follows:

Technical rating 40%	=	Technical Score (Points)
Price rating 60%	=	Price Score (Points)
Total Score	=	Max. 100 points

Mandatory requirements

Failure to meet the mandatory requirement will render the proposal as non-responsive and no further evaluation will be carried out.

Item	Mandatory Requirements	Proposal Page #(s)
1	The Proponent must have a minimum of ten (10) years' experience in the execution and as a contractor providing construction services comparable to this tender. Provide a company profile and relevant history as described in item #1 of the evaluated technical criteria.	
2	The Proponent must supply a CV for the proposed construction site supervisor.	
3	The Proponent must supply a CV for the proposed construction Project Manager.	

Include this table with your proposal and indicate the proposal page where the information can be found.

Evaluated Technical Criteria

Item	Evaluated Technical Criteria	Proposal Page # (s)	Max Score
1	<p>Demonstrated experience by the Proponent providing general construction services relevant to this project. Include 2 comparable projects completed by the proponent’s firm in the last 10 years with reference names & phone numbers. Maximum 1 page per project. Evaluations will take into account relevance compared to the scope of this tender (up to 3 point for each example project) and whether the reference was satisfied with the work completed (up to 1 point for each example project). It is the responsibility of the bidder to ensure the contact information for the reference is accurate. If the reference cannot be reached or declines to provide input the proponent will received a score of 0/1 for that example.</p>		8
2	<p>Qualifications and overall experience of proposed construction site supervisor and Project Manager. CV will be scored on the basis of related experience (up to 2 points), experience acting as a construction site supervisor on federal government construction projects (up to 2 points) and experience on federal government Project for the Manager (up to 3 points). Include detailed examples of 2 past projects for the construction site supervisor who was in that position for at least 80% of the duration of those projects. CV should be no longer than 3 pages.</p>		7
3	<p>Provide company profile for asbestos abatement sub-contractor. Include 3 comparable projects completed by the proponents firm in the last 5 years that demonstrate experience relevant to the asbestos abatement scope of work for this tender. Evaluation will consist of (1 point) for 10-15 years in business, (2 points) for over 15 years in business and up to 1 point for each comparable project (up to 3 Points).</p>		5
4	<p>The Proponent should provide their construction schedule for this project, from award to final completion, detailing major milestones, critical path elements, and associated timelines. Schedule evaluation will be based on whether it meets the completion date noted in the tender documents (up to 2 points), and if the tasks and associated timelines demonstrate the contractor understands the scope of work (up to 3 points).</p>		5
Total			25

Include this table with your proposal and indicate the proposal page where the information can be found.

EVALUATION AND RATING

Price envelopes will remain sealed and only the technical components of the proposals considered responsive will be reviewed, evaluated and rated by a NRC Evaluation Board in accordance with the criteria listed in the evaluated technical criteria table.

No further consideration will be given to proponents not achieving the pass mark of 17.5 out of 25 (70%). The successful Bidder shall be the one who accumulates the highest combined score of the technical assessment (40%) and tendered amount (60%), as shown below:

TABLE A	Bidder #1	Bidder #2	Bidder #3
Technical score	18 out of 25	20 out of 25	23 out of 25
Tendered amount	\$190,000	\$200,000	\$210,000

For information only:

	Technical score (40%)	Tendered amount score (60%)	Final score
Bidder #1	$18/25 \times 40\% = 28.8$	$\frac{190 \text{ k} \times 60\%}{190 \text{ k}} = 60$	= 88.8
Bidder #2	$20/25 \times 40\% = 32$	$\frac{190 \text{ k} \times 60\%}{200 \text{ k}} = 57$	= 89
Bidder #3	$23/25 \times 40\% = 36.8$	$\frac{190 \text{ k} \times 60\%}{210 \text{ k}} = 54.3$	= 91.1 (successful bid)

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 May 7th and May 8th 2024 at **10:00am**. Meet Nick Becker at 1200 Montreal Road, Building M24, Main Entrance, 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 May 30th, 2024, 14:00

4. TENDER RESULTS

Following the Tender closing, proposals will be evaluated and notice of individual results will be sent by email to all Contractors who submitted a tender.

5. SECURITY REQUIREMENT FOR CANADIAN CONTRACTORS

5.1 MANDATORY SECURITY REQUIREMENT:

This procurement contains a mandatory security requirement as follows:

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

5.2 VERIFICATION OF SECURITY CLEARANCE AT BID CLOSING

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

be held liable or accountable for any delays or additional costs associated with the contractor's non-compliance to the mandatory security requirement. Failure to comply with the mandatory security requirement will be grounds for being declared in default of contract.

4. For any enquiries concerning the project security requirement during the bidding period, the Bidder/Tenderer must contact the Security Officer @ 613-993-8956.

6. WSIB (WORKPLACE SAFETY AND INSURANCE BOARD)

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

7. OFFICE OF THE PROCUREMENT OMBUDSMAN

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

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

2. Contract Administration

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

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

3. Dispute Resolution

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

The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169, by e-mail at boa.opo@boa-opo.gc.ca, or by web at www.opo-boa.gc.ca.

The Departmental Representative or his designate for this project is: Nick Becker
Nicholas.Becker@nrc-cnrc.gc.ca
Telephone: (343) 553-9461

Contracting Authority for this project is: Collin Long
Collin.Long@nrc-cnrc.gc.ca

INSTRUCTIONS TO BIDDERS

Article 1 – Receipt of Tender

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

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

NRC.BidReceiving-ReceptiondesSoumissions.CNRC@nrc-cnrc.gc.ca

Article 2 – Tender Form & Qualifications

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

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

Article 3 - Contract

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

Article 4 – Tender Destination

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

NRC.BidReceiving-ReceptiondesSoumissions.CNRC@nrc-cnrc.gc.ca

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

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

Article 5 - Security

- 1a) Bid Security is required and must be submitted in one of the following forms:
 - i) bonds of the Government of Canada, or bonds unconditionally guaranteed as to principal and interest by the Government of Canada; **OR**
 - ii) a bid bond.
- 1b) Regardless of the Bid Security submitted, it should never be more than \$250,000 maximum, calculated at 10% of the first \$250,000 of the tendered price, plus 5% of any amount in excess of \$250,000.
- 1c) Bid Security shall accompany each tender or, if forwarded separately from the tender, shall be provided not later than the specified tender closing time. Bid bond or E-bond Security must be in the ORIGINAL form. PDF via email is acceptable. **FAILURE TO PROVIDE THE REQUIRED BID SECURITY SHALL INVALIDATE THE TENDER.**
- 1d) The successful tenderer is required to provide security within 14 days of receiving notice of tender acceptance. The tenderer must furnish EITHER:

- i) a Security Deposit as described in 1(b) above together with a Labour and Material Payment Bond in the amount of at least 50% of the amount payable under the contract, OR
 - ii) a Performance Bond and a Labour and Material Payment Bond – each in the amount of 50% of the amount payable under the contract.
- 1e) Bonds must be in an approved form and from the companies whose

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

Article 7 – Sales Tax

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

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

Article 8 – Examination of Site

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

Article 9 – Discrepancies, Omissions, Etc.

- 1a) Bidders finding discrepancies in, or omissions from, drawings, specifications or other documents, or having any doubt as to the meaning or intent of any part thereof, should at once notify the Engineer who will send written instructions or explanation to all bidders.
- 1b) Neither the Engineer nor the Council will be responsible for oral instructions.
- 1c) Addenda or corrections issued during the time of the bidding shall be covered in the proposal. However, the contract supersedes all communications, negotiations and agreements, either written or oral, relating to the work and made prior to the date of the contract.

Article 10 – No additional Payments for Increased Costs

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

Article 11 – Awards

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

Article 12 – Harmonized Sales Tax

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

Non-resident contractors

RST guide 804

Published August 2006

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

Publication Archived

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

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

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

Non-Resident Contractor Defined

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

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

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

Registration and Guarantee Deposit

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

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

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

Letter of Compliance

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

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

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

Calculation of RST

Fair Value

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

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

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

Machinery and Equipment - Leased

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

Machinery and Equipment - Owned by Contractor

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

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

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

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

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

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

net book value at date of import x tax rate

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

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

(See Completion of Contract section)

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

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

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

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

(See RST Guide 401 - Manufacturing Contractors)

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

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

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

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

E x e m p t i o n s

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

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

Status Indians, Indian Bands and Band Councils

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

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

Completion of Contract

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

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

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

All returns are subject to audit.

Legislative References

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

For More Information

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

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

Articles of Agreement

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

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

Articles of Agreement

These Articles of Agreement made in duplicate this day of .

Between

His Majesty the King, in right of Canada (referred to in the contract documents as “His 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, His 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 His 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

Articles of Agreement

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

1.2 In the contract

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

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

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

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

A2 Date of Completion of Work and Description of Work

(23/01/2002)

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

which work is more particularly described in the Plans and Specifications, including addendum(s).

Articles of Agreement

A3 Contract Amount

(23/01/2002)

3.1 Subject to any increase, decrease, deduction, reduction or set-off that may be made under the Contract, Her Majesty shall pay the Contractor at the times and in the manner that is set out or referred to in the Terms of Payment

3.1.1 the sum of (GST/HST extra), in consideration for the performance of the work or the part thereof that is subject to Fixed Price Arrangement, and

3.1.2 a sum that is equal to the aggregate of the products of the number of units of Measurement of each class of labour, plant and material that is set out in a Final Certificate of Measurement referred to in GC44.8 multiplied in each case by the appropriate unit price that is set out in the Unit Price Table in consideration for the performance of the work or the part thereof that is subject to a Unit Price Arrangement.

3.2 For the information and guidance of the Contractor and the persons administering the contract on behalf of Her Majesty, but not so as to constitute a warranty, representation or undertaking of any nature by either party, it is estimated that the total amount payable by Her Majesty to the Contractor for the part of the work to which a Unit Price Arrangement is applicable will be approximately \$N/A

3.3 A3.1.1 is applicable only to a Fixed Price Arrangement.

3.4 A3.1.2 and A3.2 applicable only to a Unit Price Arrangement.

A4 Contractor's Address

(23/01/2002)

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

Articles of Agreement

Signed on behalf of His 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

of

on the _____

day of _____

Seal

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- Designated Substances and Hazardous Materials Survey (updated) January 27, 2024

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1. SCOPE OF WORK

- .1 Work under this contract covers the Lab Renovations in Building M-24 Room 111 of the National Research Council.

2. DRAWINGS

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

ARCHITECTURAL (RPPM) - A00, A01, A02 & A03
STRUCTURAL (LEIB) – S01
MECHANICAL (RPPM) – M01, M02 & M03
ELECTRICAL (RPPM) – E01

3. COMPLETION

- .1 Complete all work by September 30th, 2024 after receipt of notification of acceptance of tender.

4. GENERAL

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

5. SPECIFIED ACCEPTABLE & ALTERNATIVE EQUIPMENT & MATERIALS

- .1 Materials and equipment scheduled and/or specified on the drawings or in the specifications have been selected to establish a performance and quality standard. In most cases, acceptable manufacturers are stated for any material or equipment specified by manufacturer's name and model number. Contractors may base their tender price on materials and equipment supplied by any of the manufacturers' names as acceptable for the particular material or equipment.
.2 In addition to the manufacturers specified or named as acceptable, you may propose alternative manufacturers of materials or equipment to the Departmental Representative for acceptance. For a product to be considered as an alternative product substitute, make a written application to the Departmental Representative during the tender period, not later than ten (10) working days before tender closing.
.3 Certify in writing that the alternative meets all requirements of the specified material or equipment. In addition, it shall be understood that all costs required by or as a result of acceptance or proposed alternatives, will be borne by the Contractor.
.4 Approval of alternatives will be signified by issue of an Addendum to the Tender Documents.
.5 Any alternative manufacturers or materials submitted which are incomplete and cannot be evaluated, or are later than ten (10) working days before tender closing date or after the tender period, will not be considered.

6. MINIMUM STANDARDS

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

7. WORKPLACE HAZARDOUS MATERIAL INFORMATION SYSTEM (WHMIS)

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

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

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

- .1 Acrylonitrile, Isocyanates, Arsenic, Lead, Asbestos, Mercury, Benzene, Silica, Coke Oven Emissions, Vinyl Chloride, and Ethylene Oxide
 - .1 It is the responsibility of the General Contractor to ensure that each prospective sub-contractor for this project has received a copy of the above list.

9. COST BREAKDOWN

- .1 Submit, for approval by the Departmental Representative, a cost breakdown of tender 72 hours after the contract is awarded.
- .2 Use the approved cost breakdown as the basis for submitting all claims.
- .3 Request Departmental Representative's verbal approval to amount of claim prior to preparing and submitting the claim in its final form.

- .4 Contractor costs associated with compliance with occupational health and safety requirements (Canada Labour Code) related to the Coronavirus/COVID-19 pandemic must be included in the initial bid price. These costs may include, but are not limited to, the provision of additional personal protective equipment (PPE) and social distancing requirements as required to complete the project. Contractor must review and incorporate into initial bid pricing compliance with any Coronavirus/COVID-19 related health and safety guidance issued by the local Medical Officer of Health (applicable in the jurisdiction of the project), the Public Health Agency of Canada, Health Canada and/or the provincial Ministry of Health, as applicable.

10. SUB-TRADES

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

11. PERSONNEL SECURITY AND IDENTIFICATION

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

12. WORKING HOURS AND SECURITY

- .1 Normal working hours on the NRC property are from 8:00 a.m. until 4:30 p.m., Monday to Friday inclusive, except statutory holidays.
- .2 At all other times, special written passes are required for access to the building site.
- .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.
- .3 14 day(s) 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 assumes responsibility for recording and distributing minutes.

15. SHOP DRAWINGS

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

16. SAMPLES AND MOCK-UPS

- .1 Submit samples in sizes and quantities as specified.
- .2 Where colour, pattern or texture is criterion, submit full range of samples.
- .3 Construct field samples and mock-ups at locations acceptable to Departmental Representative.
- .4 Reviewed samples or mock-ups will become standards of workmanship and material against which installed work will be checked on the project.

17. MATERIALS AND WORKMANSHIP

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

18. WORK & MATERIALS SUPPLIED BY OWNER

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

19. SITE ACCESS

- .1 Make prior arrangements with the Departmental Representative before starting work or moving materials and equipment on site.
- .2 Obtain approval of Departmental Representative for regular means of access during the construction period.
- .3 Obtain approval of Departmental Representative before temporarily suspending operations on site; before returning to the site and before leaving the site at the end of the job.
- .4 Provide and maintain access to site.
- .5 Build and maintain temporary roads and provide snow removal during period of work.
- .6 Provide snow clearing and removal as required during the contract period.
- .7 Make good any damage and clean up dirt, debris, etc., resulting from Contractor's use of existing roads.

20. USE OF SITE

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

21. ACCEPTANCE OF SITE

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

22. SITE OFFICE & TELEPHONE

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

23. SANITARY FACILITIES

- .1 Obtain permission from the Departmental Representative to use the existing washroom facilities in the building.

24. TEMPORARY SERVICES

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

25. DOCUMENTS REQUIRED AT WORK SITE

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

26. CO-OPERATION

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

27. PROTECTION AND WARNING NOTICES

- .1 Provide all materials required to protect existing equipment.
- .2 Erect dust barriers to prevent dust and debris from spreading through the building.
- .3 Place dust protection in the form of cover sheets over equipment and furniture and tape these sheets to floors, to ensure no dust infiltration.
- .4 Repair or replace any and all damage to Owner's property caused during construction, at no cost to the Owner and to the satisfaction of the Departmental Representative.
- .5 Protect the buildings, roads, lawns, services, etc. from damage which might occur as a result of this work.
- .6 Plan and co-ordinate the work to protect the buildings from the leakage of water, dust, etc.
- .7 Ensure that all doors, windows, etc., that could allow transfer of dust, noise, fumes, etc., to other areas of the building are kept closed.
- .8 Be responsible for security of all areas affected by the work under the Contract until acceptance by NRC. Take all necessary precautions to prevent entry to the work area by unauthorized persons and guard against theft, fire and damage by any cause. Secure working area at the end of each day's work and be responsible for same.
- .9 Provide and maintain adequate safety barricades around the work sites to protect NRC personnel and the public from injury during the construction.
- .10 Post warnings, in all instances where possible injury could occur such as Work Overhead, Hard Hat Areas, etc. or as required by the Departmental Representative.
- .11 Provide temporary protective enclosures over building entrances and exits to protect pedestrians. All enclosures to be structurally sound against weather and falling debris.

28. BILINGUALISM

- .1 Ensure that all signs, notices, etc. are posted in both official languages.

- .2 Ensure that all identification of services called for by under this contract are bilingual.

29. LAYOUT OF WORK

- .1 Location of equipment, fixtures, outlets and openings indicated on drawings or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with the manufacturer's recommendations for safety, access and maintenance.
- .3 Employ competent person to lay out work in accordance with the contract documents.

30. DISCREPANCIES & INTERFERENCES

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

31. MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
- .2 Notify the Departmental Representative in writing of any conflict between these specifications and manufacturer's instruction. Departmental Representative will designate which document is to be followed.

32. TEMPORARY HEATING AND VENTILATING

- .1 Bear the costs of temporary heat and ventilation during construction including costs of installation, fuel, operation, maintenance, and removal of equipment.
- .2 Use of direct-fired heaters discharging waste products into the work areas will not be permitted unless prior approval is given by the Departmental Representative.
- .3 Furnish and install temporary heat and ventilation in enclosed areas as required to:

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

33. CONNECTIONS TO AND INTERRUPTIONS TO EXISTING SERVICES

- .1 Where work involves breaking into or connecting to existing services, carry out work at times and in the manner agreed to by the Departmental Representative and by authorities having jurisdiction, with minimum disruption to NRC Personnel and vehicular traffic and minimum service interruption. Do not operate any NRC equipment or plant.
- .2 Before commencing work, establish location and extent of service lines in area of work and notify Departmental Representative of findings.

- .3 Submit a schedule to and obtain approval from the Departmental Representative for any shut-down or closure of active service or facility; allow minimum 72 hours notice. Adhere to approved schedule and provide notice to the Departmental Representative.
- .4 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .5 Provide detours, bridges, alternate feeds, etc., as required to minimize disruptions.
- .6 Protect existing services as required and immediately make repairs if damage occurs.
- .7 Remove any abandoned service lines as indicated on the contract documents and as approved by the Departmental Representative; cap or otherwise seal lines at cut-off points. Record and provide a copy to the Departmental Representative of locations of maintained, re-routed and abandoned service lines.

34. CUTTING AND PATCHING

- .1 Cut existing surfaces as required to accommodate new work.
- .2 Remove all items as shown or specified.
- .3 Patch and make good with identical materials, the surfaces that have been disturbed, cut or damaged, to the satisfaction of the Departmental Representative.
- .4 Where new pipes pass through existing construction, core drill an opening. Size openings to leave 12mm (1/2") clearance around the pipes or pipe insulation. Do not drill or cut any surface without the approval of the Departmental Representative.
- .5 Obtain written approval of the Departmental Representative before cutting openings through existing or new structural members.
- .6 Seal all openings where cables, conduits or pipes pass through walls with an acoustic sealant conforming to CAN/CGSB-19.21-M87.
- .7 Where cables, conduits and pipes pass through fire rated walls and floors, pack space between with compressed glass fibres and seal with fire stop caulking in accordance with CAN/CGSB-19.13-M87 AND NBC 3.1.7.

35. FASTENING DEVICES

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

36. OVERLOADING

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

37. DRAINAGE

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

38. ENCLOSURE OF STRUCTURES

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

39. STORAGE

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

40. GENERAL REVIEW

- .1 Periodic review of the Contractor's work by the Departmental Representative does not relieve the Contractor of the responsibility of making the work in accordance with contract documents. Contractor shall carry out his own quality control to ensure that the construction work is in accordance with contract documents.

- .2 Inform the Departmental Representative of any impediments to the installation and obtain his / her approval for actual location.

41. INSPECTION OF BURIED OR CONCEALED SERVICES

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

42. TESTING

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

43. PARTIAL OCCUPANCY

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

44. DISPOSAL OF WASTES

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

45. CLEAN-UP DURING CONSTRUCTION

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

46. FINAL CLEAN-UP

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

47. WARRANTY AND RECTIFICATION OF DEFECTS IN WORK

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

48. MAINTENANCE MANUALS

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

END OF SECTION

1. GENERAL CONSTRUCTION SAFETY REQUIREMENTS

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

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

2. FIRE SAFETY REQUIREMENTS

.1 Authorities

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

.2 Smoking

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

.3 Hot Work

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

.4 Reporting Fires

- .1 Know the exact location of the nearest Fire Alarm Pull Station and telephone, including the emergency phone number.

- .2 REPORT immediately, all fire incidents as follows:
 1. Activate nearest fire alarm pull station; and
 2. Telephone the following emergency phone number as appropriate:

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

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

.5 Interior and Exterior Fire protection & Alarm Systems

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

.6 Fire Extinguishers

- .1 Provide a minimum of 1-20 lb. ABC Dry Chemical Fire Extinguisher at each hot work or open flame location.
- .2 Provide fire extinguishers for hot asphalt and roofing operations as follows:
 1. Kettle area - 1-20 lb. ABC Dry Chemical; and
 2. Roof - 1-20 lb. ABC Dry Chemical at each open flame location.
- .3 Provide fire extinguishers equipped as below:
 1. Pinned and sealed;
 2. With a pressure gauge; and
 3. With an extinguisher tag signed by a fire extinguisher servicing company.

- .4 Carbon Dioxide (CO₂) extinguishers will not be considered as substitutes for the above.

.7 Roofing Operations

- .1 Kettles:
 - .1 Arrange for the location of asphalt kettles and material storage with the Departmental Representative before moving on site. Do not locate kettles on any roof or structure and keep them at least 10m (30 feet) away from a building.
 - .2 Equip kettles with two (2) thermometers or gauges in good working order; a hand held and a kettle-mounted model.
 - .3 Do not operate kettles at temperatures in excess of 232°C (450°F).
 - .4 Maintain continuous supervision while kettles are in operation and provide metal covers for the kettles to smother any flames in case of fire. Provide fire extinguishers as required in article 2.6.
 - .5 Demonstrate container capacities to Departmental Representative prior to start of work.
 - .6 Store materials a minimum of 6m (20 feet) from the kettle.
- .2 Mops:
 - .1 Use only glass fibre roofing mops.
 - .2 Remove used mops from the roof site at the end of each working day.
- .3 Torch Applied Systems:
 - .1 DO NOT USE TORCHES NEXT TO WALLS.
 - .2 DO NOT TORCH MEMBRANES TO EXPOSED WOOD OR CAVITY.
 - .3 Provide a Fire Watch as required by article 2.9 of this section.
- .4 Fire and Smoke Hazard Management:
 - .1 Contractor shall identify “Designated Roofing Marshall” for duration of construction activities. “Designated Roofing Marshall” shall be responsible for the following:
 - .1 Perform NRC Daily Fire and Smoke Risk Hazard Assessment each day prior to commencement of roofing activities.
 - .2 Provide completed NRC Daily Fire and Smoke Risk Hazard Assessment to Departmental Representative every morning by email prior to commencement of roofing activities.
 - .3 Follow behind any torch activities with a thermal scanner periodically to identify any hot spots and rectify immediately. Interval for periodic thermal scanning to be approved on site with Departmental Representative.
 - .2 Any proposed changes to “Designated Roofing Marshall” must be reviewed and approved by Departmental Representative.

- .5 Store all combustible roofing materials at least 3m (10 feet) away from any structure.
- .6 Keep compressed gas cylinders a minimum of 6m (20 feet) away from the kettle, protected from mechanical damage and secured in an upright position.

.8 Welding / Grinding Operations

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

.9 Fire Watch

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

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

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

.11 Rubbish and Waste Materials

- .1 Keep rubbish and waste materials to a minimum and a minimum distance of 6m (20 feet) from any kettle or torches.
- .2 Do not burn rubbish on site.
- .3 Rubbish Containers:
 - .1 Consult with the Departmental Representative to determine an acceptable safe location for any containers and the arrangement of chutes etc. prior to bringing the containers on site.
 - .2 Do not overfill the containers and keep area around the perimeter free and clear of any debris.

- .4 Storage:
 - .1 Exercise extreme care when storing combustible waste materials in work areas. Ensure maximum possible cleanliness, ventilation and that all safety standards are adhered to when storing any combustible materials.
 - .2 Deposit greasy or oily rags or materials subject to spontaneous combustion in CSA or ULC approved receptacles and remove at the end of the work day or shift, or as directed.

.12 Flammable Liquids

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

3. QUESTIONS OR CLARIFICATIONS

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 10 00 - General Instructions Ontario

1.2 ADMINISTRATIVE

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

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 2 weeks for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.

- .9 After Departmental Representative's review, distribute copies.
- .10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within [3] years of date of contract award for project.
- .13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit electronic copies of manufacturer's instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .17 Delete information not applicable to project.
- .18 Supplement standard information to provide details applicable to project.
- .19 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .20 The review of shop drawings by National Research Council Canada (NRC) is for sole purpose of ascertaining conformance with general concept.

- .1 This review shall not mean that NRC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
- .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.4 SAMPLES

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

1.5 MOCK-UPS

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for management of construction waste and disposal, which forms the Contractor's commitment to reduce and divert waste materials from landfill and includes the following:
 - .1 Preparation of a Draft Construction Waste Management Plan that will be used to track the success of the Construction Waste Management Plan against actual waste diversion from landfill.
 - .2 Preparation of monthly progress reports indicating cumulative totals representing progress towards achieving diversion and reduction goals of waste materials away from landfill and identifying any special programs, landfill options or alternatives to landfill used during construction.
 - .3 Preparation of a Construction Waste Management Report containing detailed information indicating total waste produced by the project, types of waste material and quantity of each material, and total waste diverted and diversion rates indicated as a percentage of the total waste produced.
- .2 Owner has established that this project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors be employed by the Contractor.

1.2 RELATED REQUIREMENTS

- .1 Section 00 10 00 – General Instructions
- .2 Section 02 42 00 – Removal and Salvage of Construction Material
- .3 Section 22 05 05 – Selective Demolition for Plumbing
- .4 Section 23 05 05.01 – Selective Demolition for HVAC-R Equipment
- .5 Section 26 05 05 – Selective Demolition for Electrical

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM E1609 01, Standard Guide for Development and Implementation of a Pollution Prevention Program
- .2 Canada Green Building Council (CaGBC)
 - .1 LEED Reference Guide for Building Design and Construction, Version 4
- .3 Recycling Certification Institute (RCI):
 - .1 RCI Certification Construction and Demolition Materials Recycling

1.4 DEFINITIONS

- .1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.
- .2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, re-modeling, repair and demolition operations.
- .3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.
- .4 Non-hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.
- .5 Non-toxic: Not poisonous to humans either immediately or after a long period of exposure.
- .6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- .7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- .8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Return: To give back reusable items or unused products to vendors for credit.
- .10 Reuse: To reuse a construction waste material in some manner on the project site.
- .11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- .12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.
- .13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- .14 Toxic: Poisonous to humans either immediately or after a long period of exposure.
- .15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- .16 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:
 - .1 Solvents in paints and other coatings;
 - .2 Wood preservatives; strippers and household cleaners;
 - .3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.

.4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.

.17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

.18 Construction Waste Management Plan: A project related plan for the collection, transportation, and disposal of the waste generated at the construction site; the purpose of the plan is to ultimately reduce the amount of material being landfilled.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project, and ensure that requirements of the Construction Waste Management Plan are followed.

.2 Preconstruction Meeting: Arrange a pre-construction meeting in accordance with Section 01 10 00 – General Instructions before starting any Work of the Contract attended by the Owner, Contractor, affected Subcontractor's and Departmental Representative to discuss the Contractor's Construction Waste Management Plan and to develop mutual understanding of the requirements for a consistent policy towards waste reduction and recycling.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide required information in accordance with Section 01 10 00 – General Instructions.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Draft Construction Waste Management Plan (Draft CWM Plan): Submit to Departmental Representative a preliminary analysis of anticipated site generated waste by listing a minimum of five (5) construction or demolition waste streams that have potential to generate the most volume of material indicating methods that will be used to divert construction waste from landfill and source reduction strategies; Departmental Representative will provide commentary before development of Contractor's Construction Waste Management Plan.

.2 Construction Waste Management Plan (CWM Plan): Submit a CWM Plan for this project prior to any waste removal from site and that includes the following information:

.1 Material Streams: Analysis of the proposed jobsite waste being generated, including material types and quantities forming a part of identified material streams in the Draft CWM Plan; materials removed from site destined for alternative daily cover at landfill sites and land clearing debris cannot be considered as contributing to waste diversion and will be included as a component of the total waste generated for the site.

.2 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.

.3 Alternative Waste Disposal: Prepare a listing of each material proposed to be salvaged, reused, recycled or composted during the course of the project, and the proposed local market for each material.

- .4 Landfill Materials: Identify materials that cannot be recycled, reused or composted and provide explanation or justification; energy will be considered as a viable alternative diversion strategy for these materials where facilities exist and are operated in accordance with LEED Construction and Demolition Waste Management requirements.
- .5 Landfill Options: The name of the landfill where trash will be disposed of; landfill materials will form a part of the total waste generated by the project.
- .6 Materials Handling Procedures: A description of the means by which any recycled waste materials will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.
- .7 Transportation: A description of the means of transportation of the recyclable materials, whether materials will be site separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site, and destination of materials.

1.7 PROJECT CLOSEOUT SUBMISSIONS

- .1 Record Documentation: Submit as constructed information in accordance with Section 01 10 00 – General Instructions as follows:
 - .1 Construction Waste Management Report (CWM Report): Submit a CWM Report for this project in a format that includes the following information:
 - .1 Accounting: Submit information indicating total waste produced by the project.
 - .2 Composition: Submit information indicating types of waste material and quantity of each material.
 - .3 Diversion Rate: Submit information indicating total waste diverted from landfill as a percentage of the total waste produced by the project.
 - .4 Transportation Documentation and Diversion Documentation: Submit copies of transportation documents or shipping manifests indicating weights of materials, and other evidence of disposal indicating final location of waste diverted from landfill and waste sent to landfill.
 - .5 Multiple Waste Hauling: Compile all information into a single CWM Report where multiple waste hauling and diversion strategies were used for the project.

1.8 QUALITY ASSURANCE

- .1 Resources for Development of Construction Waste Management Report (CWM Report): The following sources may be useful in developing the Draft Construction Waste Management Plan:
 - .1 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.
 - .2 Waste-to-Energy Systems: Investigate local waste-to-energy incentives where systems for diverting materials from landfill for reuse or recycling are not available.
 - .3 Municipal Garbage & Recycling Waste Websites:
 - .1 Ontario Region
 - .1 London
[EnviroDepots | City of London](#)

- .2 Mississauga
 - [How to sort your waste - Region of Peel \(peelregion.ca\)](#)
- .3 National Capital Region (City of Ottawa)
 - [Garbage and recycling | City of Ottawa](#)
- .2 Quebec Region
 - .1 Boucherville
 - [Accueil | Ville de Longueuil](#)
 - .2 Montreal
 - [Get details about bulky items and construction debris collections | Ville de Montréal \(montreal.ca\)](#)
 - .3 Saguenay
 - [Demolition Waste Management | Demex-Centrem group \(groupedemexcentrem.com\)](#)
- .3 East Region
 - .1 Charlottetown
 - [Sorting Guide - Island Waste Management Corporation | Prince Edward Island Recycling, Compost and Waste Disposal \(iwmc.pe.ca\)](#)
 - .2 Fredericton
 - [Construction and Demolition - Fredericton Region Solid Waste : Fredericton Region Solid Waste \(frswc.ca\)](#)
 - .3 Halifax
 - [Halifax C&D Recycling \(halifaxcdrecycling.ca\)](#)
 - .4 Ketch Harbour
 - [Halifax C&D Recycling \(halifaxcdrecycling.ca\)](#)
 - .5 St. John's
 - [Accepted Material at RHB \(Commercial/ Municipal Users\) | Robin Hood Bay Facility | Garbage Disposal | St. John's](#)
- .4 West Region
 - .1 Edmonton
 - [Material Recovery Facility \(MRF\) | KBL Environmental](#)
 - .2 Penticton
 - <https://keremeos.civicweb.net/document/3069/>
 - .3 Saskatoon
 - [Construction/Demolition/Fencing — Loraas Disposal North](#)
 - .4 Victoria
 - [Reno & Demo Waste | CRD](#)
 - .5 Vancouver
 - [Construction and demolition waste disposal | City of Vancouver](#)
 - .6 Winnipeg

[What goes where? Use the Recyclepedia - MyUtility - Water and Waste Department - City of Winnipeg / MesServices – Service des eaux et des déchets – Ville de Winnipeg \]](#)

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Storage Requirements: Implement a recycling/reuse program that includes separate collection of waste materials as appropriate to the project waste and the available recycling and reuse programs in the project area.
- .2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials:
 - .1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.
 - .2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.
- .3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 OBJECTIVE

- .1 The Federal Sustainable Development Strategy (FSDS) presents the Government of Canada's sustainable development goals and targets, as required by the *Federal Sustainable Development Act*. In keeping with the purpose of this Act – to provide the legal framework for developing and implementing a Federal Sustainable Development Strategy that will make environmental decision-making more transparent and accountable to Parliament – National Research Council (NRC) supports the goals laid out in the FSDS through the activities described in our Departmental Sustainable Development Strategy (DSDS). NRC's DSDS waste management target is as follows:
 - .1 Divert at least 90% (by weight) of all construction and demolition waste from landfills (striving to achieve 100% by 2030).
 - .2 Project Waste Diversion Target: 90%.

3.2 (CWM PLAN) IMPLEMENTATION

- .1 Manager: Contractor is responsible for designating an on-site party or parties responsible for instructing workers and overseeing and documenting results of the CWM Plan for the project.

- .2 Distribution: Distribute copies of the CWM Plan to the job site foreman, each Subcontractor, the Owner, the Departmental Representative and other site personnel as required to maintain CWM Plan.
- .3 Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods being used for the project to Subcontractor's at appropriate stages of the project.
- .4 Separation Facilities: Lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting and return:
 - .1 Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.
 - .2 Hazardous wastes shall be separated, stored, and disposed of in accordance with local regulations.
- .5 Progressive Documentation: Submit a monthly summary of waste generated by the project to ensure that waste diversion goals are on track with project requirements:
 - .1 Submission of waste summary can coincide with application for progress payment, or similar milestone event as agreed upon between the Contractor and Departmental Representative.
 - .2 Monthly waste summary shall contain the following information:
 - .1 The amount in tonnes or m3 and location of material landfilled;
 - .2 The amount in tonnes or m3 and location of materials diverted from landfill; and
 - .3 Indication of progress based on total waste generated by the project with materials diverted from landfill as a percentage.

3.3 SUBCONTRACTOR'S RESPONSIBILITY

- .1 Subcontractors shall cooperate fully with the Contractor to implement the CWM Plan.
- .2 Failure to cooperate may result in the Owner not achieving their environmental goals, and may result in penalties being assessed by the Contractor to the responsible Subcontractor's.

3.4 CONSTRUCTION WASTE MANAGEMENT FORMS

- .1 Departmental Representative will provide Contractor will NRC Waste Management and Disposal Tracking Forms (sample provided below) for recording management of construction waste.
- .2 Contractor shall utilize these forms for all waste management and disposal tracking for the duration of the project, and is responsible for maintaining current up to date records at all times during construction.
- .3 Contractor is responsible to ensure all waste management tracking forms, weigh-bills, donation receipts, and summary information are incorporated into Operational and Maintenance Manuals upon construction completion in accordance with 01 10 00 – General Instructions.

[INSERT WASTE MANAGEMENT FORMS]

END OF SECTION

WASTE AUDIT worksheet for NRC Construction, Renovation and Demolition Projects

Worksheet for: Total Inventory Specific Stage Individual Floor

Create one worksheet for the entire project or multiple worksheets for each stage of the project, or per floor (where needed). Mark each worksheet accordingly

For Project Planning Purposes (i.e. number of bins required)

Project Name	
Project Type (Construction, Renovation or Demolition)	
Area (sq. m)	
Site Address	
Contact Person & Telephone	
Date	

* Add or delete materials as project requires

WASTE CATEGORY AND MATERIAL TYPE	Units	Total Units	Weight (kg) per unit of measurement	Estimated Weight (Metric Tonnes)	Potential Reuse (Metric Tonnes)	Potential Recycle (Metric Tonnes)	Potential Landfill (Metric Tonnes)	Volume (cubic yards)
Masonry and Pavement								
Asphalt (cu. m.)	cu. m.		2400.00	0.00				
Concrete (walls, floors, stairs)	cu. m.		2400.00	0.00				
Brick, block, etc.	cu. m.		1840.00	0.00				
Stone (foundation)	cu. m.		1473.80	0.00				
Glass masonry	cu. m.			0.00				
Marble	cu. m.		2563.00	0.00				
Granite	cu. m.		2750.00	0.00				
Clay tile	cu. m.			0.00				
Other	cu. m.			0.00				
			TOTAL	0.00	0.00	0.00	0.00	0
Walls and Ceilings								
Drywall (12.5 mm)	sq. m.		9.74	0.00				
Drywall (19 mm)	sq. m.		12.25	0.00				
Cellulose insulation	sq. m.		6.41	0.00				
Fiberglass insulation	sq. m.		6.41	0.00				
Solid SM insulation	sq. m.		11.54	0.00				
Ceiling tile (19 mm standard)	sq. m.		6.82	0.00				
Glass (5 - 6 mm)	sq. m.			0.00				
Acoustic composite (ceilings, walls)	sq. m.		0.30	0.00				
Other	sq. m.			0.00				
			TOTAL	0.00	0.00	0.00	0.00	0
Metal								
Steel (structural, stairs, fabrications, joists, deck, siding)	weight		600.00	0.00				
Aluminum (structural, siding)			2700.00	0.00				
Light Metal				0.00				
Studs	lm. of wall			0.00				
Ceiling grid	sq. m.		1.41	0.00				
Steel mesh				0.00				
Miscellaneous				0.00				
Other				0.00				
			TOTAL	0.00	0.00	0.00	0.00	0
Mechanical								
HVAC								
Solid ducts	weight		26238.00	0.00				
Flex ducts	weight		5180.00	0.00				
Metal diffuser (600 X600)	each			0.00				
Light diffuser (boot only)	each			0.00				
Plastic grilles (600 X 600)	each			0.00				
VAV boxes	weight			0.00				
Heat coils	weight			0.00				
A/C units	weight		90.00	0.00				
			TOTAL	0.00	0.00	0.00	0.00	0
Plumbing								
Copper piping (12.5 to 19mm)	lin. m.		1833.30	0.00				
Steel piping (38 to 50mm)	lin. m.		220.00	0.00				
Plastic piping (38 to 50mm)	lin. m.			0.00				
			TOTAL	0.00	0.00	0.00	0.00	0
Fixtures								
Sinks (ceramic/porcelain)	each		10.00	0.00				
Sinks (metal)	each		10.00	0.00				
Faucets	each			0.00				
Water Closet	each		46.00	0.00				
Urinals (wall hung)	each		29.00	0.00				
			TOTAL	0.00	0.00	0.00	0.00	0
Other								
			TOTAL	0.00	0.00	0.00	0.00	0
Windows and Doors								
Doors								
Wood (solid or hollow core)	each		20.00	0.00				
Metal (hollow metal)	each		30.00	0.00				
Garage	each		135.00	0.00				
Frame (wood)	each		23.33	0.00				
Frame (metal)	each		2.33	0.00				
Windows								
Wood frame	each		216.36	0.00				
Plastic frame	each		125.10	0.00				
Aluminum frame	each		216.67	0.00				
Door Hardware								
Locksets	each		2.50	0.00				
Hinges, plates, stops, etc.	each		2.50	0.00				
Other (closers, operators, etc.)	each		2.50	0.00				
Other				0.00				
			TOTAL	0.00	0.00	0.00	0.00	0
Wood								
Rough (crating, timber, etc.)	weight			0.00				
Dimension (3 m studs)	each		2.83	0.00				
Plywood (17mm)	sq. m.		0.08	0.00				
Hardwood (floor)	sq. m.		0.02	0.00				
Other				0.00				
			TOTAL	0.00	0.00	0.00	0.00	0
Millwork and Finish Carpentry								
Baseboards and casing (60 mm ht.)	each			0.00				
Lower cabinets (c/w doors)	each		44.10	0.00				
Upper cabinets (c/w doors)	each			0.00				
Counters (9' sections)	each		45.65	0.00				
Other				0.00				
			TOTAL	0.00	0.00	0.00	0.00	0
Flooring								
Carpet (roll)	sq. m.		2.44	0.00				
Carpet tile	sq. m.		2.98	0.00				
Sheet vinyl and linoleum	sq. m.		2.98	0.00				
Rubber cove or carpet base	lin. m.		0.52	0.00				
Terrazzo - 25 mm	sq. m.		0.02	0.00				
Ceramic Tiles	sq. m.		0.21	0.00				
Other				0.00				
			TOTAL	0.00	0.00	0.00	0.00	0
Electrical								
Wiring								
Data	weight			0.00				
Electrical (aluminum, copper, iron, etc)	weight			0.00				
Junction and outlet boxes (standard)	each		3800.00	0.00				
Cover plates	each			0.00				
Electrical panels	weight			0.00				
Conduit (25 mm)	lin. m.			0.00				
Conduit (50 mm)	lin. m.			0.00				
			TOTAL	0.00	0.00	0.00	0.00	0
Lighting								

Fluorescent fixture (600 X 1200)	each		0.82	0.00					
Fluorescent fixture (300 X 1200)	each		0.08	0.00					
Ballast	each		4432.00	0.00					
Lamps	each			0.00					
Complete fixture (600 X 1200)	each			0.00					
Complete fixture (300 X 1200)	each			0.00					
Emergency battery lights	each		6.66	0.00					
Exit lights	each		1.00	0.00					
Fire bells/alarms	each			0.00					
Micellaneous (switches, sensors, etc.)	each		600.00	0.00					
			TOTAL	0.00	0.00	0.00	0.00		0
Other									
			TOTAL	0.00	0.00	0.00	0.00		0
Roofing									
Shingles - asphalt	sq. m.		10.72	0.00					
Tin	sq. m.		616.76	0.00					
Copper	sq. m.			0.00					
Waterproof EDPM	sq. m.		796.67	0.00					
Waterproof PVC	sq. m.			0.00					
Tar and gravel	sq. m.		608.85	0.00					
Other	sq. m.			0.00					
			TOTAL	0.00	0.00	0.00	0.00		0
Specialties & Miscellaneous									
Office Furnishings									
Furniture (workstations and chairs)	each								
Shelving	each								
Bulletin and white boards	each								
Building Furnishings									
Window Coverings (rolling shutters, blinds)	each								
Signs	each								
Lockers	each								
Metal partition (toilet)	each								
Plastic partition (toilet)	each								
Stud-type partition (demountable)	each								
Specialized Equipment									
Food service equipment	each								
Parking control equipment	each								
Waste/cleaning equipment	each								
Refrigeration equipment	each								
Lifts	each								
Elevators	each								
Escalators	each								
Dumbwaiters	each								
Communications	each								
Telecom raceways/cables	each								
Terminals and connectors	each								
Other	each								
			TOTAL	0.00	0.00	0.00	0.00		0
Packaging									
Cardboard Packaging	weight		60.00	0.00					
Plastic packaging	weight			0.00					
Other				0.00					
			TOTAL	0.00	0.00	0.00	0.00		0
Other									
				0.00					
				0.00					
				0.00					
				0.00					
			TOTAL	0.00	0.00	0.00	0.00		0
			TOTAL	0.00	0.00	0.00	0.00		0

NRC Construction, Renovation and Demolition PRE-WASTE AUDIT SUMMARY

Project Name	0
Project Type (Construction, Renovation or Demolition)	0
Area (sq. m)	0
Site Address	0
Contact Person & Telephone	0
Date	

WASTE CATEGORY	Waste Audit Summary				
	Estimated Quantity Generated (Metric Tonnes)	Potential Quantity (Metric Tonnes)			Potential Diversion Rate
		Reuse	Recycle	Landfill	
Masonry and Pavement	0.00	0.00	0.00	0.00	#DIV/0!
Walls and Ceilings	0.00	0.00	0.00	0.00	#DIV/0!
Metal	0.00	0.00	0.00	0.00	#DIV/0!
Mechanical:					
HVAC	0.00	0.00	0.00	0.00	#DIV/0!
Plumbing	0.00	0.00	0.00	0.00	#DIV/0!
Fixtures	0.00	0.00	0.00	0.00	#DIV/0!
Other	0.00	0.00	0.00	0.00	#DIV/0!
Windows and Doors	0.00	0.00	0.00	0.00	#DIV/0!
Wood	0.00	0.00	0.00	0.00	#DIV/0!
Millwork and Finish Carpentry	0.00	0.00	0.00	0.00	#DIV/0!
Flooring	0.00	0.00	0.00	0.00	#DIV/0!
Electrical:					
Wiring	0.00	0.00	0.00	0.00	#DIV/0!
Lighting	0.00	0.00	0.00	0.00	#DIV/0!
Other	0.00	0.00	0.00	0.00	#DIV/0!
Roofing	0.00	0.00	0.00	0.00	#DIV/0!
Specialties & Miscellaneous	0.00	0.00	0.00	0.00	#DIV/0!
Packaging	0.00	0.00	0.00	0.00	#DIV/0!
Other	0.00	0.00	0.00	0.00	#DIV/0!
TOTALS	0.00	0.00	0.00	0.00	#DIV/0!

Sample

NRC Construction, Renovation and Demolition WASTE REDUCTION WORK PLAN

Project Name	0
Project Type (Construction, Renovation or Demolition)	0
Area (sq. m)	0
Site Address	0
Contact Person & Telephone	0
Date	

WASTE CATEGORY AND MATERIAL	Estimated Quantity (Metric Tonnes)	Proposed Action to Reduce, Reuse or Recycle Material (including end-destination)	Projected Quantity (Metric Tonnes)		
			Reuse	Recycle	Landfill
Masonry and Pavement					
Asphalt (cu. m.)	0.00				0.00
Concrete (walls, floors, stairs)	0.00				0.00
Brick, block, etc.	0.00				0.00
Stone (foundation)	0.00				0.00
Glass masonry	0.00				0.00
Marble	0.00				0.00
Granite	0.00				0.00
Clay tile	0.00				0.00
Other	0.00				0.00
Walls and Ceilings					
Drywall (12.5 mm)	0.00				0.00
Drywall (19 mm)	0.00				0.00
Cellulose insulation	0.00				0.00
Fiberglass insulation	0.00				0.00
Solid SM insulation	0.00				0.00
Ceiling tile (19 mm standard)	0.00				0.00
Glass (5 - 6 mm)	0.00				0.00
Acoustic composite (ceilings, walls)	0.00				0.00
Other	0.00				0.00
Windows and Doors					
Doors					
Wood (solid or hollow core)	0.00				0.00
Metal (hollow metal)	0.00				0.00
Garage	0.00				0.00
Windows					
Wood frame	0.00				0.00
Plastic frame	0.00				0.00
Aluminum frame	0.00				0.00
Door Hardware					
Locksets	0.00				0.00
Hinges, plates, stops, etc.	0.00				0.00
Other (closers, operators, etc.)	0.00				0.00
Other	0.00				0.00
Wood					
Rough (crating, timber, etc.)	0.00				0.00
Dimension (3 m studs)	0.00				0.00
Plywood (17mm)	0.00				0.00
Hardwood (floor)	0.00				0.00
Other	0.00				0.00
Millwork and Finish Carpentry					
Baseboards and casing (50 mm ht.)	0.00				0.00
Lower cabinets (c/w doors)	0.00				0.00
Upper cabinets (c/w doors)	0.00				0.00
Counters	0.00				0.00
Other	0.00				0.00
Flooring					
Carpet (roll)	0.00				0.00
Carpet tile	0.00				0.00
Sheet vinyl and linoleum	0.00				0.00
Rubber cove or carpet base	0.00				0.00
Terrazzo - 25 mm	0.00				0.00
Ceramic Tiles	0.00				0.00
Other	0.00				0.00
Metal					
Steel (structural, stairs, fabrications, joists, deck, siding)	0.00				0.00
Aluminum (structural, siding)	0.00				0.00
Light Metal					
Studs	0.00				0.00
Ceiling grid	0.00				0.00
Miscellaneous	0.00				0.00
Other	0.00				0.00
Mechanical					
HVAC					
Solid ducts	0.00				0.00
Flex ducts	0.00				0.00
Metal diffuser	0.00				0.00
Light diffuser (boot only)	0.00				0.00
Plastic grilles	0.00				0.00
VAV boxes	0.00				0.00
Heat coils	0.00				0.00
A/C units, fan coil units, exhaust fans	0.00				0.00
Plumbing					
Copper piping (12.5 to 19mm)	0.00				0.00
Steel piping (38 to 50mm)	0.00				0.00
Plastic piping (38 to 50mm)	0.00				0.00
Fixtures					
Sinks (ceramic/porcelain)	0.00				0.00
Sinks (metal)	0.00				0.00
Faucets	0.00				0.00
Water Closet	0.00				0.00
Urinals (wall hung)	0.00				0.00
Other (drinking water fountain, insulation)	0.00				0.00
Electrical					

NRC Construction, Renovation and Demolition WASTE REDUCTION WORK PLAN SUMMARY

Project Name	0
Project Type (Construction, Renovation or Demolition)	0
Area (sq. m)	0
Site Address	0
Contact Person & Telephone	0
Date	

Waste Management Summary								
WASTE CATEGORY	Estimated Quantity (Metric Tonnes)	Proposed Action to Reduce, Reuse or Recycle Material (including end-destination)	Projected Quantity (Metric Tonnes)			Potential Diversion Rate	Start date	End Date
			Reuse	Recycle	Landfill			
Masonry and Pavement	0.00		0.00	0.00	0.00	#DM/0!		
Walls and Ceilings	0.00		0.00	0.00	0.00	#DM/0!		
Windows and Doors	0.00		0.00	0.00	0.00	#DM/0!		
Wood	0.00		0.00	0.00	0.00	#DM/0!		
Millwork and Finish Carpentry	0.00		0.00	0.00	0.00	#DM/0!		
Flooring	0.00		0.00	0.00	0.00	#DM/0!		
Metal	0.00		0.00	0.00	0.00	#DM/0!		
Mechanical:								
HVAC	0.00		0.00	0.00	0.00	#DM/0!		
Plumbing	0.00		0.00	0.00	0.00	#DM/0!		
Fixtures	0.00		0.00	0.00	0.00	#DM/0!		
Other	0.00		0.00	0.00	0.00	#DM/0!		
Electrical:								
Wiring	0.00		0.00	0.00	0.00	#DM/0!		
Lighting	0.00		0.00	0.00	0.00	#DM/0!		
Other	0.00		0.00	0.00	0.00	#DM/0!		
Roofing	0.00		0.00	0.00	0.00	#DM/0!		
Specialties & Miscellaneous	0.00		0.00	0.00	0.00	#DM/0!		
Packaging	0.00		0.00	0.00	0.00	#DM/0!		
Other	0.00		0.00	0.00	0.00	#DM/0!		
TOTAL	0.00		0.00	0.00	0.00	#DM/0!		

Sample

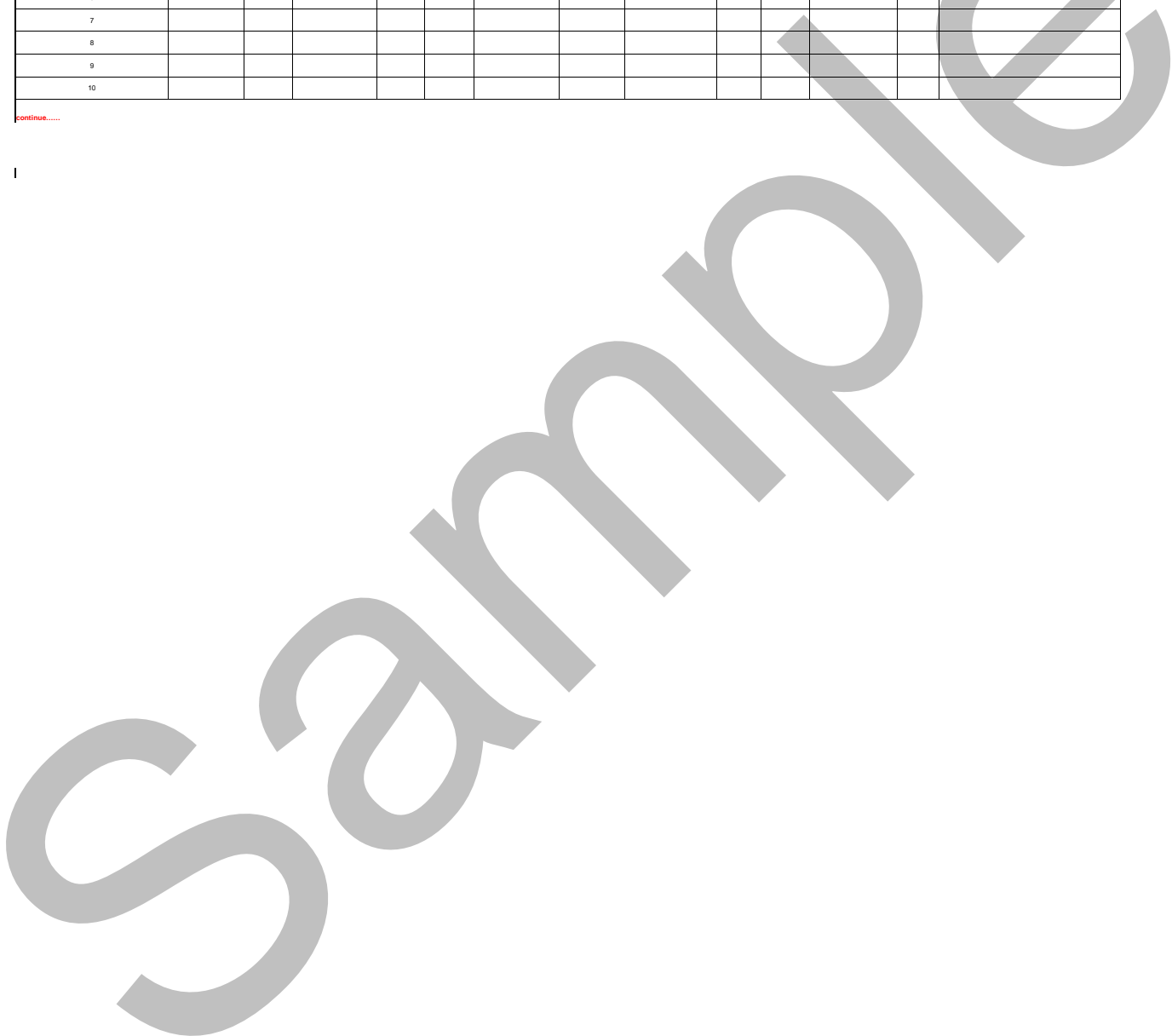
NRC Construction, Renovation and Demolition WASTE MATERIAL TRACKING FORM
 (Entries required for every load leaving the site)

Project Name	
Type (Construction, Renovation or Demolition)	
Area (sq. m)	
Site Address	
Contact Person & Telephone	
Date	

Load #	Date	Time	Hauler	If Applicable:		Material Type(s)	Waybill # (if applicable)	Destination	Weight (metric Tonnes)				Comments
				Bin Size (yd ³)	Fill Level				Reuse	Recycling	Unspecified Diversion (Reuse or Recycling)	Landfill	
1	Dec 17/08	3:00pm	Waste Co.	20	3/4	Commingled Recyclables (metals, wood, concrete)	12345	Waste Co.					Waste sent to commingled recycling facility. Total weight and % diversion to be reported by hauler
2	Dec 17/08	4:00pm	Waste Co.	30	Full	Untreated Wood	12346	Waste Co.					Total weight to be reported by hauler
3	Dec 18/08	12:00pm	Waste Co.	20	Over Flowing	Miscellaneous Waste	12347	Landfill					Total weight to be reported by hauler
4	Dec 19/08	12:00pm	Man and His Truck	N/A	N/A	Doors	N/A	Resale					Totals weight estimated by hauler and PM
5													
6													
7													
8													
9													
10													

continue.....

1



NRC Construction, Renovation and Demolition FINAL DIVERSION REPORT

Project Name	0
Project Type (Construction, Renovation or Demolition)	0
Area (sq. m)	0
Site Address	0
Contact Person & Telephone	0
Date	0

Material	Actual Weight Diverted (metric tonnes)		Final Destination and End-Use of Diverted Materials	Total Weight Landfilled (metric tonnes)	TOTAL WEIGHT (metric tonnes)	Diversion Rate
	Re-used	Recycled				
Masonry and Pavement					0	#DIV/0!
Walls and Ceilings					0	#DIV/0!
Metal					0	#DIV/0!
Mechanical:						
HVAC					0	#DIV/0!
Plumbing					0	#DIV/0!
Fixtures					0	#DIV/0!
Other					0	#DIV/0!
Windows and Doors					0	#DIV/0!
Wood					0	#DIV/0!
Millwork and Finish Carpentry					0	#DIV/0!
Flooring					0	#DIV/0!
Electrical:						
Wiring					0	#DIV/0!
Lighting					0	#DIV/0!
Other					0	#DIV/0!
Roofing					0	#DIV/0!
Specialties & Miscellaneous					0	#DIV/0!
Cardboard					0	#DIV/0!
Other Packaging					0	#DIV/0!
Mixed Recycling					0	#DIV/0!
General Waste					0	#DIV/0!
Other					0	#DIV/0!
TOTAL	0	0		0	0	#DIV/0!

Sample

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.
- .2 Acronyms:
 - .1 AFD - Alternate Forms of Delivery, service provider.
 - .2 BMM - Building Management Manual.
 - .3 Cx - Commissioning.
 - .4 EMCS - Energy Monitoring and Control Systems.
 - .5 O&M - Operation and Maintenance.
 - .6 PI - Product Information.
 - .7 PV - Performance Verification.
 - .8 TAB - Testing, Adjusting and Balancing.

1.2 GENERAL

- .1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
 - .2 Ensure appropriate documentation is compiled into the BMM.
 - .3 Effectively train O&M staff.
- .2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
 - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.
- .4 AFD managed projects the term NRC Representative in Cx specifications to be interpreted as AFD Service Provider.

1.3 COMMISSIONING OVERVIEW

- .1 Section 01 91 31 - Commissioning (Cx) Plan.
- .2 For Cx responsibilities refer to Section 01 91 31 - Commissioning (Cx) Plan.
- .3 Cx to be a line item of Contractor's cost breakdown.
- .4 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .5 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built systems are constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .6 NRC Representative will issue Interim Acceptance Certificate when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by NRC Representative.
 - .2 Equipment, components and systems have been commissioned.
 - .3 O&M training has been completed.

1.4 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

- .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the unfunctional system, including related systems as deemed required by NRC Representative, to ensure effective performance.
- .2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

1.5 PRE-CX REVIEW

- .1 Before Construction:
 - .1 Review contract documents, confirm by writing to NRC Representative.
 - .1 Adequacy of provisions for Cx.
 - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
 - .1 Co-ordinate provision, location and installation of provisions for Cx.
- .3 Before start of Cx:
 - .1 Have completed Cx Plan up-to-date.
 - .2 Ensure installation of related components, equipment, sub-systems, systems is complete.

- .3 Fully understand Cx requirements and procedures.
 - .4 Have Cx documentation shelf-ready.
 - .5 Understand completely design criteria and intent and special features.
 - .6 Submit complete start-up documentation to NRC Representative.
 - .7 Have Cx schedules up-to-date.
 - .8 Ensure systems have been cleaned thoroughly.
 - .9 Complete TAB procedures on systems, submit TAB reports to NRC Representative for review and approval.
 - .10 Ensure "As-Built" system schematics are available.
- .4 Inform NRC Representative in writing of discrepancies and deficiencies on finished works.

1.6 CONFLICTS

- .1 Report conflicts between requirements of this section and other sections to NRC Representative before start-up and obtain clarification.
- .2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.7 SUBMITTALS

- .1 Submittals: in accordance with Section 00 10 00 – General Instructions.
 - .1 Request in writing to NRC Representative for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.
 - .2 Submit proposed Cx procedures to NRC Representative where not specified and obtain written approval at least 8 weeks prior to start of Cx.
 - .3 Provide additional documentation relating to Cx process required by NRC Representative.

1.8 COMMISSIONING DOCUMENTATION

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms for requirements and instructions for use.
- .2 NRC Representative to provide Cx documentation.
- .3 Provide completed and approved Cx documentation to NRC Representative.

1.9 COMMISSIONING SCHEDULE

- .1 Provide detailed Cx schedule as part of construction schedule.
- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 - .1 Approval of Cx reports.
 - .2 Verification of reported results.

- .3 Repairs, retesting, re-commissioning, re-verification.
- .4 Training.

1.10 COMMISSIONING MEETINGS

- .1 Convene Cx meetings following project meetings and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .4 At 60% construction completion stage. NRC Representative to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
 - .1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
 - .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
- .5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.

1.11 STARTING AND TESTING

- .1 Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.

1.12 WITNESSING OF STARTING AND TESTING

- .1 Provide 3 days notice prior to commencement.
- .2 NRC Representative to witness of start-up and testing.
- .3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.13 MANUFACTURER'S INVOLVEMENT

- .1 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with NRC Representative.
 - .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
 - .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.
- .2 Integrity of warranties:
 - .1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.
 - .2 Verify with manufacturer that testing as specified will not void warranties.

- .3 Qualifications of manufacturer's personnel:
 - .1 Experienced in design, installation and operation of equipment and systems.
 - .2 Ability to interpret test results accurately.
 - .3 To report results in clear, concise, logical manner.

1.14 PROCEDURES

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Conduct start-up and testing in following distinct phases:
 - .1 Included in delivery and installation:
 - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
 - .2 Visual inspection of quality of installation.
 - .2 Start-up: follow accepted start-up procedures.
 - .3 Operational testing: document equipment performance.
 - .4 System PV: include repetition of tests after correcting deficiencies.
 - .5 Post-substantial performance verification: to include fine-tuning.
- .3 Correct deficiencies and obtain approval from NRC Representative after distinct phases have been completed and before commencing next phase.
- .4 Document require tests on approved PV forms.
- .5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by NRC Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
 - .1 Minor equipment/systems: implement corrective measures approved by NRC Representative.
 - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by NRC Representative.
 - .3 If evaluation report concludes that major damage has occurred, NRC Representative shall reject equipment.
 - .1 Rejected equipment to be remove from site and replace with new.
 - .2 Subject new equipment/systems to specified start-up procedures.

1.15 START-UP DOCUMENTATION

- .1 Assemble start-up documentation and submit to NRC Representative for approval before commencement of commissioning.
- .2 Start-up documentation to include:
 - .1 Factory and on-site test certificates for specified equipment.
 - .2 Pre-start-up inspection reports.
 - .3 Signed installation/start-up check lists.

- .4 Start-up reports,
- .5 Step-by-step description of complete start-up procedures, to permit NRC Representative to repeat start-up at any time.

1.16 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

- .1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.
- .2 With assistance of manufacturer develop written maintenance program and submit [Departmental Representative] [Engineer] [Consultant] [____] for approval before implementation.
- .3 Operate and maintain systems for length of time required for commissioning to be completed.
- .4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

1.17 TEST RESULTS

- .1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.
- .2 Provide manpower and materials, assume costs for re-commissioning.

1.18 START OF COMMISSIONING

- .1 Notify NRC Representative at least 3 days prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.19 INSTRUMENTS / EQUIPMENT

- .1 Submit to NRC Representative for review and approval:
 - .1 Complete list of instruments proposed to be used.
 - .2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.
- .2 Provide the following equipment as required:
 - .1 Equipment as required to complete work.

1.20 COMMISSIONING PERFORMANCE VERIFICATION

- .1 Carry out Cx:
 - .1 Under accepted simulated operating conditions, over entire operating range, in all modes.
 - .2 On independent systems and interacting systems.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.

- .3 Follow equipment manufacturer's operating instructions.
- .4 EMCS trending to be available as supporting documentation for performance verification.

1.21 WITNESSING COMMISSIONING

- .1 NRC Representative to witness activities and verify results.

1.22 AUTHORITIES HAVING JURISDICTION

- .1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.
- .2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.
- .3 Provide copies to NRC Representative within 5 days of test and with Cx report.

1.23 COMMISSIONING CONSTRAINTS

- .1 None expected.

1.24 EXTRAPOLATION OF RESULTS

- .1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by [Departmental Representative] [Engineer] [Consultant] [___] in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

1.25 EXTENT OF VERIFICATION

- .1 Elsewhere:
 - .1 Provide manpower and instrumentation to verify 30 % of reported results, unless specified otherwise in other sections.
 - .2 Number and location to be at discretion of NRC Representative.
 - .3 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.
 - .4 Review and repeat commissioning of systems if inconsistencies found in more than 20 % of reported results. Repeat verifications shall be performed in accordance to the following unless otherwise specified.
 - .1 Elsewhere:
 - .1 Second verification:
 - .1 Provide manpower and instrumentation to verify 100 % of all failed tests results.

- .2 Provide manpower and instrumentation to verify an additional 20% of reported results, locations to be at the discretion of the NRC Representative.
- .2 Third and subsequent verifications:
 - .1 Provide manpower and instrumentation to verify 100 % of reported results.
- .5 Perform additional commissioning until results are acceptable to NRC Representative.

1.26 REPEAT VERIFICATIONS

- .1 Assume costs incurred by NRC Representative for third and subsequent verifications where:
 - .1 Verification of reported results fail to receive NRC Representative's approval.
 - .2 Repetition of second verification again fails to receive approval.
 - .3 NRC Representative deems Contractor's request for second verification was premature.

1.27 SUNDRY CHECKS AND ADJUSTMENTS

- .1 Make adjustments and changes which become apparent as Cx proceeds.
- .2 Perform static and operational checks as applicable and as required.

1.28 DEFICIENCIES, FAULTS, DEFECTS

- .1 Correct deficiencies found during start-up and Cx to satisfaction of NRC Representative.
- .2 Report problems, faults or defects affecting Cx to NRC Representative in writing. Stop Cx until problems are rectified. Proceed with written approval from NRC Representative.

1.29 COMPLETION OF COMMISSIONING

- .1 Upon completion of Cx leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
- .3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by NRC Representative.

1.30 ACTIVITIES UPON COMPLETION OF COMMISSIONING

- .1 When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.

1.31 TRAINING

- .1 In accordance with Section 01 91 41 - Commissioning (Cx) - Training.

1.32 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

- .1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

1.33 OCCUPANCY

- .1 Cooperate fully with NRC Representative during stages of acceptance and occupancy of facility.

1.34 INSTALLED INSTRUMENTATION

- .1 Use instruments installed under Contract for TAB and PV if:
 - .1 Accuracy complies with these specifications.
 - .2 Calibration certificates have been deposited with NRC Representative.
- .2 Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

1.35 PERFORMANCE VERIFICATION TOLERANCES

- .1 Application tolerances:
 - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10% of specified values.
- .2 Instrument accuracy tolerances:
 - .1 To be of higher order of magnitude than equipment or system being tested.
- .3 Measurement tolerances during verification:
 - .1 Unless otherwise specified actual values to be within +/- 5 % of recorded values.

1.36 OWNER'S PERFORMANCE TESTING

- .1 Performance testing of equipment or system by NRC Representative will not relieve Contractor from compliance with specified start-up and testing procedures.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Description of overall structure of Cx Plan and roles and responsibilities of Cx team.
- .2 Related Sections:
 - .1 Section 00 10 00 – General Instructions.
 - .2 Section 00 15 45 – General Safety Section and Fire Instructions.

1.2 REFERENCES

- .1 American Water Works Association (AWWA)
- .2 National Fire Protection Association (NFPA)
 - .1 NFPA-13, Installation of Sprinkler Systems Handbook.
 - .2 NFPA-14, Automatic Sprinkler Systems Handbook.
 - .3 NFPA-20, Standard for the Installation of Stationary Fire Pumps for Fire Protection.
- .3 Public Works and Government Services Canada (PWGSC)
 - .1 PWGSC - Commissioning Guidelines CP.4 -3rd edition-[03].
- .4 Underwriters' Laboratories of Canada (ULC)

1.3 GENERAL

- .1 Provide a fully functional lab area:
 - .1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
 - .2 O&M personnel have been fully trained in aspects of installed systems.
 - .3 Optimized life cycle costs.
 - .4 Complete documentation relating to installed equipment and systems.
- .2 Term "Cx" in this section means "Commissioning".
- .3 Use this Cx Plan as master planning document for Cx:
 - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
 - .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
 - .3 Sets out deliverables relating to O&M, process and administration of Cx.
 - .4 Describes process of verification of how built works meet user requirements.

- .5 Produces a complete functional system prior to issuance of Certificate of Occupancy.
- .6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
 - .1 Overview of Cx.
 - .2 General description of elements that make up Cx Plan.
 - .3 Process and methodology for successful Cx.
- .4 Acronyms:
 - .1 Cx - Commissioning.
 - .2 BMM - Building Management Manual.
 - .3 EMCS - Energy Monitoring and Control Systems.
 - .4 MSDS - Material Safety Data Sheets.
 - .5 PI - Product Information.
 - .6 PV - Performance Verification.
 - .7 TAB - Testing, Adjusting and Balancing.
 - .8 WHMIS - Workplace Hazardous Materials Information System.
- .5 Commissioning terms used in this Section:
 - .1 Bumping: short term start-up to prove ability to start and prove correct rotation.
 - .2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

1.4 DEVELOPMENT OF 100% CX PLAN

- .1 Cx Plan to be 95% completed before added into Project Specifications.
- .2 Cx Plan to be 100% completed within 2 weeks of award of contract to take into account:
 - .1 Approved shop drawings and product data.
 - .2 Approved changes to contract.
 - .3 Contractor's project schedule.
 - .4 Cx schedule.
 - .5 Contractor's, sub-contractor's, suppliers' requirements.
 - .6 Project construction team's and Cx team's requirements.
- .3 Submit completed Cx Plan to NRC Representative and obtain written approval.

1.5 REFINEMENT OF CX PLAN

- .1 During construction phase, revise, refine and update Cx Plan to include:
 - .1 Changes resulting from Client program modifications.
 - .2 Approved design and construction changes.
- .2 Revise, refine and update every week during construction phase. At each revision, indicate revision number and date.

- .3 Submit each revised Cx Plan to NRC Representative for review and obtain written approval.
- .4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

1.6 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM

- .1 NRC Representative to maintain overall responsibility for project and is sole point of contact between members of commissioning team.
- .2 Project Manager will select Cx Team consisting of following members:
 - .1 PWGSC Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
 - .2 PWGSC Quality Assurance Commissioning Manager: ensures Cx activities are carried out to ensure delivery of a fully operational project including:
 - .1 Review of Cx documentation from operational perspective.
 - .2 Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.
 - .3 Protection of health, safety and comfort of occupants and O&M personnel.
 - .4 Monitoring of Cx activities, training, development of Cx documentation.
 - .5 Work closely with members of Cx Team.
 - .3 NRC Representative is responsible for:
 - .1 Organizing Cx.
 - .2 Monitoring operations Cx activities.
 - .3 Witnessing, certifying accuracy of reported results.
 - .4 Witnessing and certifying TAB and other tests.
 - .5 Developing BMM.
 - .6 Ensuring implementation of final Cx Plan.
 - .7 Performing verification of performance of installed systems and equipment.
 - .8 Implementation of Training Plan.
 - .4 Construction Team: contractor, sub-contractors, suppliers and support disciplines, is responsible for construction/installation in accordance with contract documents, including:
 - .1 Testing.
 - .2 TAB.
 - .3 Performance of Cx activities.
 - .4 Delivery of training and Cx documentation.
 - .5 Assigning one person as point of contact with Consultant and PWGSC Cx Manager for administrative and coordination purposes.
 - .5 Contractor's Cx agent implements specified Cx activities including:
 - .1 Demonstrations.
 - .2 Training.

- .3 Testing.
- .4 Preparation, submission of test reports.
- .6 Property Manager: represents lead role in Operation Phase and onwards and is responsible for:
 - .1 Receiving facility.
 - .2 Day-To-Day operation and maintenance of facility.

1.7 CX PARTICIPANTS

- .1 Employ the following Cx participants to verify performance of equipment and systems:
 - .1 Installation contractor/subcontractor:
 - .1 Equipment and systems except as noted.
 - .2 Equipment manufacturer: equipment specified to be installed and started by manufacturer.
 - .1 To include performance verification.
 - .3 Specialist subcontractor: equipment and systems supplied and installed by specialist subcontractor.
 - .4 Ensure that Cx participant:
 - .1 Could complete work within scheduled time frame.
 - .2 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O&M personnel, including:
 - .1 Modify ventilation rates to meet changes in off-gassing.
 - .2 Changes to heating or cooling loads beyond scope of EMCS.
 - .3 Changes to EMCS control strategies beyond level of training provided to O&M personnel.
 - .4 Redistribution of electrical services.
 - .5 Modifications of fire alarm systems.
 - .6 Modifications to voice communications systems.
 - .5 Provide names of participants to NRC Representative and details of instruments and procedures to be followed for Cx 2 weeks prior to starting date of Cx for review and approval.

1.8 EXTENT OF CX

- .1 Commission mechanical systems and associated equipment:
 - .1 HVAC and exhaust systems:
 - .1 HVAC systems.
 - .2 General exhaust systems.
 - .2 Noise and vibration control systems for mechanical systems.
 - .3 Seismic restraint and control measures.
- .2 Commission electrical systems and equipment:

- .1 High voltage:
 - .1 High voltage switch gear and transformation equipment.
 - .2 High voltage distribution systems.
 - .3 [____].
- .2 Low voltage below 750 V:
 - .1 Low voltage equipment.
 - .2 Low voltage distribution systems.
 - .3 Central clock systems.
 - .4 Voice communications systems.
 - .5 Audio/visual systems to following areas:
 - .1 [____].
 - .6 Electronic data and communications information systems.
 - .7 Simultaneous translation systems.
 - .8 MP's call systems.
 - .9 Messenger call systems.
 - .10 Division bells systems.
 - .11 [____].
- .3 Emergency power generation systems:
 - .1 Generators.
 - .2 Fuel systems.
 - .3 Transfer switchgear and controllers.
 - .4 Uninterruptible power systems.
 - .5 [____].
- .4 Lighting systems:
 - .1 Lighting equipment.
 - .2 Distribution systems.
 - .3 Emergency lighting systems, including battery packs.
 - .4 Fire exit emergency signage.
 - .5 [____].
- .5 Fire alarm systems, equipment:
 - .1 Annunciators.
 - .2 Control panels.
 - .3 Fire alarm battery banks.
 - .4 [____].
- .6 Other systems and equipment:
 - .1 Intrusion and access security and safety systems as follows:
 - .1 [____].
 - .2 Lightning protection systems.
 - .3 Watchman's tour system.
 - .4 [____].

1.9 DELIVERABLES RELATING TO O&M PERSPECTIVES

- .1 General requirements:
 - .1 Compile English and French documentation.
 - .2 Documentation to be computer-compatible format ready for inputting for data management.
- .2 Provide deliverables:
 - .1 Warranties.
 - .2 Project record documentation.
 - .3 Inventory of spare parts, special tools and maintenance materials.
 - .4 Maintenance Management System (MMS) identification system used.
 - .5 WHMIS information.
 - .6 MSDS data sheets.
 - .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

1.10 DELIVERABLES RELATING TO THE CX PROCESS

- .1 General:
 - .1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.
- .2 Definitions:
 - .1 Cx as used in this section includes:
 - .1 Cx of components, equipment, systems, subsystems, and integrated systems.
 - .2 Factory inspections and performance verification tests.
- .3 Deliverables: provide:
 - .1 Cx Specifications.
 - .2 Startup, pre-Cx activities and documentation for systems, and equipment.
 - .3 Completed installation checklists (ICL).
 - .4 Completed product information (PI) report forms.
 - .5 Completed performance verification (PV) report forms.
 - .6 Results of Performance Verification Tests and Inspections.
 - .7 Description of Cx activities and documentation.
 - .8 Cx Reports.
 - .9 Prescribed activities during warranty period.
- .4 NRC Representative to witness and certify tests and reports of results provided.

1.11 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Items listed in this Cx Plan include the following:

- .1 Pre-Start-Up inspections: by [Departmental Representative] [Engineer][Consultant] [___] prior to permission to start up and rectification of deficiencies to [Departmental Representative's] [Engineer's] [Consultant's] [___] satisfaction.
 - .2 [Departmental Representative] [Engineer] [Consultant] [___] to use approved check lists.
 - .3 [Departmental Representative] [Engineer] [Consultant] [___] will monitor[some] [all] of these pre-start-up inspections.
 - .4 Include completed documentation with Cx report.
 - .5 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and certified by [Departmental Representative] [Engineer] [Consultant] [___] and does not form part of Cx specifications.
 - .6 [Departmental Representative] [Engineer] [Consultant] [___] will monitor[some] [___] of these inspections and tests.
 - .7 Include completed documentation in Cx report.
- .2 Pre-Cx activities - MECHANICAL:
- .1 HVAC equipment and systems:
 - .1 "Bump" each item of equipment in its "stand-alone" mode.
 - .2 At this time, complete pre-start-up checks and complete relevant documentation.
 - .3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
 - .4 Perform TAB on systems. TAB reports to be approved by NRC Representative.
 - .2 EMCS:
 - .1 EMCS trending to be available as supporting documentation for performance verification.
 - .2 Perform point-by-point testing in parallel with start-up.
 - .3 Carry out point-by-point verification.
- .3 Pre-Cx activities - ELECTRICAL:
- .1 High voltage distribution systems over 750 V:
 - .1 [___].
 - .2 Low voltage distribution systems under 750 V:
 - .1 Requires independent testing agency to perform pre- energization and post-energization tests.
 - .2 [___].
 - .3 Emergency power generation systems
 - .1 Transfer switches: test by simulating loss of power. Verify availability of power at equipment requiring same.
 - .1 [___].
 - .2 Uninterruptible power systems: test under full and partial load conditions.
 - .1 [___].

- .4 Lighting systems: [____].
 - .1 Emergency lighting systems:
 - .1 Tests to include verification of lighting levels and coverage, initially by disrupting normal power.
 - .5 Fire alarm systems: test after other safety and security systems are completed. Testing to include a complete verification in accordance with ULC requirements.[Departmental Representative] [Engineer] [Consultant] [____] has witnessed and certified report, demonstrate devices and zones to [Departmental Representative][Engineer] [Consultant] [____].
 - .6 Low voltage systems: these include:
 - .1 Clock, communications, low voltage lighting control systems and data communications systems.
 - .2 Special systems such as Simultaneous Translation systems, MPs Call systems, Messenger Call systems, Division Bell systems, [____].
 - .7 Lightning protection systems.

1.12 START-UP

- .1 Start up components, equipment and systems.
- .2 NRC Representative to monitor some of these start-up activities.
 - .1 Rectify start-up deficiencies to satisfaction of NRC Representative.
- .3 Performance Verification (PV):
 - .1 Use procedures modified generic procedures to suit project requirements.
 - .2 NRC Representative to witness and certify reported results using approved PI and PV forms.
 - .3 [Departmental Representative] [Engineer] [Consultant] [____] to approve completed PV reports and provide to [Departmental Representative] [Engineer][Consultant] [____].
 - .4 NRC Representative reserves right to verify up to 30% of reported results at random.
 - .5 Failure of randomly selected item shall result in rejection of PV report or report of system start-up and testing.

1.13 CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 NRC Representative to monitor Cx activities.
- .2 Upon satisfactory completion, Cx agency performing tests to prepare Cx Report using approved PV forms.
- .3 NRC Representative to witness, certify reported results of, Cx activities.
- .4 NRC Representative reserves right to verify a percentage of reported results at no cost to contract.

1.14 CX OF INTEGRATED SYSTEMS AND RELATED DOCUMENTATION

- .1 Tests to be witnessed by NRC Representative and documented on approved report forms.
- .2 NRC Representative reserves right to verify percentage of reported results.
- .3 Integrated systems to include:
 - .1 HVAC and associated systems forming part of integrated HVAC systems.
 - .2 Environmental space conditions.
 - .3 Fire alarm systems: [___].
 - .4 Voice communications systems: [___].
 - .5 Emergency power generator: [___].
 - .6 Transfer switch and controllers: [___].
 - .7 Emergency lighting systems: [___].
 - .8 [___].
- .4 Identification:
 - .1 As per specifications.

1.15 INSTALLATION CHECK LISTS (ICL)

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.16 PRODUCT INFORMATION (PI) REPORT FORMS

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.17 PERFORMANCE VERIFICATION (PV) REPORT

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.18 CX SCHEDULES

- .1 Prepare detailed Cx Schedule and submit to NRC Representative for review and approval same time as project Construction Schedule. Include:
 - .1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:
 - .1 Design criteria, design intents.
 - .2 Implementation of training plans.
 - .3 Cx reports: immediately upon successful completion of Cx.
- .2 After approval, incorporate Cx Schedule into Construction Schedule.
- .3 Consultant, Contractor, Contractor's Cx agent, and NRC Representative will monitor progress of Cx against this schedule.

1.19 CX REPORTS

- .1 Submit reports of tests, witnessed and certified to NRC Representative who will verify reported results.
- .2 Include completed and certified PV reports in properly formatted Cx Reports.
- .3 Before reports are accepted, reported results to be subject to verification by NRC Representative.

1.20 ACTIVITIES DURING WARRANTY PERIOD

- .1 Cx activities must be completed before issuance of Interim Certificate, it is anticipated that certain Cx activities may be necessary during Warranty Period, including:
 - .1 Fine tuning of HVAC systems.
 - .2 Adjustment of ventilation rates to promote good indoor air quality and reduce deleterious effects of VOCs generated by off-gassing from construction materials and furnishings.

1.21 TRAINING PLANS

- .1 Refer to Section 01 91 41 - Commissioning (Cx) - Training.

1.22 FINAL SETTINGS

- .1 Upon completion of Cx to satisfaction of NRC Representative lock control devices in their final positions, indelibly mark settings marked and include in Cx Reports.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Commissioning forms to be completed for equipment, system and integrated system.
- .2 Related Sections:
 - .1 Section 00 10 00 – General Instructions.
 - .2 Section 00 15 45 – General Safety Section and Fire Instructions

1.2 INSTALLATION/START-UP CHECK LISTS

- .1 Include the following data:
 - .1 Product manufacturer's installation instructions and recommended checks.
 - .2 Special procedures as specified in relevant technical sections.
 - .3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.
- .2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by NRC Representative supplemental additional data lists will be required for specific project conditions.
- .3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.
- .4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to NRC Representative. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.
- .5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.3 PRODUCT INFORMATION (PI) REPORT FORMS

- .1 Product Information (PI) forms compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the BMM at completion of work.
- .2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain NRC Representative approval.

1.4 PERFORMANCE VERIFICATION (PV) FORMS

- .1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.
- .2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.
- .3 Prior to PV of integrated system, complete PV forms of related systems and obtain NRC Representative's approval.

1.5 SAMPLES OF COMMISSIONING FORMS

- .1 NRC Representative will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.
- .2 Revise items on Commissioning forms to suit project requirements.
- .3 Samples of Commissioning forms and a complete index of produced to date will be attached to this section.

1.6 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS

- .1 When additional forms are required, but are not available from NRC Representative develop appropriate verification forms and submit to NRC Representative for approval prior to use.
 - .1 Additional commissioning forms to be in same format as provided by NRC Representative.

1.7 COMMISSIONING FORMS

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Strategy for Use:
 - .1 NRC Representative provides Contractor project-specific Commissioning forms with Specification data included.
 - .2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
 - .3 Confirm operation as per design criteria and intent.
 - .4 Identify variances between design and operation and reasons for variances.
 - .5 Verify operation in specified normal and emergency modes and under specified load conditions.
 - .6 Record analytical and substantiating data.
 - .7 Verify reported results.
 - .8 Form to bear signatures of recording technician and reviewed and signed off by NRC Representative.
 - .9 Submit immediately after tests are performed.

- .10 Reported results in true measured SI unit values.
- .11 Provide NRC Representative with originals of completed forms.
- .12 Maintain copy on site during start-up, testing and commissioning period.

1.8 LANGUAGE

- .1 To suit the language profile of the awarded contract.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 This Section specifies roles and responsibilities of Commissioning Training.
- .2 Related Sections:
 - .1 Section 00 10 00 – General Instructions.
 - .2 Section 00 15 45 – General Safety Instructions and Fire Instructions.

1.2 TRAINEES

- .1 Trainees: personnel selected for operating and maintaining this facility. Includes building operators, maintenance staff, security staff, and technical specialists as required.
- .2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

1.3 INSTRUCTORS

- .1 NRC Representative will provide:
 - .1 Descriptions of systems.
 - .2 Instruction on design philosophy, design criteria, and design intent.
- .2 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:
 - .1 Start-Up, operation, shut-down of equipment, components and systems.
 - .2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
 - .3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.
- .3 Contractor and equipment manufacturer to provide instruction on:
 - .1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

1.4 TRAINING OBJECTIVES

- .1 Training to be detailed and duration to ensure:
 - .1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.
 - .2 Effective on-going inspection, measurements of system performance.
 - .3 Proper preventive maintenance, diagnosis and trouble-shooting.
 - .4 Ability to update documentation.
 - .5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

1.5 TRAINING MATERIALS

- .1 Instructors to be responsible for content and quality.
- .2 Training materials to include:
 - .1 "As-Built" Contract Documents.
 - .2 Operating Manual.
 - .3 Maintenance Manual.
 - .4 Management Manual.
 - .5 TAB and PV Reports.
- .3 Project Manager, Commissioning Manager and [Facility] [Property] Manager will review training manuals.
- .4 Training materials to be in a format that permits future training procedures to same degree of detail.
- .5 Supplement training materials:
 - .1 Transparencies for overhead projectors.
 - .2 Multimedia presentations.
 - .3 Manufacturer's training videos.
 - .4 Equipment models.

1.6 SCHEDULING

- .1 Include in Commissioning Schedule time for training.
- .2 Training to be completed prior to acceptance of facility.

1.7 RESPONSIBILITIES

- .1 Be responsible for:
 - .1 Implementation of training activities,
 - .2 Coordination among instructors,
 - .3 Quality of training, training materials,
- .2 NRC Representative will evaluate training and materials.
- .3 Upon completion of training, provide written report, signed by Instructors, witnessed by NRC Representative.

1.8 TRAINING CONTENT

- .1 Training to include demonstrations by Instructors using the installed equipment and systems.
- .2 Content includes:
 - .1 Review of facility and occupancy profile.
 - .2 Functional requirements.

- .3 System philosophy, limitations of systems and emergency procedures.
 - .4 Review of system layout, equipment, components and controls.
 - .5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
 - .6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.
 - .7 Maintenance and servicing.
 - .8 Trouble-shooting diagnosis.
 - .9 Inter-Action among systems during integrated operation.
 - .10 Review of O&M documentation.
- .3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes the following:
 - .1 Demolition and removal of selected portions of interior building components and finishes.
 - .2 Repair procedures for selective demolition operations.
- .2 This section does not include the following:
 - .1 Removal of hazardous materials or asbestos abatement.
 - .2 Demolition of exterior building components or structural elements.
 - .3 Mechanical or electrical equipment, except as required to make minor modifications to allow the work to be completed.
- .3 Drawings contain details that suggest directions for solving some of the major demolition and removal requirements for this project; Contractor is required to develop these details further.

1.2 RELATED REQUIREMENTS

- .1 Section 22 05 05 - Selective Demolition for Plumbing
- .2 Section 23 05 05 - Selective Demolition for Heating, Ventilating, and Air Conditioning (HVAC)
- .3 Section 26 05 05 - Selective Demolition for Electrical

1.3 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI A10.8 2011, Safety Requirements for Scaffolding
- .2 ASTM International (ASTM)
 - .1 ASTM C475/C475M-15, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board

1.4 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.
- .2 Remove and Salvage: Detach items from existing construction and deliver them to Departmental Representative ready for reuse.
- .3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.

- .5 Waste Management Coordinator (WMC): Contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
- .6 Draft Construction Waste Management Plan (Draft CWM Plan): Detailed inventory of materials in building indicating estimated quantities of reuse, recycling and landfill, prepared in accordance with Section 01 74 19 - Waste Management and Disposal and as follows:
 - .1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.
- .7 Construction Waste Management Plan (CWM Plan): Written plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Waste Management and Disposal.
- .8 Construction Waste Management Report (CWM Report): Written report identifying actual materials that formed CWM Plan for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Waste Management and Disposal.
- .9 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate with Departmental Representative for the material ownership as follows:
 - .1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Departmental Representative's property, demolished materials shall become Contractor's property and shall be removed from Project site.
 - .2 Coordinate selective demolition work so that work of this Section adheres to aesthetic criteria established by the Drawings and specified dimensions with all elements in planes as drawn, maintaining their relationships with all other building elements.
 - .3 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Departmental Representative's property:
 - .1 Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Departmental Representative.
 - .2 Coordinate with Departmental Representative, who will establish special procedures for removal and salvage.
- .2 Pre-Demolition Meeting: Convene pre-installation meeting with Contractor and Departmental Representative in accordance with Section 01 10 00 – General Instructions to:
 - .1 Confirm extent of salvaged and demolished materials
 - .2 Review Contractor's demolition plan.
 - .1 Verify existing site conditions adjacent to demolition work.
 - .2 Coordination with other construction sub trades.

- .3 Hold project meetings in accordance with agreement established between Contractor and Departmental Representative during kick-off meeting.
- .4 Ensure key personnel attend.
- .5 WMC must provide written report on status of waste diversion activity at each meeting.
- .6 Departmental Representative will provide written notification of change to meeting schedule established upon contract award.

1.6 ACTION AND INFORMATION SUBMITTALS

- .1 Action Submittals: Provide the following submittals before starting any work of this Section:
 - .1 Schedule of Selective Demolition Activities indicating the following:
 - .1 Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
 - .2 Coordinate with Departmental Representative ongoing site operations, and limit the number of interruptions during regular business hours.
 - .3 Interruption of utility services.
 - .4 Coordination for shutoff, capping, and continuation of utility services.
 - .5 Use of elevator and stairs.
 - .6 Locations of temporary partitions and means of egress, including for others affected by selective demolition operations.
 - .7 Coordination with Departmental Representative's continuing occupancy of portions of existing building.
 - .2 Demolition Plan: Submit a plan of demolition area indicating extent of temporary facilities and supports, methods of removal and demolition prepared by a professional engineer in accordance with requirements of Authority Having Jurisdiction, and as follows:
 - .1 Proposed Dust Control and Noise Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Departmental Representative reserves the right to make modifications where proposed methods interfere with the Departmental Representative's ongoing operation
 - .2 Inventory: Submit a list of items that have been removed and salvaged after selective demolition is complete.
 - .3 Landfill Records: Indicate receipt and acceptance of wastes by a landfill facility.
- .2 Informational Submittals: Provide the following submittals when requested by the Departmental Representative:
 - .1 Qualification Data: Submit information for companies and personnel indicating their capabilities and experience to perform work of this Section including; but not limited to, lists of completed projects with project names and addresses, names and addresses of architects and owners, for work of similar complexity and extent.

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: Perform work as follows; use most restrictive requirements where differences occur between the municipal, provincial and federal jurisdictions:
 - .1 Provincial and Federal Requirements: Perform work in accordance with governing environmental notification requirements and regulations of the Authority Having Jurisdiction.
 - .2 Municipal Requirements: Perform hauling and disposal operations in accordance with regulations of Authority Having Jurisdiction.
- .2 Qualifications: Provide proof of qualifications when requested by Departmental Representative:
 - .1 Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project:
 - .1 Conform to the provincial Occupational Health and Safety Act and Regulation.
 - .2 Conform to Workers' Compensation Board Regulations.
 - .3 Conform to City of local municipal bylaws and regulations governing this type of work.

1.8 SITE CONDITIONS

- .1 Owner will occupy portions of building immediately adjacent to selective demolition area:
 - .1 Conduct selective demolition so that Owner's operations will not be disrupted.
 - .2 Provide not less than 72 hours' notice to Departmental Representative of activities that will affect Owner's operations.
- .2 Maintain access to existing means of egress, walkways, corridors, exits, and other adjacent occupied or used facilities:
 - .1 .1 Do not close or obstruct means of egress, walkways, corridors, exits, or other occupied or used facilities without written acceptance from authorities having jurisdiction.
- .3 Departmental Representative assumes no responsibility for condition of areas to be selectively demolished:
 - .1 Conditions existing at time of Pre Bid Site Review will be maintained by Departmental Representative as far as practical.
- .4 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in the Work; immediately notify Departmental Representative if materials suspected of containing hazardous substances are encountered and perform the following activities:
 - .1 Refer to Regulatory Requirements for directives associated with specific material types.
 - .2 Hazardous materials will be as defined in the Hazardous Materials Act.
 - .3 Hazardous materials removal will be coordinated by Departmental Representative before start of the Work.
 - .4 If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Departmental Representative. Hazardous materials will be removed by Departmental Representative under a separate contract or as a change to the Work.

Part 2 Products

2.1 TEMPORARY SUPPORT STRUCTURES

- .1 Design temporary support structures required for demolition work and underpinning and other foundation supports necessary for the project using a qualified professional engineer registered or licensed in province of the Work.

2.2 DESCRIPTION

- .1 This section of the Work includes, but is not necessarily limited to, the following:
 - .1 Demolition, removal completely from site, and disposal of all identified components, materials, equipment and debris.
 - .2 Selective demolition to allow new walls, bulkheads, ceilings and other materials to meet existing construction as indicated.
 - .3 All material from demolition shall be removed from site immediately with no salvage, selling, sorting or burning permitted on site.
 - .4 Retain items indicated on drawings for re use in new construction.

2.3 DEBRIS

- .1 Make all arrangements for transport and disposal of all demolished materials from the site.

2.4 EQUIPMENT

- .1 Provide all equipment required for safe and proper demolition of the building interiors indicated.

2.5 REPAIR MATERIALS

- .1 Use repair materials identical to existing materials:
 - .1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - .2 Use a material whose installed performance equals or surpasses that of existing material.
 - .3 Comply with material and installation requirements specified in individual Specification Sections.
- .2 Floor Patching and Levelling Compounds: Cement based, trowelable, self-levelling compounds compatible with specified floor finishes; gypsum based products are not acceptable for work of this Section.
- .3 Concrete Unit Masonry: Lightweight concrete masonry units, and mortar, cut and trimmed to fit existing opening to be filled. Provide standard hollow core units, square end units and bond beam units as indicated on drawings.
- .4 Prefinished Sheet Steel: Prefinished sheet steel, colour to match existing radiation cabinets, bent and profiled to match existing radiation cabinets.

- .5 Gypsum Board Patching Compounds: Joint compound to ASTM C475/C475M, bedding and finishing types thinned to provide skim coat consistency to patch and prepare existing gypsum board walls ready for new finishes in accordance with applicable standards.

2.6 EXISTING MATERIALS

- .1 Items to be retained for re use in new construction include, but are not limited to the following:
 - .1 Carpet Tiles.
 - .2 Confirm with Departmental Representative any materials that appear to be in re-usable condition prior to disposal.
 - .3 Confirm with Departmental Representative any materials scheduled for re-use that are not in re-usable condition prior to installation.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify that utilities have been disconnected and capped.
- .2 Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- .3 Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- .4 Notify the Departmental Representative where existing mechanical, electrical, or structural elements conflict with intended function or design:
 - .1 Investigate and measure the nature and extent of conflict and submit a written report to Departmental Representative.
 - .2 Departmental Representative will issue additional instructions or revise drawings as required to correct conflict.
- .5 Perform surveys as the work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

- .1 Coordinate existing services indicated to remain and protect them against damage during selective demolition operations.
- .2 Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
 - .1 Arrange to shut off affected utilities with utility companies.
 - .2 If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
 - .3 Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

- .4 Cut off pipe or conduit to a minimum of 25mm below slab, and remove concrete mound. Patch concrete using cementitious grout.
- .3 Coordinate with Mechanical and Electrical Divisions for shutting off, disconnecting, removing, and sealing or capping utilities.
- .4 Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- .1 Identify and mark all equipment and materials identified to be retained by Departmental Representative or to be re used in subsequent construction. Separate and store items to be retained in an area away from area of demolition and protect from accidental disposal.
- .2 Post warning signs on electrical lines and equipment that must remain energized to serve other areas during period of demolition.
- .3 Confirm that all electrical and telephone service lines entering buildings are not disconnected.
- .4 Do not disrupt active or energized utilities crossing the demolition site.
- .5 Provide and maintain barricades, warning signs, protection for workmen and the public during the full extent of the Work. Read drawings carefully to ascertain extent of protection required.
- .6 Mark all materials required to be re used, store in a safe place until ready for re installation.
- .7 Adjust all junction boxes, receptacles and switch boxes flush with new wall construction where additional layers to existing construction are indicated.
- .8 Remove permanent marker lines used or found on exposed surfaces and at surfaces indicated for subsequent finish materials. Mechanically remove permanent marker lines and associated substrates where permanent marker lines occur and patch surface. Sealing or priming over permanent marker lines is not acceptable.

3.4 CONCRETE SLAB REINFORCING

- .1 Locate location of reinforcing steel in concrete slabs prior to cutting or coring using non-destructive, non-ionizing radio frequency locators.
- .2 Core concrete slabs to avoid reinforcing steel, electrical conduit or water pipes; adjust core location and coordinate with Departmental Representative where slab features interfere with core drilling.
- .3 Notify the Departmental Representative immediately for further instructions where coring or cutting will damage existing slab features.

3.5 SELECTIVE DEMOLITION

- .1 Demolish and dismantle work in a neat and orderly manner and in strict accordance with all regulations.

- .2 At end of each day's work, leave Work in safe condition so that no part is in danger of toppling or falling.
- .3 Demolish in a manner to minimize dusting and to prevent migration of dust.
- .4 Selling or burning of materials on the site is not permitted.
- .5 Remove concrete bases by cutting and chipping, take precautions against slab cracking and degradation. Grind edges smooth, fill and make level with self-levelling grout.
- .6 Fill all openings in concrete block walls with concrete masonry units, coursing to match existing, prepare ready to receive new finishes to match existing.
 - .1 Provide bond beams in new openings cut into existing concrete masonry unit walls.
 - .2 Provide finished end masonry units to patch and repair for new jamb sections in existing concrete masonry unit walls.
- .7 Fill all openings in gypsum board walls with gypsum board and steel framing to match existing, skim coat to make wall smooth and even.
- .8 Demolish existing carpet, resilient flooring and adhesive remnants as follows:
 - .1 Vacuum existing carpet thoroughly, prior to removal, using vacuum equipped with power head/sweeper.
 - .2 Apply fine mist water spray to carpet as required to minimize dust generation during removal. Avoid spraying near electrical outlets.
 - .3 Demolish and salvage existing carpet and resilient floor finishes, remove and dispose of off-site or retain for future re-installation in accordance with Section 01 74 19.13 – Carpet Reclamation.
 - .4 Remove adhesive to the greatest extent possible using scraping tools and as follows:
 - .1 Do not use solvent based cleaners to remove adhesive remnants.
 - .2 Lightly grind floor using machine designed for purpose to remove adhesive remnants.
 - .3 Vacuum floor ready for application of skim coating.
 - .4 Repair all slab depressions and damage with cementitious patching compound.
 - .5 Skim coat floor with minimum 1 mm thick cementitious floor underlayment compatible with new flooring materials.
 - .5 Floor substrate shall be smooth, free from ridges and depressions, and adhesive remnants that could telegraph through resilient flooring materials and carpets.
 - .6 Recycle materials in accordance with Section 01 74 19 - Waste Management and Disposal.
- .9 Demolish completely all ceiling panels and grid as indicated.
- .10 Remove all wall coverings scheduled for demolition. Patch and repair wall surfaces with skim coat of gypsum board joint compound leaving wall surfaces smooth and even ready for new wall finishes.
- .11 Patch and repair all walls, floor and ceilings damaged during demolition with material matching adjacent walls, prepare ready for new finishes.

- .12 Patch and repair all radiation cabinets, mechanical equipment and electrical fixtures damaged or exposed during demolition to match adjacent finished surfaces.

3.6 PATCHING AND REPAIRING

- .1 Floors and Walls:
 - .1 Where walls or partitions that are demolished extend from one finished area into another, patch and repair floor and wall surfaces in the new space.
 - .2 Provide a level and smooth surface having uniform finish colour, texture, and appearance.
 - .3 Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.
 - .4 Patch with durable seams that are as invisible as possible.
 - .5 Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - .6 Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
 - .7 Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
- .2 Ceilings: patch, repair, or re hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.7 PROTECTION

- .1 Prevent debris from blocking drainage inlets and systems and ground draining, and protect material and electrical systems and services that must remain in operation.
- .2 Maintain safe access to and egress from occupied areas adjoining.
- .3 Provide and maintain fire prevention equipment and alarms accessible during demolition.

3.8 CLEANING

- .1 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 19 - Waste Management and Disposal.
- .2 Waste Management: Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal, and as follows:
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- .3 Divert excess materials from landfill.
- .4 Promptly as the Work progresses, and on completion, clean up and remove from the site all rubbish and surplus material. Remove rubbish resulting from demolition work daily.
- .5 Maintain access to exits clean and free of obstruction during removal of debris.

- .6 Keep surrounding and adjoining roads, lanes, sidewalks, municipal rights of way clean and free of dirt, soil or debris that may be a hazard to vehicles or persons.
- .7 Transport material designated for alternate disposal using approved facilities and organizations in accordance with applicable regulations.
- .8 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
 - .1 Disposal facilities must be those approved of and listed in CWM Plan.
 - .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in WM Plan.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for careful removal and salvage, and reconditioning of building components identified for storage at a designated remote site, for storage on site, and subsequent reinstallation forming a part of Project ready for re use at a later date.

1.2 RELATED REQUIREMENTS

- .1 [Section 01 10 00 – General Instructions]
- .2 [Section 01 74 19 – Waste Management and Disposal]
- .3 [Section 02 41 19.16 - Selective Interior Demolition]
- .4 [Section 22 05 05 - Selective Demolition for Plumbing]
- .5 [Section 23 05 05 - Selective Demolition for HVAC]
- .6 [Section 26 05 05 - Selective Demolition for Electrical]

1.3 DEFINITIONS

- .1 Remove and Salvage: Detach items from existing construction and deliver them ready for reuse.
- .2 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination Existing Salvaged Work: Coordinate with Departmental Representative for confirmation of materials, components, and items of equipment identified for removal and salvage from their present existing locations and as follows:
 - .1 Items that are turned over to Departmental Representative.
 - .2 Off-site or on-site storage locations.
 - .3 Confirmation of items that are renovated or refurbished ready for reinstallation as a part of Work.
 - .4 Confirmation of items that Departmental Representative will not re use, but will retain as follows:
 - .1 Contractor is responsible for loading and handling identified salvaged items using their own forces and equipment.

Part 2 Products

2.1 SALVAGED ITEMS

.1 Items salvaged by Contractor include, but are not limited to:

Work	Deliver To
Diversion of miscellaneous office furniture from landfill through re-use/donation or recycling facilities (ie. metal filing cabinets and shelving, office desks and chairs, demountable panel partition systems, window blinds, wood cabinets, etc.)	Off-site applicable re-use or recycling facility
Lighting fixtures for salvage and re-installation	Departmental Representative approved storage location on-site for future re-installation
Diversion of miscellaneous metal mechanical equipment from landfill to appropriate recycling facility (ie. fan coil units, domestic cold water drinking fountains, mechanical piping (sprinkler, plumbing and chilled water), sheet metal ductwork and accessories, etc.)	Off-site applicable recycling facility
Carpet reclamation	Departmental Representative approved storage location on-site for future re-installation
Diversion of miscellaneous metal electrical conduits and wiring from landfill through recycling	Off-site applicable recycling facility
Diversion of architectural elements from landfill through re-use/donation to appropriate recycling facility (ie. ceiling grids, metal blinds, metal studs, doors and associated hardware, glazing, etc.)	Off-site applicable re-use or recycling facility
Diversion of miscellaneous packaging materials and cardboard from landfill through recycling facilities (ie. plastic wrap, cardboard, wood pallets, etc.)	Off-site applicable re-use or recycle facility

.2 Confirm with Departmental Representative additional items that appear salvageable prior to disposal.

Part 3 Execution

3.1 SALVAGE

- .1 Remove and handle salvageable items from site to minimize damage and to ensure that usability is maintained.
- .2 Clean, decontaminate, or remediate hazardous substances (lead based paint, asbestos dust, PCB residue, and similar substances) from salvaged materials so they are safe for reuse or resale.
- .3 Place materials on pallets or wrap in protective film to ensure that loose pieces and projections do not cause injury to personnel, and that salvaged items remain as complete units.

- .4 Clean items of construction or building debris, or materials that are not a part of salvaged work before delivering to Departmental Representative.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

- .1 Remove and dispose off-site, at a licensed asbestos hazardous waste management facility, the following asbestos-containing materials (ACMs) identified as being present in the Room 111 project area within the Building:
 - .1 Drywall in which asbestos-containing drywall joint compound has been applied.
 - .2 Non-friable yellow mastic on walls.
- .2 Comply with requirements of this Section when performing the following Work:
 - .1 Removing non-friable ACM (i.e., mastic), if the material is removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
 - .2 Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable ACM (i.e., mastic) if:
 - .1 the material is wetted to control the spread of dust or fibres; and,
 - .2 the work is done only by means of non-powered hand-held tools.
 - .3 Removing/disturbing less than one square metre of drywall in which asbestos-containing drywall joint compound has been applied.
- .3 See section 1.2 Related Sections available through the National Research Council Canada for further information.

1.2 RELATED SECTIONS

- .1 Report titled “Project-Specific Designated Substances and Hazardous Materials Survey Related to the M-24, Room 111 New Fit-Up Project at the Montreal Road Campus of the National Research Council Canada, in Ottawa, Ontario”, dated 17 January 2024 (WSP project number 22565806 Rev. 1), herein referred to as the “Designated Substances Report”.
- .2 Section 02 82 00.02 Type 2 Asbestos Operations - Intermediate Precautions.
- .3 Section 02 82 00.03 Type 3 Lead Operations - Maximum Precautions.
- .4 Section 02 83 10 Type 1 Lead Operations - Minimum Precautions.

1.3 REFERENCES

- .1 Comply with Federal, Provincial, and local requirements, provided that in any case of conflict among those requirements or with these Specifications the more stringent requirements shall apply. Work shall be performed under regulations and guidelines in effect at the time work is performed. Regulations and guidelines include but are not limited to the following:
 - .1 Canada Labour Code (CLC)
 - .1 *Canada Occupational Health and Safety Regulations* (SOR/86-304).
 - .2 Ministry of Labour, Immigration, Training, and Skills Development (MLITSD)
 - .1 *Occupational Health and Safety Act*, R.S.O. 1990, Chapter O.1 (OHSA).
 - .2 Ontario Regulation 213/91: *Construction Projects*, as amended (O. Reg. 213/91).
 - .3 Ontario Regulation 278/05: *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*, as amended (O. Reg. 278/05).

- .4 Ontario Regulation 490/09: *Designated Substances* (O. Reg. 490/09).
- .5 Ontario Regulation 860/90: *Workplace Hazardous Materials Information System (WHMIS) Regulation*, as amended (O. Reg. 860/90).
- .6 *Lead on Construction Projects*, updated April 2011.
- .7 *Silica on Construction Projects*, updated November 2022.
- .3 Ministry of Environment, Conservation and Parks (MECP)
 - .1 *Environmental Protection Act*, R.S.O. 1990, Chapter E.19, as amended (EPA).
 - .2 Ontario Regulation 347/90: *General – Waste Management*, as amended (O. Reg. 347/90).
- .4 Transport Canada (TC)
 - .1 *Transportation of Dangerous Goods Act*, 1992, as amended (TDGA).
- .5 U.S. Department of Health and Human Services (DHHS)/Centers for Disease Control and Prevention (CDC)/National Institute for Occupational Safety and Health (NIOSH)
 - .1 NIOSH Manual of Analytical Methods (NMAM), 5th ed., DHHS (December 2017).
- .6 Canadian Standards Association
 - .1 CAN/CSA-Z94.4-18 – Selection, Use, and Care of Respirators.
- .7 Public Services and Procurement Canada (PSPC)
 - .1 Public Services and Procurement Canada Asbestos Management Standard, as amended.

1.4 DEFINITIONS

- .1 Airless Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray without the use of compressed air. Must have appropriate capacity for the scope of work.
- .2 Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.
- .3 Approved Supervisor: a person who has charge of a workplace or authority over a worker and has received the appropriate training for that role. A supervisor is ultimately responsible to provide direction to workers on site and must follow the laws of the OHSA.
- .4 Asbestos-Containing Materials (ACMs): materials identified under Existing Conditions (Section 1.8), including fallen materials and settled dust containing 1% or more by dry weight in accordance with the CLC or 0.5% or more by dry weight in accordance with O. Reg. 278/05. For the purposes of this project, the lower limit of 0.5% or more asbestos by dry weight is applied to define a material as an ACM.
- .5 Asbestos Waste Containers: an impermeable container acceptable to disposal site and MECP. New materials only. Comprised of one of the following:
 - .1 A 0.15 mm sealed polyethylene bag, inside a second 0.15 mm polyethylene bag.
 - .2 A 0.15 mm polyethylene bag, positioned inside or outside a rigid sealed container of sufficient strength to prevent perforation of the container during filling, transportation and disposal.

- .1 Rigid sealed container: metal or fibre type acceptable to dump operator with tightly fitting covers and 0.15 mm minimum thickness sealable polyethylene liners.
- .2 If this is accepted by the dump operator, a written letter from the waste facility must be provided to the Consultant stating its acceptability.
- .3 Label containers in accordance with Ontario Regulation 278/05 and Ontario Regulation 347. Label in both official languages.
- .4 Any alternative to these methods of disposal detailed in writing to and approved by the Consultant.
- .6 Asbestos Work Area: area where work takes place within banner tape or polyethylene enclosure which will, or may, disturb ACM.
- .7 Authorized Visitors: Consultant(s) and representatives of regulatory agencies.
- .8 Banner Tape: pre-printed cautionary asbestos warning banner tape that describes the asbestos hazard.
- .9 Building: National Research Council Canada, M-24 Building located at 1200 Montréal Road, Ottawa, Ontario.
- .10 Competent Worker: a worker who is qualified to complete the work because of knowledge, training and experience to organize the work and its performance, and who is familiar with applicable regulations that apply to this work as outlined in References (Section 1.3).
- .11 Contractor: company or individual designated to complete the scope of work outlined in this specification.
- .12 Consultant: 3rd party consultant contracted by the National Research Council Canada, competent in the processes to be completed as part of this specification with authority to provide direction on behalf of the Owner.
- .13 Friable Material: material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.
- .14 HEPA: High Efficiency Particulate Air filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .15 HEPA Filter Efficiency Testing: test to measure the efficiency of all HEPA filtered equipment on site prior to installation and movement of the equipment. Testing should be conducted using dispersed oil particulate (DOP).
- .16 HVAC System: all components of the Heating, Ventilation and Air Conditioning system.
- .17 Occupied Area: any area of the Building or work site that is outside an Asbestos Work Area(s).
- .18 Owner: The National Research Council Canada.
- .19 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation. Minimum thickness 0.15 mm (6 mil).
- .20 Project Area: Room 111 within M-24 Building located at 1200 Montréal Road, Ottawa, Ontario.

1.5 ACTION AND INFORMATION SUBMITTALS

- .1 Before beginning work:
 - .1 Obtain from appropriate agency and submit to the Owner, necessary permits for transportation and disposal of asbestos waste. Ensure that approved and licensed landfill operator is fully aware of hazardous nature of material(s) being landfilled and proper methods of disposal. Submit proof satisfactory to the Owner that suitable arrangements have been made to receive and properly dispose of asbestos waste.
 - .2 Submit to the Owner satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing.
 - .1 Instruction and training related to respirators includes, following minimum requirements:
 - .1 Fitting of equipment;
 - .2 Inspection and maintenance of equipment;
 - .3 Disinfecting of equipment; and,
 - .4 Limitations of equipment.
 - .2 Instruction and training must be provided by a competent, qualified person.
 - .3 Submit proof satisfactory to the Owner that employees have respirator fitting and testing. Workers must be fit-tested with respirator that is personally issued.
 - .4 Submit proof of Contractor's Asbestos Liability Insurance.
 - .5 Submit Worker's Compensation Board status and transcription of insurance.
 - .6 Submit proof of HEPA filter efficiency testing for all vacuums, negative air units and all other HEPA filtered equipment (e.g., grinders, sanders, cutters etc.) prior to use in the Building. HEPA filter efficiency testing must have been completed within one month of project start and must also be completed every six (6) months for all negative air exhaust units, vacuums and all other HEPA filtered equipment (e.g. grinders, sanders, cutters etc.) in the Building. Proof of this testing must be provided to the DCC Representative.
 - .7 Submit documentation including test results, fire and flammability data, and Safety Data Sheets (SDS) for all chemicals and/or materials to be used including, but not limited to, the following:
 - .1 Spray adhesive;
 - .2 Amended water; and,
 - .3 Slow-drying sealer.
 - .8 Submit a Health & Safety Plan before commencing work. Comply with all applicable health and safety regulations.

1.6 QUALITY ASSURANCE

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

- .2 Health and Safety Requirements:
 - .1 All construction must be done in accordance occupational health and safety requirements, the CLC, SOR/86-304, OHSA and all applicable regulations made under the OHSA.
 - .2 Health and Safety Requirements for worker and visitor protection:
 - .1 If requested by the worker, protective equipment and clothing to be worn by workers while in Asbestos Work Areas includes:
 - .1 Air purifying half-face respirator with N-100, R-100 or P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator is to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator is to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator must have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer is to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures are to be provided to, and reviewed with, each worker who is required to wear a respirator. A worker is not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.
 - .2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing is to be provided by the employer and worn by every worker who enters an Asbestos Work Area, and the protective clothing shall consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing to include suitable footwear, and to be repaired or replaced if torn.
 - .3 Wear CSA-approved hard hat, CSA-approved safety boots and CSA-approved safety glasses at all times.
 - .2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Areas.
 - .3 Before leaving Asbestos Work Areas, the worker shall decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in an Asbestos Waste Container.
 - .4 Facilities for washing hands and face shall be provided within or close to the Asbestos Work Areas.
 - .5 Ensure workers wash hands and face when leaving Asbestos Work Area.
 - .6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Asbestos waste generated during the project will be removed from site daily in the appropriate Asbestos Waste Containers as detailed in O. Reg. 278/05 and O. Reg. 347/90.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Handle and dispose of hazardous materials in accordance with the EPA, TDGA, Provincial, Regional and Municipal regulations.
- .4 All asbestos waste transfer must occur by hand. It is not permitted that Asbestos Waste Containers be transferred by use of garbage chutes, mechanized belts or other means whereby the Asbestos Waste Containers may be caused to break or fail in any way during handling or transfer.
- .5 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial and Municipal regulations. All asbestos waste must be disposed of in appropriate Asbestos Waste Containers.
- .6 Provide waste manifests describing and listing waste generated and disposed of. Transport containers by approved means to MECP licensed asbestos disposal landfill for burial.

1.8 EXISTING CONDITIONS

- .1 Information pertaining to ACMs to be handled, removed, or otherwise disturbed and disposed of during this project are provided in the Designated Substances Report.
- .2 Any interested parties must (i.e., qualified remediation contractor(s)) must verify the approximate quantities and locations of ACMs identified in the Designated Substances Report.
- .3 Notify the Owner of suspected ACMs that are discovered during work and not apparent from specifications, reports pertaining to the work. Do not disturb such material pending written instructions from the Consultant.

Part 2 Products

2.1 MATERIALS

- .1 Asbestos Waste Containers, as described in Definitions (Section 1.4).
- .2 Drop Sheets:
 - .1 Polyethylene: 0.15 mm thick.
 - .2 Fire Rated (FR) polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.
- .3 Tape: fibre-reinforced duct tape suitable for sealing polyethylene under both dry conditions and wet conditions using amended water.
- .4 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in a concentration to provide thorough wetting of ACMs.

Part 3 Execution

3.1 PROCEDURES

- .1 All work must be done in accordance with occupational health and safety requirements, the CLC, SOR/86-304, OHS A and all applicable regulations made under the OHS A.

- .2 Refer to the Designated Substances Report for a list of identified designated substances and select hazardous materials at the Project Area.
- .3 Before beginning work, isolate Asbestos Work Area(s) using, minimum, preprinted Banner Tape that is visible at access routes to Asbestos Work Area(s).
- .4 Do not begin work until the Consultant has provided authorization to proceed.
- .5 At each access to Asbestos Work Areas install warning signs in both official languages in upper case "Helvetica Medium" letters reading as follows where number in parentheses indicates font size to be used: "CAUTION ASBESTOS HAZARD AREA (25 mm) NO UNAUTHORIZED ENTRY (19 mm) WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)". ATTENTION RISQUE D'EXPOSITION Á L'AMIANTE (25mm) PAS D'ENTRÉS SANS AUTORISATION (19mm) PORTER LES ÉQUIPEMENTS DE PROTECTION SPÉCIFIÉS (19mm) RESPIRER DES POUSSIÈRES D'AMIANTE PEUT REPRÉSENTER UN RISQUE Á LA SANTÉ (7mm)).
- .6 Should scaffolding be required, it must be approved by a licensed Engineer in the Province of Ontario.
- .7 Remove visible dust from all surfaces in the Asbestos Work Areas where dust is likely to be disturbed during course of work.
- .8 Use HEPA vacuum or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate.
- .9 Do not use compressed air to clean up or remove dust from any surface.
- .10 Wet ACMs to be removed, cut, ground, abraded, scraped, drilled, or otherwise disturbed unless wetting creates a hazard or causes damage:
 - .1 Use Airless Sprayer to wet materials;
 - .2 When performing work, reduce dust generation to lowest levels practicable;
 - .3 Work may be subject to visual inspection and air monitoring; and,
 - .4 Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete segregation and clean-up of affected areas at no cost to the Owner.

3.2 CLEANUP

- .1 Frequently during work and immediately after completion of work, clean up dust and asbestos-containing waste using a HEPA vacuum or by damp mopping.
- .2 Place dust and asbestos-containing waste in Asbestos Waste Containers. Treat drop sheets and disposable protective clothing as asbestos waste; wet and fold these items to contain dust, and place in Asbestos Waste Containers.
- .3 Clean exterior of each Asbestos Waste Container using damp cloths or HEPA vacuum prior to removal from Asbestos Work Areas.
- .4 Seal Asbestos Waste Containers and remove from site immediately following work. Dispose of in accordance with requirements of Provincial and Federal Authority having jurisdiction. Ensure that landfill operator is fully aware of hazardous nature of material to be disposed of and ensure that regulations and guidelines for asbestos disposal are followed.
- .5 Perform final thorough clean-up of Asbestos Work Areas and adjacent areas affected by work using a HEPA vacuum.

3.3 INSPECTION

- .1 Prior to the beginning of ACM removal, the Consultant may perform a pre-abatement inspection on the Asbestos Work Area. The pre-abatement inspection may be completed to ensure all equipment required to complete the measures and procedures that apply to low-risk activities are present. Deviation from these requirements that have not been approved in writing by the Consultant and/or Owner may result in work stoppage, at no cost to the Owner.
- .2 Following completion of the work, the Consultant may be contacted to complete a final visual inspection. This inspection must be organised by the contractor with a minimum of twenty-four (24) hours notice if it is being performed.
- .3 Consultant may inspect work for:
 - .1 Adherence to specific procedures and materials requirements;
 - .2 Compliance with specification and governing authority requirements prior to contaminated work; and,
 - .3 Final cleanliness and completion. Asbestos Work Area will be considered clean when all visible dust and debris is removed from the substrate to which it was adhered and deemed acceptable to the Consultant. No distinction will be made about the content of the dust or debris.
- .4 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

- .1 Remove and dispose off-site, at a licensed asbestos hazardous waste management facility, the following asbestos-containing materials (ACMs) identified as being present in the Room 111 project area within the Building:
 - .1 Drywall in which asbestos-containing drywall joint compound has been applied.
 - .2 Non-friable mastic on walls.
 - .3 Friable parging cement on pipe fittings.
 - .4 Air filters used in air handling equipment present within Room 111.
- .2 Additional ACMs have been historically identified as being present at the Site. However, based on Site observations, the additional ACMs are not currently anticipated to be impacted by planned project activities and include:
 - .1 Friable asbestos-containing spray-applied fireproofing present on select structural steel beams throughout the interior of the Building.
 - .2 Friable cementitious firestop material present on pipe penetrations throughout basement mechanical spaces and presumed throughout the Building.
- .3 See section 1.2 Related Sections available through the National Research Council Canada for further information.
- .4 Comply with requirements of this section when performing the following work:
 - .1 Removing non-friable ACMs (i.e., mastic) by breaking, cutting, drilling, abrading, grounding, sanding or vibrating if the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.
 - .2 Removing less than one square meter friable ACMs (i.e., cementitious pipe insulation parging) by breaking, cutting, drilling, abrading, grounding, sanding or vibrating if the work is done by means of non-powered hand-held tools and the materials are wetted to control the spread of dust or fibres.
 - .3 Removing, repairing, or disturbing more than one square metre of drywall in which asbestos-containing drywall joint compound has been applied.
 - .4 Removing ACM from a pipe, duct or similar structure using a glove bag.

1.2 RELATED SECTIONS

- .1 Report titled “Project-Specific Designated Substances and Hazardous Materials Survey Related to the M-24, Room 111 New Fit-Up Project at the Montreal Road Campus of the National Research Council Canada, in Ottawa, Ontario”, dated 17 January 2024 (WSP project number 22565806 Rev. 1), herein referred to as the “Designated Substances Report”.
- .2 Section 02 82 00.01 Type 1 Asbestos Operations – Minimum Precautions.
- .3 Section 02 82 00.03 Type 3 Asbestos Operations – Maximum Precautions.
- .4 Section 02 83 10 Type 1 Lead Operations – Minimum Precautions.

1.3 REFERENCES

- .1 Comply with Provincial and Municipal requirements, provided that in any case of conflict among those requirements or with these Specifications the more stringent requirements shall apply. Work shall be performed under regulations and guidelines in effect at the time work is performed. Regulations and guidelines include but are not limited to the following:
 - .1 Canada Labour Code (CLC)
 - .1 *Canada Occupational Health and Safety Regulations* (SOR/86-304).
 - .2 Ministry of Labour, Immigration, Training, and Skills Development (MLITSD)
 - .1 *Occupational Health and Safety Act*, R.S.O. 1990, Chapter O.1 (OHSA).
 - .2 Ontario Regulation 213/91: *Construction Projects*, as amended (O. Reg. 213/91).
 - .3 Ontario Regulation 278/05: *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*, as amended (O. Reg. 278/05).
 - .4 Ontario Regulation 490/09: *Designated Substances* (O. Reg. 490/09).
 - .5 Ontario Regulation 860/90: *Workplace Hazardous Materials Information System (WHMIS) Regulation*, as amended (O. Reg. 860/90).
 - .6 *Lead on Construction Projects*, updated April 2011.
 - .7 *Silica on Construction Projects*, updated November 2022.
 - .3 Ministry of the Environment, Conservation and Parks (MECP)
 - .1 R.R.O. 1990, Regulation 347: *General – Waste Management*, as amended (R.R.O. 1990, Reg. 347)
 - .2 *Environmental Protection Act*, R.S.O. 1990, Chapter E.19, as amended (EPA)
 - .4 Transport Canada (TC)
 - .1 *Transportation of Dangerous Goods Act*, 1992, as amended (TDGA).
 - .5 U.S. Department of Health and Human Services (DHHS)/Centers for Disease Control and Prevention (CDC)/National Institute for Occupational Safety and Health (NIOSH)
 - .1 NIOSH Manual of Analytical Methods (NMAM), 5th ed., DHHS (December 2017).
 - .6 Canadian Standards Association (CSA)
 - .1 Z94.4-11 (R2016) Selection, Use, and Care of Respirators.
 - .7 Public Services and Procurement Canada (PSPC)
 - .1 Public Services and Procurement Canada Asbestos Management Standard, as amended.

1.4 DEFINITIONS

- .1 Airless Sprayer: spray equipment capable of producing mist or fine spray without the use of compressed air. Must have appropriate capacity for the scope of work.

- .2 Airlock: system for permitting ingress or egress without permitting air movement between contaminated area and uncontaminated area, consisting of two weighted, curtained doorways at least 2 metres apart.
- .3 Amended Water: water with a non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.
- .4 Approved Supervisor: a person who has charge of a workplace or authority over a worker and has received the appropriate training for that role. A supervisor is ultimately responsible to provide direction to workers on site and must follow the laws of the OHSA. This person must be approved by the Ontario Ministry of Colleges and Universities as a Certified Asbestos Abatement Supervisor.
- .5 Asbestos-Containing Materials (ACMs): materials identified under Existing Conditions (Section 1.8), including fallen materials and settled dust containing 1% or more by dry weight in accordance with the CLC or 0.5% or more by dry weight in accordance with O. Reg. 278/05. For the purposes of this project, the lower limit of 0.5% or more asbestos by dry weight is applied to define a material as an ACM.
- .6 Asbestos Waste Containers: an impermeable container acceptable to disposal site and MECP. New materials only. Comprised of one of the following:
 - .1 A 0.15 mm sealed polyethylene bag, inside a second 0.15 mm polyethylene bag.
 - .2 A 0.15 mm polyethylene bag, positioned inside or outside a rigid sealed container of sufficient strength to prevent perforation of the container during filling, transportation and disposal.
 - .1 Rigid sealed container: metal or fibre type acceptable to dump operator with tightly fitting covers and 0.15 mm minimum thickness sealable polyethylene liners.
 - .2 If this is accepted by the dump operator, a written letter from the waste facility must be provided to the Consultant stating its acceptability.
 - .3 Label containers in accordance with Ontario Regulation 278/05 and Ontario Regulation 347. Label in both official languages.
 - .4 Any alternative to these methods of disposal detailed in writing to and approved by the Consultant.
- .7 Asbestos Work Area: area where work takes place within banner tape or polyethylene enclosure which will, or may, disturb ACM.
- .8 Authorized Visitors: Consultant(s) and representatives of regulatory agencies.
- .9 Banner Tape: pre-printed cautionary asbestos warning banner tape that delineates the asbestos work area.
- .10 Building: National Research Council Canada, M-24 Building located at 1200 Montréal Road, Ottawa, Ontario.
- .11 Competent Worker: a worker who is qualified to complete the work because of knowledge, training and experience to organize the work and its performance, and who is familiar with applicable regulations that apply to this work as outlined in References (Section 1.3). This person must be approved by the Ontario Ministry of Training, Colleges and Universities as a Certified Asbestos Abatement Worker.
- .12 Contractor: company or individual designated to complete the scope of work outlined in this specification.

- .13 Consultant: 3rd party consultant contracted by the National Research Council Canada, competent in the processes to be completed as part of this specification with authority to provide direction on behalf of the Owner.
- .14 Friable Material: material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.
- .15 Glove Bag: prefabricated glove bag as follows:
 - .1 Minimum thickness 0.25 mm (10 mil) polyvinyl-chloride bag.
 - .2 Integral 0.25 mm (10 mil) thick polyvinyl-chloride gloves and elastic ports.
 - .3 Equipped with reversible, double-pull, double throw zipper on top and at approximately mid-section of the bag.
 - .4 Straps for sealing ends around pipe.
 - .5 Must incorporate internal closure strip if it is to be moved or used in more than one specific location.
- .16 HEPA: High Efficiency Particulate Air filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .17 HEPA Filter Efficiency Testing: test to measure the efficiency of all HEPA filtered equipment on site prior to installation and movement of the equipment. Testing should be conducted using dispersed oil particulate (DOP).
- .18 HVAC system: all components of the Heating, Ventilation and Air Conditioning system.
- .19 Negative Pressure: system that extracts air directly from work area, filters such extracted air through (HEPA) filtering system, and discharges this air directly outside work area to exterior of Building. This system should be placed through HEPA filter efficiency testing prior to installation or movement of the equipment to other work areas.
- .20 Occupied Area: any area of Building or work site that is outside Asbestos Work Area.
- .21 Owner: The National Research Council Canada.
- .22 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation. Minimum thickness 0.15 mm (6 mil).
- .23 Project Area: Room 111 within M-24 Building located at 1200 Montréal Road, Ottawa, Ontario.
- .24 Weighted, Curtained Doorways: arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, constructed as follows:
 - .1 Place two overlapping sheets of Fire Rated (FR) polyethylene over existing or temporarily framed doorway. Secure each along top of doorway. Secure vertical edge of one sheet along one vertical side of doorway, and secure vertical edge of other sheet along opposite vertical side of doorway.
 - .2 Reinforce free edges of polyethylene with duct tape and weight bottom edge to ensure proper closing.

1.5 ACTION AND INFORMATION SUBMITTALS

- .1 Before beginning work:
 - .1 Obtain from appropriate agency and submit to the Owner, necessary permits for transportation and disposal of asbestos waste. Ensure that approved and licensed landfill operator is fully aware of hazardous nature of material(s) being landfilled, and proper methods of disposal. Submit proof satisfactory to the Owner that suitable arrangements have been made to receive and properly dispose of asbestos waste.
 - .2 Submit to the Owner satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing.
 - .1 Instruction and training related to respirators includes, following minimum requirements:
 - .1 Fitting of equipment
 - .2 Inspection and maintenance of equipment
 - .3 Disinfecting of equipment
 - .4 Limitations of equipment
 - .2 Instruction and training must be provided by a competent, qualified person.
 - .3 Submit proof satisfactory to the Owner that employees have respirator fitting and testing. Workers must be fit-tested with respirator that is personally issued.
 - .4 Submit proof of Contractor's Asbestos Liability Insurance.
 - .5 Submit Worker's Compensation Board status and transcription of insurance.
 - .6 Submit proof of HEPA filter efficiency testing for all vacuums, negative air units and all other HEPA filtered equipment (e.g., grinders, sanders, cutters, etc.) prior to use in the Building. HEPA filter efficiency testing must be completed immediately prior to all vacuums, negative air units and all other HEPA filtered equipment (e.g., grinders, sanders, cutters, etc.) arriving in the Building and every six (6) months following that date for the duration of the project. Proof of this testing must be provided to the Consultant.
 - .7 Submit documentation including test results, fire and flammability data, and Safety Data Sheets (SDS) for all chemicals and/or materials to be used including, but not limited to, the following:
 - .1 Spray Adhesive;
 - .2 Amended Water; and,
 - .3 Slow-drying Sealer.
 - .8 Submit a Health & Safety Plan before commencing work. Comply with all applicable health and safety regulations.
 - .9 Submit layout of proposed enclosures and decontamination facilities to the Consultant.
 - .10 Submit Provincial and local requirements for Notice of Project Form, when required based on abatement method.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Provincial and local requirements pertaining to asbestos, provided that, in case of conflict among those requirements or with these specifications, more stringent requirement applies. Comply with regulations in effect at time work is performed.
- .2 Health and Safety Requirements for worker and visitor protection:
 - .1 All construction must be done in accordance occupational health and safety requirements, the OHSA and all applicable regulations made under the OHSA.
 - .2 Health and Safety Requirements for worker and visitor protection:
 - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area includes:
 - .1 At a minimum, a half-face air-purifying respirator equipped with P100 particulate filter cartridges, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to authority having jurisdiction.
 - .1 Workers must have respirators fit-tested qualitatively or quantitatively prior to use. Instruction must be provided on the use, care and maintenance of respirator being used.
 - .2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres, consisting of full-body covering including head covering with snug-fitting cuffs at wrists, ankles, and neck.
 - .3 Separate disposable covers shall be used to cover footwear.
 - .4 Wear a CSA-approved Class C hard hat, CSA-approved safety boots and CSA-approved safety glasses at all times.
 - .2 Visitor Protection:
 - .1 Provide protective clothing and approved respirators to Authorized Visitors to work areas.
 - .2 Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.
 - .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.
 - .3 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
 - .4 Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual asbestos abatement.
- .3 Health and Safety Requirements for worker or visitor entering the Asbestos Work Area:
 - .1 Wear respirator, with new filters or reusable filters that have been deemed as satisfactory, and protective clothing before entering Asbestos Work Area.
 - .2 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

- .4 Health and Safety Requirements for worker or visitor exiting the Asbestos Work Area:
 - .1 Decontaminate protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing protective clothing. Place disposable protective clothing in Asbestos Waste Containers for disposal as asbestos waste. Be sure not to affect the seal between the face and the respirator during decontamination. Still wearing the respirator, exit Asbestos Work Area. Using soap and water wash hands and face at wash facilities provided by the employer. Clean outside of respirator with soap and water and be sure to cover respirator filters to avoid damage to HEPA filters from water. Upon completion of asbestos abatement, dispose of footwear or footwear covers as asbestos waste or clean footwear thoroughly inside and out using a HEPA filtered vacuum, soap and water before removing from Asbestos Work Area.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Asbestos waste generated during the project will be removed daily from site in the appropriate Asbestos Waste Container as detailed in Ontario Regulation 278/05 and Ontario Regulation 347.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Handle and dispose of hazardous materials in accordance with the EPA, TDGA, and all regional and municipal regulations.
- .4 All asbestos waste transfer must occur by hand. It is not permitted that Asbestos Waste Containers be transferred by use of garbage chutes, mechanized belts or other means whereby the Asbestos Waste Containers may be caused to break or fail in any way during handling or transfer.
- .5 Disposal of asbestos waste generated by removal activities must comply with Provincial and municipal regulations. All asbestos waste must be disposed of in appropriate Asbestos Waste Containers.
- .6 Provide waste manifests describing and listing waste generated and disposed of. Transport containers by approved means to licensed landfill for burial.

1.8 EXISTING CONDITIONS

- .1 Information pertaining to ACMs to be handled, removed, or otherwise disturbed and disposed of during this project are provided in the Designated Substances Report.
- .2 Any interested parties must (i.e., qualified remediation contractor(s)) must verify the approximate quantities and locations of ACMs identified in the Designated Substances Report.
- .3 Notify the Owner of suspected ACMs discovered during work and not apparent from specifications or reports pertaining to the work. Do not disturb such material pending written instructions from Consultant.

Part 2 Products

2.1 MATERIALS

- .1 Asbestos Waste Containers, as outlined in Definitions (Section 1.4).
- .2 Glove Bag, as outlined in Definitions (Section 1.4):
- .3 Fire Rated (FR) polyethylene: minimum 0.25 mm thick, woven fibre reinforced fabric bonded both sides with polyethylene.
- .4 Polyethylene: minimum 0.15 mm thick unless otherwise specified; in sheet size to minimize joints.
- .5 Slow-drying Sealer: non-staining, clear, water-dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.
 - .1 Sealer: flame spread and smoke developed rating less than 50 and be compatible with new fireproofing.
- .6 Spray Adhesive: quick-drying aerosol contact cement used to bond FR polyethylene sheeting during enclosure construction.
 - .1 Spray adhesive must be free of methylene chloride.
- .7 Tape: fibre-reinforced duct tape suitable for sealing polyethylene under both dry conditions and wet conditions using amended water.
- .8 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in a concentration to provide thorough wetting of ACMs.

Part 3 Execution

3.1 PREPARATION

- .1 All work must be done in accordance with occupational health and safety requirements, the OHSA and all applicable regulations made under the OHSA.
- .2 Refer to the Designated Substances Report for a list of identified designated substances at the Project Area.
- .3 Do not begin Asbestos Abatement work until:
 - .1 Arrangements have been made for disposal of waste.
 - .2 For wet removal techniques, arrangements have been made for containing, filtering, and disposing of waste water.
 - .3 Work areas and decontamination enclosures and parts of Building required to remain in use are effectively segregated.
 - .4 Tools, equipment, and materials waste containers are on hand.
 - .5 Arrangements have been made for Building security.
 - .6 Warning signs are displayed where access to contaminated areas is possible.
 - .7 Notifications have been completed and other preparatory steps have been taken.
 - .8 Consultant has given authorization to proceed.
- .4 Should scaffolding be required, it must be approved by a licensed Engineer in the Province of Ontario.

- .5 Asbestos Work Areas:
 - .1 Surround the Asbestos Work Area(s) with banner tape ensuring that all access points have restricted access.
 - .2 Shut off and isolate air handling and ventilation systems to prevent fibre dispersal to other Building areas during work phase.
 - .3 Clean proposed work areas using, where practicable, HEPA vacuum cleaning equipment. If not practicable, use wet cleaning method. Do not use methods that generate dust, such as dry sweeping, or vacuuming using non- HEPA vacuum equipment.
 - .4 At each access to Asbestos Work Area(s) install warning signs in both official languages in upper case "Helvetica Medium" letters reading as follows where number in parentheses indicates font size to be used: "CAUTION ASBESTOS HAZARD AREA (25 mm) NO UNAUTHORIZED ENTRY (19 mm) WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm). ATTENTION RISQUE D'EXPOSITION Á L'AMIANTE (25mm) PAS D'ENTRÉS SANS AUTORISATION (19mm) PORTER LES ÉQUIPEMENTS DE PROTECTION SPÉCIFIÉS (19mm) RESPIRER DES POUSSIÈRES D'AMIANTE PEUT REPRÉSENTER UN RISQUE Á LA SANTÉ (7mm)".
 - .5 The spread of dust from the Asbestos Work Areas shall be prevented by:
 - .1 Sealing off openings such as corridors, doorways, windows, elevator shafts, pipe penetrations, stairwells, skylights, ducts, grilles, and diffusers, with polyethylene sheeting sealed with duct tape.
 - .2 Using upper seals to prevent dust, fibres and any debris from contaminating wall cavities or other spaces that are not accessible for cleaning.
 - .3 Removing any ceiling mounted objects such as suspended ceiling tile grid system and ceiling or wall fixtures that may interfere with asbestos removal, as directed by Consultant.
 - .4 Covering porous surfaces not being removed including all fire alarm systems, sensors and/or devices, flooring and pipe insulation with polyethylene sheeting sealed with duct tape and spray adhesive. Cover floors, where required, so that polyethylene extends at least 300 mm up walls then cover walls to overlap floor sheeting, when possible.
 - .5 Entire enclosure in each individual Asbestos Work Area, including upper seals, are to be constructed in such a fashion that they remain intact for the duration of asbestos abatement activities in the Asbestos Work Area, or until directed by the Consultant following the receipt of acceptable asbestos inspection and air monitoring reports.
 - .6 Build airlocks at entrances to and exits from Asbestos Work Areas so that Asbestos Work Areas are always closed off by one Weighted, Curtained Doorway when workers enter or exit.

- .6 Pipe Insulation Removal Using Glove Bag:
 - .1 A glove bag shall not to be used to remove insulation from a pipe, duct or similar structure if:
 - .1 It may not be possible to maintain a proper seal for any reason including, without limitation:
 - .1 The condition of the insulation.
 - .2 The temperature of the pipe, duct or similar structure.
 - .3 The bag could become damaged for any reason including, including, without limitation:
 - .1 The type of jacketing.
 - .2 The temperature of the pipe, duct or similar structure.
 - .2 Upon installation of the glove bag, inspect bag for any damage or defects. If any damage or defects are found, the glove bag is to be repaired or replaced. The glove bag to be inspected at regular intervals for damage and defects, and repair or replaced, as appropriately. The asbestos-containing contents of the damaged or defective glove bag found during removal are to be wetted and the glove bag and its contents are to be removed and disposed of in an appropriate waste disposal container. Any damaged or defective glove bags are not to be reused.
 - .3 Place tools necessary to remove insulation in tool pouch. Wrap bag around pipe and close zippers. Seal bag to pipe with cloth straps.
 - .4 Place hands in gloves and use necessary tools to remove insulation. Arrange insulation in bag to obtain full capacity of bag.
 - .5 Insert nozzle of garden reservoir type sprayer into bag through valve and wash down pipe and interior of bag thoroughly. Wet surface of insulation in lower section of bag.
 - .6 To remove bag after completion of stripping, wash top section and tools thoroughly. Remove air from top section through elasticized valve using a HEPA vacuum. Pull polyethylene waste container over glove bag before removing from pipe. Release one strap and remove freshly washed tools. Place tools in water. Remove second strap and zipper. Fold over into waste container and seal.
 - .7 After removal of bag ensure that pipe is free of residue. Remove residue using HEPA vacuum or wet cloths. Ensure that surfaces are free of sludge which after drying could release asbestos dust into atmosphere. Seal exposed surfaces of pipe and ends of insulation with slow drying sealer to seal in any residual fibres.
 - .8 Upon completion of Work shift, cover exposed ends of remaining pipe insulation with polyethylene taped in place.
 - .7 Application of water required for wetting ACMs, requires the shut off electrical power, 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools or provide 110 volt safety lighting if power is provided from a ground fault panel, in accordance with applicable CSA Standard. Ensure safe installation of electrical lines and equipment. Contractor is responsible for providing qualified personnel to connect all utilities including the water and hydro.

- .8 Maintain emergency and fire exits from Asbestos Work Area(s) or establish alternative exits satisfactory to authority having jurisdiction.
- .9 After preparation of Asbestos Work Area and installation of decontamination systems, remove asbestos-containing materials. Spray debris in immediate Asbestos Work Area with amended water through use of low pressure spraying device to reduce dust as work progresses.
- .10 Maintenance of Asbestos Work Area(s):
 - .1 The Asbestos Work Area shall be inspected by a competent worker for defects in the enclosure, barriers and wash facility:
 - .1 At the beginning of each shift;
 - .2 At the end of a shift if there is no shift that begins immediately after the first-named shift; and,
 - .3 At least once each day on days when there are no shifts.
 - .2 Defects observed during an inspection shall be repaired immediately and no other work shall be carried out in the work area until the repair.
 - .3 Maintain Asbestos Work Areas in tidy condition.
 - .4 Use smoke methods to test effectiveness of barriers when directed by Consultant.

3.2 SUPERVISION

- .1 Minimum of one Approved Supervisor for every ten workers is required.
- .2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of ACM.

3.3 ASBESTOS REMOVAL

- .1 Before removing asbestos:
 - .1 Prepare Asbestos Work Area in accordance with section 3.1.
 - .2 Spray ACM with water containing specified wetting agent, using Airless Sprayer capable of providing "mist" application to prevent release of fibres. Saturate ACM sufficiently to wet it to substrate without causing excess dripping. Spray asbestos material repeatedly during work process to maintain saturation and to minimize asbestos fibre dispersion.
- .2 Remove saturated ACM in small sections. Do not allow saturated asbestos to dry out. As it is being removed, pack ACM in Asbestos Waste Containers.
- .3 Seal Asbestos Waste Containers. Clean outside of Asbestos Waste Containers with a damp cloth or a vacuum equipped with a HEPA filter immediately before being removed from the Asbestos Work Area.
- .4 Remove Asbestos Waste Containers from the Asbestos Work Area frequently and at regular intervals.
- .5 After completion of removal work, wire brush and wet-wipe or wet-sponge all surfaces from which asbestos has been removed to remove visible material. During this work keep surfaces wet.

- .6 Asbestos Work Area will be considered clean when all visible dust and debris is removed from the substrate to which it was adhered and any other dust / debris in the Asbestos Work Area is removed and the entire Asbestos Work Area is deemed acceptable to the Consultant. No distinction will be made about the content of the dust or debris.
- .7 After wire brushing and wet-wiping or wet-sponging to remove visible asbestos, wet clean entire Asbestos Work Area and equipment used in removal process.
- .8 After acceptance of visual inspection by Consultant apply continuous coat of slow-drying sealer to all surfaces of Asbestos Work Area.

3.4 FINAL CLEANUP

- .1 Following cleaning specified in 3.3 above, and when air sampling shows that airborne fibre levels do not exceed 0.01 fibres/cubic centimeter (f/cc) using forced air clearance methods inside the enclosure(s) and Phase Contrast Microscopy (PCM) analysis as determined by NIOSH Method 7400, proceed with final cleanup.
- .2 Remove polyethylene sheet by rolling it away from walls to centre of Asbestos Work Area. Vacuum visible asbestos-containing particles observed during cleanup, immediately, using HEPA vacuum equipment.
- .3 Place polyethylene seals, tape, cleaning material, clothing, and other contaminated waste in Asbestos Waste Containers.
- .4 Include in clean-up sealed Asbestos Waste Containers and equipment used in work and remove from Asbestos Work Areas, at appropriate time in cleaning sequence.
- .5 Conduct final inspection to ensure that no dust or debris remains on surfaces as result of dismantling operations. Repeat cleaning using HEPA vacuum equipment, or wet cleaning methods where feasible.
- .6 As work progresses, and to prevent exceeding available storage capacity on site, remove Asbestos Waste Containers and dispose of at authorized disposal area in accordance with requirements of disposal authority.

3.5 INSPECTION

- .1 Prior to the beginning of the removal, the Consultant will perform a pre-contamination inspection on the Asbestos Work Area. The pre-contamination inspection will be completed to ensure the integrity of the containment, that all required paperwork including submittals have been reviewed or are on site and all equipment required to complete the measures and procedures that apply to Type 2/Moderate-risk asbestos operations are present.
- .2 From beginning of work until completion of final cleaning operations, Consultant to perform daily site inspections to monitor Asbestos Work Area and monitor contractor compliance with specifications and governing authority requirements. Deviations from these requirements that have not been approved in writing by the Consultant and/or Owner may result in work stoppage, at no cost to the Owner.
- .3 Following completion of the work the Consultant must be contacted to complete a final visual inspection. This inspection must be organised by the contractor with a minimum of twenty-four (24) hours' notice. Asbestos Work Area will be considered clean when all visible dust and debris is removed from the substrate to which it was adhered and deemed acceptable to the Consultant. No distinction will be made about the content of the dust or debris. This inspection is to take place in a dry environment.

- .4 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.
- .5 When asbestos leakage from Asbestos Work Area has occurred or is likely to occur Consultant may order Work shutdown.
 - .1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

3.6 AIR MONITORING

- .1 From beginning of work until completion of cleaning operations and reinstatement activities, Consultant may take air samples on daily basis outside of Asbestos Work Area(s).
 - .1 All air monitoring to be conducted in accordance with O. Reg. 278/05 and following NIOSH Method 7400.
 - .2 If air monitoring shows that areas outside Asbestos Work Area(s) are contaminated, enclose, maintain and clean these areas, in same manner as that applicable to Asbestos Work Area(s), as directed by the Consultant, at no cost to the Owner.
 - .3 Stop work when PCM measurements outside of the Asbestos Work Area exceed 0.05 f/cc and correct procedures, at no cost to the owner.
- .2 Consultant to take air samples inside the work area as required to establish the type of respirators to be used. Workers may be required to wear sample pumps for up to full-shift periods.
 - .1 If fibre levels are above protection factor of respirators in use, stop abatement, apply means of dust suppression, and use higher respiratory protection factor in respiratory protection for persons inside enclosure.
- .3 If enclosures were used for asbestos abatement, final air monitoring to be conducted as follows: after Asbestos Work Area has passed visual inspection and acceptable coat of lock-down agent has been applied to surfaces within enclosure, and appropriate settling period has passed, Consultant may perform air monitoring within Asbestos Work Area using forced air clearance methods, if required. Enclosure to remain in place until completion of final clearance air sampling:
 - .1 Final air monitoring results must show fibre levels of less than 0.01 f/cc for all samples taken as analyzed by PCM techniques.
 - .2 If air monitoring results show fibre levels in excess of 0.01 f/cc, re-clean Asbestos Work Area and apply another acceptable coat of lock-down agent to surfaces at no cost to the Owner.
 - .3 Repeat re-cleaning as necessary until fibre levels are less than 0.01 f/cc. Additional testing may be subject to Transmission Electron Microscopy analysis following the NIOSH Method 7402.
 - .4 The number of air samples taken shall be in accordance with O. Reg. 278/05, paragraph 4, sub-section 18(6).

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

- .1 Remove and dispose off-site, at a licensed asbestos hazardous waste management facility, the following asbestos-containing materials (ACMs) identified as being present in the Room 111 project area within the Building:
 - .1 Friable parging cement on pipe fittings.
 - .2 Non-friable mastic on walls, if needed.
 - .3 Air handling equipment and associated ducting, but not including air filters, within Room 111.
- .2 Additional ACMs have been historically identified as being present at the Site. However, based on Site observations, the additional ACMs are not currently anticipated to be impacted by planned project activities and include:
 - .1 Friable asbestos-containing spray-applied fireproofing present on select structural steel beams throughout the interior of the Site.
 - .2 Friable cementitious firestop material present on pipe penetrations throughout basement mechanical spaces and presumed throughout the Site.
- .3 See Section 1.2 Related Sections available through the National Research Council Canada for further information.
- .4 Comply with requirements of this Section when performing following Work:
 - .1 The removal or disturbance of more than one square metre of friable asbestos-containing material (i.e., cementitious pipe insulation parging) during the repair, alteration, maintenance or demolition of all or part of a building, or any machinery or equipment.
 - .2 The cleaning or removal of air handling equipment, including rigid ducting but not including air filters, in a building that has asbestos-containing sprayed fireproofing present within it.
 - .3 Breaking, cutting, drilling, abrading, grinding, sanding, or vibrating non-friable ACMs (i.e., mastic), if the work is done by means of power tools that are not attached to dust-collecting devices equipped with HEPA filters.

1.2 RELATED SECTIONS

- .1 Report titled “Project-Specific Designated Substances and Hazardous Materials Survey Related to the M-24, Room 111 New Fit-Up Project at the Montreal Road Campus of the National Research Council Canada, in Ottawa, Ontario”, dated 17 January 2024 (WSP project number 22565806 Rev. 1), herein referred to as the “Designated Substances Report”.
- .2 Section 02 82 00.01 Type 1 Asbestos Operations – Minimum Precautions.
- .3 Section 02 82 00.02 Type 2 Asbestos Operations – Intermediate Precautions.
- .4 Section 02 83 10 Type 1 Lead Operations – Minimum Precautions.

1.3 REFERENCES

- .1 Comply with Provincial and Municipal requirements, provided that in any case of conflict among those requirements or with these Specifications the more stringent requirements shall apply. Work shall be performed under regulations and guidelines in effect at the time work is performed. Regulations and guidelines include but are not limited to the following:
 - .1 Canada Labour Code (CLC)
 - .1 *Canada Occupational Health and Safety Regulations* (SOR/86-304).
 - .2 Ministry of Labour, Immigration, Training, and Skills Development (MLITSD)
 - .1 *Occupational Health and Safety Act*, R.S.O. 1990, Chapter O.1 (OHSA).
 - .2 Ontario Regulation 213/91: *Construction Projects*, as amended (O. Reg. 213/91).
 - .3 Ontario Regulation 278/05: *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*, as amended (O. Reg. 278/05).
 - .4 Ontario Regulation 490/09: *Designated Substances* (O. Reg. 490/09).
 - .5 Ontario Regulation 860/90: *Workplace Hazardous Materials Information System (WHMIS) Regulation*, as amended (O. Reg. 860/90).
 - .6 *Lead on Construction Projects*, updated April 2011.
 - .7 *Silica on Construction Projects*, updated November 2022.
 - .3 Ministry of the Environment, Conservation and Parks (MECP)
 - .1 R.R.O. 1990, Regulation 347: *General – Waste Management*, as amended (R.R.O. 1990, Reg. 347)
 - .2 *Environmental Protection Act*, R.S.O. 1990, Chapter E.19, as amended (EPA)
 - .4 Transport Canada (TC)
 - .1 *Transportation of Dangerous Goods Act*, 1992, as amended (TDGA).
 - .5 U.S. Department of Health and Human Services (DHHS)/Centers for Disease Control and Prevention (CDC)/National Institute for Occupational Safety and Health (NIOSH)
 - .1 NIOSH Manual of Analytical Methods (NMAM), 5th ed., DHHS (December 2017).
 - .6 Canadian Standards Association (CSA)
 - .1 Z94.4-11 (R2016) Selection, Use, and Care of Respirators.
 - .7 Public Services and Procurement Canada (PSPC)
 - .1 Public Services and Procurement Canada Asbestos Management Standard, as amended.

1.4 DEFINITIONS

- .1 Airless Sprayer: spray equipment capable of producing mist or fine spray without the use of compressed air. Must have appropriate capacity for the scope of work.
- .2 Airlock: system for permitting ingress or egress without permitting air movement between contaminated area and uncontaminated area, consisting of two weighted, curtained doorways at least 2 metres apart .

- .3 Amended Water: water with a non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.
- .4 Approved Supervisor: a person who has charge of a workplace or authority over a worker and has received the appropriate training for that role. A supervisor is ultimately responsible to provide direction to workers on site and must follow the laws of the OHSA. This person must be approved by the Ontario Ministry of Colleges and Universities as a Certified Asbestos Abatement Supervisor.
- .5 Asbestos-Containing Materials (ACMs): materials identified under Existing Conditions (Section 1.8), including fallen materials and settled dust containing 1% or more by dry weight in accordance with the CLC or 0.5% or more by dry weight in accordance with O. Reg. 278/05. For the purposes of this project, the lower limit of 0.5% or more asbestos by dry weight is applied to define a material as an ACM.
- .6 Asbestos Waste Containers: an impermeable container acceptable to disposal site and MECP. New materials only. Comprised of one of the following:
 - .1 A 0.15 mm sealed polyethylene bag, inside a second 0.15 mm polyethylene bag.
 - .2 A 0.15 mm polyethylene bag, positioned inside or outside a rigid sealed container of sufficient strength to prevent perforation of the container during filling, transportation and disposal.
 - .1 Rigid sealed container: metal or fibre type acceptable to dump operator with tightly fitting covers and 0.15 mm minimum thickness sealable polyethylene liners.
 - .2 If this is accepted by the dump operator, a written letter from the waste facility must be provided to the Consultant stating its acceptability.
 - .3 Label containers in accordance with Ontario Regulation 278/05 and Ontario Regulation 347. Label in both official languages.
 - .4 Any alternative to these methods of disposal detailed in writing to and approved by the Consultant
- .7 Asbestos Work Area: area where work takes place within banner tape or polyethylene enclosure which will, or may, disturb ACMs.
- .8 Authorized Visitors: Consultant(s) and representatives of regulatory agencies .
- .9 Banner Tape: pre-printed cautionary asbestos warning banner tape that describes the asbestos hazard.
- .10 Building: National Research Council Canada, M-24 Building located at 1200 Montréal Road, Ottawa, Ontario.
- .11 Competent Worker: a worker who is qualified to complete the work because of knowledge, training and experience to organize the work and its performance, and who is familiar with applicable regulations that apply to this work as outlined in References (Section 1.3). This person must be approved by the Ontario Ministry of Training, Colleges and Universities as a Certified Asbestos Abatement Worker .
- .12 Contractor: company or individual designated to complete the scope of work outlined in this specification.
- .13 Consultant: 3rd party consultant contracted by the National Research Council Canada, competent in the processes to be completed as part of this specification with authority to provide direction on behalf of the Owner.

- .14 Dispersed Oil Particulate (DOP) Test: testing method used to evaluate particle penetration and air flow resistance properties of filtration materials - HEPA filter leak test.
- .15 Friable Material: material that when dry can be crumbled, pulverized, or powdered by hand pressure and includes such material that is crumbled, pulverized, or powdered.
- .16 HEPA: High Efficiency Particulate Air filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .17 HEPA Filter Efficiency Testing: test to measure the efficiency of all HEPA filtered equipment on site prior to installation and movement of the equipment. Testing should be conducted using DOP.
- .18 HVAC system: all components of the Heating, Ventilation and Air Conditioning system.
- .19 Negative Pressure: system that extracts air directly from Asbestos Work Area, filters such extracted air through HEPA filtering system, and discharges this air directly outside the Asbestos Work Area to exterior of Building.
 - .1 System to maintain minimum pressure differential of at least 0.02 inches of water relative to adjacent areas outside of Asbestos Work Area.
- .20 Occupied Area: any area of the Building or work site that is outside Asbestos Work Area.
- .21 Owner: The National Research Council Canada.
- .22 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation. Minimum thickness 0.15 mm (6 mil).
- .23 Project Area: Room 111 within M-24 Building located at 1200 Montréal Road, Ottawa, Ontario.
- .24 Weighted, Curtained Doorways: arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, constructed as follows:
 - .1 Place two overlapping sheets of Fire Rated (FR) polyethylene over existing or temporarily framed doorway. Secure each along top of doorway. Secure vertical edge of one sheet along one vertical side of doorway, and secure vertical edge of other sheet along opposite vertical side of doorway.
 - .2 Reinforce free edges of polyethylene with duct tape and weight bottom edge to ensure proper closing.
 - .3 Overlap each polyethylene sheet at openings not less than 1.5 m on each side.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Before beginning work:
 - .1 Obtain from appropriate agency and submit to the Owner necessary permits for transportation and disposal of asbestos waste. Ensure that approved and licensed landfill operator is fully aware of hazardous nature of material(s) being landfilled, and proper methods of disposal. Submit proof satisfactory to the Owner that suitable arrangements have been made to receive and properly dispose of asbestos waste.
 - .2 Submit proof satisfactory to the Owner that employees have had instruction on hazards of asbestos exposure, respirator use, dress, use of showers, entry and exit from Asbestos Work Area, and aspects of work procedures and protective measures. Ensure asbestos workers and asbestos supervisory personnel have

attended asbestos abatement course, of not less than two days duration, approved by the Ministry of Colleges and Universities. Submit proof of attendance in form of certificate. Minimum of one Supervisor for every ten workers.

- .1 Every worker involved in a high-risk activity (Type 3) asbestos abatement operation must complete an Asbestos Abatement Worker Training Program approved by the Ministry of Colleges and Universities.
- .2 Every supervisor of a worker involved in a high-risk activity (Type 3) asbestos abatement operation must complete an Asbestos Abatement Supervisor Training Program approved by the Ministry of Colleges and Universities.
- .3 Submit to Owner satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing.
 - .1 Instruction and training related to respirators includes, following minimum requirements:
 - .1 Fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
 - .2 Instruction and training must be provided by a competent, qualified person.
- .4 Submit proof satisfactory to Owner that employees have respirator fitting and testing. Workers must be fit-tested with respirator that is personally issued.
- .5 Submit proof of Contractor's Asbestos Liability Insurance.
- .6 Submit Worker's Compensation Board status and transcription of insurance.
- .7 Submit proof of HEPA filter efficiency testing for all vacuums and negative air units in the Building. HEPA filter efficiency testing must be completed immediately prior to all vacuums and negative air units arriving in the Building and every six (6) months following that date for the duration of the project. Proof of this testing must be provided to the Consultant.
- .8 Submit documentation including test results, fire and flammability data, and Safety Data Sheets (SDS) for all chemicals and/or materials to be used including, but not limited to, the following:
 - .1 Spray adhesive.
 - .2 Amended water.
 - .3 Slow-drying sealer.
- .9 Submit a Health & Safety Plan before commencing work to Owner. Comply with all applicable health and safety regulations.
- .10 Submit layout of proposed enclosures and decontamination facilities to Owner.
- .11 Submit Provincial requirements for Notice of Project Form.

1.6

QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial, and local requirements pertaining to asbestos, provided that in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.
- .2 Mathematical calculations identifying the number of negative air units required for each enclosed area to ensure four air exchanges per hour must be displayed at the entrance to the clean room.
- .3 All negative air units and vacuums must be HEPA filter efficiency tested, inspected, and maintained by a competent worker before each use of the negative air unit. This is to ensure that the filter is not defective or damage and that there is no air leakage. HEPA filter testing must take place every six (6) months and all certificates detailing the outcome of the testing must be provided to the Owner.
- .4 Health and Safety:
 - .1 Health and Safety Requirements for worker and visitor protection:
 - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Areas include:
 - .1 At a minimum, a full-face air-purifying respirator equipped with P100 filter cartridges, personally issued to worker, and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to authority having jurisdiction.
 - .1 Workers and visitors must have respirators fit-tested qualitatively or quantitatively prior to use. Instruction must be provided on the use, care and maintenance of respirator being used.
 - .2 Disposable type protective clothing that does not readily retain or permit penetration of asbestos fibres, consisting of full-body covering including head covering with snug-fitting cuffs at wrists, ankles, and neck.
 - .3 CSA certified steel-toed lace-less rubber boots must be provided to all workers in every high-risk Type 3 Asbestos Work Area. Boots are to be stored in the Equipment and Access Room during abatement activities and only removed from the Asbestos Work Area when clearance air sampling has been completed and communicated by the Consultant. All boots are to be thoroughly washed prior to removal from the Asbestos Work Area or sealed in a 0.15 mm polyethylene bag and re-opened in another Asbestos Work Area.
 - .4 CSA-approved hard hats must be worn in all work areas and thoroughly washed prior to removal from the Asbestos Work Area.
 - .2 Visitor Protection:
 - .1 Provide protective clothing and approved respirators to Authorized Visitors to Asbestos Work Area.
 - .2 Instruct Authorized Visitors in the use of protective clothing, respirators, and procedures.
 - .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

- .3 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
- .4 Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual asbestos abatement.
- .2 Health and Safety Requirements for worker or visitor entering the Asbestos Work Area:
 - .1 Remove street clothes in clean change room and put on respirator with new filters or reusable filters that have been inspected as satisfactory, clean coveralls and head covers before entering shower room, dirty room or Asbestos Work Area. Store street clothes, uncontaminated footwear, towels, and similar uncontaminated articles in clean change room.
 - .2 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.
- .3 Health and Safety Requirements for worker or visitor exiting the Asbestos Work Area:
 - .1 Decontaminate protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing protective clothing. Place disposable protective clothing in Asbestos Waste Containers for disposal as asbestos waste. Be sure not to affect the seal between the face and the respirator during decontamination. Leave reusable items, except respirator, in dirty room. Still wearing the respirator, proceed naked to showers and be sure not to get P100 filters wet. Using soap and water wash body and hair thoroughly. Clean outside of respirator with soap and water while showering and be sure to cover respirator filters to avoid damage to P100 filters from water; remove respirator; cover respirator filters with duct tape to avoid fibre fall-out; and wash and rinse inside of respirator. When not in use in Asbestos Work Area, store work footwear in Equipment and Access Room. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from Asbestos Work Area or clean room.
 - .2 After showering and drying off, proceed to clean change room and dress in street clothes at end of each day's work, or in clean coveralls before eating, smoking, or drinking. If re-entering Asbestos Work Area, follow procedures outlined in paragraphs above.
- .4 Health and Safety Requirements for workers outside of the Asbestos Work Area:
 - .1 Must wear a CSA-approved hard hat and CSA-approved eye and foot protection. CSA-approved hearing protection may be required.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Asbestos waste generated during the project will be removed daily from the Buildings in the appropriate Asbestos Waste Container as detailed in O. Reg. 278/05 and O. Reg. 347/90.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Provincial, Regional, and local regulations.

- .4 All asbestos waste transfer must occur by hand. It is not permitted that Asbestos Waste Containers be transferred by use of garbage chutes, mechanized belts or other means whereby the Asbestos Waste Containers may be caused to break or fail in any way during handling or transfer.
- .5 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial, and local regulations. Dispose of asbestos waste in sealed double thickness 0.15mm bags or leak proof drums. Label containers with appropriate warning labels.
- .6 Asbestos waste to be handled in accordance with O. Reg. 347/90 and O. Reg. 278/05.
- .7 Provide waste manifests describing and listing waste generated and disposed of. Transport containers by approved means to MOECP licensed asbestos disposal landfill for burial.

1.8 EXISTING CONDITIONS

- .1 Information pertaining to ACMs to be handled, removed, or otherwise disturbed and disposed of during this project are provided in the Designated Substances Report.
- .2 Any interested parties must (i.e., qualified remediation contractor(s)) must verify the approximate quantities and locations of ACMs identified in the Designated Substances Report.
- .3 Notify Owner of suspected ACMs discovered during work and not apparent from specifications or reports pertaining to the work. Do not disturb such material pending written instructions from Consultant.

1.9 PERSONNEL TRAINING

- .1 Before beginning Work, provide to Owner, satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene including dress and showers, in entry and exit from Asbestos Work Area, in aspects of work procedures including glove bag procedures, and in use, cleaning, and disposal of respirators and protective clothing.
- .2 Instruction and training related to respirators includes, at minimum:
 - .1 Proper fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by competent, qualified person.
- .4 Supervisory personnel to complete required training.

Part 2 Products

2.1 MATERIALS

- .1 Polyethylene: minimum 0.15 mm thick unless otherwise specified; in sheet size to minimize joints.
- .2 Fire Rated (FR) polyethylene: minimum 0.25 mm thick, woven fibre reinforced fabric bonded both sides with polyethylene.
- .3 Tape: fibre-reinforced duct tape suitable for sealing polyethylene under both dry conditions and wet conditions using amended water.
- .4 Wetting agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether, or other material approved by Consultant, mixed with water in concentration to provide adequate penetration and wetting of asbestos containing material.
- .5 Asbestos Waste Containers: contain waste in two separate containers.
 - .1 Inner container: 0.15 mm thick sealable polyethylene bag [or where glove bag method is used, glove bag itself].
 - .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise, outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
 - .3 Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site. Label containers in accordance with Ontario Regulation 278/05 and Ontario Regulation 347. Label in both official languages.
- .6 Slow-drying sealer: non-staining, clear, water-dispersible type that remains tacky on surface for at least 8 hours and designed for the purpose of trapping residual asbestos fibres.
 - .1 Sealer: flame-spread and smoke-developed rating less than 50 and be compatible with new fireproofing.
- .7 Spray adhesive: quick-drying aerosol contact cement used to bond FR polyethylene sheeting during enclosure construction.
 - .1 Spray adhesive must be free of methylene chloride.

Part 3 Execution

3.1 PREPARATION

- .1 All work must be done in accordance with occupational health and safety requirements, the CLC, the COHSR, the *PSPC Asbestos Management Standard*, the OHSA, and all applicable regulations made under the OHSA.
- .2 All scaffolding must be approved by a licensed Engineer in the Province of Ontario.
- .3 Asbestos Work Areas:
 - .1 Surround the Asbestos Work Areas with banner tape ensuring that all access points have restricted access.
 - .2 Shut off and isolate air handling and ventilation systems to prevent fibre dispersal to other Building areas during work phase.

- .3 Clean proposed Asbestos Work Area using, where practicable, HEPA vacuum cleaning equipment. If not practicable, use wet cleaning method. Do not use methods that generate dust, such as dry sweeping, or non- HEPA vacuum equipment.
- .4 Remove any equipment or objects that may interfere with asbestos removal, as directed by the Owner and/or Consultant. Cover porous surfaces not being removed including all fire pull systems, sensors and/or devices. Fibreglass pipe insulation is either to be removed prior to abatement or covered with polyethylene sheeting sealed with tape and spray adhesive. Any carpets within Abatement Work Areas must either be removed prior to abatement or covered with FR polyethylene sheeting sealed with tape and spray adhesive. Use localized water spraying during fixture removal to reduce fibre dispersal.
- .5 Seal off all openings including but not limited to windows, ducts, grilles, diffusers, wall cavities, shafts, pipe chases and risers with polyethylene sheeting and tape.
- .6 Upper seals are to be constructed within each Asbestos Work Area to prevent the spread of dust or fibres to other areas of the Building.
- .7 Build airlocks at entrances to and exits from work areas so that work areas are always closed off by one weighted, curtained doorway when workers enter or exit.
- .8 The spread of dust from the Asbestos Work Area shall be prevented by:
 - .1 Using enclosures of FR polyethylene that is impervious to asbestos (including one or more transparent window areas to allow observation of Asbestos Work Area from outside the enclosure), if the work area is not enclosed by walls.
 - .2 Using curtains of FR polyethylene sheeting or other suitable material that is impervious to asbestos, fitted on each side of each entrance or exit from the Asbestos Work Area.
 - .3 Creating and maintaining within the enclosed area, by installing a ventilation system equipped with a HEPA filtered exhaust unit, a negative air pressure of at least 0.02 inches of water, relative to the area outside the enclosed area.
 - .4 Ensuring that replacement air is taken from outside the enclosed area and is free from contamination with any hazardous dust, vapour, smoke, fume, mist or gas.
 - .5 Using a device, at regular intervals, to measure the difference in air pressure between the enclosed area and the area outside it. This device must be calibrated within the last six months. Proof of calibration must be provided when requested.
- .9 At each access to Asbestos Work Areas install warning signs in both official languages in upper case "Helvetica Medium" letters reading as follows where number in parentheses indicates font size to be used: "CAUTION ASBESTOS HAZARD AREA (25 mm) NO UNAUTHORIZED ENTRY (19 mm) WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm). ATTENTION RISQUE D'EXPOSITION Á L'AMIANTE (25mm) PAS D'ENTRÉS SANS AUTORISATION (19mm) PORTER LES ÉQUIPEMENTS DE PROTECTION SPÉCIFIÉS (19mm) RESPIRER DES POUSSIÈRES D'AMIANTE PEUT REPRÉSENTER UN RISQUE Á LA SANTÉ (7mm)".

- .10 Maintain emergency and fire exits from Asbestos Work Area or establish alternative exits satisfactory to Authority having jurisdiction.
 - .11 Where application of water is required for wetting ACMs, shut off electrical power, provide 24-volt safety lighting and ground fault interrupter circuits on power source for electrical tools or provide 110-volt safety lighting if power is provided from a ground fault panel, in accordance with applicable CSA Standard. Ensure safe installation of electrical lines and equipment. Contractor is responsible for providing qualified personnel to connect all utilities including the water and hydro.
 - .12 After preparation of Asbestos Work Areas and decontamination enclosure systems, remove ACMs. Spray ACMs and debris in Asbestos Work Areas with amended water through use of low-pressure spraying device to reduce dust as work progresses.
- .4 Worker Decontamination Enclosure System:
- .1 Build suitable framing for enclosures, and line with FR polyethylene sheeting sealed with tape. Use two layers of FR polyethylene on floors and one layer on walls and ceiling.
 - .2 Build Weighted, Curtained Doorways between enclosures so that when people move through or when waste containers and equipment are moved through doorway, one of two closures comprising doorway always remains closed.
 - .3 Worker Decontamination Enclosure System includes Dirty Room (Equipment and Access Room, Shower Room, and Clean Room, as follows:
 - .1 Dirty Room (Equipment and Access Room): build Equipment and Access Room between Shower Room and Asbestos Work Area, with two weighted, curtained doorways, one to Shower Room and one to Asbestos Work Areas. Install waste receptor, and storage facilities for workers steel-toed lace-less rubber boots and protective clothing to be re-worn in Asbestos Work Area. Build Equipment and Access Room large enough to accommodate specified facilities, other equipment needed, and at least the number of workers composing the work team to undress comfortably. This area shall be temperature controlled and have a temperature maintained above 17 degrees Celsius.
 - .2 Shower Room: build Shower Room between Clean Room and Equipment and Access Room, with two weighted, curtained doorways, one to Clean Room and one to Equipment and Access Room. Provide one shower with hot and cold running water for every five workers. Provide constant supply of warm water. Provide all copper or high-pressure flexible piping and necessary equipment to connect to water sources and drains. Pump wastewater through 5 micrometre filter system acceptable to Consultant before directing into drains. Provide soap, clean towels, and appropriate containers for disposal of used respirator filters. This area shall be temperature controlled and have a temperature maintained above 17 degrees Celsius. The showers must have hot and cold water or water of a constant temperature that is not less than 40 degrees Celsius or more than 50 degrees Celsius.

- .3 Clean Room: build Clean Room between Shower Room and clean areas outside of enclosures, with two weighted, curtained doorways, one to outside of enclosures and one to Shower Room. Provide lockers or hangers and hooks for workers street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install mirror to permit workers to fit respiratory equipment properly. This area shall be temperature controlled and have a temperature maintained above 17 degrees Celsius.
- .5 Waste and Equipment Decontamination Enclosure System:
 - .1 All waste and equipment decontamination to be conducted through a separate decontamination system. The designation of each room for equipment and waste decontamination is outlined below.
 - .1 Dirty Room (Staging Area): use dirty room/staging area for gross removal of dust and debris from Asbestos Waste Containers and equipment, labelling and sealing of Asbestos Waste Containers, and temporary storage pending removal to the Wash Down Room.
 - .2 Wash Down Room: Provide low pressure volume sprays for washing of Asbestos Waste Containers and equipment. Pump wastewater through 5 micrometre filter system before directing into drains. Provide piping and all necessary equipment to connect to water sources and drains.
 - .3 Clean Room: use clean room to unload decontaminated Asbestos Waste Containers and equipment.
- .6 Separation of Work Areas from Occupied Areas.
 - .1 Separate parts of Building required to remain in use from parts of Building used for asbestos abatement by means of airtight barrier system constructed as follows:
 - .1 Build suitable floor to ceiling lumber or metal stud framing, cover with polyethylene sheeting sealed with tape, and apply 9 mm minimum thick plywood. Seal joints between plywood sheets and between plywood and adjacent materials with surface film forming type sealer, to create airtight barrier.
 - .2 Cover plywood barrier with polyethylene sealed with tape, as specified for work areas.
- .7 Maintenance of Asbestos Work Area(s):
 - .1 Maintain Asbestos Work Area in tidy condition.
 - .2 The Asbestos Work Area shall be inspected at the beginning of each working period, as a minimum, by a competent worker for defects in the enclosure, barriers, and wash facility.
 - .3 Ensure that barriers and polyethylene linings are effectively sealed and taped.
 - .4 Defects observed during an inspection shall be repaired immediately and no other work shall be carried out in the Asbestos Work Area until the repair.
- .8 Do not begin work until:
 - .1 Arrangements have been made for disposal of waste.
 - .2 Arrangements have been made for containing, filtering, and disposal of wastewater.

- .3 Work areas and decontamination enclosures and parts of Building required to remain in use are effectively segregated.
- .4 Tools, equipment, materials, and waste containers are on hand.
- .5 Arrangements have been made for Building security.
- .6 Warning signs are displayed where access to contaminated areas is possible.
- .7 Notifications have been completed and other preparatory steps have been taken.
- .8 Consultant has provided authorization to proceed.

3.2 SUPERVISION

- .1 Minimum of one Approved Supervisor for every ten workers is required.
- .2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of ACMs.

3.3 ASBESTOS REMOVAL

- .1 Before removing asbestos:
 - .1 Prepare Work Area in accordance with section 3.1.
 - .2 Spray asbestos material with water containing specified wetting agent, using airless spray equipment capable of providing "mist" application to prevent release of fibres. Saturate asbestos material sufficiently to wet it to substrate without causing excess dripping. Spray asbestos material repeatedly during work process to maintain saturation and to minimize asbestos fibre dispersion.
- .2 Remove saturated ACMs in small sections. Do not allow saturated asbestos to dry out. As ACMs are being removed, place ACMs in Asbestos Waste Containers.
- .3 Seal Asbestos Waste Containers. Clean outside of Asbestos Waste Containers thoroughly by wet sponging. Remove from Asbestos Work Area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving outside of Asbestos Waste Containers to Wash Down Room. Wash outside of Asbestos Waste Containers thoroughly in Wash Down Room and remove immediately through Clean Room and out of the enclosure. Ensure that Asbestos Waste Containers are removed from Clean Room by workers who have entered from uncontaminated areas dressed in clean coveralls.
- .4 After completion of removal work, wire brush and wet-sponge surfaces from which asbestos has been removed to remove visible material. During this work keep surfaces wet.
- .5 After wire brushing and wet sponging to remove visible asbestos, wet clean entire work area including Equipment and Access Room, and equipment used in removal process.
- .6 All visible dust and debris must be removed from the substrate to which it was adhered and any other dust / debris in the Asbestos Work Area must be removed. No distinction will be made about the content of the dust or debris.
- .7 Work is subject to visual inspection and air monitoring. Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
- .8 After acceptance of visual inspection by Consultant, apply continuous coat of slow-drying sealer to surfaces of work area.
- .9 Cleanup:

- .1 Frequently during Work and immediately after completion of work, clean up dust and asbestos containing waste using HEPA vacuum or by damp mopping.
- .2 Place dust and asbestos containing waste in sealed dust tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste and wet and fold to contain dust and then place in waste bags.
- .3 Immediately before their removal from Asbestos Work Area and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.
- .4 Seal and remove double bagged waste from site. Dispose of in accordance with requirements of Provincial/Territorial and Federal authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that guidelines and regulations for asbestos disposal are followed.
- .5 Perform final thorough clean-up of Asbestos Work Areas and adjacent areas affected by Work using HEPA vacuum.

3.4 FINAL CLEANUP

- .1 Following cleaning specified in 3.3 above, and when air sampling shows that airborne fibre levels do not exceed 0.01 fibres/cc using forced air clearance methods inside the enclosure and Phase Contrast Microscopy analysis as determined by NIOSH Method 7400, the Asbestos Work Areas is considered clean. Proceed with final cleanup.
- .2 Remove FR polyethylene sheet by rolling it away from walls to centre of Asbestos Work Area. Vacuum visible asbestos-containing dust observed during cleanup, immediately, using HEPA vacuum equipment as directed by the Consultant.
- .3 Place FR polyethylene seals, tape, cleaning material, clothing, and other contaminated waste in Asbestos Waste Containers.
- .4 Include in cleanup Work Area(s), Container and Equipment Decontamination Enclosure System, Worker Decontamination Enclosure System, and other contaminated enclosures.
- .5 Include in cleanup sealed Asbestos Waste Containers and equipment used in Asbestos Work Area(s) and remove from Asbestos Work Areas, via Container and Equipment Decontamination Enclosure System, at appropriate time in cleaning sequence.
- .6 Conduct final visual check to ensure that no dust or debris remains on surfaces as result of dismantling operations. Repeat cleaning using HEPA vacuum equipment, or wet cleaning methods where feasible.
- .7 As work progresses, and to prevent exceeding available storage capacity on site, remove Asbestos Waste Containers and dispose of at authorized disposal area in accordance with requirements of disposal authority.

3.5 INSPECTION

- .1 Prior to the beginning of ACMs removal, Consultant will perform a pre-abatement inspection on the Asbestos Work Area. The pre-abatement inspection will be completed to ensure the integrity of the enclosure, that all required submittals and paperwork have been reviewed or are on site and all equipment required for a High-risk activity (Type 3) asbestos removal is on site. No work is to begin until this inspection has been deemed acceptable to the Consultant.
- .2 From beginning of Work until completion of cleaning operations, Consultant to perform daily site inspections and collect air samples to monitor outside of the Asbestos Work Area enclosure and monitor contractor compliance with specification and governing authority requirements. Deviations from these requirements that have not been approved in writing by the Consultant may result in work stoppage, at no cost to Owner.
- .3 When asbestos leakage from Asbestos Work Area has occurred or is likely to occur Consultant may order Work shutdown.
 - .1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.
- .4 Following completion of the work, the Consultant must be contacted to complete a final visual inspection. This inspection must be organised by the Contractor with a minimum of twenty-four (24) hours' notice. This inspection is to take place in a dry environment.
- .5 Consultant will inspect Asbestos Work Area for:
 - .1 Adherence to specific procedures and materials.
 - .2 Compliance with specification and governing authority requirements.
 - .3 Final cleanliness and completion. Asbestos Work Area will be considered clean when all visible dust and debris is removed from the substrate to which it was adhered and deemed acceptable to the Consultant. No distinction will be made about the content of the dust or debris.
 - .4 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

3.6 AIR MONITORING

- .1 From beginning of work until completion of cleaning operations and reinstatement activities, Consultant will collect air samples on daily basis, outside of Asbestos Work Area and within the clean room.
 - .1 All air monitoring to be conducted in accordance with O. Reg. 278/05, the COHSR, the *PSPC Asbestos Management Standard* and following NIOSH Method 7400.
 - .1 A minimum of one (1) air sample to be collected outside of the Asbestos Work Area enclosure, for the duration of any work activity that involves ACMs, for work activities that lasts longer than 24 hours.
 - .2 A minimum of one (1) air sample to be collected in the clean room for the duration of any work activity that involves ACMs, for work activities that lasts longer than 24 hours.
 - .2 If air monitoring shows fibre levels to exceed 0.05 f/cc outside of Asbestos Work Area and/or within the clean room, work must stop.

- .3 Corrective action must be taken to mitigate and reduce elevated fibre levels. In addition to corrective action, these areas must be enclosed, maintained and cleaned, in same manner as that applicable to Asbestos Work Area, as directed by the Consultant, at no cost to the owner.
- .4 Work must stop and until subsequent air monitoring results are less than 0.05 f/cc.
- .2 Clearance air testing to be conducted as follows: After Asbestos Work Area has passed visual inspection and acceptable coat of lock-down agent has been applied to surfaces within enclosure, and appropriate setting period has passed, Consultant will perform clearance air testing within Asbestos Work Area using forced air methods. Enclosure to remain in place until completion of clearance air testing.
 - .1 Clearance air testing to be conducted in accordance with O. Reg. 278/05, the COHSR, the *PSPC Asbestos Management Standard* and following NIOSH Method 7400.
 - .2 The number of air samples taken shall be in accordance with O. Reg 278/05, para. 4 sub-section 18(6) and the COHSR.
 - .1 Two (2) air samples to be collected for an area in an enclosure that is 10 square meters or less.
 - .2 Three (3) air samples to be collected for an area in an enclosure that is more than 10 square meters and not more than 500 square meters.
 - .3 Five (5) air samples to be collected for an area in an enclosure that is more than 500 square meters.
 - .3 Clearance air testing results must show fibre levels of less than 0.01f/cc for all samples taken.
 - .4 If clearance air testing results show fibre levels in excess of 0.01f/cc, re-clean Asbestos Work Area and apply another acceptable coat of lock-down agent to surfaces at no cost to the Owner.
 - .5 Repeat as necessary until fibre levels are less than 0.01 f/cc. Additional testing may be subject to Transmission Electron Microscopy analysis following the NIOSH Method 7402.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

- .1 The following presumed silica-containing materials identified as being present in the Room 111 project area within the Building:
 - .1 Concrete
 - .2 Mortar
 - .3 Cementitious texture coat and other aggregates
- .2 Disturbance of silica-containing materials such as plaster and drywall or aggregate materials are considered Type 2 Silica Operation when performing the following Work as part of this project:
 - .1 The use of a power tool to cut, grind, or break silica-containing materials.
 - .2 The use of a power tool to remove silica containing materials.

1.2 RELATED SECTIONS

- .1 Report titled “Project-Specific Designated Substances and Hazardous Materials Survey Related to the M-24, Room 111 New Fit-Up Project at the Montreal Road Campus of the National Research Council Canada, in Ottawa, Ontario”, dated 17 January 2024 (WSP project number 22565806 Rev. 1), herein referred to as the “Designated Substances Report”.
- .2 Section 02 82 00.02 Type 2 Asbestos Operations - Intermediate Precautions.
- .3 Section 02 82 00.03 Type 3 Lead Operations - Maximum Precautions.
- .4 Section 02 83 10 Type 1 Lead Operations - Minimum Precautions.

1.3 REFERENCES

- .1 Comply with Federal, Provincial, and local requirements, provided that in any case of conflict among those requirements or with these specifications the more stringent requirements shall apply. Work shall be performed under regulations and guidelines in effect at the time work is performed. Regulations and guidelines include but are not limited to the following:
 - .1 Canada Labour Code (CLC)
 - .1 *Canada Occupational Health and Safety Regulations* (SOR/86-304).
 - .2 Ministry of Labour, Training and Skills Development (MLTSD)
 - .1 *Occupational Health and Safety Act*, R.S.O. 1990, Chapter O.1 (OHSA).
 - .2 Ontario Regulation 213/91: *Construction Projects*, as amended (O. Reg. 213/91).
 - .3 Ontario Regulation 278/05: *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*, as amended (O. Reg. 278/05).
 - .4 Ontario Regulation 490/09: *Designated Substances* (O. Reg. 490/09).
 - .5 Ontario Regulation 833/90: *Control of Exposure to Biological or Chemical Agents* (O. Reg. 833/90).

- .6 Ontario Regulation 860/90: *Workplace Hazardous Materials Information System (WHMIS) Regulation*, as amended (O. Reg. 860/90).
- .7 *Lead on Construction Projects*, MLTSD, updated April 2011.
- .8 *Silica on Construction Projects*, MLTSD, updated November 2022.
- .3 Ministry of Environment, Conservation and Parks (MECP)
 - .1 *Environmental Protection Act*, R.S.O. 1990, Chapter E.19, as amended (EPA).
 - .2 Ontario Regulation 347/90: *General – Waste Management*, as amended (O. Reg. 347/90).
- .4 Transport Canada (TC)
 - .1 *Transportation of Dangerous Goods Act*, 1992, as amended (TDGA).
- .5 U.S. Department of Health and Human Services (DHHS)/Centers for Disease Control and Prevention (CDC)/National Institute for Occupational Safety and Health (NIOSH).
 - .1 *NIOSH Manual of Analytical Methods (NMAM)*, 5th ed., DHHS (December 2017).
- .6 Canadian Standards Association
 - .1 CAN/CSA-Z94.4-18 – *Selection, Use, and Care of Respirators*.
- .7 Public Services and Procurement Canada (PSPC)
 - .1 *PSPC Asbestos Management Standard* as amended.
- .8 Department of Justice Canada
 - .1 *Canadian Environmental Protection Act (CEPA)*, 1999.

1.4 DEFINITIONS

- .1 Approved Supervisor: a person who has charge of a workplace or authority over a worker and has received the appropriate training for that role. A supervisor is ultimately responsible to provide direction to workers on site and must follow the applicable regulations and guidelines that apply to this work including, but not limited to, those as outlined in References (Section 1.3).
- .1 Authorized Visitors: Consultants and representatives of regulatory agencies.
- .2 Banner Tape: pre-printed cautionary warning banner tape that delineates the Silica Work Area.
- .3 Building: National Research Council Canada, M-24 Building located at 1200 Montreal Road, Ottawa, Ontario
- .4 Competent Worker [person]: in relation to specific work, means a worker who:
 - .1 Is qualified because of knowledge, training and experience to perform the work.
 - .2 Is familiar with the provincial and federal laws and with the provisions of the regulations that apply to the work.
 - .3 Has knowledge of all potential or actual danger to health or safety in the work.
- .5 Contractor: company or individual designated to complete the scope of work outlined in this specification

- .6 Consultant: 3rd party consultant contracted by the National Research Council Canada, competent in the processes to be completed as part of this specification with authority to provide direction on behalf of the Owner.
- .7 Dispersed Oil Particulate (DOP) Test: testing method used to evaluate particle penetration and air flow resistance properties of filtration materials - HEPA filter leak test.
- .8 HEPA: High Efficiency Particulate Air (HEPA) filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .9 HEPA Filter Efficiency Testing: test to measure the efficiency of all HEPA filtered equipment on the Site prior to use of the equipment. Testing should be conducted using DOP.
- .10 HVAC System: all components of the Heating, Ventilation and Air Conditioning system.
- .11 Occupied Area: any area of the building outside the Silica Work Areas.
- .12 Owner: The National Research Council Canada.
- .13 Silica Work Area: area where work takes place which will, or may, disturb silica-containing material.
- .14 Project Area: Room 111 within M-24 Building located at 1200 Montreal Road, Ottawa, Ontario.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Before beginning work:
 - .1 Submit to Owner satisfactory proof that every worker has had instruction and training in WHMIS, the hazards of crystalline silica exposure, the recognition of typical operations containing crystalline silica, personal hygiene, respirator requirements, proper work measures, and procedures, and in the use, cleaning, maintenance and disposal of respirators and protective clothing.
 - .2 Submit to the Owner satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing.
 - .1 Instruction and training related to respirators includes, following minimum requirements:
 - .1 Fitting of equipment;
 - .2 Inspection and maintenance of equipment;
 - .3 Disinfecting of equipment; and,
 - .4 Limitations of equipment.
 - .2 Instruction and training must be provided by a competent, qualified person.
 - .3 Submit proof of HEPA filter efficiency testing for all vacuums. HEPA filter efficiency testing must be completed immediately prior to commencing work and every 6 months thereafter. Proof of this testing must be provided to the Owner prior to commencing work.
 - .4 Submit Worker's Compensation Board status and transcription of insurance.

- .5 Submit documentation including test results, fire and flammability data, and Safety Data Sheets (SDS) for all chemicals and/or materials to be used including, but not limited to, the following:
 - .1 Spray adhesive.
 - .2 Amended water.
 - .3 Slow-drying sealer.
- .6 Submit a Health & Safety Plan before commencing work to Owner. Comply with all applicable health and safety regulations.

1.6 EXISTING CONDITIONS

- .1 Information pertaining to crystalline silica to be handled, removed, or otherwise disturbed and disposed of during this project are provided in the Designated Substances Report.
- .2 Any interested parties must (i.e., qualified remediation contractor(s)) must verify the approximate quantities and locations of crystalline silica identified in the Designated Substances Report.

1.7 WORKER AND VISITOR PROTECTION:

- .1 Workers and visitors shall use as a minimum; full-face air purifying respirators fitted with P100 particulate filters. Contractors should refer to the MLTSD's Guideline: *Silica on Construction Projects*, revised in 2011, for respirator requirements under all classifications of work for silica operations.
 - .1 Respiratory protective devices shall be certified by the National Institute of Occupational Safety and Health (NIOSH) and fit-tested to the worker wearing it.
 - .2 Ensure that no person required to enter a Silica Work Area has facial hair which affects the seal between respirator and face.
- .2 Protective Clothing: If requested by the worker, employer to provide workers with protective clothing that does not readily retain or permit penetration of crystalline silica dust. This clothing can be disposable type or reusable. If reusable clothing is used, it must remain in a designated area on Site and be washed as required based on the level of contamination or as directed by the Consultant.
- .3 Every worker who enters the work area shall wear protective clothing.
- .4 Eating, drinking, chewing, and smoking are not permitted in the Silica Work Areas.
- .5 Before leaving the Silica Work Areas, workers shall decontaminate their protective clothing using a HEPA vacuum or by damp wiping. Store clean protective re-usable clothing in clean plastic bag for reuse, or, if protective clothing is not re-usable or not to be reused, dispose of as contaminated waste.
- .6 Ensure workers wash hands and face when leaving Silica Work Areas. If washing facilities are not available, a washcloth, water basin and soap shall be made available directly outside the Silica Work Areas.

1.8 VISITOR PROTECTION

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

1.9 NOTIFICATION

- .1 Inform all contractors and subcontractors of the presence of crystalline silica identified in the contract documents.

Part 2 Products

2.1 MATERIALS

- .1 All materials brought to work site must be in good condition and free of crystalline silica dust, debris, and fibrous materials. Disposable items must be of new materials only.

2.2 EQUIPMENT

- .1 HEPA Vacuum: HEPA filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency with all necessary fittings, tools, and attachments. All air must pass through HEPA filter before discharge.
- .2 Portable Eye Wash Station: portable eye wash station, minimum spray time of 15 minutes.
- .3 Sprayer: garden-type portable manual sprayer or water hose with spray attachment if suitable.

Part 3 Execution

3.1 PREPARATION

- .1 Before beginning work, at each access to Silica Work Areas, warning signs must be posted in sufficient number to warn of the hazard. The signs must display the following information in large, clearly visible letters:
 - .1 There is a silica dust hazard.
 - .2 Access to the work area is restricted to authorized persons.
 - .3 Respirators must be worn in the work area.
- .2 Surround the Silica Work Areas with banner tape ensuring that all access points have restricted access. The Silica Work Area must be set up such that other workers (if applicable) are to remain at least 10 meters away from the Silica Work Area. The banner tape is to be set up to prevent unauthorized personnel from entering the Silica Work Area.
 - .1 Maintenance of Silica Work Areas:
 - .1 Maintain Silica Work Area in tidy condition.
 - .2 The Silica Work Area shall be inspected at the beginning of each working period, as a minimum, by a competent worker for defects in the enclosure, barriers, and wash facility.
 - .3 Defects observed during an inspection shall be repaired immediately and no other work shall be carried out in the Silica Work Area until the repair.

3.2 CRYSTALLINE SILICA DISTURBANCE

- .1 Any material containing crystalline silica to be removed or disturbed should be thoroughly wetted before work unless wetting creates a hazard or causes damage. Use garden reservoir type low velocity fine mist sprayer or equipment appropriate for work being performed. Perform all work in a manner to reduce dust generation to lowest levels practicable.
- .2 Clean up after each operation is required to prevent dust containing silica from spreading.
- .3 Compressed air or dry sweeping must be avoided when cleaning a Silica Work Area.
- .4 Compressed air must not be used for removing dust from clothing.
- .5 Workers exposed to silica must be provided with or have access to washing facilities equipped with clean water, soap, and individual towels.
- .6 Silica dust on personal protective clothing and equipment must be removed by damp wiping and/or HEPA vacuuming.
- .7 Contaminated personal protective clothing and equipment must be handled with care to prevent disturbing the silica dust and the generation of airborne silica dust.
- .8 Consultant will perform cleanliness inspections and testing, as necessary, and inspect work for adherence to specification sections and guidelines.
- .9 Cleanup:
 - .1 Frequently during the work, and immediately after completion of the work, clean up waste containing crystalline silica in a manner that does not create airborne dust. Wetting the material is likely a feasible method.

3.3 WASTE AND MATERIAL HANDLING

- .1 Clean up waste routes and loading area after each load. Use applicable specification sections where appropriate or requested by Consultant.
- .2 Cooperate with governmental inspectors and immediately carry out instructions for remedial work, at no additional cost to the owner.

3.4 CLEANLINESS TESTING AND AIR MONITORING

- .1 Acceptance of the completed work and cleanliness of surfaces in the work areas will be based on visual inspection, as required. The acceptable criteria for airborne crystalline silica dust concentrations within a work area are based on the type of crystalline silica present as outlined in applicable regulations and guidelines. Final visual inspections may be conducted before the dismantling of any barrier system used during silica operations.
- .2 The Consultant may perform air monitoring inside and outside the Silica Work Areas. If airborne silica concentrations exceed 0.025 mg/m^3 outside the work areas, the contractor shall stop all work and modify work practices to reduce worker exposures to acceptable levels.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

- .1 Disturbance or removal of door frames, walls, metal beams, ceramic tiles, and related materials with lead-containing paints and/or glazing are anticipated to be required during the new fit-up project activities in the Room 111 project area within the Building. Type 1 Lead Operations are applicable to the following procedures:
 - .1 Installation or removal of lead-containing sheet metal, packing or similar material. This includes removal of doors, door frames and trim with lead-containing paints. It does not include removal of doors with lead-containing paint when the doors can be removed by removing them from the door hinges if this can be done without disturbance of the lead-containing paint. In such an instance, door removal is not considered a lead operation, however, the doors must be disposed/recycled in accordance with this specification.
 - .2 Removal of lead-containing paints using a chemical gel or paste.
 - .3 Removal of lead-containing paints by means of a power tool with an effective dust collection system equipped with a HEPA filter.
 - .4 Removal of lead-containing paints using non-powered hand tools, other than manual scraping and sanding.

1.2 RELATED SECTIONS

- .1 Report titled “Project-Specific Designated Substances and Hazardous Materials Survey Related to the M-24, Room 111 New Fit-Up Project at the Montreal Road Campus of the National Research Council Canada, in Ottawa, Ontario”, dated 17 January 2024 (WSP project number 22565806 Rev. 1), herein referred to as the “Designated Substances Report”.
- .2 Section 02 82 00.01 Type 1 Asbestos Operations – Minimum Precautions.
- .3 Section 02 82 00.02 Type 2 Asbestos Operations – Intermediate Precautions.
- .4 Section 02 82 00.03 Type 3 Asbestos Operations – Maximum Precautions.

1.3 REFERENCES

- .1 Canada Labour Code (CLC)
 - .1 *Canada Occupational Health and Safety Regulations* (SOR/86-304).
- .2 Ministry of Labour, Immigration, Training, and Skills Development (MLITSD)
 - .1 *Occupational Health and Safety Act*, R.S.O. 1990, Chapter O.1 (OHSA).
 - .2 Ontario Regulation 213/91: *Construction Projects*, as amended (O. Reg. 213/91).
 - .3 Ontario Regulation 278/05: *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*, as amended (O. Reg. 278/05).
 - .4 Ontario Regulation 490/09: *Designated Substances* (O. Reg. 490/09).
 - .5 Ontario Regulation 860/90: *Workplace Hazardous Materials Information System (WHMIS) Regulation*, as amended (O. Reg. 860/90).
 - .6 *Lead on Construction Projects*, Ontario Ministry of Labour, updated April 2011.
 - .7 *Silica on Construction Projects*, updated November 2022.

- .3 Ministry of Environment, Conservation and Parks (MECP)
 - .1 *Environmental Protection Act*, R.S.O. 1990, Chapter E.19, as amended (EPA)
 - .2 Ontario Regulation 347/90: *General – Waste Management*, as amended (O. Reg. 347/90)
- .4 Transport Canada (TC)
 - .1 *Transportation of Dangerous Goods Act*, 1992, as amended (TDGA).
- .5 U.S. Department of Health and Human Services (DHHS)/Centers for Disease Control and Prevention (CDC)/National Institute for Occupational Safety and Health (NIOSH).
 - .1 NIOSH Manual of Analytical Methods (NMAM), 5th ed., DHHS (December 2017).
- .6 Canadian Standards Association
 - .1 CAN/CSA-Z94.4-18 – Selection, Use, and Care of Respirators.

1.4 DEFINITIONS

- .1 Approved Supervisor: a person who has charge of a workplace or authority over a worker and has received the appropriate training for that role. A supervisor is ultimately responsible to provide direction to workers on site and must follow the applicable regulations that apply to this work including, but not limited to, those as outlined in References (Section 1.3).
- .2 Authorized Visitors: Consultant(s) and representatives of regulatory agencies.
- .3 Banner Tape: Pre-printed cautionary lead warning banner tape that describes the lead hazard and delineates the Lead Work Area.
- .4 Building: National Research Council Canada, M-24 Building located at 1200 Montréal Road, Ottawa, Ontario.
- .5 Competent Worker: a worker who is qualified to complete the work because of knowledge, training and experience to organize the work and its performance, and who is familiar with applicable regulations that apply to this work including, but not limited to, those as outlined in References (Section 1.3).
- .6 Contractor: company or individual designated to complete the scope of work outlined in this specification section.
- .7 Consultant: 3rd party consultant contracted by BGIS, competent in the processes to be completed as part of this specification with authority to provide direction on behalf of the Owner.
- .8 HEPA: High Efficiency Particulate Air filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .9 HEPA Filter Efficiency Testing: test to measure the efficiency of all HEPA filtered equipment on site prior to installation and movement of the equipment. Testing should be conducted using dispersed oil particulate (DOP).
- .10 HVAC system: all components of the Heating, Ventilation and Air Conditioning system.
- .11 Lead Work Area: area where actual disturbance of lead-containing materials takes place.
- .12 Occupied Area: areas of Building that is outside of the Lead Work Area.
- .13 Owner: The National Research Council Canada.

- .14 Project Area: Room 111 within M-24 Building located at 1200 Montréal Road, Ottawa, Ontario.
- .15 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work.
- .16 Type 1 Lead Operations: See Section 1.1. Type 1 Lead Operations precautions are based on expected airborne lead concentrations of $\leq 0.05 \text{ mg/m}^3$.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide proof satisfactory to Owner that suitable arrangements have been made to dispose of lead-containing material(s) and lead-contaminated waste in accordance with requirements of authority having jurisdiction.
- .2 Provide proof of Contractor's General and Environmental Liability Insurance.
- .3 Submit proof of HEPA filter efficiency testing for all vacuums and negative air units in the Building. HEPA filter efficiency testing must be completed prior to all vacuums and negative air units arriving in the Building and every six (6) months following that date for the duration of the project. Proof of this testing must be provided to the Owner.
- .4 Quality Control:
 - .1 Provide the Owner with necessary permits for transportation and disposal of lead-containing material(s) and lead-contaminated waste and proof that it has been received and properly disposed.
 - .2 Provide proof satisfactory to the Owner that employees have had instruction on hazards of lead exposure, respirator use, dress, entry and exit from Lead Work Area, and aspects of work procedures and protective measures.
 - .3 Submit proof satisfactory to the Owner that employees have respirator fitting and testing. Workers must be fit-tested (irritant smoke test) with a respirator that is personally issued prior to beginning work.
 - .4 Submit Worker's Compensation Board status and transcription of insurance.
- .5 Product data:
 - .1 Provide documentation including Safety Data Sheets (SDSs) for all chemicals and/or materials to be used including, but not limited to, the following:
 - .1 Encapsulants;
 - .2 Amended water;
 - .3 Slow drying sealer; and,
 - .4 Chemical pastes and gels.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial and local requirements pertaining to lead paint, in case of conflict among those requirements or with these specifications, the more stringent requirement applies. Comply with regulations in effect at time work is performed.
- .2 Health and Safety:
 - .1 Health and Safety Requirements for worker and visitor protection:
 - .1 Protective equipment and clothing to be worn by workers and visitors in Lead Work Area includes:

- .1 NIOSH approved air purifying half-face respirator equipped with P-100 filter cartridges acceptable to Authority having jurisdiction and fit-tested to the worker wearing it.
- .2 Disposable type protective clothing that does not readily retain or permit skin contamination, consisting of full body covering including head covering with snug fitting cuffs at wrists, ankles, and neck.
- .3 Protective clothing to cover hands and prevent ingestion of lead dust and particulate during and following work activities. This protection must be durable enough to withstand construction / demolition activities.
- .2 Decontamination Requirements for workers:
 - .1 Remove gross contamination from clothing before leaving Lead Work Area. Place contaminated work suits in receptacles for disposal with other lead-contaminated materials. Upon completion of lead abatement/disturbance operations, thoroughly clean footwear using a HEPA vacuum before removing from Lead Work Area.
 - .3 Eating, drinking, chewing, and smoking are not permitted in the Lead Work Area.
 - .4 Ensure workers wash hands and face when leaving Lead Work Area. Facilities for washing are to be provided by Contractor.
 - .5 Ensure no person required to enter Lead Work Area has facial hair that affects seal between respirator and face.
 - .6 Visitor Protection:
 - .1 Provide protective clothing and approved respirators to Authorized Visitors to Lead Work Area.
 - .2 Instruct Authorized Visitors in use of protective clothing, respirators and procedures.
 - .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Lead Work Area.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Handle and dispose of hazardous materials in accordance with EPA, TDGA, MECP, Federal, Provincial and Municipal regulations.
- .2 All lead-containing materials to be removed must be sent to a MECP licensed recycling or disposal facility. If recycling of the lead is not completed, then it must be disposed of in an approved hazardous landfill.
- .3 Disposal of any lead waste that cannot be recycled or generated by removal activities must comply with Federal, Provincial, and Municipal regulations. Dispose of lead waste in sealed double thickness 0.15 mm bags or leak proof drums. Label containers with appropriate warning labels.
- .4 Provide waste manifests describing and listing waste generated and disposed of. Transport containers by approved means to MECP licensed disposal landfill for burial.

1.8 EXISTING CONDITIONS

- .1 Information pertaining to materials with lead-containing paints and/or glazing to be handled, removed, or otherwise disturbed and disposed of during this project are provided in the Designated Substances Report.
- .2 Any interested parties (i.e., qualified remediation contractor(s)) must verify the approximate locations of lead-containing materials identified in the Designated Substances Report.
- .3 Notify Owner of suspected lead-containing materials that are discovered during work and not apparent from specifications or reports pertaining to the work. Do not disturb such material pending written instructions from Consultant.

Part 2 Products

2.1 MATERIALS

- .1 Polyethylene: 0.15 mm unless otherwise specified; in sheet size to minimize joints.
- .2 Fire Rated (FR) polyethylene: 0.25 mm woven fibre reinforced fabric bonded both sides with polyethylene.
- .3 Tape: fibre-reinforced duct tape suitable for sealing polyethylene under dry conditions and wet conditions using amended water.
- .4 Slow-drying sealer: non-staining, clear, water-dispersible type that remains tacky on surface for at least 8 hours and designed for trapping residual dust or other residue.
- .5 Lead waste containers: metal or fibre type acceptable to dump operator with tightly fitting covers and 0.15 mm sealable polyethylene liners.
 - .1 Label containers with pre-printed bilingual cautionary labels warning of lead hazard that are clearly visible when containers are ready for removal to disposal site.

Part 3 Execution

3.1 SUPERVISION

- .1 Approved Supervisor must remain within Lead Work Area during disturbance, removal, or other handling of lead-containing materials.

3.2 PREPARATION

- .1 Lead Work Area:
 - .1 Prepare washing facility, consisting of wash basin, water, soap and towels. Washing facilities must be used by workers prior to eating, drinking, smoking or leaving the Lead Work Area.
 - .2 Place drop sheets below all materials containing lead to be removed, which will or may produce lead dust, debris or chips upon removal.
 - .3 Place HEPA vacuum and lead waste container in the Lead Work Area.
 - .4 Maintain emergency and fire exits from Lead Work area, or establish alternative exits satisfactory to Owner.

3.3 INSPECTION

- .1 Prior to the beginning of removal work, the Consultant may perform a pre-abatement inspection on the Lead Work Area. The pre-abatement inspection will be completed to ensure all equipment required to complete the measures and procedures that apply to Type 1 Lead Operations are present. Deviations from these requirements not approved in writing by Consultant will result in work stoppage, at no cost to the Owner.
- .2 Following completion of the removal work, the Consultant may complete a final visual inspection. This inspection must be organised by the contractor with a minimum of twenty-four (24) hours notice.
- .3 Consultant will inspect work for:
 - .1 Adherence to specific procedures and materials requirements.
 - .2 Final cleanliness and completion of work. Lead Work Area will be considered clean when all visible dust and debris is removed, and level of cleanliness is deemed acceptable to the Consultant. No distinction will be made about the content of the dust or debris.
 - .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.
- .4 When lead dust migration from Lead Work Area occurs, Consultant will order work shutdown.
 - .1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

3.4 FINAL CLEANUP

- .1 Following specified cleaning procedures and after acceptance of final visual inspection by Consultant, proceed with final cleanup.
- .2 Vacuum visible lead-containing particulate immediately, using a HEPA filtered vacuum.
- .3 Place polyethylene, tape, cleaning material, clothing, and other lead-contaminated waste in plastic bags and sealed labelled waste containers for transport.
- .4 Clean up Lead Work Area, equipment and any other potentially lead-contaminated equipment or Building components.
- .5 Clean up sealed waste containers and equipment used in Lead Work Areas and remove from Lead Work Area, at appropriate time in cleaning sequence.
- .6 Conduct final inspection to ensure no dust or debris remains on surfaces as result of lead abatement / disturbance operations.

END OF SECTION

Part 1 GENERAL

1.1 Reference Standard

- .1 Do welding work in accordance with CSA W59-1982 unless specified otherwise.

1.2 Shop Drawings

- .1 Submit to the Engineer for approval five (5) copies of erection drawings together with shop drawings of details, special connections, reinforced openings and other non-standard items. Shop drawings to bear the stamp of a registered professional Engineer.
- .2 Indicate shop and erection details including cuts, copes, connections, holes, bolts and welds. Indicate welds by welding symbols defined in [CSA W59-M1984].
- .3 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

Part 2 PRODUCTS

2.1 2.1 Materials

- .1 SPEC NOTE: For aluminum, stainless steel, galvanized iron Ref. to mini Spec. - Section 05500.
- .2 Steel sections and plates: to CAN3-G40.21- M81, Grade 300W: Hollow steel sections to CAN3-G40.21-M81, Grade 350W.
- .3 Steel pipe: to ASTM A53-82 extra strong finish.
- .4 Welding materials: to CSA W59-1982.
- .5 Bolts and anchor bolts: to ASTM A307-82a.
- .6 Galvanizing: hot dipped galvanizing with zinc coating 600g/m² (0.12 lb/ft²) to CSA G164-M1981.
- .7 Shop coat primer: to CGSB 1-GP-40M.
- .8 Zinc primer: zinc rich, ready mix to CGSB 1-GP-181M.
- .9 Grout: non-shrink, non-metallic, flowable, 24h, MPa 15 (2175 lbs/in²), pull-out strength 7.9 MPa (1145 lbs/in²).

2.2 Fabrication

- .1 Build work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Fabricate items from steel unless otherwise noted.
- .3 Use self-tapping shake-proof, flat, round, oval headed screws on items requiring assembly by screws or as indicated.
- .4 Where possible, fit and shop assemble work, ready for erection.
- .5 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 Shop Painting

- .1 Apply one shop coat of primer to metal items, with exception of stainless steel, aluminum, galvanized or concrete encased items.
- .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7°C (45°F).
- .3 Clean surfaces to be field welded, do not paint.

2.4 Angle Lintels

- .1 Steel angles: prime painted, and sizes as indicated for openings. Provide 150mm (6") minimum bearing at ends.
- .2 Weld or bolt back-to-back angles to profiles as indicated.

2.5 Pipe Railings

- .1 Steel Pipe: [] mm nominal outside diameter, formed to shapes and sizes as indicated.
- .2 Galvanize external pipe railings after fabrication.

2.6 Access Ladders

- .1 Stringers: [] mm thick, steel angle.
- .2 Rungs: 20mm (3/4") diameter x x mm thick, angle, welded to stringers at mm o.c.

- .3 Brackets: sizes and shapes as indicated, weld to stringers at mm c.c., complete with fixing anchors.
- .4 Galvanize finish for exterior, prime paint for interior.
- .5 Galvanize exterior ladders after fabrication.

2.7 Trench Covers and Frames

- .1 Fabricate from 6mm (1/4") thick raised checkered pattern steel plate set in L55mm x 55mm x 6mm frame (2-3/16" x 2-3/16" x 1/4"). Include anchors at 1200 mm (4 ft) oc for embedding in concrete. Supply trench covers in 1200 mm (4 ft) removable lengths. Sizes as indicated.
- .2 Hot dipped galvanized after fabrication.
- .3 Provide perimeter and edge compressive rubber seal/gasket.
- .4 Provide flush type lifting devices with an air tight steel plate pocket.
- .5 Provide stainless steel Philips head machine bolts @ 150 mm o.c.

Part 3 EXECUTION

3.1 Erection

- .1 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .2 Provide suitable means of anchorage acceptable to Engineer, Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .3 Make field connections, with bolts to CSA S16-1969 and CSA S1653-1981, or weld.
- .4 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
- .5 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
- .6 Touch-up galvanized surfaces with zinc primer where burned by field welding and cutting.

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 2020 as supplemented by following requirement except where specific type is indicated.
- .2 Nails, spikes and staples to NBC 9.23. 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 N/A

Part 2 PRODUCTS

2.1 Insulation

- .1 Bulk insulation: fabricated from friction fit batts or rolls [glass fibre][mineral fibre], RSI 0.6 (R3.33) for each 25 mm (1") thickness. Extruded polystyrene: below grade: to CAN/CGSB-51.20-M87, type 4 having RSI 0.87 for each 25 mm (1") thickness to thickness indicated and having a compressive strength of 210 Kpa, square edges. Only polystyrene insulations listed on CGSB Qualified Products List (GP-41) are acceptable for use on this project. For roofing application, use polystyrene board with pre-grooved channels on the underface to facilitate drainage.
- .2 Extruded polystyrene: below grade: to CAN/CGSB-51.20-M87, type 4 having RSI 0.87 for each 25 mm (1") thickness to thickness indicated and having a compressive strength of 210 Kpa, square edges. Only polystyrene insulations listed on CGSB Qualified Products List (GP-41) are acceptable for use on this project. For roofing application, use polystyrene board with pre-grooved channels on the underface to facilitate drainage.
- .3 Bulk insulation: fabricated from friction fit batts or rolls mineral fibre, RSI 0.6 (R3.33) for each 25 mm (1") thickness.
- .4 Acoustical Fire Batt Insulation (ROCKWOOL AFB or Equivalent (formerly ROXUL)) for Commercial & Interior partition wall: Mineral Fiber Thermal Insulation is fabricated from natural stone and recycled formats, fire resistant (CAN4 S114, ASTM E 136, CAN/ULC S102 & S129), Corrosive Resistance (ASTM C 665 & 795), Air Erosion (UL 181), Compliance and Performance (CAN/ULC S702-07, ASTM C 665 & 553). Sizes 412.75mm x 1219mm, 615.95mm x 1219mm, Thickness 25mm to 88.9mm with 12.7mm increments (as well as 100mm, 125mm and 152mm). Density at 50mm thick (45kg/m³).

2.2 Accessories

- .1 Insulation clips: impale type, perforated 50 x 50 mm (2" x 2") cold rolled carbon steel 0.8 mm (20 ga.) thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm (1") diameter washers of self-locking type.
- .2 Sealant: to CAN/CGSB-19.21-M87.
- .3 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.

3.2 Semi-Rigid Insulation Installation

- .1 Install glass fibre bulk insulation with insulation clips and disc, cut off fastener spindle 3 mm (1/8") beyond disc where installed to substrate. Install with adhesive to concrete substrate.
- .2 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm (6") wide 0.15 mm (6 mil) polyethylene strip over joint using compatible adhesive before application of insulation.

3.3 Perimeter Foundation Insulation

- .1 Interior application: extend boards vertically and horizontally below bottom of finish floor slab, installed on inside face of perimeter foundation walls as shown on drawings.
- .2 Exterior application: extend boards below finish grade as shown on drawing. Install on exterior face of perimeter foundation wall with adhesive Type A. Protect entire face of insulation exposed to backfill with protection board.
- .3 Under slab application: extend boards from perimeter foundation wall as shown on drawings. Lay boards on level compacted fill.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCES

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

1.3 DEFINITIONS

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

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with submittal procedures of Section 01 33 00.
 - .2 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.
 - .3 Construction details should accurately reflect actual job conditions.
- .3 Samples:
 - .1 Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.
- .4 Quality assurance submittals:
 - .1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
 - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
- .5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .6 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.
- .7 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company specializing in fire stopping installations, with 5 years experience, approved by manufacturer.
- .2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Departmental Representative.
- .3 Verify project requirements.
- .4 Review installation and substrate conditions.
- .5 Co-ordination with other building subtrades.

- .6 Review manufacturer's installation instructions and warranty requirements.
- .7 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
 - .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .2 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, and ULC markings.
- .2 Storage and Protection:
 - .1 Store materials indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

Part 2 PRODUCTS

2.1 MATERIALS

- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
- .2 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended.
- .3 Fire stop system rating: 2 hours.
- .4 Service penetration assemblies: systems tested to CAN-ULC-S115.
- .5 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
- .6 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .7 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal. Where existing/new electrical/data conduit passes through existing/new wall, accepted provision for assembly seal to use 'ez-path series 22 device c/w adjustable sleeve, wall plates and gaskets both sides.

- .8 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .9 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .10 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .11 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .12 Sealants for vertical joints: non-sagging.

Part 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
- .2 Ensure that substrates and surfaces are clean, dry and frost free.
- .3 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .4 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .5 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

3.4 SEQUENCES OF OPERATION

- .1 Proceed with installation only when submittals have been reviewed by Departmental Representative.
- .2 Install floor fire stopping before interior partition erections.
- .3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.
- .4 Mechanical pipe insulation: certified fire stop system component.
 - .1 Ensure pipe insulation installation precedes fire stopping.

3.5 FIELD QUALITY CONTROL

- .1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .2 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.6 CLEANING

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

3.7 SCHEDULE

Fire stop and smoke seal at:

- .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
- .2 Edge of floor slabs at curtain wall and precast concrete panels.
- .3 Top of fire-resistance rated masonry and gypsum board partitions.
- .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
- .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
- .7 Openings and sleeves installed for future use through fire separations.
- .8 Around mechanical and electrical assemblies penetrating fire separations.
- .9 Rigid ducts: greater than 129 cm²: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

END OF SECTION

Part 1 GENERAL

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

Part 2 PRODUCTS

2.1 Materials

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

2.2 Sealant Selection

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

Part 3 EXECUTION

3.1 Preparation

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

3.2 Backup Material

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

3.3 Application

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

3.4 Cleaning

- .1 Leave Work area clean at end of each day.
 - .1 Clean adjacent surfaces immediately.
 - .2 Remove excess and droppings, using recommended cleaners as work progresses.

- .3 Remove masking tape after initial set of sealant.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 07 92 00 Joint Sealing: Caulking of joints between frames and other building components.
- .2 Section 08 71 00 Finish Hardware - General: Supply of finish hardware, including sound-stripping and mounting heights.
- .3 Section 09 91 00 Painting: Paint systems for interior hollow metal doors and frames.

1.2 REFERENCES

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

1.3 DEFINITIONS

- .1 Opening sizes shall be defined as follows:

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

1.4 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with submittal procedures of Section 01 33 00.
- .2 Indicate each type of door, frame, including CSDMA classification, steel type, fire rating, construction type, finishes and core.
- .3 Indicate material thicknesses, mortises, reinforcements, location of exposed fasteners, openings (glazed, paneled or louvred), arrangement of hardware.
- .4 Indicate each type frame material, CSDMA duty grade classification, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing fire rating finishes.
- .5 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

1.5 SAMPLES

- .1 Submit samples in accordance with submittal procedures of Section 01 33 00.
- .2 Submit one 300 x 300 mm top butt corner sample of each type door.
- .3 Submit one 300 x 300 mm corner sample of each type of frame.
 - .1 Show butt cutout, glazing stops, 300 mm long removable mullion connection snap-on trim with clips.

1.6 FIRE PROTECTION REQUIREMENTS

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

1.7 DELIVERY, STORAGE AND HANDLING

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

1.8 WARRANTY

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

Part 2 Products

2.1 MATERIALS

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

2.2 DOOR CORE MATERIALS

- .1 Fiberglass: Loose batt type, density 24 kg/m³ minimum, conforming to CAN/ULC-S702.

2.3 ADHESIVES

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

2.4 PRIMER

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

2.5 PAINT

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

2.6 ACCESSORIES

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Metallic paste filler: to manufacturer's standard.
- .3 Fire labels: metal riveted.
- .4 Sealant: in accordance with Section 07 90 00.

2.7 FRAME FABRICATION GENERAL

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

2.8 FRAME ANCHORAGE

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

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

2.9 FRAMES: WELDED TYPE

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

2.10 FRAMES: SLIP-ON TYPE

- .1 Ship slip-on type frames unassembled.
- .2 Provide frames with mechanical joints which inter-lock securely and provide functionally satisfactory performance when installed in accordance with CSDMA Recommended Installation Guide for Steel Doors and Frames and manufacturers' instructions.
- .3 Provide slip-on frames with manufacturers' proprietary design of wall anchorage comprising single, adjustable tension type per jamb and provision for secure attachment of each jamb base to partition.

2.11 DOOR FABRICATION TYPES

- .1 Doors: swing type, flush, 45 mm thick, with provision for glass and/or louvre openings as indicated.
- .2 Interior door construction shall be laminated insulated core construction.
- .3 Provide all interior hollow steel doors as medium-duty doors fabricated in accordance with CSDFMA Recommended Selection and Usage Guide except as follows:
 - .1 Room 111 door D-1
- .4 Fabricate doors with longitudinal edges locked seamed only, locked seamed and adhesive assisted, tack- or continuously-welded in accordance with CSDFMA recommendations, except as follows:
 - .1 Seams: visible except seamless as follows:

2.12 DOOR FABRICATION DETAILS

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

2.13 DOORS: LAMINATED CORE CONSTRUCTION

- .1 Form each face sheet for interior doors from sheet steel of thickness specified with vertical steel stiffeners laminated under pressure to face sheets.
 - .1 Vertical steel stiffeners shall be securely laminated to each face sheet at 150 mm on center maximum.
 - .2 Voids between vertical stiffeners shall be filled with fiberglass batt type insulation.

Part 3 Execution

3.1 INSTALLATION GENERAL

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

- .2 Install door and frame to CSDMA Installation Guide.

3.2 FRAME INSTALLATION

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

3.3 DOOR INSTALLATION

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 Finish Hardware.
- .2 Adjust operable parts for correct function.
- .3 Re-install existing door D-2 including frame and all hardware as per Part 3 Execution. Refer to Detail 4/A03 for additional information.

3.4 FINISH REPAIRS

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

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Insulated Sectional Overhead Doors.
- B. Steel Sectional Overhead Doors.
- C. Glazed Aluminum Sectional Overhead Doors
- D. Electric Operators and Controls.
- E. Operating Hardware, tracks, and support.

1.2 RELATED SECTIONS

- A. Section 05 05 00 - Metal Fabrications.
- B. Section 06 10 00 – Rough Carpentry.
- C. Section 00 07 900 - Joint Sealers: Perimeter sealant and backup materials.
- D. Section 08 71 00 – Finish Hardware
- E. Section 09 91 00 - Painting

1.3 REFERENCES

- A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.
- B. ASTM A 123 – Zinc hot-dipped galvanized coatings on iron and steel products.
- C. ASTM A 216 - Specifications for sectional overhead type doors.
- D. ASTM A 229 - Steel wire, oil-tempered for mechanical springs.
- E. ASTM A 653 - Steel sheet, zinc-coated galvanized by the hot-dipped process, commercial quality.
- F. ASTM D 1929 - Ignition temperature test to determine flash and ignition temperature of foamed plastics.
- G. ASTM E 84 - Tunnel test for flame spread and smoke developed index.
- H. ASTM E 330 - Structural performance of exterior windows, curtain walls, and doors by uniform static air pressure difference.
- I. ASTM E 413 - Classification for Rating Sound Insulation

- J. ASTM E 1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation.
- K. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
 - 1. Design pressure of _____ lb/sq ft (_____ kPa).
- B. Wiring Connections: Requirements for electrical characteristics.
 - 1. 120 volts, single phase, 60 Hz.
- C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Operation and Maintenance Data.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened labeled packaging until ready for installation.

- B. Protect materials from exposure to moisture until ready for installation.
- C. Store materials in a dry, ventilated weathertight location.

1.8 PROJECT CONDITIONS

- A. Pre-Installation site meeting: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.9 WARRANTY

- A. Warranty: Manufacturer's limited door and operators System warranty for 10 years against cracking, splitting or deterioration of steel skin due to rust.
- B. Warranty: Manufacturer's limited door and operators System warranty for 8 years against cracking, splitting or deterioration due to rust-through.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Wayne Dalton Wayne Dalton model TS 200-20 for a 3048 mm x 3048 mm (10'-0" x 10'-0") opening or acceptable substitution.

2.2 INSULATED SECTIONAL OVERHEAD DOORS

- A. Insulated Steel Sectional Overhead Doors: Insulated sectional overhead steel doors. Units shall have the following characteristics:
 - 1. Door Sections: Shall be of steel/polyurethane/steel sandwich type construction with thermal break.
 - a. Panel Thickness: 2 inches (51 mm).
 - b. Exterior Surface: Flush non-repeating random stucco texture and 1/4 inch wide pinstriping.
 - c. Exterior Steel: .015 inch (0.38 mm), hot-dipped galvanized.
 - d. Sections roll formed with two 1-3/4 inch integral struts sealed with polypropylene rib caps per section.
 - e. Thermal Values: R-value of 17.50; U-value of 0.057.
 - f. Air Infiltration: 0.07 cfm at 15 mph.
 - g. Sound transmission class 22 when tested in accordance with ASTM E 413.
 - h. Outdoor-indoor transmission class 19 when tested in accordance with ASTM E 1332.
 - i. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
 - 1) Insulated sections tested in accordance with ASTM E 84 and achieve a Flame spread Index of 10 or less, and a Smoke Developed Index of 210 or less.
 - 2) Insulation material tested in accordance with ASTM D 1929 and achieve a minimum Flash Ignition temperature of 734 degrees F, and a minimum Self Ignition temperature of 950 degrees F.

- 3) Insulated sections shall meet all requirements of the UBC 17-5 corner burn.
- j. Ends: Hot-dipped galvanized steel, full height with end caps.
 - 1) 18 or 16 gauge.
- k. Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of die cast aluminum with high strength galvanized aircraft cable. Sized with a minimum 5 to 1 safety factor.
 - 1) Standard cycle spring: 10,000 cycles.
- l. Full View Aluminum Glazing Sections:
 - 1) 1/2 inch (12.5 mm) Tempered Double Insulating glass.
2. Finish and Color:
 - a. Two coat baked-on polyester:
 - 1) Interior color, white.
 - 1) Exterior color, white.
3. Wind load Design: Provide to meet the Design/Performance requirements specified.
4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
5. Lock:
 - a. Interior mounted slide lock with interlock switch for automatic operator.
6. Weatherstripping:
 - a. Flexible bulb-type strip at bottom section.
 - b. Flexible Jamb seals.
 - c. Flexible Header seal.
7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
 - a. Size:
 - 1) 2 inch (51 mm).
 - b. Type:
 - 1) Standard lift or Low headroom.
 - c. Horizontal track shall be reinforced with continuous angle of adequate length and gauge to minimize deflection.
 - d. Vertical track shall be graduated to provide wedge type weathertight closing with continuous angle mounting for steel or wood jambs, and shall be fully adjustable to seal door at jambs.
8. Electric Motor Operation: Provide UL listed electric operator, equal to Genie Commercial Operators, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
 - a. Standard Duty
 - 1) Model H – hoist
 - b. Entrapment Protection: Required for momentary contact, includes radio control operation.
 - 1) Pneumatic sensing edge up to 18 feet (5.5 m) wide. Constant contact only complying with UL 325/2010.
 - c. Operator Controls:
 - 1) Push-button operated control stations with open, close, and stop buttons.
 - 2) Surface mounting.
 - 3) Interior location.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until openings have been properly prepared.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- C. Verify electric power is available and of correct characteristics.
- D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
- B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- C. Anchor assembly to wall construction and building framing without distortion or stress.
- D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- E. Fit and align door assembly including hardware.
- F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- G. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion
- B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

- A. Clean doors, frames and glass using non-abrasive materials and methods recommended by manufacturer.
- B. Remove labels and visible markings.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

- A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
- B. Protect installed products until completion of project.

END OF SECTION

Part 1 GENERAL

1.1 Reference Standards

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

1.2 Hardware List

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

1.3 Maintenance

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

1.4 Maintenance Materials

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

1.5 Hardware Requirements

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

Part 2 PRODUCTS

2.1 Architectural Schedule

- .1 Refer to Architectural door and frame schedules for all hardware and accessories in addition to the sub-sections to follow.

2.2 Hardware Items

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

- .3 Refer to Architectural Door Schedule for more information AND additional door accessories

2.3 Door Hardware Standards

- .1 Hinges:
 - .1 Interior doors: Dorex 114.3mm x 101.6mm x 179 454 NRP X C15.
- .2 Latching devices: Apply to all buildings other than buildings M-50 and M-55.
 - .1 Lockset "Yale" AU-5307LN x 626.
- .3 Cylinders:
 - .1 Medeco, keyed to NRC key plan M19CA5 by Lister Lock.
 - .2 Mortise cylinder (100200-26-DB Restricted KeyWay)
 - .3 Contractor to carry all costs associated with keying of doors.
- .4 Electric Strikes (N/A):
 - .1 Pre-wired by door supplier.
 - .2 Model: HES 4500.
 - .3 Model: HES 9600. (surface mounted)
- .5 Closers: Standard duty on:
 - .1 "LCN" 4040XP Rw/Pa-AL (regular arm/parallel arm bracket)
 - .1 Include integral overhead stop.
 - .2 Adapt for Low Ceiling
- .6 Astragal (N/A) : Provide 5mm tick clear anodized aluminum astragal c/w nylon brush sweep on active leaf.
- .7 Weather-stripping:
 - .1 K.N.Crowder W-24S clear Anodized Extruded Aluminum nylon brush sweep (25mm) on outside bottom face of active leaf
 - .2 K.N. Crowder W-16N clear Anodized Aluminum and Extruded Neoprene (10.3mm)
- .8 Single Door Exit devices (N/A):
 - .1 Von Duprin Exit Device 98L-NL (includes lever; for electric strike), 3' or 4' length (to be chosen base on door width), 630 finish.
 - .2 Von Duprin Exit Device 98EO (lever not included), 3' or 4' length (to be chosen base on door width), 630 finish.
- .9 Paired Door Exit devices: modern-narrow stile with exit trim.
 - .1 Sargent ASSA ABLOY 8300 Series 8315-F-xET-704-RHR-15-26D-36

- .1 Auxiliary items: open back strike 815 with tamper proof plate.
- .10 Door bottom seal (N/A): heavy duty, door seal of extruded aluminum frame and closed cell neoprene weather seal, closed ends, adjustable with automatic retract mechanism when door is open.
 - .1 K.N. Crowder CT-52 (~~surface mounted OR~~ semi-mortised)
- .11 Flush Bolt (N/A): lever action, with flat plate shoe on inactive leaf (top and bottom).
 - .1 Ives FB458 12" Manual 626.
- .12 Threshold: Full length and width of opening, extruded aluminum, with thermal break of rigid PVC. Ensure full frame to frame coverage in width (cut to suit door frame profile)
 - .1 K.N. Crowder CT75 c/w extension piece to suit depth and flooring finish. Height to suit handicap access (5mm High Max)
- .13 Door Holder: Provide "Hager" Kick down Door Holder 270C. S1-sprayed aluminum finish.
- .14 Door Wall Stop: Provide "Hager" HD wall stop 234W. US26D satin chrome.
- .15 Kick plates: 16-gauge stainless steel. Height: 300mm Hg (as per drawing). Width: to suit each door with minimal edge gaps to be fastened to both sides of each interior door.
- .16 Above hardware is standard NRC requirements unless specified or listed on drawings to be otherwise.

2.4 Fastenings

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

Part 3 EXECUTION

3.1 Installation

- .1 Furnish door and frame manufacturer with complete instructions and templates for preparation of their work to receive hardware.

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

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 33 00.
- .2 Product Data: submit WHMIS MSDS - Material Data Sheets in accordance with submittal procedures of Section 01 33 00.
- .3 Submit shop drawings and product data in accordance with submittal procedures of Section 01 00 10.
- .4 Submit samples in accordance with submittal procedures of Section 01 33 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 33 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 33 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 33 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 be 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 [0.53 mm (26 gauge)] [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:
 - .1 Fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails,etc,
 - .2 Base and upper cabinets,
 - .3 Door closures, automatic door openers and swing door operators. 38x140

- .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. [Use double track slip joints.] [Use slotted deflection track.]
- .12 Install continuous insulating strips to isolate studs from uninsulated surfaces.
- .13 Install two continuous beads of acoustical sealant behind studs and tracks around perimeter of sound control partitions.

END OF SECTION

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 walls: 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.
- .2 Rated walls: Type 'X' board: to CAN/CSA A82.27-M91 15.9mm (5/8") x 1200 mm (4'-0") wide OR/AND 19mm (3/4") x 1200 mm (4'-0") x maximum practical length, edges tapered with round edge.
- .3 Wet/humid Area Walls :CGC 1/2-inch SHEETROCK Ultralight Mold Tough: 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. (Lightweight 1/2 in. moisture- and mold-resistant panels.)

2.2 Metal Furring

- .1 Metal furring, runners, hangers, 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.

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.

3.3 Sound Attenuation Blanket

- .1 N/a.

3.4 Control Joints

- .1 N/a.

3.5 Access Doors

- .1 Install access doors to electrical and mechanical fixtures specified in respective Sections.
- .2 Rigidly secure frames to furring or framing systems.

3.6 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 33 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 33 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 0.80.
 - .3 Ceiling Attenuation Class (CAC): minimum 35.
 - .4 Light reflectance range: Actual LR of 0.85 to 0.90.
 - .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 Certaineed 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 Certaineed
 - .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 Certaineed.
- .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 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 579-01(2012), Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - .2 ASTM D 638-14, Standard Test Method for Tensile Properties of Plastics.
 - .3 ASTM D 1308-02(2013), Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
 - .4 ASTM D 2240-15, Standard Test Method for Rubber Property-Durometer Hardness.
 - .5 ASTM D 4060-14, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.

1.2 SUMMARY

- .1 Complete Resinous flooring system to include:
 - .1 Primer: penetrating, moisture tolerant, two-component epoxy primer,
 - .2 Epoxy Flooring System: high performance, two-component, high solids epoxy resin coating.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with 00 10 00 – General Instructions.
- .2 Product Data:
 - .1 Submit manufacturer's technical data, installation instructions, and general recommendations for each resinous flooring material required including individual components of system. Include certification indicating compliance of materials with requirements.
- .3 Samples:
 - .1 Submit, for verification purposes, duplicate 300mm x 300mm samples of resinous flooring system, applied to a rigid backing, in color and finish indicated. Samples to indicate colour, texture, gloss and thickness of complete system to be installed.
 - .2 For initial selection of colors and finishes, submit manufacturer's color charts showing full range of colors and finishes available.

1.4 QUALITY ASSURANCE

- .1 Single Source Responsibility:
 - .1 Obtain primary resinous flooring materials including primers, resins, hardening agents, finish or sealing coats from a single manufacturer with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Contractor shall have completed at least five projects of similar size and complexity.
 - .2 Provide secondary materials only of type and source recommended by manufacturer of primary materials.
- .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting 5 days prior to beginning work of this Section and on-site installation, with Contractor's Representative, Manufacturer/Installer's Representative and NRC Departmental Representative to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Review manufacturer's written installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Material shall be delivered to job site and checked by flooring contractor for completeness and shipping damage prior to job start.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 All materials used shall be factory pre-weighed and pre-packaged in single, easy to manage batches to eliminate on site mixing errors. No on site weighing or volumetric measurements allowed.
- .4 Material shall be stored in a dry, enclosed area protected from exposure to moisture. Temperature of storage area shall be maintained between 60 and 85°F/16 and 30°C.
- .5 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
- .6 Replace defective or damaged materials with new.

1.6 PROJECT CONDITIONS

- .1 Concrete substrate shall be inspected by General Contractor. General Contractor to ensure that substrate shall be prepared according to Manufacturer's written instructions prior to the resinous flooring application.
- .2 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to NRC Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

- .3 Conduct moisture testing of surfaces to be painted using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .4 Utilities, including electric, water, heat (air temperature between 60 and 85°F/16 and 30°C) and finished lighting to be supplied by General Contractor.
- .5 Job area to be free of other trades and personnel during, and for a period of 24 hours, after floor installation.
- .6 Protection of finished floor from damage by subsequent trades shall be the responsibility of the General Contractor.

1.7 WARRANTY

- .1 Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of one (1) full year from date of installation.

Part 2 PRODUCTS

2.1 COLORS

- .1 Colors: As selected by NRC Departmental Representative from manufacturer's standard colors.

2.2 EPOXY FLOORING

- .1 Physical Properties: Provide flooring system in which physical properties of topping including aggregate, when tested in accordance with standards or procedures referenced below, are as follows:
 - .1 Compressive Strength: 7,000 - 13,500 psi.
 - .2 Tensile Strength: 4,000 - 8,000 psi.
 - .3 Flexural Strength: 4,000 - 9,00 psi.
 - .4 Hardness/ Shore D: 70 - 90 85-90.
 - .5 Bond Strength: >300 psi.
 - .6 Impact Resistance: > 160 in. lbs.
 - .7 Abrasion Resistance: 0.070 – 0.1mg max. weight loss.
 - .8 Coefficient of Friction: 0.22 - 0.75.
 - .9 Flammability: Self Extinguishing.
 - .10 Water Absorption: .05 - 0.2%
 - .11 Cure Rate: 8 hours for foot traffic (at 77°F/25°C) 24 hours for normal operations.
- .2 Acceptable Manufacturer's product systems:
 - .1 Stonhard: Stonkote GS4, HT Primer.
 - .2 Sika: Sikafloor 261, Sikafloor 156ca Primer.
 - .3 BASF: Selbaclad 425, Selbaclad Primer.

2.3 JOINT SEALANT MATERIALS

- .1 Type produced by manufacturer of resinous flooring system for type of service and joint condition indicated.

Part 3 EXECUTION

3.1 PREPARATION

- .1 Substrate: Concrete preparation shall be by mechanical means and include use of a scabber, scarify or shot blast machine for removal of bond inhibiting materials such as curing compounds or laitance.

3.2 APPLICATION

- .1 General: Apply each component of resinous flooring system in compliance with manufacturer's directions to produce a uniform monolithic wearing surface of thickness indicated, uninterrupted except at divider strips, sawn joints or other types of joints (if any), indicated or required.
- .2 Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates. Coordinate timing of primer application with application of troweled mortar to ensure optimum adhesion between resinous flooring materials and substrate.
- .3 Troweled Mortar: Mix mortar material according to manufacturer's recommended procedures. Uniformly spread mortar over substrate using manufacturer's specially designed screed box adjusted to manufacturer's recommended height. Hand trowel apply mixed material over freshly primed substrate using stainless steel finishing trowels.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .2 NRC Departmental Representative will appoint and pay for services of testing laboratory except as follows:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Mill tests and certificates of compliance.
 - .4 Tests specified to be carried out by Contractor under supervision of NRC Departmental Representative.
- .3 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by NRC Departmental Representative to verify acceptability of corrected work.
- .4 Testing laboratory will perform tests for any of characteristics specified or referenced, using applicable testing procedures and in accordance with Manufacturer's product data.

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- .5 If test results show materials being used do not comply with specified requirements, Contractor to stop work; remove non-complying materials; perform any remedial preparation work required to reapply flooring materials to prepare surfaces previously coated with unacceptable materials. Remedial work to be performed in accordance with Manufacturer's written instructions.

3.4 CURING, PROTECTION AND CLEANING

- .1 Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 24 hours.
- .2 Protect resinous flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with Manufacturer's recommendations for protective materials and method of application. Protect and clean surfaces after final applications.
- .3 Cleaning: Remove temporary covering and clean resinous flooring prior to final inspection by NRC Departmental Representative. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

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 Confirm with NRC Departmental Representative if SPRAY EQUIPMENT is allowed for use other than paint brush and roller.

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 to be confirmed by NRC Departmental Representative. Allow for colours as noted below (Sherwin-Williams palette):
 - .1 WF-1: Main wall colour
 - .2 WF-2: Accent wall colour
 - .3 WF-3: Exposed steel beam colour
 - .4 DF-1: Door frame colour
 - .5 DF-2: Door colour

2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Departmental Representative for tinting of painting materials on site.
 - .1 For re-painting, the first coat in a two coat (Premium) repaint system shall be tinted slightly lighter colour than top coat to show visible difference between coats.
 - .2 For painting new surfaces, the second coat in three coat system shall be tinted slightly lighter colour than top coat to show visible difference between coats.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.
- .4 Thin paint for spraying in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

- .1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

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

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

2.5 INTERIOR PAINTING AND RE-PAINTING SYSTEMS

- .1 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 pre-treatment 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 cut-outs 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 00 10 00 – General Instructions.
- .2 Shop drawings to show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
- .3 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.
- .4 Closeout Submittals:
 - .1 Provide operation and maintenance data for incorporation into manual specified in Section 00 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 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
- .2 Make changes as required and re-submit as directed by Departmental Representative.
- .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 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
 - .2 Transfer information 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 DEFINITIONS

- .1 For purposes of this the Mechanical Division the following:
 - .1 "Concealed" - mechanical services and equipment in suspended ceilings and in chases and furred spaces.
 - .2 "Exposed" - will mean not concealed as defined above.

1.3 EXAMINATION OF THE SITE

- .1 Carefully examine conditions at the site which the site will or may affect your work, and become familiar with both the new and existing construction, finishes, and other work associated with your work in order that your tender price includes for everything necessary for completion of your work within the proposed project schedule

1.4 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 00 10 00 – General Instructions.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 00 10 00 – General Instructions and 00 15 45 – General Safety Section and Fire Instructions.

1.5 MAINTENANCE

- .1 Furnish spare parts in accordance with Section 00 10 00 – General Instructions.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: in accordance with Section 00 10 00 – General Instructions and Section 00 15 45 – General Safety Section and Fire Instructions.

1.7 COORDINATION & COOPERATION WITH OTHER TRADES

- .1 Co-ordinate your work with the work of all trades to ensure a proper and complete installation. Notify all trades concerned of the requirement for openings, sleeves, inserts and other hardware necessary in their work for the installation of your work.
- .2 The exact locations and routing of mechanical and electrical services must be properly planned, coordinated and established with all affected trades prior to installation such that they will clear each other as well as any obstructions. Generally, piping requiring uniform pitch shall be given the right of way, with other services located and arranged to suit.

1.8 PERMITS, CERTIFICATES & FEES

- .1 Display all required permits on worksite and include copies of inspection certificates in operating and maintenance instruction manuals.
- .2 Obtain "Hot Work Permit" from the Engineer prior to commencement of soldering, welding or other high temperature work.
- .3 Comply with all requirements of Section 001000.

1.9 FEDERAL HALOCARBON REGULATION

- .1 Generate halocarbon records for work on equipment (cooling equipment with CFC's, HCFC's and HFC refrigerants; fire suppression systems; solvent cleaning systems) that may result in the release of a halocarbon.
- .2 Tag equipment with duplicate of halocarbon record.
- .3 Provide additional copy of halocarbon record to NRC for inclusion in the Zone Halocarbon Service File.

1.10 CLEANING & FINAL ADJUSTMENT

- .1 During construction, keep the site reasonably clear of rubbish and waste material resulting from your work on a daily basis to the satisfaction of the Engineer. Notify the general contractor of any requirements for a waste receptacle for disposal of waste materials.
- .2 Balance and adjust all systems and each piece of equipment to operate as designed.

1.11 PROTECTION OF EQUIPMENT & MATERIALS Properly protect all of your equipment and materials on site from damage due to the elements, your work and the work of other trades, to the approval of the Engineer.

- .2 Wherever possible, coordinate equipment deliveries with the manufacturers and/or suppliers such that equipment is delivered to the site when it is required, or so that it can be suitably stored within the building and protected from the elements.

1.12 STORAGE OF EQUIPMENT & MATERIALS

- .1 Arrange for sufficient storage facilities off the premises for the storage of equipment and materials which will not be allowed to stand in the open, nor to interfere with normal operations in the building.
- .2 Bring prefabricated materials on the job site as and when required to be installed.

1.13 HOISTING & SCAFFOLDING

- .1 Provide all necessary hoists and scaffolds required for your work.
- .2 Design and construction of scaffolding to be in accordance with CSA S269.2

Part 2 Products

2.1 MATERIALS

- .1 Materials and products in accordance with Section 00 10 00 – General Instructions.

Part 3 Execution

3.1 PAINTING REPAIRS AND RESTORATION

- .1 Do painting in accordance with Section 09 91 23 - Interior Painting.
- .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 Site Tests: conduct following tests in accordance with Section 00 10 00 – General Instructions and submit report as described in PART 1 - SUBMITTALS.
- .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.

3.4 DEMONSTRATION (If Required)

- .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Trial usage to apply to following equipment and systems:
 - .1 Fume hood and associated services.
- .3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .5 Instruction duration time requirements as specified in appropriate sections.
- .6 Determination of whether or not demonstration is required will be decided by Departmental Representative in consultation with end user (client).

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 RELATED

- .1 Section 00 10 00 – General Instructions
- .2 Section 00 15 45 – General Safety Section and Fire Instructions
- .3 Section 21 05 01 – Common Work Results- Mechanical

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.
 - .2 CAN/CGSB-24.3, Identification of Piping Systems.
- .2 Canadian Gas Association (CGA).
 - .1 CAN/CGA B149.1.
 - .2 CAN/CGA B149.2.
- .3 National Fire Protection Association
 - .1 NFPA 13-1989, Installation of Sprinkler Systems.
 - .2 NFPA 14-1986, Standpipe and Systems.

1.3 PRODUCT DATA

- .1 Submit product data in accordance with Section 00 10 00 – General Instructions.
- .3 Product data to include paint colour chips, all other products specified in this section.

1.4 SAMPLES

- .1 Submit samples in accordance with Section 00 10 00 – General Instructions.
- .2 Samples to include nameplates, labels, tags, lists of proposed legends.

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 to be 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 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 NRC representative.

2.3 PIPING SYSTEMS GOVERNED BY CODES

- .1 None

2.6 VALVES, CONTROLLERS

- .1 Brass tags with 12 mm 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.

2.7 CONTROLS COMPONENTS IDENTIFICATION

- .1 Identify all systems, equipment, components, controls, sensors with system nameplates as specified in section 25 05 54 – EMCS Identification.

2.8 LANGUAGE

- .1 Identification to be in English and French.

PART 3 - EXECUTION

3.1 TIMING

- .1 Provide identification only after all painting has been completed.

3.2 INSTALLATION

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

3.3 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 in any way.

3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

- .1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: At not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
- .2 Adjacent to each change in direction.
- .3 At least once in each small room through which piping or ductwork passes.
- .4 On both sides of visual obstruction or where run is difficult to follow.
- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in pipe chases, ceiling spaces, galleries, other confined spaces, at entry and exit points, and at each access opening.
- .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, dampers, etc. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .9 Identification to be easily and accurately readable from usual operating areas and from access points.

- .1 Position of identification to be 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.

3.5 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 copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by NRC representative. Provide one copy (reduced in size if required) in each operating and maintenance manual.
- .3 **Number valves in each system consecutively.**

END OF SECTION

Part 1

General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Thermal insulation for piping and piping accessories.

1.2 REFERENCES

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
 - .1 ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Manufacturer's Trade Associations
 - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).

1.3 DEFINITIONS

- .1 For purposes of this section:
 - .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" - will mean "not concealed" as specified.

1.4 SUBMITTALS

- .1 Submittals: in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet. Include product characteristics, performance criteria, and limitations.
 - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).
- .3 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 00 10 00 – General Instructions.
 - .1 Shop drawings: submit drawings stamped for review by NRC.
- .4 Samples:
 - .1 Samples: Not required.

1.5 QUALITY ASSURANCE

- .1 Qualifications:
- .2 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project, member of TIAC.
- .3 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 00 10 00 – General Instructions.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Storage and Protection:
 - .1 Protect from weather, theft, construction traffic.
 - .2 Protect against damage.

- .3 Store at temperatures and conditions required by manufacturer.
- .3 Waste Management and Disposal:
 - .1 Remove all material from NRC property and dispose, reuse and recycle excel material as per local good waste management practices.
 - .2 Place excess or unused insulation and insulation accessory materials in designated containers.

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 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.
 - .1 Vapor retarder jacket includes a continuous longitudinal self-sealing closure lap.
 - .2 Jacket shall be suitable to be painted with future latex paint.
 - .3 Mineral fibre: CAN/ULC S102-M88
 - .4 Jacket: to CGSB 51-GP-9M, self-sealing lap.
 - .5 Temperature Range: 0 to 538 °C
 - .6 Maximum "k" factor: 0.033 W/m°C at 24°C to ASTM C 335.

2.3

INSULATION SECUREMENT

- .1 Tape: self-adhesive, reinforced aluminum 50 mm wide minimum.
- .2 Contact adhesive: quick setting.
- .3 Canvas adhesive: washable.
- .4 Single/double bands: stainless steel, 19 mm wide, 0.5 mm thick.
- .5 Wire mesh: 25 mm hexagonal type 304 stainless steel wire mesh, tightly laced together at horizontal and circumferential mesh joints.

2.4

VAPOUR RETARDER LAP ADHESIVE

- .1 Water based, fire retardant type, compatible with insulation.

2.5

INDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.

2.6

JACKETS

- .1 Polyvinyl Chloride (PVC):
 - .1 One-piece moulded type to CAN/CGSB-51.53 with pre-formed shapes as required.
 - .2 Colours: As indicated
 - .3 Minimum service temperatures: -20 °C
 - .4 Maximum service temperature: 65 °C
 - .5 Moisture vapour transmission: 0.02 perm.
 - .6 Thickness: 0.3 mm.
 - .7 Fastenings:
 - .1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
 - .2 Pressure sensitive vinyl tape of matching colour.
 - .8 Special requirements:
 - .1 Indoor: As indicated.
 - .2 Outdoor: UV rated material at least 0.5 mm thick.

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 by NRC.
- .2 Piping to be inspected and approved by NRC.
- .3 Surfaces clean, dry, free from foreign material.

3.3 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturers instructions and this specification.
- .3 Use two layers with staggered joints (minimal 400 mm) when required nominal wall thickness exceeds 50 mm.
- .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 temperature and compressive strength insulation between all hangers and piping where temperature of pipe exceeds 230 °C. Insulation to be sized to suit compressive loads at hanger. Where pipe surface temperature is less than 230°C, wood blocking may be used between pipe support hanger.

3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

- .1 Application: at expansion joints, valves, primary flow measuring elements, flanges, unions, equipment and where indicated.
- .2 Design: to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.
- .3 Insulation:
 - .1 Insulation, fastenings and finishes: same as system.
 - .2 Jacket: aluminum, SS, PVC

3.5 INSTALLATION OF ELASTOMERIC INSULATION

- .1 Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.
- .2 Provide vapour retarder as recommended by manufacturer.

3.6 PIPING INSULATION SCHEDULES

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 TIAC Code: A-3.
 - .1 Securements: SS bands at 300 mm on centre.
 - .2 Seals: VR lap seal adhesive, VR lagging adhesive.
 - .3 Installation: TIAC Code: 1501-C.
- .3 Thickness of insulation as listed in following table.
 - .1 Run-outs to individual units and equipment not exceeding 4000 mm long.

- .2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	MAX TEMP. °C	TIAC CODE	Pipe sizes (NPS) and insulation thickness (mm)				
			< 1	1 to <1-1/2	1-1/2 to < 4	4 to < 8	8 & over
Heating Water/Glycol	100	A-3	25	25	25	38	38
Domestic hot water		A-3	25	25	25	25	25
Chilled Water or Glycol		A-3	25	25	25	25	38
Domestic cold water		A-3	25	25	25	25	25
Cooling Condensate drain		A-3	25	25	25	25	25

- .4 Finishes:
 - .1 Exposed indoors: aluminum jacket.
 - .2 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.7 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for selective demolition and removal of plumbing, sprinkler systems and related mechanical components and incidentals required to complete work described in this Section ready for new construction.

1.2 RELATED REQUIREMENTS

- .1 Section 01 10 00 – General Instructions
- .2 Section 01 74 19 – Waste Management and Disposal
- .3 Section 02 41 19.16 - Selective Interior Demolition
- .4 Section 02 42 00 - Removal and Salvage of Construction Materials
- .5 Section 23 05 05.01 – Selective Demolition for HVAC-R Equipment
- .6 Section 26 05 05 – Selective Demolition for Electrical

1.3 REFERENCE STANDARDS

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

1.4 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Remove and Salvage: Detach items from existing construction and deliver them to Departmental Representative ready for reuse.
- .4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.
- .6 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals: Provide the following in accordance with Section 01 10 00 – General Instructions before starting work of this Section:
 - .1 Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Landfill Records: Indicate receipt and acceptance of selective demolition waste and hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.
- .2 Scheduling: Account for Departmental Representative’s continued occupancy requirements during selective demolition with Section 02 41 19.16 - Selective Interior Demolition.

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: Perform work of this Section in accordance with the following:
 - .1 Federal Workers’ Compensation Service.
 - .2 Government of Canada, Labour Program: Workplace Safety.

1.8 SITE CONDITIONS

- .1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition at time of site examination before tendering.
- .2 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in the Work; immediately notify Departmental Representative if materials suspected of containing hazardous substances are encountered and perform the following activities:
 - .1 Refer to Section 01 10 00 – General Instructions for directives associated with specific material types.
 - .2 Hazardous substances will be as defined in the Hazardous Products Act.
 - .3 Stop work in the area of the suspected hazardous substances.
 - .4 Take preventative measures to limit users’ and workers’ exposure, provide barriers and other safety devices and do not disturb.
 - .5 Hazardous substances will be removed by Departmental Representative under a separate contract or as a change to the Work.
 - .6 Proceed only after written instructions have been received from Departmental Representative.

1.9 SALVAGE AND DEBRIS MATERIALS

- .1 Demolished items become Contractor’s property and will be removed from Project site; except for items indicated as being reused, salvaged, or otherwise indicated to remain Departmental Representative’s property.

- .2 Carefully remove materials and items designated for salvage and store in a manner to prevent damage or devaluation of materials in accordance with Section 02 42 00 - Removal and Salvage of Construction Materials.

Part 2 Products

2.1 MATERIALS

- .1 General Patching and Repair Materials: Refer to Section 02 41 19.16 - Selective Interior Demolition for listing of patching and repair materials incidental to removal or demolition of components associated with work of this Section.
- .2 Plumbing Repair Materials: Use only new materials required for completion or repair matching materials damaged during performance of work of this Section; new materials are required to meet assembly or system characteristics as existing systems indicated to remain and carry CSA approval labels required by the Authority Having Jurisdiction.
- .3 Fire stopping Repair Materials: Use fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect the work of this Section before tendering the Bid; Departmental Representative will not consider claims for extras for work or materials necessary for proper execution and completion of the contract that could have been determined by a site visit.

3.2 PREPARATION

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
 - .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 - .2 Notify Departmental Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 - .3 Prevent debris from blocking drainage inlets.
 - .4 Protect mechanical systems that must remain in operation.
- .2 Protection of Building Occupants: Sequence demolition work so that interference with the use of the building by the Departmental Representative] and users is minimized and as follows:
 - .1 Prevent debris from endangering the safe access to and egress from occupied buildings.
 - .2 Notify Departmental Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 EXECUTION

- .1 Demolition and Removal: Coordinate requirements of this Section with information contained in Section 02 41 19.16 - Selective Interior Demolition and as follows:
 - .1 Disconnect and cap mechanical services in accordance with requirements of local Authority Having Jurisdiction.
 - .2 Do not disrupt active or energized utilities without approval of the Departmental Representative.
 - .3 Erect and maintain dust proof and weather tight partitions to prevent the spread of dust and fumes to occupied building areas; remove partitions when complete.
 - .4 Demolish parts of existing building to accommodate new construction and remedial work as indicated.
 - .5 At end of each day's work, leave worksite in safe condition.
 - .6 Perform demolition work in a neat and workmanlike manner:
 - .1 Remove any tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
 - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.

3.4 CLOSEOUT ACTIVITIES

- .1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) except where explicitly noted otherwise for materials being salvaged for re use in new construction in accordance with Section 02 42 00 - Removal and Salvage of Construction Materials.

END OF SECTION

Part 1

General

1.1

SUMMARY

- .1 Section Includes:
 - .1 Selection of piping valves in domestic water system.

1.2

RELATED SECTIONS

- .1 Section 00 10 00 – General Instructions.
- .2 Section 00 15 45 – General Safety Section and Fire Instructions.
- .3 Section 23 05 23.01 Valves – Bronze.
- .4 Section 23 05 23.05 Butterfly Valves
- .5 Section 23 05 01 - Installation of Pipework

1.3

REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
 - .1 ANSI/ASME B16.15, Cast Bronze Threaded Fittings, Classes 125 and 250.
 - .2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
 - .3 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - .4 ANSI/ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- .2 American National Standards Institute/American Water Works Association (ANSI)/(AWWA)
 - .1 ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
- .4 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .6 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
 - .1 MSS-SP-67, Butterfly Valves.
 - .2 MSS-SP-70, Gray Iron Gate Valves, Flanged and Threaded Ends.
 - .3 MSS-SP-71, Gray Iron Swing Check Valves, Flanged and Threaded Ends.
 - .4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

.7 National Research Council (NRC)/Institute for Research in Construction

.1 NRCC 38728, National Plumbing Code of Canada (NPC) .

.8 Transport Canada (TC)

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

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide manufacturer shop drawings for all valves, piping, fittings and as specified on drawings and in section 00 10 00 – General Instructions.

.2 Product Data:

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

1.5 DELIVERY, STORAGE AND HANDLING

.1 See section 00 10 00 – General Instructions **Products**

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.

.1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

.2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B88M. No buried joints.

2.2 FITTINGS

.1 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22. NPS 2 and larger: roll grooved to CSA B242.

.3 Cast bronze threaded fittings, Class 150: to ANSI/ASME B16.15.

.4 Cast copper, solder type: to ANSI/ASME B16.18.

.5 Bronze pipe flanges and flanged fittings, Class 150 to ANSI/ASME B16.24.

2.3 JOINTS

.1 Solder: 95% tin / 5% copper alloy.

.2 Teflon tape: for threaded joints.

.3 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner. **SWING CHECK VALVES**

.1 NPS 2 and under, soldered:

.1 To MSS-SP-80, Class 150, bronze body, bronze swing disc, screw in cap, see Section 23 05 23.01 - Valves – Bronze.

.2 NPS 2 and under, screwed:

- .1 To MSS-SP-80, Class 150, bronze body, bronze swing disc, screw in cap, see Section 23 05 23.01 - Valves - Bronze.

2.5 BALL VALVES

- .1 NPS 2 and under, screwed:
 - .1 Threaded, 2-Piece, Std. Port, Bronze Ball Valve, 600 CWP, with extension, see Section 23 05 23.01 - Valves - Bronze
- .2 NPS 2 and under, soldered:
 - .1 Solder, 2-Piece, Std. Port, Bronze Ball Valve, 600 CWP, with extension, see Section 23 05 23.01 - Valves - Bronze.

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 Ontario Plumbing Code.
- .2 Install pipe work in accordance with Section 23 05 01 - Installation of Pipework, supplemented as specified herein.
- .3 Assemble piping using fittings manufactured to ANSI standards.
- .4 Install CWS piping below and away from HWS and HWC and other hot piping so as to maintain temperature of cold water as low as possible.
- .5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.
- .6 Buried tubing:
 - .1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.
 - .2 Bend tubing without crimping or constriction. Minimize use of fittings.
- .7 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance and equipment removal.

3.3 VALVES

- .1 Isolate equipment with unions, fixtures and branches with gate valves.
- .2 Provide valves as indicated on drawing and in specifications.
- .3 Balance recirculation system using balancing valve. Mark settings and record on as-built drawings on completion.

- .4 Provide line size check valve on discharge of all pumps.

3.4 PRESSURE TESTS

- .1 Test pressure: Hydrostatic test pressure (1.5 times maximum working pressure), Pneumatic test pressure (1.2 maximum working pressure pending NRC approval) for a minimum of 15 minutes. All tests must be witnessed and approved by NRC.
- .2 Provide NRC with a minimum of 48 hours notice in writing before all pressure tests.

3.5 FLUSHING AND CLEANING

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

3.6 PRE-START-UP INSPECTIONS

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

3.7 START-UP

- .1 Timing: Start up after:
 - .1 Pressure tests have been completed.
 - .2 Disinfection procedures have been completed.
 - .3 Certificate of static completion has been issued.
 - .4 Water treatment systems operational.
- .2 Provide continuous supervision during start-up.
- .3 Start-up procedures:
 - .1 Establish circulation and ensure that air is eliminated.
 - .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
 - .3 Bring HWS storage tank up to design temperature slowly.
 - .4 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.
 - .5 Check control, limit, safety devices for normal and safe operation.

3.8 PERFORMANCE VERIFICATION

- .1 Scheduling:

- .1 Verify system performance after pressure and leakage tests and disinfection are completed, and Certificate of Completion has been issued by authority having jurisdiction.
- .2 Procedures:
 - .1 Verify that flow rate and pressure meet Design Criteria.
 - .2 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
 - .3 Sterilize HWS and HWC systems for Legionella control.
 - .4 Verify performance of temperature controls.
 - .5 Verify compliance with safety and health requirements.
 - .6 Check for proper operation of water hammer arrestors. Run [one][two...] outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.
 - .7 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 00 10 00 – General Instructions.
- .2 Section 00 15 45 – General Safety Section and Fire Instructions.
- .3 Section 01 74 11 – Cleaning.
- .4 Section 21 05 01 – Common Work Results – Mechanical
- .5 Section 21 05 02 – Mechanical Identification
- .6 Section 23 05 05 – Installation of Pipework

1.2 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM B32, Standard Specification for Solder Metal.
 - .2 ASTM B306, Standard Specification for Copper Drainage Tube (DWV).
 - .3 ASTM C564, 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, Cast Iron Soil Pipe, Fittings and Means of Joining.
 - .3 CAN/CSA-B125.3, Plumbing Fittings.
- .3 Green Seal Environmental Standards (GSES)
 - .1 Standard GS-36, Commercial Adhesives.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle in accordance with Section 00 10 00 – General Instructions and 00 15 45 - General Safety Section and Fire Instructions.

- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: in accordance with Section 00 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: lead free, tin-antimony 95:5, to ASTM B32.

2.2 CAST IRON PIPING AND FITTINGS

- .1 Buried sanitary minimum NPS 3, to: CAN/CSA-B70, with one layer of protective coating of anti-corrosion sealant.
 - .1 Joints:
 - .1 Mechanical joints:
 - .1 Neoprene or butyl rubber compression gaskets: to ASTM C564 or CAN/CSA-B70.
 - .2 Stainless steel clamps.
 - .2 Hub and spigot:
 - .1 Caulking lead: to CSA B67.
 - .2 Cold caulking compounds.
 - .2 Above ground sanitary and vent: to CAN/CSA-B70.
 - .1 Joints:
 - .1 Hub and spigot:
 - .1 Caulking lead: to CSA B67.
 - .2 Mechanical joints:
 - .1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

Part 3 Execution

3.1 APPLICATION

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

3.2 INSTALLATION

- .1 In accordance with Section 23 05 05 – Installation of Pipework.
- .2 Install in accordance with National Plumbing Code, supplemented as per Provincial Plumbing Code.

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, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

3.5 LABELLING

- .1 Label all above ground sanitary, condensate and vent piping as per section 21 05 02 – Mechanical Identification

3.6 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 00 10 00 – General Instructions.
- .2 Section 00 15 45 – General Safety Section and Fire Instructions.
- .3 Section 01 74 11 – Cleaning.
- .4 Section 21 05 01 – Common Work Results – Mechanical
- .5 Section 21 05 02 – Mechanical Identification
- .6 Section 23 05 05 – Installation of Pipework

1.2 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM D2235-04, Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
 - .2 ASTM D2564-[04e1], Standard Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-Series B1800-06, Thermoplastic Nonpressure Pipe Compendium - B1800 Series.
- .3 Green Seal Environmental Standards (GSES)
 - .1 Standard GS-36-00, Commercial Adhesives.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 00 10 00 – General Instructions.
 - .1 Provide manufacturer's printed product literature and datasheets for piping and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Provide copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 00 15 45 – General Safety Section and Fire Instructions.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle in accordance with Section 00 10 00 – General Instructions and Section 00 15 45 – General Safety Section and Fire Instructions.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

- .3 Store at temperatures and conditions recommended by manufacturer.
- .4 Packaging Waste Management: in accordance with Section 00 10 00 – General Instructions.

Part 2 Products

2.1 MATERIAL

- .1 Adhesives and Sealants: in accordance with applicable codes and standards.

2.2 PIPING AND FITTINGS

- .1 For buried DWV piping to:
 - .1 CAN/CSA B1800.

2.3 JOINTS

- .1 Solvent weld for PVC: to ASTM D2564.
- .2 Solvent weld for ABS: to ASTM D2235.

Part 3 Execution

3.1 APPLICATION

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

3.2 INSTALLATION

- .1 In accordance with Section 23 05 05 - Installation of Pipework.
- .2 Install in accordance with National Plumbing Code and supplemented by Provincial Plumbing Code.

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 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 fixtures are properly anchored, connected to system and effectively vented.
- .5 Affix applicable label (storm, sanitary, vent, pump discharge) c/w directional arrows every floor or 4.5 m (whichever is less) as per Section 21 05 02 – Mechanical Identification.

3.5 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

- .1 Materials and installation for plumbing specialties and accessories.

1.2 REFERENCES

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

- .1 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
- .2 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.2 Canadian Standards Association (CSA International).

- .1 CSA-B64 Series, Backflow Preventers and Vacuum Breakers.
- .2 CSA-B79, Floor, Area and Shower Drains, and Cleanouts for Residential Construction.
- .3 CSA-B356, Water Pressure Reducing Valves for Domestic Water Supply Systems.

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

- .1 Material Safety Data Sheets (MSDS).

.4 Plumbing and Drainage Institute (PDI).

- .1 PDI-WH201 Water Hammer Arresters Standard.

1.3 SUBMITTALS

.1 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.
- .2 Indicate dimensions, construction details and materials for specified items.

.2 Shop Drawings:

- .1 Submit shop drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions, color, construction and assembly details.

.3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Instructions: submit manufacturer's installation instructions.

.5 Manufacturers' Field Reports: manufacturers' field reports specified.

Part 2 Products

2.1 FLOOR DRAINS

- .1 FD1, Wide reveal trench drain, Duco Cast Iron Flanged Body, outlet section "A" and flanged end plate with cast iron anti-shift loose set medium duty square hole grate, Ductile iron grate construction. Acceptable Material: Jay R Smith 2710 series or approved equal

2.2 CLEANOUTS

- .1 Line cleanout: in cast iron pipe with bolted neoprene gasketed cover secured to body with brass bolts, with full size pipe opening. Access shall be made by round stainless steel plate and slotted flat head stainless steel screws.
- .2 Floor cleanout in unfinished areas: Duco coated cast iron body with flashing flange, and removable positive gasket seal closure plug and heavy duty 6" diameter adjustable cast iron cover secured with stainless steel screws, C.O. cast in cover. For water-proofed areas provide 'FC' flange with flashing clamp.

2.3 WATER HAMMER ARRESTORS

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

2.4 ACCESS DOORS

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

2.5 VACUUM BREAKERS

- .1 Breakers: to CSA-B64 Series, vacuum breaker hose connection.
- .2 Hose Connection Vacuum Breakers: chrome finish stainless steel working parts, a rubber diaphragm and disc, and a draining stem. Maximum Pressure: 125psi

2.6 HOSE BIBBS AND SEDIMENT FAUCETS

- .1 Bronze construction complete with integral back flow preventer, hose thread spout, replaceable composition disc, and chrome plated in finished areas.

2.7 STRAINERS

- .1 NPS 2 and under
 - .1 Body: Bronze , ASTM B 62
 - .2 Strainer: stainless steel type 304
 - .3 Screen perforation: 1/16"
 - .4 Removable cap c/w removable threaded cap for blow off connection
 - .5 Connection: screwed
 - .6 Minimum saturated steam pressure rating: 200 psig

SEDIMENT/ OIL INTERCEPTORS

- .1 All steel oil interceptor, capacity as noted, gray duco coating inside and out, flow control fitting, flush to floor installation, with non-skid cover, neoprene gasket and extension to suit installation depth. Acceptable Material: Jay R Smith series S8560 interceptor
- .2 Capacity: 100 USGPM (378 L/min).

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install in accordance with latest version of Ontario Building Code.
- .2 Install in accordance with manufacturer's instructions and as specified.

3.3 ACCESS DOORS

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

3.4 CLEANOUTS

- .1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as indicated.
- .2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
- .3 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

3.5 STRAINERS

- .1 Provide strainers in piping where shown on the drawings and where specified herein.
- .2 Equip strainers 50mm (2") diameter and larger with valved blowdown piping.

- .3 Terminate blowdown piping over the nearest funnel and floor drain unless otherwise noted.
- .4 Locate strainers so they are easily accessible for service.
- .5 Install ahead of each automatic control valve and radiation and as indicated on drawing.
- .6 Install ahead of each pump.

3.6 WATER HAMMER ARRESTORS

- .1 Install on branch supplies to fixtures or group of fixtures and where indicated.
- .2 All arrestors shall be accessible. Provide access panels has required.
- .3 Provide isolation ball valve.

3.7 INSTALLATION OF PIPE ESCUTCHEON

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

3.8 HOSE BIBBS AND SEDIMENT FAUCETS

- .1 Install at bottom of risers, at low points to drain systems, and as indicated.

3.9 TRAP SEAL PRIMERS

- .1 Install for floor drains and elsewhere, as indicated.
- .2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of NRC. Where located in wall unit shall be c/w access panel sized to suit proper access to primer.
- .3 Install soft copper tubing to floor drain.

3.10 START-UP

- .1 General:
 - .1 In accordance with Section 00 10 00 – General Instructions: General Requirements, supplemented as specified herein.
- .2 Timing: start-up only after:
 - .1 Pressure tests have been completed.
 - .2 Disinfection procedures have been completed.
 - .3 Certificate of static completion has been issued.

- .4 Water treatment systems operational.
- .3 Provide continuous supervision during start-up of all equipment.

3.11 TESTING AND ADJUSTING

- .1 General:
 - .1 Contractor shall be responsible to verify that all equipment operates as per manufacturer specification to the satisfaction of NRC.
 - .2 Contractor shall be responsible to train NRC staff in the use of all equipment. Exact training schedule to be coordinated with NRC.
- .2 Timing:
 - .1 After start-up deficiencies rectified.
 - .2 After certificate of completion has been issued by authority having jurisdiction.
- .3 Application tolerances:
 - .1 Pressure at fixtures: +/- 20 kPa.
 - .2 Flow rate at fixtures: +/- 20%.
- .4 Adjustments:
 - .1 Verify that flow rate and pressure meet design criteria.
 - .2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.
- .5 Floor drains:
 - .1 Verify operation of trap seal primer.
 - .2 Prime, using trap primer. Adjust flow rate to suit site conditions.
 - .3 Check operations of flushing features.
 - .4 Check security, accessibility, remove-ability of strainer.
 - .5 Clean out baskets.
- .6 Vacuum breakers, backflow preventers, backwater valves:
 - .1 Test tightness, accessibility for O&M of cover and of valve.
 - .2 Simulate reverse flow and back-pressure conditions to test operation of vacuum breakers, backflow preventers.
 - .3 Verify visibility of discharge from open ports.
- .7 Access doors:
 - .1 Verify size and location relative to items to be accessed.
- .8 Cleanouts:
 - .1 Verify covers are gas-tight, secure, yet readily removable.
- .9 Strainers:
 - .1 Clean out repeatedly until clear.
 - .2 Verify accessibility of cleanout plug and basket.

- .3 Verify that cleanout plug does not leak.
- .10 Sediment/ Oil interceptors:
 - .1 Activate, using manufacturer's recommended procedures and materials.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 00 10 00 – General Instructions.
- .2 Section 00 15 45 – General Safety Section and Fire Instructions.
- .3 Section 21 05 01 – Common Work Results- Mechanical
- .4 Section 21 07 19 – Thermal Insulation for Piping
- .5 Section 22 11 16 – Domestic Water Piping
- .6 Section 22 42 01 – Plumbing Specialties and Accessories
- .7 Section 23 05 05 – Installation of Pipework

1.2 REFERENCES

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 CLOSEOUT SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 MANUFACTURED UNITS

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.
- .3 Exposed plumbing brass to be chrome plated.
- .4 Number, locations and basis of design: as indicated on drawing 6218-M02.
- .5 Fixtures in any one location to be product of one manufacturer and of same type.
- .6 Trim in any one location to be product of one manufacturer and of same type.
- .7 Lab Sink:
 - .1 S1: Free-standing Sink with worktable and backsplash.:
 - .1 18 gauge stainless steel, type 430 construction, machined polished top, galvanized steel lower shelf, hemmed edges, pre-cut holes. 100mm (4 inch) backsplash, 100mm (4in) center pre-cut holes for deck mounted faucet. Total size: 1220mm (48in) x 660mm (26in) x 889mm (35in) heigh, sink: minimum 356mm (14in) x 254mm (10in) x 254mm (10in) deep. Center 40mm diameter (1-1/2in diameter) drain.
- .8 Sink Trim:
 - .1 Chrome plated brass, combination supply and waste fittings, mixing spout, washer-less, aerator, metal indexed handles.
 - .1 Provide accessories to limit maximum flow rate to 8.3 l/minute at 413 kPa.
 - .2 Acceptable Material: Moen model 8279SM, American Standard, Delta, Moen, Chicago Faucets, or approved equal.
- .9 Fixture piping:
 - .1 Hot and cold water supplies to fixtures:
 - .1 Chrome plated flexible supply pipes with 1/4 turn valve stop, reducers, escutcheon.
 - .2 Waste:
 - .1 Brass P trap with clean out on fixtures not having integral trap.
 - .2 Chrome plated in exposed places.

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 As per manufacturer's instructions

3.3 ADJUSTING

- .1 Conform to water conservation requirements specified this section.
- .2 Adjustments:

- .1 Adjust water flow rate to design flow rates.
- .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
- .3 Adjust flush valves to suit actual site conditions.
- .4 Adjust urinal flush timing mechanisms.
- .3 Checks:
 - .1 Aerators: operation, cleanliness.
 - .2 Vacuum breakers, backflow preventers: operation under all conditions.

3.4 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for selective demolition and removal of heating, ventilation, air conditioning systems, refrigerant systems, controls and automated automation components, and related mechanical components and incidentals required to complete work described in this Section to prepare for new construction.

1.2 RELATED SECTIONS

- .1 Section 01 10 00 – General Instructions
- .2 Section 01 74 19 - Waste Management and Disposal
- .3 Section 02 41 19.16 - Selective Interior Demolition
- .4 Section 02 42 00 - Removal and Salvage of Construction Materials
- .5 Section 22 05 05 – Selective Demolition for Plumbing
- .6 Section 26 05 05 – Selective Demolition for Electrical

1.3 REFERENCE STANDARDS

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

1.4 DEFINITIONS

- .1 Concealed: mechanical services and equipment is suspended ceilings and in chases and furred spaces.
- .2 Exposed: will mean not concealed as defined above.
- .3 Demolish: detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .4 Remove: planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .5 Remove and Salvage: detach items from existing construction and deliver them to Departmental Representative ready for reuse.
- .6 Remove and Reinstall: detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

- .7 Existing to Remain: existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.
- .8 Hazardous Substances: dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals: Provide in accordance with Section 01 10 00 – General Instructions, and as outlined in the following:
 - .1 Construction Waste Management Plan (CWM Plan): submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Landfill Records: indicate receipt and acceptance of selective demolition waste and hazardous wastes by a landfill facility licensed to accept hazardous wastes.
 - .3 Halocarbon Service Logs: Contractor shall complete halocarbon service logs and provide copies to Departmental Representative containing all information in accordance with requirements outlined in the Federal Halocarbon Regulation.

1.6 EXAMINATION OF THE SITE

- .1 Carefully examine conditions at the site which will or may affect your work, and become familiar with both the new and existing construction, finishes, and other work associated with your work in order that your tender price includes for everything necessary for completion of your work within the proposed project schedule.

1.7 SALVAGE AND DEBRIS MATERIALS

- .1 Demolished items become property of the Contractor and will be removed from the work site, except items indicated as being reused, salvaged or otherwise indicated to remain in accordance with Section 01 74 19 - Waste Management and Disposal.
- .2 Carefully remove materials and items designated for salvage and store in a manner to prevent damage or devaluation of materials in accordance with Section 02 42 00 – Removal and Salvage of Construction Materials.

Part 2 Products

2.1 MATERIAL

- .1 HVAC Repair Materials: use only new materials required for completion or repair matching materials damaged during performance of work of this Section; new materials are required to meet assembly or system characteristics as existing systems indicated to remain and carry CSA approval labels required by the Authority Having Jurisdiction.

- .2 Fire stopping Repair Materials: use fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Existing Conditions: visit site, thoroughly examine and become familiar with conditions that may affect the work of this Section before tendering the Bid; Departmental Representative will not consider claims for extras for work or materials necessary for proper execution and completion of the contract that could have been determined by a site visit.

3.2 PREPARATION

- .1 Protection of Existing Systems to Remain: protect systems and components indicated to remain in place during selective demolition operations and as follows:
 - .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 - .2 Notify Departmental Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 - .3 Prevent debris from blocking drainage inlets.
 - .4 Protect mechanical systems that must remain in operation.
- .2 Protection of Building Occupants: sequence demolition work so that interference with the use of the building by the Departmental Representative and users is minimized and as follows:
 - .1 Prevent debris from endangering the safe access to and egress from occupied buildings.
 - .2 Notify Departmental Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 EXECUTION

- .1 Demolition and Removal: coordinate requirements of this Section as follows:
 - .1 Disconnect and cap gas supply and electrical services in accordance with requirements of local Authority Having Jurisdiction.
 - .2 Do not disrupt active or energized utilities without approval of the Departmental Representative.
 - .3 Erect and maintain dust proof and weather tight partitions to prevent the spread of dust and fumes to occupied building areas; remove partitions when complete.
 - .4 Demolish parts of existing building to accommodate new construction and remedial work as indicated.
 - .5 At end of each day's work, leave worksite in safe condition.

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- .6 Perform demolition work in a neat and workmanlike manner:
 - .1 Remove any tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
 - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.
 - .2 Halocarbon Requirements: Contractor shall coordinate requirements of this Section as outlined below and in accordance with requirements specified in the Federal Halocarbon Regulation:
 - .1 Contractor shall generate halocarbon service log records for work on equipment (cooling equipment with CFC's, HCFC's and HRC refrigerants; fire suppression systems; solvent cleaning systems) that may result in the release of a halocarbon.
 - .2 Contractor shall generate Decommissioning, Dismantling or Destroying (DDD) Notice containing all information in accordance with requirements outlined in the Federal Halocarbon Regulation for all systems to be decommissioned, dismantled or destroyed as part of work activities.
 - .1 Prior to commencement of DDD activities Contractor shall collect halocarbons in approved, designated container per Federal Halocarbon Regulation.
 - .2 Contractor shall generate DDD Notice and affix notice to system and provide copies to be maintained on site by Departmental Representative.
 - .3 Contractor shall provide additional copy of all halocarbon service log records, including DDD Notices in the O&M Manual.

3.4 CLOSEOUT ACTIVITIES

- .1 Demolition Waste Disposal: arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) except where explicitly noted otherwise for materials being salvaged for reuse in new construction in accordance with requirements outlined in Section 01 74 19 - Waste Management and Disposal.
- .2 Halocarbon Service Logs: arrange for supplemental copies of all halocarbon service logs as specified in the Federal Halocarbon Regulations, including DDD Notices, to be incorporated into O&M Manuals upon project completion.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS SPEC

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 The contractor is responsibility to coordinate and dispose of all waste material to local provincial and municipality requirements.
 - .2 It is the full responsibility of the contractor to ensure that all construction material, equipment, tools, etc. are stored and used in a safe and reasonable manor as per good industry standards.
 - .3 The contractor is responsible for all damaged and stolen material, tools or equipment on site.
 - .4 The contractor is responsible for the delivery of all material, tools or equipment.

Part 2 Products

2.1 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 and when penetrating ceiling/roof and has indicated..

3.3 CLEARANCES

- .1 Provide clearance around systems, equipment and components for observation of operation, inspection, testing (x-ray, 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, 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 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

3.5 AIR VENTS

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

3.6 DIELECTRIC COUPLINGS

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

3.7 PIPEWORK INSTALLATION

- .1 Screwed fittings jointed with Teflon tape.
- .2 Protect openings against entry of foreign material.
- .3 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.
- .4 Assemble piping using fittings manufactured to ANSI standards.

- .5 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main.
 - .1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.
- .6 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.
- .7 Install concealed pipework to minimize furring space, maximize headroom, conserve space.
- .8 Slope piping, except where indicated, in direction of flow for positive drainage and venting.
- .9 Install, except where indicated, to permit separate thermal insulation of each pipe.
- .10 Group piping wherever possible.
- .11 Ream pipes, remove scale and other foreign material before assembly.
- .12 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- .13 Provide for thermal expansion as indicated.
- .14 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 valves at branch take-offs for isolating purposes except where otherwise specified.
 - .7 Install butterfly valves between weld neck flanges to ensure full compression of liner.
 - .8 Install ball valves for glycol service and where indicated.
 - .9 Use chain operators on valves NPS 2 1/2 and larger where installed more than 2400 mm above floor in Mechanical Rooms.
- .15 Check Valves:
 - .1 Install silent check valves on discharge of pumps 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.

3.8 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: 6 mm 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 25 mm 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.

3.9 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.

3.10 PREPARATION FOR FIRE STOPPING

- .1 Material and installation within annular space between pipes, ducts, insulation and adjacent fire separation to [Section 07 84 00 - Fire Stopping](#).
- .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 fire stopping material or installation.
- .4 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

3.11 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

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

3.12 EXISTING SYSTEMS

- .1 Connect into existing piping systems at times approved by NRC.
- .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 74 11 - Cleaning](#).
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Electrical motors, drives and guards for mechanical equipment and systems.
 - .2 Supplier and installer responsibility indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.
 - .3 Control wiring and conduit is specified in Division 26 except for conduit, wiring and connections below 50 V which are related to control systems specified in Division 22 and 23. Refer to Division 26 for quality of materials and workmanship.
- .2 Related Sections:
 - .1 Section 00 10 00 – General Instructions.
 - .2 Section 00 15 45 - General Safety Section and Fire Instructions.
 - .3 Section 21 05 01 – Common Work Results- Mechanical

1.2 REFERENCES

- .1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)
 - .1 ASHRAE 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA cosponsored; ANSI approved; Continuous Maintenance Standard).
- .2 Electrical Equipment Manufacturers' Association Council (EEMAC)
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

- .1 Submittals: in accordance with Section 00 10 00 – General Instructions
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet. Include product characteristics, performance criteria, and limitations.
- .3 Quality Control: in accordance with Section 00 10 00 – General Instructions.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .4 Closeout Submittals
 - .1 Provide maintenance data for motors, drives and guards for incorporation into manual specified in Section 00 10 00 – General Instructions.

1.4 QUALITY ASSURANCE

- .1 Regulatory Requirements: work to be performed in compliance with CEPA, CEAA, TDGA and applicable Provincial /Territorial regulations.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 00 15 45 - General Safety Section and Fire Instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

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

Part 2 Products

2.1 GENERAL

- .1 Motors: high efficiency, in accordance with local Hydro company standards and to ASHRAE 90.1.

2.2 MOTORS

- .1 Provide motors for mechanical equipment as specified.
- .2 Motors under 373 W [1/2 HP] speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 120 V, unless otherwise specified or indicated.
- .3 Motors 373 W [1/2 HP] and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40 degrees C, 3 phase, 575 V, unless otherwise indicated.

2.3 TEMPORARY MOTORS

- .1 If delivery of specified motor will delay completion or commissioning work, install motor approved by Departmental Representative for temporary use. Work will only be accepted when specified motor is installed.

2.4 BELT DRIVES

- .1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.
- .2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise indicated.

- .3 For motors under 7.5 kW (10 HP) standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.
- .4 For motors 7.5 kW (10 HP) and over: sheave with split tapered bushing and keyway having fixed pitch unless specifically required for item concerned. Provide sheave of correct size to suit balancing.
- .5 Correct size of sheave determined during commissioning.
- .6 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.
- .7 Motor slide rail adjustment plates to allow for centre line adjustment.

2.5 DRIVE GUARDS

- .1 Provide guards for unprotected drives.
- .2 Guards for belt drives;
 - .1 Expanded metal screen welded to steel frame.
 - .2 Minimum 1.2 mm thick sheet metal tops and bottoms.
 - .3 38 mm dia holes on both shaft centres for insertion of tachometer.
 - .4 Removable for servicing.
- .3 Provide means to permit lubrication and use of test instruments with guards in place.
- .4 Install belt guards to allow movement of motors for adjusting belt tension-
- .5 Guard for flexible coupling:
 - .1 "U" shaped, minimum 1.6 mm thick galvanized mild steel.
 - .2 Securely fasten in place.
 - .3 Removable for servicing.
- .6 Unprotected fan inlets or outlets:
 - .1 Wire or expanded metal screen, galvanized, 19 mm mesh.
 - .2 Net free area of guard: not less than 80% of fan openings.
 - .3 Securely fasten in place.
 - .4 Removable for servicing.

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 Fasten securely in place.

- .2 Make removable for servicing, easily returned into, and positively in position.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes: Bronze valves that may be used for the following systems unless otherwise stated.
 - .1 Pressure less then 100 psig : domestic water, chilled water, heating water, glycol piping and compressed air piping
 - .2 Pressure less then 15 psig: saturated steam

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)/ American Society of Mechanical Engineers (ASME).
 - .1 ANSI/ASME B1.20.1, Pipe Threads, General Purpose (Inch).
 - .2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
- .2 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM A276, Specification for Stainless Steel Bars and Shapes.
 - .2 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
 - .3 ASTM B283, Specification for Copper and Copper Alloy Die Forgings (Hot-Pressed).
 - .4 ASTM B505/B505M, Specification for Copper-Base Alloy Continuous Castings.
- .3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).
 - .1 MSS-SP-25, Standard Marking System for Valves, Fittings, Flanges and Unions.
 - .2 MSS-SP-80, Bronze Gate Globe, Angle and Check Valves.
 - .3 MSS-SP-110, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.3 SUBMITTALS

- .1 Contractor shall submit detailed shop drawings for all valves for NRC review.
- .2 Shop drawings shall include but not limited to the following:
 - .1 Fitting type
 - .2 Material for valve body and internals
 - .3 ASME Class
- .3 Valve shall not be purchased until shop drawing has been approved by NRC.

1.4 QUALITY ASSURANCE

- .1 Health and Safety:
 - .1 See Section 01545 - Safety Requirements.

1.5 DELIVERY STORAGE AND DISPOSAL

- .1 See Section 01000

Part 2 Products

2.1 MATERIALS

- .1 Valves:
 - .1 Except for specialty valves, to be single manufacturer.
 - .2 All valves on steam and compressed air above at or above 15 psig shall have Canadian Registration Number (CRN#)
- .2 End Connections:
 - .1 Connection into adjacent piping/tubing:
 - .1 Steel pipe systems: Screwed ends to ANSI/ASME B1.20.1.
 - .2 Copper tube systems: Solder ends to ANSI/ASME B16.18.
- .3 Lockshield Keys:
 - .1 Where lockshield valves are specified, provide 2 keys of each size: malleable iron cadmium plated.
- .4 Globe Valves:
 - .1 Requirements common to globe valves, unless specified otherwise:
 - .1 Standard specification: MSS SP-80.
 - .2 Bonnet: union with hexagonal shoulders.
 - .3 Connections: screwed with hexagonal shoulders.
 - .4 Stuffing box: threaded to bonnet with gland follower, packing nut, high grade non-asbestos packing.
 - .5 Handwheel: non-ferrous.
 - .6 Handwheel Nut: bronze to ASTM B62.
 - .2 NPS 2 and under, plug disc, Class 150, screwed:
 - .1 Body and bonnet: union bonnet.
 - .2 Inside screw and rising stem
 - .3 Disc and seat ring: tapered plug type with disc stem ring.
 - .4 Operator: Handwheel.
- .5 Swing Check Valves:
 - .1 NPS 2 and under, Class 150, screwed
 - .1 To MSS SP-80 and ANSI B1.20.1.
 - .2 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.
 - .3 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: NPS 2 and under, Class 150, soldered
 - .1 To MSS SP-80 and ANSI B16.18.
 - .2 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.

- .3 Disc and seat: renewable rotating disc, two-piece hinge disc construction;
seat: Silent Check Valves:
- .1 NPS 2 and under, screwed ends:
 - .1 Body: cast high tensile bronze to ASTM B62 with integral seat.
 - .2 Minimum pressure rating: Class 150.
 - .3 Connections: screwed ends to ANSI B1.20.1 and with hex. shoulders.
 - .4 Disc and seat: renewable rotating disc.
 - .5 Stainless steel spring, heavy duty.
 - .6 Seat: regrindable.
- .7 Ball Valves:
 - .1 NPS 2 and under, threaded ends:
 - .1 Body and cap: cast high tensile bronze
 - .2 Chrome plated brass ball, RPTFE seat.
 - .3 Minimum pressure rating: 1000 kPa saturated steam, 4130 kPa WOG
 - .4 Valves to be complete with minimal 31 mm stem extension for all insulated pipes, see section 21 07 19 THERMAL INSULATION FOR PIPING
 - .5 Operator: steel lever handle with securely attached vinyl grip
 - .6 Connections: Screwed ends to ANSI B1.20.1 and with hexagonal shoulders
 - .2 NPS 2 and under, soldered ends:
 - .1 Body and cap: cast high tensile bronze
 - .2 Chrome plated brass ball, RPTFE seat.
 - .3 Minimum pressure rating: 1000 kPa saturated steam, 4130 kPa WOG
 - .4 Valves to be complete with minimal 31 mm stem extension for all insulated pipes, see section 21 07 19 THERMAL INSULATION FOR PIPING
 - .5 Operator: steel lever handle with securely attached vinyl grip
 - .6 All internals to be removed prior to soldering.
 - .7 Connections: solder ends to ANSI. Soldered ends to ANSI B16.18, solder ends to ANSI.
- .8 Circuit Balancing Valves:
 - .1 NPS 2 and under, screwed ends:
 - .1 Y-pattern, bronze body c/w two brass metering ports, memory feature and capable of precise flow measurement, flow balancing and drip tight shut-off. Standard of acceptance (screwed): Armstrong CBV-T and Tour & Andersson STADA for valves with threaded ends **Execution**

3.1 INSTALLATION

- .1 Install rising stem valves in upright position with stem above horizontal.
- .2 Where soldered valves are used contractor shall remove internal parts before soldering. Before soldering, installation shall be inspected by NRC.
- .3 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance and equipment removal.
- .4 No valve shall be insulated until all pressure tests relating to valve are completed and approved by NRC.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Cast Iron valves may be used for the following systems where indicated: Steam, condensate, compressed air, glycol, chilled water and heating water.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME).
 - .1 ANSI/ASME B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
- .2 American Society for Testing and Materials International (ASTM).
 - .1 ASTM A49, Specification for Heat-Treated Carbon Steel Joint Bars.
 - .2 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - .3 ASTM B61, Specification for Steam or Valve Bronze Castings.
 - .4 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
- .3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).
 - .1 MSS SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
 - .2 MSS SP-71, Grey Iron Swing Check Valves, Flanged and Threaded Ends.
 - .3 MSS SP-82, Valve Pressure Testing Methods.
 - .4 MSS SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.3 SUBMITTALS

- .1 Contractor shall submit detailed shop drawings for all valves for NRC review.
- .2 Shop drawings shall include but not limited to the following:
 - .1 Fitting type
 - .2 Material for valve body and internals
 - .3 ASME Class
- .3 Valve shall not be purchased until shop drawing has been approved by NRC.

1.4 QUALITY ASSURANCE

- .1 Health and Safety:
 - .1 See Section 01545 - Safety Requirements.

1.5 DELIVERY STORAGE AND DISPOSAL

- .1 See Section 01000

Part 2 Products

2.1 MATERIAL

- .1 Sustainable Requirements:
 - .1 All valves in steam or compressed air system at 103 kPa or more shall be complete with a Canadian Registration Number (CRN).

- .2 Standard specifications:
 - .1 Gate valves: MSS SP-70.
 - .2 Globe valves: MSS SP-85.
 - .3 Check valves: MSS SP-71.
- .3 Requirements common to valves, unless specified otherwise:
 - .1 Body, bonnet: cast iron to ASTM B209 Class B.
 - .2 Connections: flanged ends plain face with 2 mm raised face with serrated finish to ANSI B16.1.
 - .3 Inspection and pressure testing: to MSS SP-82.
 - .4 Bonnet gasket: non-asbestos.
 - .5 Stem: to have precision-machined Acme or 60 degrees V threads, top screwed for hand wheel nut.
 - .6 Stuffing box: non-galling two-piece ball-jointed packing gland, gland bolts and nuts.
 - .7 Gland packing: non-asbestos.
 - .8 Handwheel: Die-cast aluminum alloy to ASTM B85 or malleable iron to ASTM A49. Nut of bronze to ASTM B62.
 - .9 Identification tag: with catalogue number, size, other pertinent data.

2.2 GLOBE VALVES

- .1 NPS 2 1/2 to 8, OS&Y, class 125, flanged:
 - .1 Body: cast iron A126 Class B with multiple-bolted bonnet.
 - .2 Bonnet-yoke gasket: non-asbestos.
 - .3 Disc: cast iron A126 Class B
 - .4 Seat ring: cast bronze
 - .5 Stem: forged bronze to ASTM B124.
 - .6 Operator: Handwheel cast iron/ductile iron

2.3 SWING CHECK VALVES

- .1 NPS 2-1/2 to 24, Class 125, flanged:
 - .1 Bolted on cover, ductile iron hinges, replaceable 13% chromium stainless steel hinge pins, replaceable hinge bushings, sold iron disc with integral seat face. ASME B 161, ASME B 16.10, MSS SP-71 Type 1 and MSS SP-25.

2.4 SILENT CHECK VALVES

- .1 NPS 2-1/2" to 24, Class 125, flanged:
 - .1 316 SS trim, dual guide stem, one piece body, bronze disc. ASME A126 Class B, A351 CF8M, A313 T302.

2.5 CIRCUIT BALANCING VALVES:

- .1 NPS 2-1/2 and over, flanged:

- .1 Y-pattern, cast iron body with industry standard grooved ends and flanged adaptor or flanged ends c/w two metering ports, memory feature and capable of precise flow measurement, flow balancing and drip tight shut-off.

2.6 VALVE OPERATORS

- .1 Install valve operators as follows: as specified herein
 - .1 Handwheel: on valves except as specified.

Part 3 Execution

3.1 INSTALLATION

- .1 Install rising stem valves in upright position with stem above horizontal.
- .2 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance and equipment removal.
- .3 All valves to be installed as per manufacturer recommendation and has per good industry standard.
- .4 No valve shall be insulated until all pressure tests relating to valve are completed and approved by NRC.
- .5 Where pressure for testing of piping system exceeds valve limits contractor shall include for the removal of specific valve and blanking off of piping system to allow for testing. Once test has been completed contractor shall reinstate valve.

3.2 VERIFICATION

- .1 Verification requirements in accordance with Section 00 10 00 – General Instructions, drawings and as follows:

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Concrete housekeeping pads, hangers and supports for mechanical piping, ducting and equipment.**REFERENCES**

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

.1 ANSI/ASME B31.1 / B31.3

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

.1 ASTM A125, Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A563, Specification for Carbon and Alloy Steel Nuts.

.3 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP58, Pipe Hangers and Supports - Materials, Design and Manufacture.

.2 ANSI/MSS SP69, Pipe Hangers and Supports - Selection and Application.

.3 MSS SP89, Pipe Hangers and Supports - Fabrication and Installation Practices.**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 B31.3 as indicated.

.3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.

.4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.

.5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.

.2 Performance Requirements:

.1 Design supports, platforms, catwalks, hangers, to withstand seismic where indicated.

1.4 SUBMITTALS

.1 Submit shop drawings and product data for following items:

.1 Bases, hangers and supports.

- .2 Connections to equipment and structure.
- .3 Structural assemblies.
- .4 Installation instructions
- .2 Closeout Submittals:
 - .1 Provide maintenance data for incorporation into manual.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Waste Management and Disposal:
 - .1 The contractor is responsibility to coordinate and dispose of all waste material to local provincial and municipality requirements.
 - .2 It is the full responsibility of the contractor to ensure that all construction material, equipment, tools, etc. are stored and used in a safe and reasonable manor as per good industry standards.
 - .3 The contractor is responsible for all damaged and stolen material, tools or equipment on site.
 - .4 The contractor is responsible for the delivery of all material, tools or equipment.

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-exterior and painted with zinc-rich paint – interior after manufacture.
 - .2 Use hot dipped galvanizing process.
 - .3 Ensure steel hangers in contact with copper piping are copper plated or 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 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 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.
- .4 Upper attachment to concrete:
 - .1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
 - .2 Concrete inserts: wedge shaped body with knockout protector plate UL listed to MSS SP69.
- .5 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. Pipe attachments: material to MSS SP58:
 - .1 Attachments for steel piping: carbon steel galvanized.
 - .2 Attachments for copper piping: copper plated black steel.
 - .3 Use insulation shields for hot pipework.
 - .4 Oversize pipe hangers and supports.
- .7 Adjustable clevis: material to MSS SP69 UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
 - .1 Ensure "U" has hole in bottom for riveting to insulation shields
- .8 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP69.
- .9 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.
 - .1 Finishes for steel pipework: galvanized.
 - .2 Finishes for copper, glass, brass or aluminum pipework: black with formed portion plastic coated or epoxy coated.
- .10 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP69. Shop and field-fabricated assemblies.
 - .1 Trapeze hanger assemblies: MSS SP-89.
 - .2 Steel brackets: MSS SP-89.
 - .3 Sway braces for seismic restraint systems: to MSS SP-89.

2.3 RISER CLAMPS

- .1 Steel or cast iron pipe: galvanized steel to MSS SP58, type 42, UL listed.
- .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/m³ density insulation plus insulation protection shield to: MSS SP69, galvanized sheet carbon steel. Length designed for maximum 3 m span.
- .2 Insulated hot piping:
- .1 Curved plate 300 mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS 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 25 mm minimum.
- .6 Individually calibrated scales on each side of support calibrated prior to shipment, complete with calibration record.

2.6 VARIABLE SUPPORT SPRING HANGERS

- .1 Vertical movement: 13 mm minimum, 50 mm maximum, use single spring pre-compressed variable spring hangers.
- .2 Vertical movement greater than 50 mm: use double spring pre-compressed variable spring hanger with 2 springs in series in single casing.
- .3 Variable spring hanger complete with factory calibrated travel stops. 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 meeting requirements of Section 05 12 23 - Structural Steel for Buildings. Submit calculations with shop drawings.

2.8 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

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

2.9 OTHER EQUIPMENT SUPPORTS

- .1 Fabricate equipment supports from structural grade steel meeting requirements of Section 05 12 23 - Structural Steel for Buildings.
- .2 Submit structural calculations with shop drawings.

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 13 mm 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 or 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 300 mm of each elbow.
- .7 Pipework greater than NPS 12: to MSS SP69.
- .8 Hydronic, steam, steam condensate, compressed air, rigid, and flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.

MAXIMUM HANGER SPACING AND MINIMUM ROD SIZE

O.D		STEEL PIPE				COPPER TUBE		ROD SIZE	
INCHES	mm	WATER		STEAM / AIR		FT	METER	INCH	mm
		FT	METER	FT	METER				
<= 1/2	12.7	7	2.13	8	2.44	5	1.52	1/4'	6.4
3/4	19.1	7	2.13	9	2.74	5	1.52	1/4'	6.4
1	25.4	7	2.13	9	2.74	6	1.83	1/4'	6.4
1-1/4'	31.7	8	2.44	10	3.05	7	2.13	1/4'	6.4
1-1/2'	38.1	9	2.74	12	3.66	8	2.44	3/8'	9.5
2	50.8	10	3.05	13	3.96	8	2.44	3/8'	9.5
2-1/2'	63.5	11	3.35	14	4.27	9	2.74	3/8'	9.5
3	76.2	12	3.66	15	4.57	10	3.05	3/8'	9.5
4	101.6	14	4.27	17	5.18	12	3.66	1/2'	12.7
6	152.4	17	5.18	21	6.40	14	4.27	1/2'	12.7
8	203.2	19	5.79	24	7.31	16	4.88	5/8'	15.8
10	254.0	20	6.10	26	7.92	18	5.49	3/4'	19.0
12	304.8	23	7.01	30	9.14	19	5.79	7/8'	22.2
14	355.6	25	7.62	32	9.75			1	25.4
16	406.4	27	8.23	35	10.67			1	25.4
18	457.2	28	8.53	37	11.28			1-1/4'	31.7
20	508.0	30	9.14	39	11.89			1-1/4'	31.7

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 SUMMARY

.1 Section Includes.

- .1 Materials and installation for steel piping, valves and fittings for hydronic systems [in building services piping.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME).

- .1 ASME B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
- .2 ASME B16.3, Malleable Iron Threaded Fittings: Classes 150 and 300.
- .3 ASME B16.5, Pipe Flanges and Flanged Fittings: NPS through NPS 24 Metric/Inch Standard.
- .4 ASME B16.9, Factory-Made Wrought Butt welding Fittings.
- .5 ASME B18.2.1, Square Hex, Heavy Hex and Askew Head Bolts and Hex, Heavy Hex, Hex Flange. Loded Head and Lag Screws (Inch Series).
- .6 ASME B18.2.2, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).

.2 American Society for Testing and Materials International, (ASTM).

- .1 ASTM A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.
- .2 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
- .3 ASTM A536, Standard Specification for Ductile Iron Castings.
- .4 ASTM B61, Standard Specification for Steam or Valve Bronze Castings.
- .5 ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
- .6 ASTM E202, Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols.

.3 American Water Works Association (AWWA).

- .1 AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 Canadian Standards Association (CSA International).

- .1 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
- .2 CAN/CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.

.5 Manufacturer's Standardization of the Valve and Fittings Industry (MSS).

- .1 MSS-SP-67, Butterfly Valves.
- .2 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
- .3 MSS-SP-71, Cast Iron Swing Check Valves Flanged and Threaded Ends.
- .4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.
- .5 MSS-SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

- .6 MSS-SP-85-[02], Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.3 SUBMITTALS

- .1 Submit shop drawings for all material for review.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

1.5 MAINTENANCE

- .1 Extra Materials.
 - .1 Provide following spare parts:
 - .1 Valve seats: one for every ten valves, each size. Minimum one.
 - .2 Discs: one for every ten valves, each size. Minimum one.
 - .3 Stem packing: one for every ten valves, each size. Minimum one.
 - .4 Valve handles: two of each size.
 - .5 Gaskets for flanges: one for every ten flanges.

Part 2 Products

2.1 PIPE

- .1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:
 - .1 To NPS 12: Schedule 40

2.2 PIPE JOINTS

- .1 NPS 2 and under: screwed fittings with PTFE tape or lead-free pipe dope.
- .2 NPS 2-1/2 and over: welding fittings and flanges to CAN/CSA W48.
- .3 Roll grooved: Rigid coupling to CSA B242.
- .4 Flanges: plain ASME, B16.1, raised face, slip-on or weld neck to ASME B16.5.
- .5 Orifice flanges: slip-on raised face, 2100 kPa.
- .6 Flange gaskets: to AWWA C111
- .7 Pipe thread: taper.

- .8 Bolts and nuts: to ASME B18.2.1 and ASME B18.2.2.
- .9 Roll grooved coupling gaskets: NPS 2 to 8, type EHP, EPDM high performance, -40°C to +120°C for continuous operation, NPS 10 and above type EPDM, -30°C to +110°C for continuous acceptable on hot water, glycol water, chilled water and condenser water.
- .10 Pipe thread: taper.

2.3 FITTINGS

- .1 Screwed fittings: malleable iron, to ASME B16.3, Class 150.
- .2 Pipe flanges and flanged fittings:
 - .1 Cast iron: to ASME B16.1, Class 125.
 - .2 Steel: to ASME B16.5.
- .3 Butt-welding fittings: steel, to ASME B16.9.
- .4 Unions: malleable iron, to ASTM A47/A47M and ASME B16.3.
- .5 Fittings for roll grooved piping: malleable iron to ASTM A47/A47M, ductile iron to ASTM A536.

2.4 VALVES

- .1 Connections:
 - .1 NPS2 and smaller: screwed ends.
 - .2 NPS2.1/2 and larger: Flanged or grooved ends.
- .2 Gate valves: to MSS-SP-70 and MSS-SP-80 Application: Isolating equipment, control valves, pipelines:
 - .1 NPS 2 and under:
 - .1 Mechanical Rooms: Class 125 rising stem, solid wedge disc.
 - .2 Elsewhere: Class 125, non- rising stem, solid wedge disc.
 - .2 NPS 2 1/2 and over:
 - .1 Mechanical Rooms: rising stem, solid wedge disc, lead free bronze trim.
 - .2 Elsewhere: Non- rising stem, solid wedge disc, lead free bronze trim.
- .3 Butterfly valves: to MSS-SP-67 Application: Isolating cells or section of multiple component equipment (e.g. multi-section coils, multi-cell cooling towers).
 - .1 NPS 2 1/2 and over: Lug type or Grooved ends:
- .4 Globe valves: to MSS-SP-80 and 85 Application: Throttling, flow control, emergency bypass.
 - .1 NPS 2 and under:
 - .1 Mechanical Rooms: with plug disc.
 - .2 Elsewhere: Globe, with composition disc.
 - .2 NPS 2 1/2 and over:

- .1 With composition bronze disc, bronze trim.
- .5 Balancing, for TAB:
 - .1 Sizes: Calibrated balancing valves, as specified this section.
 - .2 NPS 2 and under:
 - .1 Copper alloy body threaded and, 2.1 MPa rating, globe style, self-sealing measuring ports for temperature or pressure probes, locking tamper proof setting.
 - .2 Mechanical Rooms and Elsewhere: Globe.
 - .3 In lieu of standard malleable iron or copper fittings the Contractor may install the following component system:
 - .1 Union port fitting with air vent and pressure/temperature port.
 - .2 Balancing valve, strainer with drain valve, ball valve combination may also be used.
 - .3 NPS 2-1/2 and over:
 - .1 Ductile iron body flanged or grooved connections, 1700 kPa rating minimum, globe style, self-sealing measurement parts for temperature or pressure probes, locking tamper proof setting.
- .6 Drain valves: Globe , Class 125 non-rising stem.
- .7 Swing check valves: to MSS-SP-71.
 - .1 NPS 2 and under:
 - .1 Class 125 swing, with composition disc, Bronze.
 - .2 NPS 2 1/2 and over:
 - .1 Flanged or grooved ends: Cast Iron.
- .8 Silent check valves:
 - .1 NPS 2 and under:
 - .1 Class 125 swing, with composition disc, Bronze.
 - .2 NPS 2 1/2 and over:
 - .1 Flanged or grooved or wafer style ends: Cast Iron.
- .9 Ball valves:
 - .1 NPS 2 and under: Bronze.
- .10 Glycol
 - .1 Ethylene glycol with inhibitors for corrosion control.
 - .2 Percent by volume as indicated.

Part 3 Execution

3.1 PIPING INSTALLATION

- .1 Install pipework in accordance with specification and authority having jurisdiction

3.2 CIRCUIT BALANCING VALVES

- .1 Tape joints in prefabricated insulation on valves installed in chilled water mains.
- .2 Install as per manufacturer recommendations.

3.3 TESTING

- .1 See drawings.

3.4 BALANCING

- .1 Balance water systems to within plus or minus 5 % of design output.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 00 10 00 – General Instructions.
- .2 Section 00 15 45 – General Safety Section and Fire Instructions

1.2 REFERENCES

- .1 American Society of Mechanical Engineers (ASME)
 - .1 ASME, Boiler and Pressure Vessel Code.
- .2 ASTM International Inc.
 - .1 ASTM A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.
 - .2 ASTM A278/A278M, Standard Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures up to 650 degrees F (350 degrees C).
 - .3 ASTM A516/A516M, Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate - and Lower - Temperature Service.
 - .4 ASTM A536, Standard Specification for Ductile Iron Castings.
 - .5 ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.
 - .2 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code, Supplement #1.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Contractor shall submit detailed shop drawings for all valves for NRC review.
- .2 Shop drawings shall include but not limited to the following:
 - .1 Fitting type
 - .2 Material for valve body and internals
 - .3 ASME Class
- .3 Equipment shall not be purchased until shop drawings have been approved by NRC.

1.4 CLOSEOUT SUBMITTALS

- .1 See Section 00 10 00 – General Instructions

1.5 DELIVERY, STORAGE AND HANDLING

- .1 See Section 00 10 00 – General Instructions

Part 2 Products

2.1 IN-LINE FILTER

- .1 Stainless steel 304 sump and brass head, 1/4" NPT drain, spring-loaded seal plate to accept cartridges of varying length.
- .2 Easier assembly of sump into head by raising the cartridge an inch for easy mating with centering post. 20" length nominally sized cartridges,
- .3 Operating pressure: 150 psi 40°-300° F, 1 inlet/outlet, 3/4" NPT connection. c/w 4 – 20 micron String Wound Polypropylene Sediment Filter Cartridges per each filter housing.
- .4 Provide filter at inlet to all By-pass feeders and as indicated on drawings.

2.2 PIPE ESCUTCHEON

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

2.3 AUTOMATIC AIR VENT

- .1 NPS 1/2 pipe size: cast brass body, 150 psig working pressure at 270 deg F, viton seal, stainless steel linkage, brass spring, screwed connection.
- .2 To be installed at all high points of system and where indicated.
- .3 Provide isolation valve to all each vent, See Section 23 05 23.01 Valves Bronze

2.4 DOUBLE BACKFLOW PREVENTERS

- .1 Up to ¾ NPS: brass body, stainless steel internals, atmosphere vent/drain, temperature range 33 to 250 deg F, maximum working pressure 175 psig, CSA B64. Grater then 3/4 NPS and for fire protection systems: Bronze body, stainless steel internals, test cocks bronze, c/w atmosphere vent/drain, temperature range 33 to 140 deg F, maximum working pressure 175 psig, CSA B64.4.
- .3 All preventers shall be complete with inlet strainer, isolation valves.
- .4 Drain to be pipes to nearest floor drain.

2.5 PIPE LINE STRAINER

- .1 NPS 2 and under
 - .1 Body: Bronze , ASTM B 62
 - .2 Strainer: stainless steel type 304
 - .3 Screen perforation: 1/16"
 - .4 Removable cap c/w removable threaded cap for blow off connection
 - .5 Connection: screwed
 - .6 Minimum saturated steam pressure rating: 200 psig

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

2.7 AIR SEPARATOR - IN-LINE

- .1 NPS 3/4 to 1-1/2 pipe size, cast brass body, 150 psig working pressure at 270 deg F, Viton seal, stainless steel linkage, brass spring, screwed connection.
- .2 To be installed in all high points of system.

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 GENERAL

- .1 Run drain lines to terminate above nearest drain.
- .2 Maintain adequate clearance to permit service and maintenance.
- .3 Should deviations beyond allowable clearances arise, request and follow NRC directive.
- .4 Check shop drawings for conformance of tapings for ancillaries and for equipment operating weights.

3.3 INSTALLATION OF PIPE ESCUTCHEON

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

3.4 ACCESS DOORS

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

3.5 STRAINERS

- .1 Provide strainers in piping where shown on the drawings and where specified herein.
- .2 Equip strainers 50mm (2") diameter and larger with valved blowdown piping.
- .3 Terminate blowdown piping over the nearest funnel and floor drain unless otherwise noted.
- .4 Locate strainers so they are easily accessible for service.
- .5 Install ahead of each automatic control valve and radiation and as indicated on drawing.
- .6 Install ahead of each pump.

3.6 AIR VENTS

- .1 Install at high points of systems and where indicated on drawing.
- .2 Install ball valve on automatic air vent inlet.

3.7 PERFORMANCE VERIFICATION

- .1 See Section 00 10 00 – General Instructions

3.8 CLEANING

- .1 See Section 00 10 00 – General Instructions **END OF SECTION**

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Materials and installation for copper tubing and fittings for refrigerant.
- .2 Related Sections:
 - .1 Section 00 10 00 – General Instructions.
 - .2 Section 00 15 45 – General Safety Section and Fire Instructions.
 - .3 Section 23 05 01 - Installation of Pipework.

1.2 REFERENCES

- .1 American Society of Mechanical Engineers (ASME)
 - .1 ASME B16.22, Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings.
 - .2 ASME B16.2, Cast Copper Pipe Flanges and Flanged Fittings: Class 150.
 - .3 ASME B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.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 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

- .1 Submittals in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet for piping, fittings and equipment.
- .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.

1.4 QUALITY ASSURANCE

- .1 Pre-Installation Meeting:

- .1 Convene pre-installation meeting one week prior to beginning work. All work and scheduling to be coordinated and approved by NRC.
 - .1 Verify project requirements.
 - .2 Review installation conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review installation instructions and warranty requirements.
- .2 Health and Safety:
 - .1 In accordance with Section 00 15 45 – General Safety Section and Fire Instructions. Comply with all provincial construction occupational health and safety requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 The contractor is responsibility to coordinate and dispose of all waste material and unused material to local provincial and municipality requirements.
 - .2 It is the full responsibility of the contractor to ensure that all construction material, equipment, tools, etc. are stored and used in a safe and reasonable manor as per good industry standards.
 - .3 The contractor is responsible for all damaged and stolen material, tools or equipment on site.
 - .4 The contractor is responsible for all delivery of material, tools or equipment.

Part 2 Products

2.1 TUBING

- .1 -40 to 60 °C, up to 1035 kPa
- .2 Copper tubing: ASTM B88 Drawn, Type L

2.2 FITTINGS

- .1 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .3 Cast bronze threaded fittings, Class 150: to ANSI/ASME B16.15.
- .4 Cast copper, solder type: to ANSI/ASME B16.18.
- .5 Bronze pipe flanges and flanged fittings, Class 150 to ANSI/ASME B16.24.

2.3 SOLDERED AND BRAZED JOINTS

- .1 Soldered
 - .1 Solder: Alloy Sb5 95-5 Tin-Antimony Solder. Teflon tape: for threaded joints
Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner

- .2 Brazed
 - .1 Fittings: wrought copper to ASME B16.22.
 - .2 Joints: silver solder, 15% Ag-80% Cu-5%P or copper - phosphorous 95% Cu-5%P and non-corrosive flux.

2.4 PIPE SLEEVES

- .1 Hard copper or steel, sized to provide 6 mm clearance around between sleeve and uninsulated pipe or between sleeve and insulation.

2.5 BRONZE BALL VALVES

- .1 NPS 2 and under, threaded ends:
 - .1 Body and cap: cast high tensile bronze
 - .2 Chrome plated brass ball, RPTFE seat.
 - .3 Minimum pressure rating: 1000 kPa saturated steam, 4130 kPa WOG
 - .4 Valves to be complete with minimal 31 mm stem extension for all insulated pipes, see section 21 07 19 THERMAL INSULATION FOR PIPING
 - .5 Operator: steel lever handle with securely attached vinyl grip
 - .6 Connections: Screwed ends to ANSI B1.20.1 and with hexagonal shoulders

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 VALVES:

- .1 Install where indicated on drawing and in specifications
- .2 Install at all low points when piping is tested with water.
- .3 Install as per manufacturer's recommendations.

3.3 BRAZING PROCEDURES

- .1 Bleed inert gas (nitrogen) into pipe during brazing.
- .2 Valves are not to be brazed.
- .3 Do not apply heat near expansion valve and bulb.
- .4 Remove valve internal parts, solenoid valve coils, sight glass.

3.4 PIPING INSTALLATION

- .1 General:
 - .1 Hard drawn copper tubing: do not bend. Minimize use of fittings.
 - .2 Contractor shall provide test ports for pressure testing as required.

3.5 PRESSURE AND LEAK TESTING

- .1 Close valves and other equipment not designed for test pressures.
2. Provide mill test report for all piping.
3. The contractor is responsible to organize and arrange for all license and welding procedure and welders qualification verification.
5. Contractor shall be responsible for provision of all labour and material necessary to blank off tested section, and remove items which cannot sustain test pressure. All test procedures to be by ASME 31.1.
6. After hydrostatic test at a minimum pressure of 1.5 times design pressure for 30 minutes, contractor shall ensure that all new piping sections are thoroughly dried off and cleaned from any debris before being put in service.
7. Contractor may perform a pneumatic test at a minimum pressure of 1.2 times design pressure for 30 minutes instead of hydrostatic pending NRC approval.
8. NRC shall be given a minimum of 48 hour notice of all tests.
9. Contractor shall provide records of the tests, data on instrumentation used and calibration of gauges shall be made available to NRC. Range on pressure gauge used for testing shall not exceed 1.25 times test pressure.
10. All piping components provided must have a valid Canadian Registration Number (CRN) recognized by the TSSA. All CRN(s) to be supplied and approved by NRC prior to installation.

3.6 CLEANING

- .1 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 Section Includes:
 - .1 Materials and installation for duct accessories including flexible connections, access doors, vanes and collars.
- .2 Related Sections:
 - .1 Section 00 10 00 – General Instructions.
 - .2 Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM).

1.2 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].

1.3 SUBMITTALS

- .1 Submittals in accordance with Section 00 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 Flexible ductwork.
 - .3 Fire dampers.
 - .4 Balancing dampers.
 - .5 Back draft dampers.
 - .6 Duct access doors.
 - .7 Turning vanes.
 - .8 Instrument test ports.
 - .2 Submit WHMIS MSDS in accordance with Section 00 10 00. 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.
 - .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 00 10 00 – General Instructions.

1.4 QUALITY ASSURANCE

- .1 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting one week prior to beginning work of this Section.
 - .1 Verify project requirements.
 - .2 Review installation [and substrate] conditions.
 - .3 Co-ordination with other building sub-trades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .2 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 00 10 00. - General Instructions.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 The contractor is responsibility to coordinate and dispose of all waste material to local provincial and municipality requirements. Refer to section [00 10 00 – General Instructions].
- .2 It is the full responsibility of the contractor to ensure that all construction material, equipment, tools, etc. are stored and used in a safe and reasonable manor as per good industry standards.
- .3 The contractor is responsible for all damaged and stolen material, tools or equipment on site.
- .4 The contractor is responsible for all delivery of material, tools or equipment

Part 2 Products

2.1 GENERAL

- .1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 STEEL DUCTWORK

- .1 Prime quality galvanized sheet steel with metal gauges in accordance with SMACNA standards to suit the duct configuration and classification.

2.3 FLEXIBLE DUCTWORK - UNINSULATED

- .1 Flexmaster Triple Lock, U.L.C. listed, fire and smoke-proof, spiral wound aluminum ductwork mechanically corrugated and meeting NFPA 90A requirements.
- .2 Acceptable manufacturers are Flexmaster Ltd., Trans Continental Equipment Ltd., "Al-U-Flex", and Alpha Sheet Metal Co.

2.4 FLEXIBLE DUCTWORK – INSULATED

- .1 Flexmaster Triple Lock Type V U.L.C. listed flexible ductwork c/w a core of standard triple lock metal flexible ducting, factory supplied glass or mineral wool insulating blanket and an outer jacket of flexible PVC sheet.
- .2 Acceptable manufacturers are Flexmaster Ltd., Trans Continental Equipment Ltd., "Al-U-Flex", and Alpha Sheet Metal Co.

2.5 FLEXIBLE CONNECTIONS

- .1 Frame: galvanized sheet metal frame [____] mm thick with fabric clenched by means of double locked seams.
- .2 Material:
 - .1 Fire resistant, self extinguishing, neoprene coated glass fabric, airtight and moisture proof material, temperature rated at minus 40 degrees C to plus 90 degrees C, density of 1.3 kg/m².
- .3 Acceptable manufacturers are Duro-Dyne Ltd., "Durolon" as above, Ventfabrics "Ventglas" and Elgen Engineering Ltd. "Neoprene".

2.6 ROUND TO RECTANGULAR DUCT CONNECTIONS

- .1 Nailor-Hart Industries Inc. "Spin-In" galvanized steel round to rectangular duct take-off connection collars, Model #1801 where dampers are not required, Model #1802 with integral damper where dampers are required.
- .2 Acceptable manufacturers are Nailor-Hart Industries Inc., Controlled Air Manufacturing and Flexmaster Canada Ltd.

2.7 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.

2.8 BALANCING DAMPERS

- .1 Nailor-Hart Industries Inc. opposed blade galvanized steel control damper, Model No. 1020 for rectangular ductwork, Model No. 1021 for round ductwork, each complete with No. 16 U.S.S. gauge frame, No. 18 U.S.S. gauge blades, nylon blade shaft bearings, linkage shaft extension, and a suitable and secure damper operator with locking device and visual indication of damper position from the duct exterior.
- .2 Acceptable manufacturers are Nailor-Hart Industries Inc., Controlled Air Manufacturing Ltd., Ruskin Ltd., and Air Specialties Manufacturing Ltd.

2.9 ACOUSTIC DUCT LINER

- .1 **General:**
 - .1 Fibrous glass duct liner 25 mm (1") thick: air side coated with black neoprene.

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50.

.3 Fibrous glass rigid board for rectangular surfaces, fibrous glass blanket for round surfaces.

.2 Fasteners:

.1 Duro-Dyne clip pins for installation through the insulation, length to suit the insulation thickness.

.3 Acceptable manufacturers of acoustic duct liner are Fiberglass Canada Ltd., Manville Canada Inc. and Atlas Asbestos Co. Ltd.

2.10 GRILLES, REGISTERS & DIFFUSERS

.1 Grilles, registers and diffusers of the type, size and arrangement as specified on the drawings.

.2 Grilles, registers and diffusers shall be product of one manufacturer.

.3 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

.4 Acceptable manufacturers are E.H. Price Ltd., Titus Ltd., Air Vector Ltd., Nailor Industries Inc., Krueger Manufacturing Co. and Carnes.

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 DUCT, DAMPER & SIMILAR FORMED OPENINGS

.1 Duct openings, air inlet and outlet openings, fire damper openings, etc. will be provided in poured concrete work, masonry, drywall surfaces, etc., by the trade responsible for the particular construction in which the opening is required.

.2 Ensure that openings for fire dampers to 350 mm (14") high are sized to suit the damper arrangement with folding blade out of the air stream.

.2 FABRICATION & INSTALLATION OF STEEL DUCTWORK

.1 Provide all required steel ductwork. Unless otherwise noted, all ductwork shall be constructed of galvanized steel.

.2 Unless specifically noted otherwise, all duct, bends, elbows, transformations, branch fittings, etc. shall be fabricated, sealed and installed in accordance with the 1" water gauge (0.25 kPa) pressure class of the latest edition of SMACNA Hvac Duct Construction Standards, except for duct upstream of VAV boxes, which shall comply with the requirements of the 2" water gauge (0.50 kPa) pressure class.

.3 FLEXIBLE DUCTWORK

.1 Install flexible ductwork where indicated.

- .2 At connections between sheet metal ducts and flexible ducts, provide galvanized steel round to rectangular duct connections as specified hereinbefore.
- .3 Install flexible ducts as straight as possible, secure at each end with steel gear type clamps, and seal joints. Where bends are required, they shall be long radius.
- .4 Maximum length of flexible duct to be 3m (10').

.4 FLEXIBLE CONNECTIONS

- .1 Provide flexible connection in following locations:
 - .1 Inlets and outlets to supply air units and fans.
 - .2 Inlets and outlets of exhaust and return air fans.
 - .3 As indicated.
- .2 Length of connection: 150 mm (6").
- .3 Install in accordance with recommendations of SMACNA.
- .4 Minimum distance between metal parts when system in operation: [75] mm (3").
- .5 When fan is running:
 - .1 Ducting on sides of flexible connection to be in alignment.
 - .2 Ensure slack material in flexible connection.

.5 BALANCING DAMPERS

- .1 Provide volume type dampers in all open end ductwork and wherever else shown.
- .2 Install the dampers such that the operating mechanism is positioned for easy operation, and such that the dampers cannot move or rattle.

.6 ACOUSTIC DUCT LINER

- .1 Provide acoustic lining for interior surfaces of ducts where indicated.
- .2 Fasten lining to interior sheet metal surfaces with 100% coverage of adhesive.
- .3 Install weld pins at 400 mm (16") centres on top and side surfaces and seal all joints, exposed edges, weld pin and clip penetrations and all damaged areas of liners. Cover lining joints with tape secured with 2 coats of sealer.
- .4 During installation, take particular care to ensure that the lining coating is not damaged and that exposed lining edges are protected properly such that the lining does not erode when subjected to the velocity in the particular system. Badly damaged areas of lining to be replaced at discretion of the Engineer.
- .5 Increase the size of all lined ducts such that interior duct dimensions with lining in place are the dimensions shown and/or specified on the drawings.
- .6 Where turning vanes, dampers, etc., occur in lined duct, they must be installed in a manner such that the liner surface is not damaged, the damper operation is not restricted, and friction loss within the duct is not increased.

.7 GRILLES, REGISTERS & DIFFUSERS

- .1 Provide grilles and diffusers of the type, size and arrangement specified and shown on the drawings.
- .2 Exactly locate grilles and diffusers to conform to the final architectural reflected ceiling plans and detailed wall elevations, and to conform to the final lighting, ceiling layout, ornamental and other wall treatment.

- .3 Equip supply diffusers having a basic four-way or all round air pattern for operation in one (1), two (2) or three (3) way pattern where so directed on the drawings.
- .4 Confirm finish of grilles, registers and diffusers prior to ordering.

3.3 CLEANING

- .1 Perform cleaning operations as specified in Section 00 10 00 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 SUMMARY

- .1 Section Includes:
 - .1 Supply, return and exhaust grilles and registers, diffusers and linear grilles, for commercial and residential use.
- .2 Related Sections:
 - .1 Section 00 10 00 – General Instructions.
 - .2 Section 00 15 45 – General Safety Section and Fire Instructions
 - .3 Section 21 05 01 – Common Work Results- Mechanical
 - .4 Section 21 05 02 – Mechanical Identification
 - .5 Section 23 05 13 – Common Motor Requirements for HVAC
 - .6 Section 23 05 93 – Testing, Adjusting and Balancing for HVAC

1.2 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.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

- .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 00 15 45 – General Safety Section and Fire Instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with Section 00 10 00 – General Instructions.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

- .2 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: in accordance with Section 00 10 00 – General Instructions.

Part 2 Products

2.1 GENERAL

- .1 To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity.
- .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.
- .5 All new and existing diffusers, grilles and registers as well as any associated ductwork is to be cleaned and vacuumed (within vacuum hose length)
- .6 Refer to drawing 6218-M02 for diffuser and grille schedule(s), basis of design and acceptable material

2.2 MANUFACTURED UNITS

- .1 Grilles, registers and diffusers of same generic type, products of one manufacturer.

2.3 RETURN AND EXHAUST GRILLES AND REGISTERS

- .1 General: with [opposed blade dampers] [____].
- .2 Type EG1: perforated face, steel construction, adjustable pattern, lay-in mounted. Finish: White. .Acceptable Material: EH Price, Titus, Nailor, Krueger or approved equal.
- .3 Type RG1: perforated face, steel construction, adjustable pattern, lay-in mounted. Finish: White. .Acceptable Material: EH Price, Titus, Nailor, Krueger or approved equal.

2.4 DIFFUSERS

- .1 General: volume control dampers with flow straightening devices and gaskets.
- .2 Type SD1 and SD2: perforated face, steel construction, square type, having adjustable pattern, lay-in mounted. Finish: White. .Acceptable Material: EH Price, Titus, Nailor, Krueger or approved equal.

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 manufacturers instructions.
- .2 Install with oval head, stainless steel screws in countersunk holes where fastenings are visible.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Materials and installation for fan coil units.
- .2 Related Sections:
 - .1 Section 00 10 00 – General Instructions.
 - .2 Section 00 15 45 – General Safety Section and Fire Instructions.
 - .3 Section 21 05 01 – Common Work Results- Mechanical
 - .4 Section 21 05 02 – Mechanical Identification
 - .5 Section 23 05 13 – Common Motor Requirements for HVAC
 - .6 Section 23 05 93 – Testing, Adjusting and Balancing for HVAC
 - .7 Section 26 05 00 – Common Work Results- Electrical

1.2 REFERENCES

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

1.3 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 00 10 00 – General Instructions. Include product characteristics, performance criteria, and limitations.
 - .1 Product data to include:
 - .1 Filters, fan accessibility.
 - .2 Suspension of cabinet.
 - .3 Physical size.
 - .4 Thermostat, transformer, controls where integral.
 - .5 Finish.
 - .6 kW rating, voltage, phase.
 - .7 Cabinet material thicknesses.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 00 10 00 – General Instructions.

1.4 QUALITY ASSURANCE

- .1 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 00 15 45 – General Safety Section and Fire Instructions.

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 00 10 00 – General Instructions.

- .2 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: in accordance with Section 00 10 00 – General Instructions.

Part 2 Products

2.1 FAN COIL UNITS

- .1 Cabinet: steel, heavy gauge, ceiling mounting, c/w with 13mm of fiberglass insulation conforming to ULC 181 and NFPA 90A/90B for flame spread and smoke development. Panels shall meet ASTM-B117. Rear inlet/ front outlet with 25mm duct collars.
- .2 Refer to Fan Coil Schedule on drawing 6218-M02 for performance specifications of all fan coil units.
- .3 Heating and Cooling Coils: seamless copper tube sheathed with aluminum fins covering full length of element. Hydrostatically tested.
- .4 Blower motors: ECM motor, single phase.
- .5 Fan shall be dynamically balanced, forward curved, DWDI centrifugal type construction
- .6 Drain Pan: Heavy gauge, powder coated epoxy or stainless steel, sloped, complete with primary and secondary drain connections
- .7 Filter: MERV13 replaceable
- .8 Assembly fully wired to one outlet location.
- .9 Multiple knockouts for up to 38 mm diameter conduit
- .10 Controls: Provided by standing offer contractor Ainsworth.
- .11 Acceptable Material: IEC, Daikan, McQuay, Magic Aire, Williams, Greenheck, United Cool Air or approved equal

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 In accordance with manufacturer's instructions
- .2 Hang units.
- .3 Make power and control connections.
- .4 Make piping connections.
- .5 Co-ordinate ducting of fresh air with Division 23.

3.3 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical and Section 23 05 93 – Testing, Adjusting and Balancing for HVAC.

3.4

CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 00 10 00 – General Instructions.
- .2 Section 00 15 45 – General Safety Section and Fire Instructions.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with Section 00 10 00 – General Instructions.
- .2 Health and Safety as per Section 00 15 45 – General Safety Section and Fire Instructions.
- .3 Submit product data sheets for unit heaters. Include:
 - .1 Product characteristics.
 - .2 Performance criteria.
 - .3 Mounting methods.
 - .4 Physical size.
 - .5 kW rating, voltage, phase.
 - .6 Cabinet material thicknesses.
 - .7 Limitations.
 - .8 Colour and finish.
- .4 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence and cleaning procedures.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 00 10 00 – General Instructions.
- .2 Indicate:
 - .1 Equipment, capacity and piping connections.
 - .2 Dimensions, internal and external construction details, recommended method of installation with proposed supports, sizes and location of mounting bolt holes.

1.4 CLOSEOUT SUBMITTALS

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

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 00 10 00 – General Instructions, and with Waste Reduction Workplan.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

Part 2 Products

.1

2.2 HORIZONTAL UNIT HEATERS

- .1 Acceptable manufacturers:
 - .1 Refer to drawing 6218-M02 for basis of design.
- .2 Casing: 1.6 mm thick cold rolled steel, gloss enamel finish, with threaded connections for hanger rods.
- .3 Coils: seamless copper tubing, silver brazed to steel headers with evenly spaced aluminum fins mechanically bonded to tubing. Hydrostatically test to 1 MPa.
- .4 Fan: direct drive propeller type, factory balanced, with anti-corrosive finish and fan guard.
- .5 Motor: speed as indicated continuous duty, built-in overload protection, and resilient motor supports.
- .6 Air outlet: two-way adjustable louvres.
- .7 Capacity: as indicated on drawing 6218-M02
- .8 Thermostat: Provided by controls contractor (Ainsworth).

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Provide double swing pipe joints as indicated.
- .3 Check final location with NRC Representative if different from that indicated prior to installation.
 - .1 Should deviations beyond allowable clearances arise, request and follow NRC Representative directive.
- .4 Hot water units: for each unit, install ball valve on inlet and ball valve plus circuit balancing and control valves on outlet of each unit. Install drain valve at low point.
 - .1 Install manual air vent at high point.
 - .2 Refer to schematic on drawing 6218-M03 for additional information.
- .5 Clean finned tubes and comb straight.
- .6 Provide supplementary suspension steel as required.
- .7 Thermostats provided and installed by standing offer controls contractor Ainsworth.
- .8 Before acceptance, set discharge patterns and fan speeds to suit requirements.

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 OPERATION & MAINTENANCE (O&M) MANUALS

- .1 O&M manuals to include but not limited to
 - .1 Letter of warranty
 - .2 ESA inspection certificate
 - .3 Fire alarm verification report

- .4 Updated panel schedule c/w circuit breaker size
- .5 Shop drawings
- .6 As-builts
- .7 Load balancing report
- .8 Mechanical equipment start up reports
- .9 Seismic review letter
- .2 Refer to 00 10 00 for additional information.

6 FINISHES

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

7 ACOUSTICAL PERFORMANCE

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

8 EQUIPMENT IDENTIFICATION

- .1 Identify with 3mm (1/8") letter, Brother, P-Touch non-smearing tape, or an alternate approved by the NRC Departmental Representative, all electrical outlets shown on drawings and/or mentioned in the specifications. These are the lighting switches, exit signs, recessed and surface mounted receptacles such as those in offices and service rooms and used to plug in office equipment, telecommunication equipment or small portable tools. Indicate only the source of power (Ex. for a receptacle fed from panel L32 circuit #1: "L32-1").
- .2 P-Touch label to be:
 - .1 Black letters on a white background for normal power circuits.
 - .2 Black letters on a yellow background for emergency power circuits.
 - .3 White letters on a red background for fire alarm device.
- .3 Light fixtures are the only exceptions for electrical equipment identification (except as noted in 8.14 below). They are not to be identified.
- .4 Identify with lamoid nameplates all electrical equipment shown on the drawings and/or mentioned in the specification such as motor control centers, switchgear, splitters, fused switches, isolation switches, motor starting switches, starters, panelboards, transformers, high voltage cables, industrial type receptacles, junction boxes, control panels, etc.,

regardless of whether or not the electrical equipment was furnished under this section of the specification.

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

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

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

- .16 Carefully update panelboard circuit directories whenever adding, deleting, or modifying existing circuitry.
- .17 Identify molded case breaker with lamicaid nameplate.

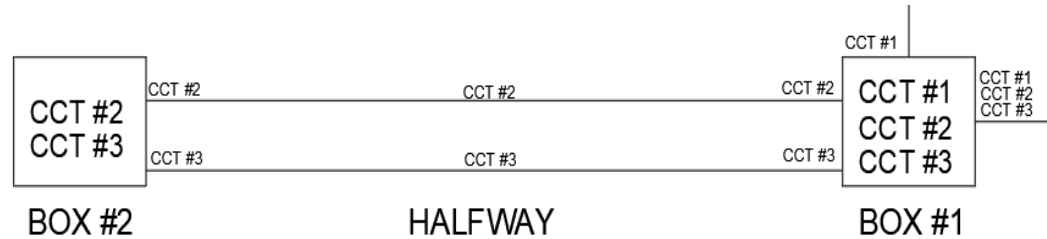
9 WIRING IDENTIFICATION

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

10 CONDUIT AND CABLE IDENTIFICATION

- .1 All new conduits to be factory painted, colour-coded EMT, type as follows:
 - .1 Fire alarm – red conduit
 - .2 Emergency power circuits – yellow conduit
 - .3 Voice/data – blue conduit
 - .4 Gas detection system – purple conduit
 - .5 Building Automation system – orange conduit
 - .6 Other base building low voltage control system – white conduit
 - .7 Security system – green conduit
 - .8 Research center control system – black conduit
- .2 Apply paint to the covers of junction boxes and condulets of existing conduits as follows:
 - .1 Fire alarm – red
 - .2 Emergency power circuits – yellow
 - .3 Voice/data – blue
 - .4 Gas detection system – purple
 - .5 Building Automation system – orange
 - .6 Other base building low voltage control system - white
 - .7 Security system – green
 - .8 Research center control system - black
- .3 For system running with cable, half-lap wrap with dedicated coloured PVC tape to 100 mm width, tape every 5 m and both sides where cable penetrates a wall.
- .4 All other systems to follow site instruction from NRC departmental representative.
- .5 Identify all electrical circuits in every junction box and pull box on the box cover with 9mm letter size P-touch label. Identify all electrical circuits on each conduit end where conduit penetrates a wall ,enclosure ,junction box or pull box , and halfway of each conduit run between walls ,enclosures ,junction boxes or pull boxes with 3mm letter size P-touch label..

- .6 Identify electrical circuit on each cable 250MCM or larger with lamacoid nameplate, or cable 4/0 or smaller with P-touch label, on every splitter, every 30m of each cable run and cable end where cable penetrates a wall, enclosure, junction box or pull box.
- .7 Sample diagram shown as below:



11 MANUFACTURER'S & APPROVALS LABELS

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

12 WARNING SIGNS AND PROTECTION

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

13 LOAD BALANCE

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

14 MOTOR ROTATION

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

15 GROUNDING

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

16 TESTS

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

17 COORDINATION OF PROTECTIVE DEVICES

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

18 WORK ON LIVE EQUIPMENT & PANELS

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

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for selective demolition and removal of electrical, communications and safety and security components including removal of conduit, junction boxes, and panels to source (home run removal) and incidentals required to complete work described in this Section ready for new construction.

1.2 RELATED REQUIREMENTS

- .1 Section 01 10 00 – General Instructions
- .2 Section 01 74 19 – Waste Management and Disposal
- .3 Section 02 41 19.16 - Selective Interior Demolition
- .4 Section 02 42 00 - Removal and Salvage of Construction Materials

1.3 REFERENCE STANDARDS

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

1.4 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Remove and Salvage: Detach items from existing construction and deliver them to Departmental Representative ready for reuse.
- .4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals: Provide in accordance with Section 01 10 00 – General Instructions before starting work of this Section:
 - .1 Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Landfill Records: Indicate receipt and acceptance of selective demolition waste and hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.
- .2 Scheduling: Account for Departmental Representative continued occupancy requirements during selective demolition with Section 02 41 19.16 - Selective Interior Demolition.

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: Perform work of this Section in accordance with:
 - .1 Federal Workers' Compensation Service.
 - .2 Government of Canada, Labour Program: Workplace Safety.

1.8 SITE CONDITIONS

- .1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition on their observed condition at time of site examination before tendering.
- .2 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in Work; immediately notify Departmental Representative if materials suspected of containing hazardous substances are encountered and perform following activities:
 - .1 Refer to Section 01 10 00 – General Instructions for directives associated with specific material types.
 - .2 Hazardous substances will be as defined in Hazardous Products Act.
 - .3 Stop work in area of suspected hazardous substances.
 - .4 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.
 - .5 Hazardous substances will be removed by Departmental Representative under a separate contract or as a change to Work.
 - .6 Proceed only after written instructions have been received from Departmental Representative.

1.9 SALVAGE AND DEBRIS MATERIALS

- .1 Demolished items become Contractor's property and will be removed from Project site; except for items indicated as being reused, salvaged, or otherwise indicated to remain Departmental Representative's property.

- .2 Carefully remove materials and items designated for salvage and store in a manner to prevent damage or devaluation of materials in accordance with Section 02 42 00 - Removal and Salvage of Construction Materials.
 - .1 Leave main electrical distribution panel in place; panel can be used for temporary construction power for this and subsequent contracts in accordance with Section 01 10 00 – General Instructions; coordinate temporary power connections with Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 General Patching and Repair Materials: Refer to Section 02 41 19.16 - Selective Interior Demolition or listing of patching and repair materials incidental to removal or demolition of components associated with work of this Section.
- .2 Electrical Repair Materials: Use only new materials, CSA or ULC labelled as appropriate and matching components remaining after work associated with components identified for removal or demolition are completed.
- .3 Fire stopping Repair Materials: Use fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect the work of this Section before tendering the Bid; Departmental Representative will not consider claims for extras for work or materials necessary for proper execution and completion of the contract that could have been determined by a site visit.

3.2 PREPARATION

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
 - .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 - .2 Departmental Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 - .3 Prevent debris from blocking drainage inlets.
 - .4 Protect mechanical systems that will remain in operation.
- .2 Protection of Building Occupants: Sequence demolition work so that interference with the use of the building by the Departmental Representative and users is minimized and as follows:
 - .1 Prevent debris from endangering safe access to and egress from occupied buildings.

- .2 Notify Departmental Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 EXECUTION

- .1 Demolition and Removal: Coordinate requirements of this Section with information contained in Section 02 41 19.16 - Selective Interior Demolition and as follows:
 - .1 Maintain electrical service and main distribution panel as is, ready for subsequent Work.
 - .2 Remove existing luminaires, electrical devices and equipment including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
 - .3 Disconnect and remove existing fire alarm system including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
 - .4 Disconnect and remove communication systems including associated conduits, boxes, cabling, and similar items unless specifically noted otherwise.
 - .5 Disconnect and remove telephone outlets, associated conduit, cabling and sub terminal backboards and related accessories; maintain telephone service and main terminal backboard as is.
 - .6 Perform demolition work in a neat and workmanlike manner:
 - .1 Remove tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
 - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.
 - .7 Place weatherproof blank cover plates on exterior outlet boxes remaining after demolition and removal activities.
 - .8 Remove existing conduits, boxes, cabling and wiring associated with removed luminaires, electrical devices and equipment.
 - .9 Grind off conduits and make flush with surface of concrete where conduits are cast into concrete; seal open ends of conduit with silicone sealant and leave in place.
 - .10 Seal open ends of conduit with silicone sealant and leave in place where they are inaccessible or cannot be removed without damaging adjacent construction.

3.4 CLOSEOUT ACTIVITIES

- .1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) except where explicitly noted otherwise for materials being salvaged for re use in new construction in accordance with Section 02 42 00 - Removal and Salvage of Construction Materials.

END OF SECTION

Part 1 General

1.1 RELATED WORK SPECIFIED ELSEWHERE

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

1.2 MATERIALS

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

Part 2 Products

2.1 BUILDING WIRES AND GENERAL REQUIREMENTS

- .1 Conductor material for branch circuit wiring and grounding:
 - .1 Stranded copper.
 - .2 Neutral wire: continuous throughout its length without breaks.
 - .3 Separate insulated green grounding conductors in all electrical conduits.
 - .4 All wire and cable insulation shall meet the C.S.A. Standards for the types and services hereinafter specified. Colours as per section 4-036 of Electrical Code.
 - .5 Unless otherwise specified, use wire and cable types as follows:
 - .1 Type R90 XLPE cross-link polyethylene stranded for applications using wires sized No. 8 and larger.
 - .2 Type T90 stranded for applications using wires sized No. 10 and smaller.
 - .3 For fire alarm wiring refer to Section 283100.
 - .4 Approved heat resistant wire for wiring through and at lighting and heating fixtures. Where insulation types are shown on the drawings other types shall not be used unless the specification is more restrictive.
 - .6 Use AC90 (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 switches or receptacles in existing or new hollow gypsum partitions, vertical runs only with cable length not to exceed 3.5m (12'), or
 - .3 When specifically called for on drawings or approved in writing by departmental representative.
 - .4 AC90 shall not be used in insulated walls or masonry walls.
 - .5 Only AC90 cable of No. 12 AWG will be accepted.
 - .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 Copper compression connectors to CSA C22.2 N0.65 are required sized for conductors
- .2 When used in hazardous area, connectors should be certified for such location in Class, Division and Group.
- .3 For conductors size of 8 AWG or larger, use bolted or compression solderless type connectors.
- .4 Use high temperature connectors and insulation on all connections of high temperature conductors.
- .5 Where connector types are called for on the drawings or in the specification, do not use other types.
- .6 Lugs, terminals, screws used for termination of wiring to be suitable for copper conductors.
- .7 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 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-09, Canadian Electrical Code, Part 1, 21st Edition

PART 2 - PRODUCTS

2.1 SPLITTERS

- .1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
- .2 Terminations: main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.
- .3 Spare Terminals: minimum three spare terminals or lugs on each connection or lug block sized less than 400 A.

2.2 JUNCTION AND PULL BOXES

- .1 Construction: welded steel enclosure.
- .2 Covers Surface Mounted: screw-on flat, turned edge covers

PART 3 - EXECUTION

3.1 SPLITTER INSTALLATION

- .1 Mount plumb, true and square to building lines.
- .2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Install terminal block as indicated in Type T cabinets.
- .3 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1

3.3 IDENTIFICATION

- .1 Equipment Identification: to Section 26 05 00.
- .2 Identification Labels: size 2 indicating system name, voltage and phase or as indicated

END OF SECTION

Part 1 General

1.1 RELATED WORK SPECIFIED ELSEWHERE

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

1.2 MATERIALS

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

Part 2 Products

2.1 FITTINGS

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

2.2 OUTLET BOXES

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

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

2.3 SUPPORT HARDWARE

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

Part 3 Execution

3.1 INSTALLATION

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

END OF SECTION

Part 1 General

1.1 RELATED WORK SPECIFIED ELSEWHERE

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

1.2 MATERIALS

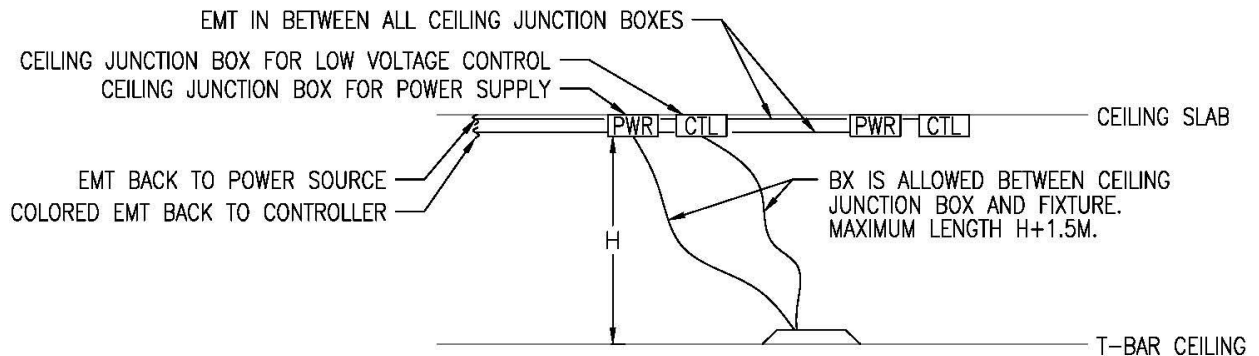
- .1 Provide only new equipment and materials, without blemish or defect, bearing Canadian Standards Association or Authorized Electrical Inspection Department labels, and subject to the approval of the NRC Departmental Representative.
- .2 After a contract is awarded, utilize alternative methods and/or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

Part 2 Products

2.1 RACEWAYS

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

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



2.2 SUPPORT HARDWARE

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

Part 3 Execution

3.1 RACEWAYS

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

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

END OF SECTION

Part 1 General

1.1 RELATED WORK

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

1.2 MATERIALS

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

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

1.4 IDENTIFICATION

- .1 Identification as per Section 26 05 00.

Part 2 Products

2.1 WIRING DEVICES

- .1 LED Dimming Switches:
 - .1 24VDC, electronic, suitable for use with installed light fixture.
 - .2 Programmable buttons.
 - .3 Standard of acceptance:
 - .1 Hubbell NXSX or equivalent approved by NRC Departmental Representative.
- .2 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.
 - .4 Standard of acceptance: Hubbell, Leviton, Philips or equivalent approved by NRC Departmental Representative.

- .3 Splitters, Junction Boxes & Cabinets:
 - .1 Sheet metal enclosure, welded corners and formed cover, provided as required.
 - .2 Splitter to be 3 phase, 4 wires, minimum 225A, voltage as indicated. Refer to drawing for quantity of the lugs. Allow minimum two extra lugs for future use, size to match the maximum rating of the existing wire.

Part 3 Execution

3.1 LOCATION OF OUTLETS

- .1 The number and general location of outlets for lighting, power, telephones, etc., are to be as shown on the drawings. Install all outlets accurately and uniformly with respect to building details. When centering outlets, make allowance for overhead pipes, ducts, etc. and for variations in wall or ceiling finish, window trim, etc. Reinstall incorrectly installed outlets at no cost to the Owner. Make field power and control connections as indicated.
- .2 The location of all outlets as shown on the plans are approximate and are subject to change, up to 3m (10') without extra cost or credit provided the information is given prior to the installation of the outlet.
- .3 Unless otherwise specified, locate light switches on latch side of doors. Determine the direction of all door swings from the architectural drawings or on site, not from the electrical drawings.
- .4 Locate roof top maintenance receptacle within 7.5m of the rooftop electrical equipment.

3.2 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not indicated verify before proceeding with installation.
- .3 Generally, locate outlets as follows: (except those otherwise shown on the drawings):
 - .1 Local switches 1.2m (3'-11") to centreline.
 - .2 Wall receptacles 400mm (1'-4") to centreline.
 - .3 Clock receptacles 2.4m (8'-0") to centreline.
 - .4 Lighting panels 1.8m (6'-0") to top.
 - .5 Telephone and data communications outlet 400mm (1'-4") to centreline.
 - .6 Fan speed control switch 1.2m (3'-11") to centreline.
 - .7 Roof top maintenance receptacle: 750mm above the finished roof.

3.3 WIRING DEVICES

- .1 Install wiring devices as follows:

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

3.4 SPLITTERS AND DEVICES

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

END OF SECTION

Part 1 General

1.1 RELATED WORK SPECIFIED ELSEWHERE

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

1.2 MATERIALS

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

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

Part 2 Products

2.1 FINISHES

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

2.2 METAL SURFACES

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

2.3 LIGHT CONTROL DEVICES

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

2.4 LUMINAIRES

- .1 LED
 - .1 Type 1:
 - .1 120V 610mm x 1220mm, 30W-43W, suitable for recessed mounting in T-bar ceiling.
 - .2 Rigid die embossed steel housing, 100mm deep, powder coated housing.
 - .3 5-year warranty.
 - .4 Removable LED boards and driver for ease of service/replacement.

- .5 0-10VDC dimming.
- .6 Rated to deliver L80 performance for 60,000 hours.
- .7 4000k colour temperature, minimum 4800 Lumen output.
- .8 Standard of acceptance: Columbia LCAT24-S-9-40L048-G-CRG-ED-U-NXW or equivalent approved by the NRC Departmental Representative.
- .2 Type 2:
 - .1 120V 610mm x 610mm, 25W-33W, suitable for recessed mounting in T-bar ceiling.
 - .2 Rigid die embossed steel housing, 100mm deep, powder coated housing.
 - .3 5-year warranty.
 - .4 Removable LED boards and driver for ease of service/replacement.
 - .5 0-10VDC dimming.
 - .6 Rated to deliver L80 performance for 60,000 hours.
 - .7 4000k colour temperature, minimum 3600 Lumen output.
 - .8 Standard of acceptance: Columbia LCAT22-S-9-40L036-G-CRG-ED-U-NXW or equivalent approved by the NRC Departmental Representative.

Part 3 Execution

3.1 INSTALLATION

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

3.2 LUMINAIRE SUPPORTS

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

3.3 WIRING

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

3.4 LUMINAIRE ALIGNMENT

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

END OF SECTION

Part 1 General

1.1 RELATED 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 00 10 00.

Part 2 Products

2.1 EXIT LIGHTS

- .1 New
 - .1 Housing: Metal construction using Canadian cold-rolled steel. Frame and back plate shall each be of a one-piece construction.
 - .2 Faceplate(s) shall be constructed of robust clear poly-carbonate panels with an opaque border colored factory-white.
 - .3 Universal pictogram sign. Two pictogram films per face, for direction selection.
 - .4 Long-life white LED light source. Consumes less than 2.5W in AC mode and 1W in DC mode.
 - .5 Meets or exceeds CSA 22.2 No.141-10 standard for pictogram exit signs.
 - .6 Two-wire universal AC input: 120 to 347V. Two-wire standard DC input: 6 to 24Vdc.
 - .7 Universal mounting: end, wall or ceiling.
 - .8 Standard of acceptance: Thomas&Betts LS series. LS1WU for single face and LS2WU for double face.

Part 3 Execution

3.1 EXIT LUMINAIRES

- .1 Connect fixtures to emergency power circuits as indicated.
- .2 Ensure that the exit light circuit breaker is locked in the "ON" position.

NRC-CNRC

EXIT SIGNS

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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.
- .2 Treasury Board Standard TBITS 6.9 “Telecommunications Wiring Systems in Government-owned and leased buildings”.

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 Cable tray to be basket type, hot dip galvanized coating, class C.
- .3 Tele-Power poles/Jiffy poles: type as indicated on drawings.
- .4 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 the closest pull box 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) and ANSI/TIA/EIA-607.

3.2 CABLE TRAY SYSTEM

- .1 Install complete cable tray system.
- .2 Use 10mm threaded rod for support. Attached cable tray directly to building structure, not any other equipment or ductwork.
- .3 Cable tray system installation shall comply with ANSI/TIA/EIA 569-D.
- .4 Thoroughly bonding the cable tray as per ANSI/TIA/EIA-607. Provide dedicated bonding wire from cable tray system to building communication grounding system.

3.3 MOUNTING

- .1 Recess mount wall outlets unless otherwise indicated. Mount wall outlets to height specified in section 26 27 26 or as indicated.

3.4 WORK BY OTHERS

- .1 Cables and terminations.

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.

1.4 SCOPE OF WORK

- .1 Supply and install all required material, equipment and labour to provide the fire alarm changes and additions as shown on the drawings and indicated by this section of the specification.

1.5 CONTRACTOR QUALIFICATION

- .1 The contractor must ensure the supervisor, site foreman and electrician working on site hold valid fire alarm certificate.

1.6 REFERENCES

- .1 Government of Canada
 - .1 TB OSH Chapter 3-03, [latest edition], Treasury Board of Canada, Occupational Safety and Health, Chapter 3-03, Standard for Fire protection Electronic Data Processing Equipment.
 - .2 TB OSH Chapter 3-04, [latest edition], Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.
- .2 Treasury Board: Fire Protection Standard effective April 1, 2010
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524-[latest edition], Standard for the Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S525-[latest edition], Audible Signal Device for Fire Alarm Systems.
 - .3 CAN/ULC-S526-[latest edition], Visual Signal Devices for Fire Alarm Systems.

- .4 CAN/ULC-S527-[latest edition], Control Units.
- .5 CAN/ULC-S528-[latest edition], Manual Pull Stations for Fire Alarm Systems.
- .6 CAN/ULC-S529-[latest edition], Smoke Detectors for Fire Alarm Systems.
- .7 CAN/ULC-S530-[latest edition], Heat Actuated Fire Detectors for Fire Alarm Systems.
- .8 CAN/ULC-S531-[latest edition], Standard for Smoke Alarms.
- .9 CAN/ULC-S536-S537-[latest edition], Burglar and Fire Alarm Systems and Components.
- .5 National Fire Protection Agency
 - .1 NFPA 72-[latest edition], National Fire Alarm Code.
 - .2 NFPA 90A-[latest edition], Installation of Air Conditioning and Ventilating Systems.

Part 2 Products

2.1 AUTOMATIC ALARM INITIATING DEVICES

- .1 Conventional system
 - .1 Combination Fixed temperature and rate-of-rise thermal fire detector, self-restoring, rated 57°C (135°F) with 8.3°C (15°F) rate-of-rise, single circuit. Edwards model No. 5601A.
 - .2 Combination Fixed temperature and rate-of-rise thermal fire detector, self-restoring, rated 90°C (194°F) with 8.3°C (15°F) rate-of-rise, single circuit. Edwards model No. 5602A.
 - .3 Photoelectric smoke detector, 2-wire, self-diagnostic, built-in fixed/rate-of-rise heat sensor and rated for 12-24VDC. Edwards model No. C2M-PD.
 - .4 Photoelectric smoke detector, self-diagnostic, built-in fixed/rate-of-rise heat sensor and rated for 24VDC. Auxiliary relay contact rated for 2A @ 30Vdc. Edwards model No. C2M-PDHRC.
 - .5 Explosion proof heat detector. Fixed temperature/rate-of-rise. rated 57°C (135°F). Hazardous location Class I Groups C & D, Class II Groups E, F, & G, and Class III. Weather proof. Water-tight and dust-tight. Edwards model No. CR135EWT.

2.2 CONDUIT AND WIRING

- .1 Raceway to be 21mm EMT unless indicated otherwise on the drawings. Wiring between junction box on underside of slab and heat detector junction box in T-bar ceiling to be 21mm flexible conduit.
- .2 All wiring is to be colour coded to match existing system and is to be of stranded copper.
- .3 Zone wiring is to be #16 TEW colour coded stranded copper.
- .4 Signal wiring to be sized to take into account voltage drop and is not to be smaller than #12 TW colour coded stranded copper.

- .5 All fire alarm trouble and alarm zone wiring to be class "A" using #16 TEW colour coded stranded copper wire, and in accordance with manufacturer's requirements. Connect two red and two zone colour wires to each device. If the colour coding is not given on drawings, coding will be provided after contract is awarded.
- .6 Run all four zone or signal circuit wires in the same conduit (i.e. Do not install only two of the four zone wires in a conduit - all four zone wires must be in each conduit.)

Part 3 Execution

3.1 MOUNTING OF EQUIPMENT

- .1 Recess mount equipment in all areas except where specified in unfinished areas.
 - .1 Fire alarm stations 1.2m (3'-11") to centreline.
 - .2 Fire alarm bells 2.1m (7'-0") to centreline.
- .2 Mounting heights from floor level to centerline of equipment are as follows:
 - .1 Fire alarm stations 1.2m (3'-11") to centreline.
 - .2 Fire alarm bells, horns, strobes 2.1m (7'-0") to centreline.

3.2 CONDUIT AND WIRING

- .1 All conduit to include a #16 TW stranded copper green ground wire.
- .2 Use only uninsulated ring-type STA-KON lugs on screw connections.
- .3 Run conduit tight along underside of ceiling slab or roof deck, unless noted otherwise on drawings.
- .4 In rooms having false ceilings, each fire detection device is to have one junction box secured to the underside of the ceiling slab or roof deck and another firmly supported to the false ceiling tile. The junction box connected to the fire alarm device is not to be used as a raceway for connection to other devices. All splices and routing to other fire alarm devices is to be from the junction box mounted on the underside of the ceiling slab or roof deck.
- .5 Use Tee bar electrical box hangers (Caddy #51224 for 610mm T-bar spacing) to mount heat detectors on T-bar ceiling tiles.
- .6 Install a maximum of 1.5 m (5'-0") 3/4" (21mm) flexible conduit where a heat detector is installed on T-bar ceiling tiles. This is to allow the ceiling tile, having the device, to be shifted two feet either direction for access above the ceiling.
- .7 Leave 6 inch loops of wire in all junction boxes.
- .8 For new installations, no splicing of wires is to be made.
- .9 For renovations, splices may be made in junction boxes other than those at heat detectors after receiving approval of the NRC Departmental Representative. All splices must be soldered and taped.

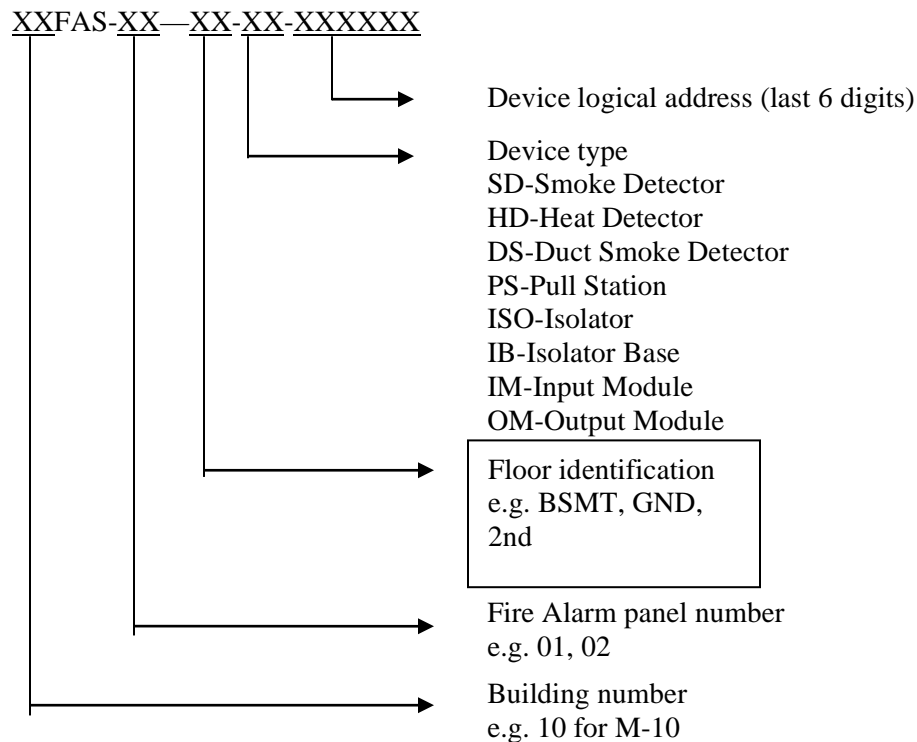
- .10 Upon awarding of the contract, the NRC Departmental Representative shall provide the contractor with the standard wiring diagram for detection devices, A-7481.
- .11 Prior to installing raceways, submit to the NRC Departmental Representative a proposed method and layout of conduit for approval.

3.3 EQUIPMENT IDENTIFICATION

- .1 Label each manual alarm station and each audible signal device with its unique identification number as per drawings. Use lamicoid nameplates as per Section 26 05 00.
- .2 Label each initiating device use P-Touch type as per Section 26 05 00. Devices are to be numbered per the format shown below.

Example M-10 fire alarm #1 Heat detector 000001

10FAS-01-GND-HD-000001



- .3 Refer to 26 05 00 for fire alarm conduit color coding.
- .4 Label wires as per drawing and as per Section. 26 05 00.

- .5 Update remote annunciator panels and fire alarm panel zone directories if new zones are added to the system.

3.4 SCHEDULING OF SHUTDOWNS

- .1 Make written shutdown request to the NRC Departmental Representative at least 48 hours in advance. Acceptance of shutdown request will be determined by the NRC Departmental Representative based on building user needs. Fire alarm systems are to be shut down by NRC staff only. **Contractor is not to shutdown system on their own.**

3.5 INTEGRATION INTO SYSTEM MONITORING AT BUILDING M-1

Presently all NRC buildings in Ottawa report back their fire alarm status to the M1 building central monitoring station. The monitoring station consists of a computer graphics terminal showing building layouts of each building, and is linked on an internal NRC network. The new fire alarm system under this contract must communicate all addressable input points to the existing computer graphics monitoring station, Fireworks by Chubb Edwards. All required modifications to the existing Fireworks station are to be included in this tender.

- .1 Conventional (non-addressable) devices:
 - .1 Integrate any new zones installed as part of this project into the monitoring system at building M-1. This is to be done by factory trained technician.
 - .2 Remove from the monitoring system at building M-1 any zones removed as part of this project.
 - .3 Make appropriate changes to the monitoring system at building M-1 to reflect any zone location changes as appropriate.
 - .4 All work on the monitoring system at building M-1 is to be done by factory trained technician.

3.6 ACCEPTANCE TEST

- .1 Perform tests in accordance with the latest regulations and in the presence of the NRC Departmental Representative and the representative of the regulating authority.
- .2 Test each device and alarm circuit to ensure manual alarm stations, thermal and smoke detectors transmit alarms to control panel and actuate alarm.
- .3 Check annunciator panels to ensure that the correct zones are activated.
- .4 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of trouble signals.
- .5 Record amperage drawn by audible signal device circuits if new audible signal devices have been added to the circuit.
- .6 Give the NRC Departmental Representative one set of marked in red prints labelled "As Built".
- .7 Provide the NRC Departmental Representative with a letter of verification from the manufacturer of the equipment stating that the equipment supplied under this contract has

been installed as per the latest CAN/ULC S537 and CAN/ULC-S524 standards and as per the latest edition of the Ontario Building Code.

- .8 For new fire alarm systems provide the NRC Departmental Representative with a certificate of verification stating that the equipment has been installed as per the latest CAN/ULC-S537 and CAN/ULC-S524 standards and as per the latest edition of the National Building Code.

3.7 SUPPORT FOR INSTALLER AND OWNER MAINTENANCE

- .1 Provide a coded one-man walk test feature. Allow audible or silent testing. Signal alarms and troubles during test. Allow receipt of alarms and programmed operations for alarms from areas not under test.
- .2 Provide internal system diagnostics and maintenance user interface controls to display/report the power, communication, and general status of specific panel components, detectors, and modules.
- .3 Provide loop controller diagnostics to identify common alarm, trouble, ground fault, Class A fault, and map faults. Map faults include wire changes, device type changes by location, device additions/deletions and conventional open, short, and ground conditions. Ground faults on the circuit wiring of remote module shall be identified by device address.
- .4 Allow the user to display/report the condition of addressable analog detectors. Include device address, device type, percent obscuration, and maintenance indicator. The maintenance indicator shall provide the user with a measure of contamination of a device upon which cleaning decisions can confidently be made.
- .5 Allow the user to report history for alarm, supervisory, monitor, trouble, smoke verification, watchdog, and restore activity. Include Facility Name, Licensee, Project Program Compilation date, Compiler Version, Project Revision Number, and the time and date of the History Report.
- .6 Allow the user to disable/enable devices, zones, actions, timers and sequences. Protect the disable function with a password.
- .7 Allow the user to activate/restore outputs, actions, sequences, and simulate detector smoke levels.
- .8 Allow the service user to enter time and date, reconfigure an external port for download programming, initiate auto programming and change passwords. Protect these functions with a password.

3.8 TRAINING SESSION

- .1 Provide training of the newly installed fire alarm system to NRC staff upon job completion.

3.9 WARRANTY

- .1 All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance or approval by AHJ. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

END OF SECTION

APPENDIX A - PROJECT-SPECIFIC DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY (WSP Global)



17 January 2024

Project No. 22565806 Rev. 1

André J. Spencer

Architectural Designer - Engineering Services | Real Property Planning and Management
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Ottawa, ON
K1A 0R6

PROJECT-SPECIFIC DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY RELATED TO THE M-24, ROOM 111 NEW FIT-UP PROJECT AT THE MONTREAL ROAD CAMPUS OF THE NATIONAL RESEARCH COUNCIL CANADA, IN OTTAWA, ONTARIO

Dear André Spencer,

WSP Canada Inc. (WSP) was retained by the National Research Council Canada (NRC) to conduct a project-specific designated substances and hazardous materials (DSHM) survey of building materials anticipated to be impacted by a fit-up project planned for Room 111 within the M-24 building located at 1200 Montreal Road, in Ottawa, Ontario (the "Site").

Based on the information provided by the NRC during a Site reconnaissance walkthrough on 1 December 2022 as well as email and telephone communications between WSP and the Client representative, André Spencer of the NRC, between 24 November 2022 and 4 January 2023, suspected asbestos-containing materials (ACMs) and suspected lead-containing materials (LCMs) localized to Room 111 (the "Project Area") at the Site are anticipated to be impacted by the planned fit-up project and were the focus of the project-specific DSHM survey.

A site inspection conducted on 23 November 2023 to assess the abatement progress since February 2023, revealed the absence of certain materials listed in this report. As per the Client's directive, the materials no longer present in the project area have been removed from this report to ensure clarity and accuracy.

Scope of Work

WSP's scope of work was limited to the following:

- Conducting a desktop review of NRC provided documents including the previously prepared DSHM reports to note data gaps. Findings from the previously prepared DSHM reports were incorporated into the project specific DSHM report for the Project Area. The specific historic reports provided by the NRC include the following titled:
 - "Designated Substance Survey Report National Research Council Canada Building M-24 Ottawa, Ontario" (Pinchin Environmental Project No. 37696), dated 31 January 2007 (Pinchin 2007 Report).
 - "Designated Substance Survey Building M-24 Ottawa, ON" (Oakhill Environmental Inc. Project No. PR-08-043), dated November 2011 (Oakhill 2011 Report).

- Conducting a non-intrusive project-specific DSHM survey of the Project Area. The DSHM survey was conducted in accordance with the *Canada Occupational Health and Safety Regulations*, SOR/86-304 (COHSR), the Public Services and Procurement Canada (PSPC) *Asbestos Management Standard*, and Section 30 of the Ontario *Occupational Health and Safety Act*, Revised Statutes of Ontario (R.S.O.) 1990, Chapter 0.1 (OHSA).
 - Collecting representative bulk samples of suspected ACMs and suspected LCMs and submitting these samples to an independent accredited laboratory for 1-week turnaround time (TAT) analysis.
- Preparing one (1) electronic (PDF) project-specific DSHM assessment report (in English only) for the Project Area, including a photo log of the sampled materials, one (1) drawing to note sample locations, and recommendations for removal and/or management of DSHM in the context of the project, as applicable.

All project tasks were performed by qualified and experienced Environmental, Health and Safety (EHS) personnel under the direction of a Canadian Registered Safety Professional (CRSP) and/or a Certified Industrial Hygienist (CIH), as required.

Regulations

The Site is federally regulated, and therefore worker exposure to chemical agents is regulated under the COHSR made under the *Canada Labour Code Part II (CLC-II)*. In addition, the general duty clause of CLC-II requires employers to ensure that the health and safety of their employees is protected.

The COHSR, Part X – Hazardous Substances, lists prescribed requirements for the control of hazardous substances in federally regulated workplaces. Specifically, Section 124 of the CLC-II requires the employer to ensure that the health and safety at work of every person employed by the employer is protected. Furthermore, Section 10.19(1) of the CLC-II requires the employer to ensure that worker exposure to chemical agents do not exceed the recommended limits of the American Conference of Governmental Industrial Hygienists (ACGIH) publication titled *Threshold Limit Values (TLVs) and Biological Exposure Indices*, dated 1994-1995, as amended from time to time.

At the request of the Client, the focus of the project-specific DSHM survey was the eleven designated substances, as defined in Ontario Regulation 490/09: *Designated Substances (O. Reg. 490/09)*, made under the OHSA. Designated substances defined by O. Reg. 490/09 are: acrylonitrile, arsenic, asbestos, benzene, coke oven emissions, ethylene oxide, isocyanates, lead, mercury, silica, and vinyl chloride. Although designated substances are not defined under federal regulations, they are included to meet the project requirements. Acrylonitrile, arsenic, benzene, coke oven emission, ethylene oxide, isocyanates and vinyl chloride were not expected to be present at this non-industrial site and therefore no sampling was included for these designated; however, they were noted if observed.

Under Section 30 of the OHSA, before beginning a project, the owner shall determine whether any designated substances are present at each project site and shall prepare a list of all designated substances that are present at each site. The project-specific DSHM survey and reporting were also performed to meet the requirements of Ontario Regulation 278/05: *Designated Substance – Asbestos on Construction Projects and in Building Repair Operations*, as amended (O. Reg. 278/05), made under the OHSA.

Further detail regarding regulatory requirements and guidelines are included as Appendix A.

Methodology

Suspected Asbestos-Containing Materials

Sampling of suspected ACMs was conducted following the requirements of O. Reg. 278/05. The number of samples of each “homogeneous material” was collected in accordance with Table 1: Bulk Material Samples of O. Reg. 278/05.

Suspect ACM samples were submitted to an independent accredited laboratory, Paracel Laboratories Ltd. (Paracel), at 2319 St. Laurent Boulevard, Ottawa, Ontario, Canadian Association for Laboratory Accreditation Inc. (CALA) laboratory membership #A1262 for asbestos content analysis. Polarized Light Microscopy was completed in accordance with EPA methodologies and dispersion staining techniques (EPA 600/R-93/116).

Suspected Lead-Containing Materials

Analyzing, sampling, and visual assessment of suspected LCMs was completed as part of the survey. Samples of suspected lead-containing paints (LCPs) were extracted using a clean knife and scraping off a small piece of the material. Care was taken to penetrate all paint layers at each sample location. Suspected LCMs (i.e. ceramic glazing) were collected by removal of a small representative portion of the material.

Collected suspect LCP and LCM samples were placed in sealed bags and labelled for submission to Paracel for lead analysis following EPA Method 6020 via Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS).

Suspected Mercury-Containing Materials

An assessment for potential mercury-containing equipment within the Project Area was completed as part of the survey. Mercury-containing thermostats and fluorescent light tubes and bulbs that may be impacted during the renovation operations were noted, where observed.

Suspected Silica Containing Materials

A visual assessment was completed to determine the potential for silica-containing materials to be present within the Project Area.

Other Designated Substances

Other designated substances as defined in O. Reg. 490/09, as amended, made under the OHSA, include acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxide, isocyanates and vinyl chloride. Based on professional experience, none of these substances were expected to be present and, as such, no specific observations or sampling of materials potentially containing these substances were undertaken as part of this assessment.

Ozone-Depleting Substances

An assessment for potential halocarbon-containing equipment was completed at the Project Area as part of the assessment, where accessible. ODS-containing equipment such as air conditioners, refrigerators and freezers were noted, where observed.

Polychlorinated Biphenyls

A visual assessment of potential PCB-containing equipment (i.e., fluorescent lighting system ballasts) at the Project Area was completed as part of the assessment, where accessible and relevant to the project. Due to health and safety concerns associated with energized fluorescent lighting systems, connected fluorescent lights were not accessed during the assessment.

Visual Mould and Animal Waste

A visual assessment for water damage, water staining, discolouration, leakage, fungal staining, and animal waste was completed at the Project Area, where accessible. The assessment was conducted in general accordance with the procedures outlined in American Industrial Hygiene Association's *Field Guide for the Determination of Biological Contaminants in Environmental Samples – 2nd Edition*, the Environmental Abatement Council of Canada's *Mould Abatement Guidelines*¹ (EACC Mould Guidelines) and the Canadian Construction Association's *Mould Guidelines for the Canadian Construction Industry*² (CCA Mould Guidelines).

Results

Characterization of the Project Area Construction

During the assessment, WSP made note of the building materials of which the Project Area comprised. The ceiling deck above the drop ceiling and floor and were both made up of poured concrete. The floor was noted to have a patch of tan epoxy floor leveling compound. A drop ceiling and bulkheads are installed, made up of a combination of two (2) varieties of acoustic ceiling tiles. Structural steel beams are present within the ceiling space above the drop ceiling. The north, west, and south walls are constructed of concrete block and mortar, while the east wall was made up of drywall and joint compound. Both piping and rigid duct work are installed in association with HVAC equipment within the Project Area. A shower area designated as Room 112 exists in the southeast quadrant of the Project Area which has walls constructed using a combination of drywall with joint compound and ceramic tiling.

A detailed characterization of the building materials observed within the Project Area has been summarized within Appendix B (Table B.1).

Asbestos-Containing Materials

A total of 32 samples of ten (10) suspected ACMs were collected and submitted for asbestos content analysis, including drywall joint compound, cementitious texture coat, mortar, vinyl baseboard, two (2) varieties of mastic, grout, acoustic ceiling tiling, caulking, and epoxy floor leveling compound.

Based on the analytical laboratory results, the following materials were determined to be ACMs:

- **Non-friable drywall joint compound (sample A-001A to A-001E) applied to drywall installed within the Project Area containing 1 % chrysotile asbestos.**
- **Non-friable mastic (sample A-006A to A-006C) present applied behind installed ceramic tiling in the Room 112 shower area within the Project Area containing 1 % chrysotile asbestos.**

It should be noted that the asbestos-containing cement parging and beige drywall joint compound applications were identified during laboratory analysis of sample set A-009 of grey caulking. Asbestos was not detected in the analyzed samples of grey caulking.

- **Friable parging cement (sample A-009B) identified during laboratory analysis, within the sample set A-009 collected from the east wall penetration, containing 40% chrysotile asbestos.**

¹ Environmental Abatement Council of Ontario. *Mould Abatement Guidelines*, 3rd Edition 2015.

² Canadian Construction Association. *Mould guidelines for the Canadian construction industry*, 2018.

- **Presumed to be similar to the previously confirmed asbestos-containing cement parging pipe insulation fittings (Pinchin sample ID 02A to 02C; Pinchin 2007 Report)**
- **Non-friable drywall joint compound (sample A-009B) identified during laboratory analysis, within the sample set A-009 collected from the east wall penetration, containing 1% chrysotile asbestos.**
 - **Presumed to be the same as the asbestos-containing drywall joint compound identified as WSP sample set A-001.**

Additional information, including analytical results of suspected ACM samples collected from the Project Area at the Site, are summarized within Appendix B (Table B.2) and the Laboratory Test Reports are included within Appendix C. Sample locations are identified on Figures found in Appendix D.

Results of historically identified or presumed ACMs within the Project Area are included within Appendix B (Table B.3) and are:

- **Friable grey parging cement pipe insulation fittings on cold and hot water piping assemblies containing 50 – 75 % chrysotile asbestos, per Pinchin 2007 Report. This material was originally observed to be present, however, it was subsequently removed from the Project Area in February 2023, as noted during WSP’s November site visit.**
- **Friable grey spray-applied fireproofing material applied to structural beams throughout Site containing 25 – 50 % chrysotile asbestos, per Pinchin 2007 Report. This material was not directly observed to be present within the Project Area at the time of the assessment.**
- **Friable, grey cementitious firestop material applied to wall pipe penetrations in basement mechanical space and presumed present throughout Site containing 0.5 – 5 % chrysotile asbestos, per Pinchin 2007 Report. This material was not directly observed to be present within the Project Area at the time of the assessment.**

Lead-Containing Paints

A total of seven (7) suspect LCMs were collected from the Project Area and submitted for lead content analysis. Based on the analytical results, the following samples were found to be lead-containing:

- **Black paint (L-003) present on doorframes within the Project Area containing lead at 298 micrograms per gram (µg/g). The paint was observed to be in good condition.**
- **Glazing of beige ceramic tiles (L-004) present on walls of Room 112 shower area within the Project Area containing lead at 781 µg/g. The material was reportedly removed in February 2023.**
- **Beige paint (L-005) present on select walls within the Project Area containing lead at 6,950 µg/g. The paint was observed to be in good condition, with isolated areas in poor condition.**
- **Grey paint (L-006) present on a metal beam within the Project Area containing lead at 1,300 µg/g. The paint was observed to be in fair condition.**
- **Red paint (L-007) present on steel beams within the Project Area containing lead at 1,030 µg/g. The paint was observed to be in good condition.**

Laboratory analysis of the remaining suspected LCM samples indicated lead concentrations below 90 µg/g and are therefore not considered to be LCMs.

The analytical laboratory results of the suspect LCM samples are summarized within Appendix B (Table B.4) and the Laboratory Test Reports are included within Appendix C. Sample locations are identified on the Figure found in Appendix D.

Please note, the confirmed LCMs may exist in other regions of the Project Area. If paints are discovered that are not described within this report, they must be assumed to be LCMs unless otherwise confirmed by laboratory analyses.

Lead may also be present in solder on pipe joints in the Project Area. In addition, if solder, cable wrapping or brick ties are discovered during renovation, repair, construction or demolition activities conducted in the Project Area, these materials should be treated as LCMs until tested and proven otherwise.

Mercury-Containing Materials

The fluorescent light tubes/bulbs observed to be present throughout the Project Area are suspected to contain mercury vapour. WSP did note that a subset of the lighting fixtures within the Project Area utilized LEDs rather than fluorescent light tubes/bulbs. Mercury-containing thermostats were not observed within the Project Area.

Silica-Containing Materials

Suspected silica-containing materials were not physically sampled for silica content analysis during the assessment as it would have caused unnecessary damage to the Project Area, and it is not standard practice to do so. Silica is presumed present in the concrete, mortar, cementitious texture coat and other aggregates used to construct the Project Area. Silica-containing materials were observed to be in good condition at the time of the assessment.

Other Designated Substances

No other designated substances, as defined in O. Reg. 490/09 under the OHSA, were observed within the Project Area at the Site.

Polychlorinated Biphenyls

Fluorescent lighting system ballasts at the Site may be PCB-containing. Due to health and safety concerns associated with energized fluorescent lighting systems, connected and energized fluorescent lights were not breached or accessed during the DSHM survey.

Ozone-Depleting Substances

An assessment for potential ODS-containing equipment within the Site was completed as part of the DSHM survey. WSP did not observe potentially ODS-containing equipment during the assessment.

Visual Mould and Animal Waste

During the DSHM survey, a visual assessment was conducted to note visible mould growth on accessible building materials as well as instances of animal waste. WSP did not observe signs of suspected mould growth during the assessment.

Recommendations

Asbestos-Containing Materials

This report was prepared to fulfil the requirements of the COHSR, the PSPC *Asbestos Management Standard*, the Duty of the project owner's requirement under Section 30(1) of the OHSA, and the requirements of Section 10

of O. Reg. 278/05. This report must be provided to contractors prior to conducting demolition or renovation work at the Site. However, this report does not include the additional requirement for project specifications and drawings outlining abatement areas, quantities and specific procedures typically required in a demolition tender contract. This project-specific DSHM survey report is intended to supplement project specifications only. Bidding contractors must refer to project specification package.

Based on review of the historical reports, the results of the project-specific DSHM survey and the site inspection on 23 November 2023, the following recommendations are made with respect to ACMs known to be present at the Site:

- ACMs must be removed in accordance with the COHSR, the PSPC *Asbestos Management Standard*, and O. Reg. 278/05, prior to any disturbance caused by the re-development, renovation, or demolition processes. ACMs must be disposed of in accordance with COHSR, O. Reg. 278/05 and Ontario Regulation 347: *General - Waste Management* (O. Reg. 347). If ACMs that are in poor condition are to remain in place at the Project Area, they must be repaired to good condition or otherwise removed.
- The following table outlines the recommended removal procedures for the remediation of ACMs identified or presumed within the Project Area at the Site to meet the requirements of the COHSR, PSPC *Asbestos Management Standard*, and O. Reg. 278/05. However, all remediation contractors must refer to relevant project specification tender documents and thus must not use Table 1 below in any way for bidding purposes.

Table 1: Asbestos Remediation Recommendations for the Project Area

Material Description / Location	Friable or Non-Friable	Asbestos Percentage and Type	Recommendations
Drywall Joint Compound / East Wall Surface and Walls of Room 112 Shower Area Within Project Area	Non-Friable	1 % Chrysotile	If removing/disturbing less than one square meter of this material it must be completed in accordance with Type 1 / Low-risk activity asbestos operations as prescribed by O. Reg. 278/05 and COHSR respectively, at a minimum, and project specifications. If removing/disturbing one square meter or more of this material it must be completed in accordance with Type 2 / Moderate-risk activity asbestos operations as prescribed by O. Reg. 278/05 and COHSR, respectively, at a minimum, project specifications.
Mastic / Applied Behind Installed Ceramic Tiling within Room 112 Shower Area Within Project Area	Non-Friable	1 % Chrysotile	If removing/disturbing this material is done by means of non-powered hand tools it must be completed in accordance with Type 1 / Low-risk activity asbestos operations as prescribed by O. Reg. 278/05 and SOR/86-304, respectively, at a minimum, and project specifications. If repair/removal/disturbance is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filtered exhausts, it must be completed in accordance with Type 2 / Moderate-risk

Material Description / Location	Friable or Non-Friable	Asbestos Percentage and Type	Recommendations
			activity asbestos operations as prescribed by O. Reg. 278/05 and SOR/86-304, respectively, at a minimum, and project specifications.
Spray-Applied Fireproofing / Structural Beams throughout the Site	Friable	25 - 50 % Chrysotile	If removing/disturbing of one square meter or less of this material, it must be completed in accordance with Type 2 / Moderate-risk activity asbestos operations as prescribed by O. Reg. 278/05 and COHSR, respectively, at a minimum and project specifications.
Cementitious Firestop / Applied to Pipe Penetrations Through Walls Throughout Basement Mechanical Spaces and Presumed Throughout the Site	Friable	0.5 – 5 % Chrysotile	If removing/disturbing more than one square meter this material, it must be completed in accordance with Type 3 / High-risk activity asbestos operations as prescribed by O. Reg. 278/05 and COHSR, respectively, at a minimum, and project specifications.
Air Handling Equipment and Associated Ducting and Filters / Present within and Servicing the Project Area	Friable	25 - 50 % Chrysotile	<p>Due to the presence of historically identified asbestos-containing spray-applied fireproofing (Historical Sample No. 16) at the Site: Cleaning or removing filters used in air handling equipment in a building that has sprayed fireproofing that is asbestos-containing material, must be completed in accordance with Type 2 / Moderate-Risk activity asbestos operations, as prescribed by O. Reg. 278/05 and COHSR, respectively, at a minimum.</p> <p>Cleaning or removing air handling equipment, including rigid ducting but not including filters, in a building that has sprayed fireproofing that is asbestos-containing material, must be completed in accordance with Type 3 / High-Risk activity asbestos operations, as prescribed by O. Reg. 278/05 and COHSR, respectively, at a minimum.</p>
Parging Cement on Pipe Fittings / Cold and Hot Water Piping Systems within Room 111	Friable	50 - 75 % Chrysotile	This material was abated in February 2023

Lead-Containing Paints

Based on the findings of the project-specific DSHM survey, the following recommendations are made with respect to the LCMs which may be disturbed during the projects:

- Disturbance of LCMs during renovation/demolition operations must be conducted in accordance with the CLC-II, OHSA and the Ontario Ministry of Labour, Immigration, Training and Skills Development (MLITSD) Lead Guideline³.
- If LCMs are to be removed, they must be sent to a Ministry of the Environment Conservation and Parks (MECP) licensed recycling or disposal facility. The demolition contractor should be responsible to recover this material and prevent it from going to a landfill. If recycling of the lead is not completed, then it must be disposed of in an approved landfill.
- If LCMs are to be disposed of in a landfill, waste characterization is to be performed including analysis of both the LCM and the underlying substrate for lead leachate, using the Toxicity Characteristic Leaching Procedure (TCLP) as specified in O. Reg. 347/90. Based on the results of the TCLP analysis, removed LCMs would either be considered as construction waste or leachate toxic waste. All leachate toxic materials would require segregation and final disposal in a landfill licensed to accept leachate toxic waste by the MECP.

If additional suspected LCMs are identified during renovation and/or demolition activities (e.g., solder, cable wrapping, or brick ties), they must be treated as LCMs until tested and proven otherwise.

Mercury-Containing Materials

The fluorescent light tubes/bulbs observed to be present throughout the Project Area are suspected to contain mercury vapour. If fluorescent light bulbs/tubes are to be removed during replacement, repair, renovation, construction or demolition operations, they must remain unbroken and kept separate from all other waste to prevent damage prior to disposal. If mercury vapours are not present in fluorescent light bulbs/tubes, they are typically not considered to be a hazardous waste product. However, if it is not possible to confirm the absence or presence of mercury vapours, they must be treated as mercury waste.

Disposal of materials containing mercury shall be performed in accordance with O. Reg. 347/90.

Silica-Containing Materials

If disturbance of SCMs such as concrete or mortar is required, disturbance must be conducted in accordance with the CLC-II, OHSA and the MLITSD Silica Guideline⁴. The MLITSD Silica Guideline provides recommended safe measures and procedures addressing construction-related work involving disturbance of materials that may generate an exposure risk. If these measures and procedures are followed, worker exposure is not expected to be greater than occupational exposure limits for silica.

Other Designated Substances

No other designated substances, as defined in O. Reg. 490/09 under the OHSA, were observed within the Project Area at the Site.

Polychlorinated Biphenyls

As WSP did not evaluate the ballasts due to safety concerns regarding energized equipment, it is recommended that ballast information be collected by the contractor when the systems are de-energized to determine if PCBs may be present prior to demolition or the NRC confirm that all PCB containing equipment has been removed from the Site. Waste management requirements for PCBs are described within Appendix A.

³ Ontario Ministry of Labour, Immigration, Training and Skills Development (Updated April 2011): Lead on Construction Projects. [Available Online.](#)

⁴ Ontario Ministry of Labour, Immigration, Training and Skills Development (Updated April 2011): Silica on Construction Projects. [Available Online.](#)

Visible Mould and Animal Waste

WSP did not observe visible signs indicating mould development during the assessment. Should water-damaged and/or mould-impacted building materials or evidence of animal waste be encountered during project activities at the Project Area, further assessment should be conducted at that time. There is no regulatory requirement to remove mould prior to demolition. However, the presence of mould-impacted building materials may pose a threat to the health and safety of unprotected works in inhalation or ingestion of these biological hazards were to occur during demolition. Any remediation or removal of water-damaged and mould-impacted building materials or animal waste should be conducted in accordance the EACC Mould Guidelines and CCA Mould Guidelines described within Appendix A.

Limitations

This report is prepared for the sole use of the National Research Council Canada. This report is based on samples and information collected during the Site visits conducted by WSP on 5 January 2023 and 23 November 2023 and is based solely on site conditions encountered at the time of the sampling, as described in this report.

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

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

The findings, observations and conclusions expressed by WSP in this report are not, and should not be considered, an opinion concerning compliance of any past or present owner or operator of the building with any federal, provincial or local laws or regulations.

The survey was non-destructive and limited to accessible surficial building materials within the Site interior. WSP did not make destructive openings to identify concealed materials. As such, if additional or suspected designated substances are encountered during renovation and/or demolition activities that are not included in this report, it is recommended that a further investigation be conducted at that time. As such, in the case of suspected ACMs or LCMs, they must be treated as such until proven otherwise. Should building materials encountered during any renovation and/or demolition activities be found to contain asbestos, these materials must be managed in accordance with the *COHSR*, *PSPC Asbestos Management Standard*, and *O. Reg. 278/05*.

Closure

We trust that this technical memorandum meets your requirements and current needs. If you have any questions regarding the content of this technical memorandum or require any further information, please do not hesitate to contact the undersigned at (613) 592-9600. Thank you for the opportunity to be of service. We look forward to working with you again.

Sincerely



WSP Canada Inc.

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Stephen Heikkila, PEng, PMP
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LM/SH

[https://wsponlinecan.sharepoint.com/sites/ca-ca-gld-22565806/shared documents/06. deliverables/psdss - english/22565806-rpt-nrc-m24_room111-1200montrealrd psdss_revised.docx](https://wsponlinecan.sharepoint.com/sites/ca-ca-gld-22565806/shared%20documents/06.%20deliverables/psdss%20-%20english/22565806-rpt-nrc-m24_room111-1200montrealrd_psdss_revised.docx)

- Appendices:
- Appendix A: Regulations and Guidelines
 - Appendix B: Spreadsheet of Findings
 - Appendix C: Laboratory Test Reports
 - Appendix D: Figure – Approximate Sample Locations

APPENDIX A

Regulations and Guidelines

REGULATIONS AND GUIDELINES

Canada Occupational Health and Safety Regulations, SOR/86-304 (COHSR), Part X – Hazardous Substances

The Site is federally regulated, and therefore worker exposure to chemical agents is regulated under the *Canada Occupational Health and Safety Regulations*, SOR/86-304 (COHSR) made under the *Canada Labour Code Part II* (CLC-II). In addition, the general duty clause of CLC-II requires employers to ensure that the health and safety of their employees is protected.

COHSR *Part X – Hazardous Substances*, lists prescribed requirements for the control of hazardous substances in federally regulated workplaces. Specifically, Section 124 of the CLC-II requires the employer to ensure that the health and safety at work of every person employed by the employer is protected. Furthermore, Section 10.19(1) of the CLC-II requires the employer to ensure that worker exposure to chemical agents do not exceed the recommended limits of the American Conference of Governmental Industrial Hygienists (ACGIH) publication titled *Threshold Limit Values (TLVs) and Biological Exposure Indices*, dated 1994-1995, as amended from time to time.

Designated Substances

Although designated substances are not defined under federal regulations, they have been included here to meet the project requirements. The project scope of work entailed a review of designated substances.

The Ontario *Occupational Health and Safety Act*, Revised Statutes of Ontario (R.S.O.) 1990, Chapter 0.1 (OHSA) defines designated substances and outlines the basic duties of project owners regarding designated substances on project sites. According to the “Duty of project owners” requirement under Section 30 (1) of the OHSA, prior to beginning a construction project (including renovation or demolition) a document summarizing the presence of these designated substances must be available to contractors and subcontractors as part of the tendering of information. In addition, the Ontario Regulation 490/09: *Designated Substances* (O. Reg. 490/09), as amended and made under OHSA, prescribes occupational exposure limits and any required assessment and control programs for designated substances which exist within a building, project site or workplace.

Asbestos

The Canada Labour Code was amended in 2017, which resulted in occupational health and safety regulation changes regarding asbestos. The amended regulation defines an asbestos-containing material (ACM) to be any material containing 1% or more asbestos by weight.

Under Section 10.26.1 of the COHSR, if ACM is present in a workplace and there is the potential for a release of asbestos fibres or employee exposure to asbestos fibres, the employer shall ensure that a qualified person carry out a hazard investigation, including identifying and documentation of the type, condition, friability, accessibility, likelihood of damage and potential release of fibres. WSP’s assessment was performed to serve this purpose.

Furthermore, if asbestos is identified during the hazard investigation, an Asbestos Control Plan must be in place prior to undertaking work involving ACM to ensure ACM is classified (as high-, moderate- or low-risk activity), ACM has been identified, and that procedures and controls are in place to prevent exposure; including asbestos dust, waste, and debris removal, decontamination, and air sampling requirements.

The Public Services and Procurement Canada (PSPC) *Asbestos Management Standard* prescribes the operational and technical requirements for the management, maintenance, and repair work processes of ACM and the COHSR.

In addition, Section 10 of Ontario Regulation 278/05: *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations* (O. Reg. 278/05), as amended and made under the OHSA, outlines specific procedures for the identification of ACMs in buildings and on construction sites and protocols for their removal or disturbance during renovation. O. Reg. 278/05 defines as an ACM as a material that contains 0.5% or more asbestos by dry weight. For the purposes of WSP's assessment, the O. Reg. 278/05 definition of asbestos was applied as WSP's mandate was to review Designated Substances at the Site which are relevant to Ontario.

Under Section 30 of the OHSA, before beginning a project, the owner shall determine whether any designated substances are present at each project site and shall prepare a list of all designated substances that are present at each site.

Ontario Regulation 347 titled *General – Waste Management* as amended (O. Reg. 347/90), made under the Ontario *Environmental Protection Act*, R.S.O. 1990, Chapter E.19, as amended, sets out requirements for general waste management including ACM. The regulation defines "asbestos waste" as "solid or liquid waste that results from the removal of asbestos-containing construction or insulation materials or from the manufacture of asbestos-containing products and contains asbestos in more than a trivial amount or proportion". This 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.

Lead

Under the COHSR, the employee shall be kept free from exposure to a concentration of an airborne lead in excess of the ACGIH Threshold Limit Value – Time-Weighted Average (TLV-TWA) of 0.05 mg/m³ for lead. Although there is no federal regulation concerning lead in paint at the workplace, section 126(1) of the CLC-II states that every employee shall, take all reasonable and necessary precautions to ensure the health and safety of the employee, the other employees and any person likely to be affected by the employee's acts or omissions. Therefore, WSP has consulted various other guidance for interpretation of lead in paint or other materials.

In 2005, the Government of Canada passed the *Surface Coating Materials Regulations*, under the *Hazardous Products Act*. The regulations were amended in 2010 setting the limit for lead content of surface coating materials at 90 mg/kg (equivalent to 90 µg/g or 90 ppm). The limit of 90 mg/kg is specifically for consumer products; however, it is a widely accepted limit for lead content in paint in federally regulated workplaces.

The Occupational Health and Safety Branch of the Ontario Ministry of Labour, Immigration, Training and Skills Development (MLITSD) published their Guideline titled *Lead on Construction Projects*, revised in April 2011 (MLITSD Lead Guideline), to raise the awareness of employers and workers in the construction industry of the hazards posed by lead in construction and the measures and procedures that should be taken to control those hazards. Currently, this document represents due diligence practice for lead exposure control on construction projects, as enforced by the MLITSD under the General Duty clause 25(2)(h) of the OHSA. As such, it is referenced within the report, where appropriate, to provide guidance on appropriate handling and exposure control procedures when dealing with lead.

WSP understands the MLITSD currently does not include criteria for classification of lead-containing paint (LCP), and as such, WSP has interpreted that any detectable concentration of lead above the Government of Canada's *Surface Coating Materials Regulations* (SOR/2016-193), made under the *Canada Consumer Product Safety Act*, of 90 ppm, as a LCP. This limit is specifically for consumer products; however, it has been historically used as an industry accepted limit for lead content in materials such as paints, therefore it has been applied herein to define the LCP threshold.

Disposal of lead must be done in accordance with applicable local regulations, if any. In the absence of applicable local regulations, disposal of lead should be in accordance with the requirements of O. Reg. 347/90.

Mercury

WSP's review of mercury was included a visual assessment of potential mercury-containing equipment and noted damage, where observed. Intact mercury-containing equipment do not create an airborne concentration or exposure risk and thus meet the requirements of the CLC-II. Disposal of mercury must be done in accordance with applicable local regulations, if any. In the absence of applicable local regulations, disposal of mercury should be in accordance with the requirements of O. Reg. 347/90.

Silica

The federally regulated TLV-TWA for crystalline silica made under the CLC-II is 0.025 mg/m³. However, silica-containing materials in good condition and not anticipated to be disturbed will not create an exposure risk. Therefore, WSP's review of silica was limited to a visual assessment and noted damage, where observed.

The Occupational Health and Safety Branch of the MLITSD published their Guideline titled *Silica on Construction Projects*, revised in 2011 ("MLITSD Silica Guideline"), to raise the awareness of employers and workers in the construction industry of the hazards posed by silica in construction and the measures and procedures that should be taken to control those hazards. The MLITSD Silica Guideline should be consulted for the removal or disturbance of silica in absence of Canadian regulations governing the removal or disturbance of silica. Currently, this document represents due diligence practice for silica exposure control on construction projects, as enforced by the MLITSD under the General Duty clause 25(2)(h) of the OHSA. As such, it is referenced within the report, where appropriate, to provide guidance on appropriate handling and exposure control procedures when dealing with silica.

Other Designated Substances

In addition to the four designated substances that have a high probability of being present at the Site, which are discussed in detail in the previous sections, the following seven designated substances as defined in the regulations under the OHSA were included in this survey: acrylonitrile, arsenic, benzene, coke oven emissions, ethylene oxide, isocyanates and vinyl chloride. Based on WSP's professional experience, none of these substances were expected to be present and, as such, no specific observations or sampling of materials potentially containing these substances were undertaken.

Ozone-Depleting Substances (ODS)

An ozone-depleting substance (ODS) refers to any substance containing chlorofluorocarbon (CFC), hydrochlorofluorocarbon (HCFC), halon or any other material capable of destroying ozone in the atmosphere. ODSs have been used in rigid polyurethane foam and insulation, laminates, aerosols, air conditioners, fire extinguishers, cleaning solvents and the sterilization of medical equipment. Federal regulations introduced in

APPENDIX A

Regulations and Guidelines Project-Specific Designated Substances and Hazardous Materials Survey

January 2024
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1995 required the elimination of production and import of CFCs by January 1, 1996 (subject to certain essential uses) and a freeze on the production and import of HCFCs by January 1, 1996, unless by permit. These regulations also require the phase-out of CFCs at the time of major overhauls of a cooling system after January 1, 2005. Some Provinces have also enacted legislation that places use prohibitions on certain listed ozone depleting substances.

As the regulations govern only the production and import of certain ODSs, they are allowed to be used in Canada, as long as there is a supply in place. Eventually the supply will run out, and the present equipment will either need to be refitted or replaced. It is understood from several air conditioning companies, that there is a sufficient supply of CFCs and HCFC-22 in Canada for at least the next several years. The federal Hazardous Products Act (HPA) does not require the licensing, approval or registration of a property in which ODSs have been identified. However, provincial regulations require the licensing of contractors who handle ODSs through equipment servicing.

Polychlorinated Biphenyls (PCBs)

R.R.O. 1990, Regulation 362 *Waste Management – PCB'S* as amended (Reg. 362), made under the Ontario *Environmental Protection Act*, R.S.O. 1990, Chapter E.19, as amended sets out requirements for PCB waste management.

Additionally, section 3(1) of Reg. 833 requires the employer to take all measures reasonably necessary in the circumstances to protect workers from exposure to a hazardous biological or chemical agents due to the storage, handling, processing or use of such agents in the workplace. Appropriate dermal protection is crucial to worker protection when handling ballasts and transformer fluids.

Other Hazardous Material – Visible Animal Waste and Mould

There are no specific regulations addressing animal waste contamination. However, the general duty clause of CLC-II requires employers to ensure that the health and safety of their employees is protected and the OSHA general duty clause applies to ensure that employers protect the health and safety of their workers. As such, animal waste such as feces or evidence of birds, bats, vermin, insects, or pests were documented, where observed in this assessment.

Respiratory protection and protective clothing should generally be worn during disturbance of animal waste to reduce dusts created from contaminated areas during demolition.

As indicated in the Health Canada Residential Indoor Air Quality Guidelines, mould growth in buildings may pose a health hazard. The Health Canada Residential Indoor Air Quality Guidelines recommend the control of humidity, diligent repair of any water damage, and thorough cleaning of any visible or concealed mould growth¹.

¹ Health Canada. Residential Indoor Air Quality Guideline – Moulds. March 31, 2007.

There are no specific provincial regulations addressing mould contamination, but the general duty clauses of CLC-II and the OSHA apply. According to Health Canada², the American Industrial Hygiene Association's *Guide for the Determination of Biological Contaminants in Environmental Samples 2nd Edition*, the Environmental Abatement Council of Canada's *Mould Abatement Guidelines* (EACC Mould Guidelines)³ and the Canadian Construction Association's *Mould Guidelines for the Canadian Construction Industry* (CCA Mould Guidelines)⁴, building materials supporting mould growth should be remediated as rapidly as possible in order to ensure a healthy environment. Water damaged building materials susceptible to mould growth should be dried immediately, or pre-emptively abated to avoid mould growth and amplification. Repair of the defects that led to water accumulation should be conducted in conjunction with, or prior to, the remediation. Appropriate procedures and protective equipment are outlined in the EACC Mould Guidelines and CCA Mould Guidelines and are dependant on severity, location and other factors of the mould contamination.

² *Fungal Contamination in Public Branches: A Guide to Recognition and Management*, Health Canada, Federal-Provincial Committee on Environmental and Occupational Health, June 1995.

³ Environmental Abatement Council of Ontario. *Mould Abatement Guidelines*, 3rd Edition, 2015.

⁴ Canadian Construction Association. *Mould guidelines for the Canadian construction industry*, 2018.

APPENDIX B

Spreadsheet of Findings

Table B.1: Detailed Characterization of Project Area Construction

Component of Project Area Construction	Description of Constituent Materials	Additional Comments
Ceiling / Ceiling Space / Deck	<ul style="list-style-type: none"> - Metal beams with lead-containing paints (L-006 and L-007) present within and immediately adjacent to ceiling space above drop ceiling - Above the drop ceiling is concrete decking with non-lead-containing white paint (L-001) applied to it - Combination of LED and potentially mercury-containing fluorescent light tubes installed immediately below drop ceiling 	Historically identified asbestos-containing spray-applied fireproofing (Historical Sample No. 16) ⁽¹⁾ reported as being associated with structural steel beams throughout Site but were not observed by WSP during the assessment.
Duct work	<ul style="list-style-type: none"> - Duct work present running length of ceiling and east wall in association with HVAC unit 24AHU04 - Duct work present running length of ceiling and west wall in association with additional HVAC unit 	The presence of historically identified asbestos-containing spray-applied fireproofing (Historical Sample No. 16) ⁽¹⁾ elsewhere at Site requires that disturbance of air handling equipment, including rigid ducting be performed under Type 3 / High-Risk asbestos precautions ⁽²⁾ .
Piping	<ul style="list-style-type: none"> - Additional hot and cold water piping with fibreglass pipe insulation straights and elbows present in Room 112 shower area running the length of the east and north walls - Two (2) pipe wall penetrations rung through the east wall where non-asbestos-containing grey caulking (A-009) is applied - 	N/A

Table B.1: Detailed Characterization of Project Area Construction

Component of Project Area Construction	Description of Constituent Materials	Additional Comments
Walls	<ul style="list-style-type: none"> - Drywall walls with asbestos-containing joint compound (A-001) applied to it make up the east wall as well as the walls of the Room 112 shower area <ul style="list-style-type: none"> o East wall has non-lead-containing white paint (L-001) applied to it while walls of Room 112 shower area have lead-containing beige paint (L-005) applied to them - Beige ceramic tiles were installed on drywall walls of Room 112 shower area using combination of non-asbestos-containing grout and asbestos-containing mastic (A-006) - Concrete block walls (north, west, and south walls) with non-asbestos-containing mortar (A-003) and non-lead-containing white paint (L-001) applied to it make up the north, west, and south walls - Non-asbestos-containing cementitious texture coat (A-002) with lead-containing beige paint (L-005) applied above bay door on south wall - Doorframes with lead-containing black paint (L-003) installed on east and south walls - Metal electrical conduits run the length of the east wall and majority of west wall - Two (2) pipe wall penetrations through east wall where non-asbestos-containing grey caulking (A-009) is applied 	N/A
Flooring	<ul style="list-style-type: none"> - Concrete floor painted with sampled lead-containing grey paint (L-002) - Non-asbestos-containing tan epoxy floor leveling compound (A-010) applied to select locations of floor surface 	N/A

Notes:

- (1) Per NRC-provided historic report titled "Designated Substance Survey Report National Research Council Canada Building M-24 Ottawa, Ontario" (Pinchin Environmental Project No. 37696), dated 31 January 2007.
- (2) Per Ontario Regulation 278/05: *Designated Substance – Asbestos on Construction Projects and in Building Repair Operations* (O. Reg. 278/05), as amended, made under Ontario *Occupational Health and Safety Act*, Revised Statutes of Ontario 1990, Chapter 0.1 and *Canada Occupational Health and Safety Regulations*, SOR/86-304.

Table B.2: Summary of Materials Sampled for Asbestos Analysis



Material ⁽¹⁾ Description	Location	Observed Estimated Quantity ⁽²⁾	Condition	Friable (Yes / No)	Accessibility ⁽³⁾	Action ⁽⁴⁾	Sample Number(s)	Asbestos Concentration (%) and Type	Photographs
Drywall joint compound	Applied to installed drywall east wall and Room 112 shower area within Project Area	32 m ²	Good to Fair	No	A	5/6 ²	A-001A to A-001E	1 % Chrysotile	
Cementitious texture coat	Applied above bay door on south wall within Project Area	N/A ⁽⁵⁾	N/A	N/A	N/A	N/A	A-002A to A-002C	None Detected	

Table B.2: Summary of Materials Sampled for Asbestos Analysis




Material ⁽¹⁾ Description	Location	Observed Estimated Quantity ⁽²⁾	Condition	Friable (Yes / No)	Accessibility ⁽³⁾	Action ⁽⁴⁾	Sample Number(s)	Asbestos Concentration (%) and Type	Photographs
Mortar	Concrete block north, west, and south walls within Project Area	N/A	N/A	N/A	N/A	N/A	A-003A to A-003C	None Detected	
Black vinyl baseboard	Installed at base of west and east walls within Project Area	Material removed February 2023. No further action required.					A-004A to A-004C	None Detected	
Tan mastic	Applied behind installed black vinyl baseboard (sample A-004)	N/A	N/A	N/A	N/A	N/A	A-005A to A-005C	None Detected	

Table B.2: Summary of Materials Sampled for Asbestos Analysis






Material ⁽¹⁾ Description	Location	Observed Estimated Quantity ⁽²⁾	Condition	Friable (Yes / No)	Accessibility ⁽³⁾	Action ⁽⁴⁾	Sample Number(s)	Asbestos Concentration (%) and Type	Photographs
Yellow mastic	Applied behind beige ceramic tiling within Room 112 shower area within Project Area	13 m ²	Good	No	C Concealed	7	A-006A to A-006C	1 % Chrysotile	
Grout	Applied in conjunction with installed beige ceramic tiling in Room 112 shower area within Project Area	Material removed February 2023. No further action required.					A-007A to A-007C	None Detected	
Acoustic ceiling tiles with stucco-like texture	Drop ceiling within project Area	Material removed February 2023. No further action required.					A-008A to A-008C	None Detected	

Table B.2: Summary of Materials Sampled for Asbestos Analysis

Material ⁽¹⁾ Description	Location	Observed Estimated Quantity ⁽²⁾	Condition	Friable (Yes / No)	Accessibility ⁽³⁾	Action ⁽⁴⁾	Sample Number(s)	Asbestos Concentration (%) and Type	Photographs
Grey caulking	Penetrations through east wall within Project Area	N/A	N/A	N/A	N/A	N/A	A-009A to A-009C	None Detected ⁽⁶⁾	
Parging cement		Unknown	Good	Yes	C Concealed	7	A-009B (Identified during laboratory analysis)	40% Chrysotile	
Drywall joint compound		13 m ²	Good	No	A	5/7 ¹	A-009B (Identified during laboratory analysis)	1% Chrysotile	
Tan epoxy floor leveler	Applied to floor surface in select locations within Project Area	N/A	N/A	N/A	N/A	N/A	A-010A to A-010C	None Detected	

APPENDIX B
Spreadsheet of Findings

Notes:

- (1) All materials found to be in likeness to confirmed asbestos-containing materials (ACMs) must be considered ACMs unless otherwise confirmed by laboratory analysis.
- (2) All quantities are estimated based on observations made at the time of the assessment. Material quantities and locations must be verified by qualified remediation contractors.
- (3) **ACCESSIBILITY**

The accessibility of known ACMs is rated in accordance with the following criteria, as prescribed by the *Public Services and Procurement Canada Asbestos Management Standard*:

Access (A): Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users (for example basketball on gym ceiling) may result in disturbance of ACM not normally within reach from floor level.

Access (B): Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk (for example tops of equipment) and mezzanines.

Access (C) Exposed: Areas of the building above 8'0" where use of a ladder is required to reach the ACM. Only refers to ACMs that are exposed to view, from the floor or ladder, without removing or opening other building components such as ceiling tiles, or service access doors or hatches. Does not include infrequently accessed service areas of the building.

Access (C) Concealed: Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems such as a ventilation plenum. Includes rarely entered crawl spaces, attic spaces, etc. Observations are limited to the extent visible from the access points.

Access (D): Areas of the building behind inaccessible solid ceiling systems, walls, or mechanical equipment, etc., where demolition of the ceiling, wall or equipment, etc., is required to reach the ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the assessor's ability to visually examine the materials in areas rated Access (D).

(4) **ACTION**

ACTION MATRIX – ASBESTOS-CONTAINING MATERIAL				
ACCESS	CONDITION			DEBRIS
	GOOD	FAIR	POOR	
(A)	ACTION 5/7¹	ACTION 5/6²	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/5³	ACTION 3	ACTION 1
(C) Exposed	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) Concealed	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

¹ If material is in ACCESS (A)/GOOD condition is not removed, ACTION 7 is required.


² If material is in ACCESS (A)/FAIR condition is not removed, ACTION 6 is required.

³ Remove ACM in ACCESS (B)/FAIR condition if ACM is likely to be disturbed.

- ACTION 1:** Immediate clean-up of debris that is likely to be disturbed. Access that is likely to cause a disturbance of the ASBESTOS-CONTAINING MATERIAL DEBRIS is to be restricted and clean up ASBESTOS-CONTAINING MATERIAL DEBRIS is to be done immediately. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.
- ACTION 2:** Entry into areas with asbestos-containing material debris requires intermediate risk precautions. At locations where ASBESTOS-CONTAINING MATERIAL DEBRIS can be isolated in lieu of removal or cleaned up, appropriate means to limit entry to the area is to be used. Access to the area is restricted to persons using intermediate risk asbestos-work precautions. The precautions will be required until the ASBESTOS-CONTAINING MATERIAL DEBRIS has been cleaned up, and the source of the DEBRIS has been stabilized or removed following intermediate risk (if minor) or high-risk precautions.
- ACTION 3:** Asbestos-containing material removal required for compliance. Asbestos-containing material must be removed for compliance with regulatory requirements and good practice. Use asbestos procedures appropriate to the scope of the removal work.
- ACTION 4:** Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions. Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the asbestos-containing material. ACTION 4 must be used until the asbestos-containing material is removed (Use ACTION 1 or 2 if DEBRIS is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).
- ACTION 5:** Proactive asbestos-containing material removal. Removal of asbestos-containing material in lieu of repair may be considered, even if it is in GOOD condition at locations, where asbestos-containing material is easily accessible, limited in quantity, and removal would be cost-effective.
- ACTION 6:** Asbestos-containing material repair. Asbestos-containing material may be repaired if found in FAIR condition and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the repair work, asbestos-containing material is to be treated as being in GOOD condition and ACTION 7 is to be implemented. If asbestos-containing material is likely to be damaged or disturbed during normal use of the area or room, ACTION 5 is to be implemented.
- ACTION 7:** Routine Surveillance. Routine surveillance of the asbestos-containing material is to be instituted. Trained workers or service providers must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining asbestos-containing material.

- (5) "N/A" indicates not applicable. Sampled material contains less than 0.5% and 1% of asbestos by weight and is not considered to be an ACM in accordance with O. Reg. 278/05 and the *Canada Occupational Health and Safety Regulations*, SOR/86-304, respectively.
- (6) The presence of additional beige joint compound and grey parging cement layers were noted during laboratory analysis of sample A-009B. The additional material layers were analyzed and confirmed to contain 40 % and 1 % chrysotile asbestos, respectively.

Table B.3: Summary of Materials Historically Assessed and Sampled for Asbestos Analysis in Project Area

Material ⁽¹⁾ Description	Location	Observed Estimated Quantity ⁽²⁾	Condition	Friable (Yes / No)	Accessibility ⁽³⁾	Action ⁽⁴⁾	Sample Number	Asbestos Concentration (%) and Type	Photograph
Grey Parging Cement	Hot and cold water pipe insulation fittings within Project Area	Material removed February 2023. No further action required.					02A to 02C ⁽⁵⁾	50 – 75 % Chrysotile	
Grey Spray- Applied Fireproofing	Structural steel beams throughout Site	Not Directly Observed ⁽⁶⁾	Not Directly Observed	Yes	Not Directly Observed	Not Directly Observed	16A to 16C ⁽⁵⁾	25 – 50 % Chrysotile	Photograph Not Available ⁽⁷⁾
Grey Cementitious Firestop	Wall penetrations in basement mechanical space and throughout Site	Not Directly Observed	Not Directly Observed	Yes	Not Directly Observed	Not Directly Observed	01A to 01C ⁽⁵⁾	0.5 – 5 % Chrysotile	Photograph Not Available

Notes:

- (1) All materials found to be in likeness to confirmed or presumed ACMs must be treated as ACMs until tested and proven otherwise by laboratory analysis.
- (2) All quantities are estimated based on observations made at the time of the assessment. Material quantities and locations must be verified by a qualified person.
- (3) The accessibility of known ACMs is rated in accordance with the following criteria, as prescribed by the *Public Services and Procurement Canada Asbestos Management Standard*:
 Access (A): Areas of the building within reach (from floor level) of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users (for example basketball on gym ceiling) may result in disturbance of ACM not normally within reach from floor level.
 Access (B): Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk (for example tops of equipment) and mezzanines.
 Access (C) Exposed: Areas of the building above 8'0" where use of a ladder is required to reach the ACM. Only refers to ACMs that are exposed to view, from the floor or ladder, without removing or opening other building components such as ceiling tiles, or service access doors or hatches. Does not include infrequently accessed service areas of the building.
 Access (C) Concealed: Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems such as a ventilation plenum. Includes rarely entered crawl spaces, attic spaces, etc. Observations are limited to the extent visible from the access points.
 Access (D): Areas of the building behind inaccessible solid ceiling systems, walls, or mechanical equipment, etc., where demolition of the ceiling, wall, or equipment, etc., is required to reach the ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the assessor's ability to visually examine the materials in areas rated Access (D).

APPENDIX B
Spreadsheet of Findings

(4) ACTION

ACTION MATRIX – ASBESTOS-CONTAINING MATERIAL				
ACCESS	CONDITION			DEBRIS
	GOOD	FAIR	POOR	
(A)	ACTION 5/71	ACTION 5/62	ACTION 3	ACTION 1
(B)	ACTION 7	ACTION 6/53	ACTION 3	ACTION 1
(C) Exposed	ACTION 7	ACTION 6	ACTION 4	ACTION 2
(C) Concealed	ACTION 7	ACTION 7	ACTION 4	ACTION 2
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7

1 If material is in ACCESS (A)/GOOD condition is not removed, ACTION 7 is required.

2 If material is in ACCESS (A)/FAIR condition is not removed, ACTION 6 is required.

3 Remove ACM in ACCESS (B)/FAIR condition if ACM is likely to be disturbed.

ACTION 1: Immediate clean-up of debris that is likely to be disturbed. Access that is likely to cause a disturbance of the ASBESTOS-CONTAINING MATERIAL DEBRIS is to be restricted and clean up ASBESTOS-CONTAINING MATERIAL DEBRIS is to be done immediately. Use correct asbestos procedures. This action is required for compliance with regulatory requirements and good practice. The assessor should immediately notify the Asset or Property and Facility Manager, or Regional/Area Asbestos Management Coordinator of this condition.

ACTION 2: Entry into areas with asbestos-containing material debris requires intermediate risk precautions. At locations where ASBESTOS-CONTAINING MATERIAL DEBRIS can be isolated in lieu of removal or cleaned up, appropriate means to limit entry to the area is to be used. Access to the area is restricted to persons using intermediate risk asbestos-work precautions. The precautions will be required until the ASBESTOS-CONTAINING MATERIAL DEBRIS has been cleaned up, and the source of the DEBRIS has been stabilized or removed following intermediate risk (if minor) or high-risk precautions.

ACTION 3: Asbestos-containing material removal required for compliance. Asbestos-containing material must be removed for compliance with regulatory requirements and good practice. Use asbestos procedures appropriate to the scope of the removal work.

ACTION 4: Access into areas where asbestos-containing material is present and likely to be disturbed by access requires intermediate risk precautions. Intermediate risk asbestos precautions are to be used when entry or access into an area is likely to disturb the asbestos-containing material. ACTION 4 must be used until the asbestos-containing material is removed (Use ACTION 1 or 2 if DEBRIS is present). Intermediate risk or high-risk precautions should be used for removal (depending on extent of removal).

ACTION 5: Proactive asbestos-containing material removal. Removal of asbestos-containing material in lieu of repair may be considered, even if it is in GOOD condition at locations, where asbestos-containing material is easily accessible, limited in quantity, and removal would be cost-effective.

ACTION 6: Asbestos-containing material repair. Asbestos-containing material may be repaired if found in FAIR condition and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the repair work, asbestos-containing material is to be treated as being in GOOD condition and ACTION 7 is to be implemented. If asbestos-containing material is likely to be damaged or disturbed during normal use of the area or room, ACTION 5 is to be implemented.

ACTION 7: Routine Surveillance. Routine surveillance of the asbestos-containing material is to be instituted. Trained workers or service providers must use appropriate asbestos precautions (low, intermediate, or high) during disturbance of the remaining asbestos-containing material.

- (5) Details of material and collected samples per NRC-provided historic report titled “Designated Substance Survey Report National Research Council Canada Building M-24 Ottawa, Ontario” (Pinchin Environmental Project No. 37696), dated 31 January 2007.
- (6) Historically identified asbestos-containing material (ACM) was not observed during DS/HM survey performed by WSP. However, based on materials and locations described in historical site report, it is possible that the ACM of interest remains concealed within Project Area. As material was not observed by WSP, no comments with regard to material quantity, condition, or accessibility could be made.
- (7) Material in question has no associated photograph available, as material was not directly observed during WSP’s DS/HM survey and corresponding photographs of material of interest were not made available within historical site reports provided by the NRC.

Table B.4: Summary of Materials Visually Assessed and Sampled for Lead Analysis

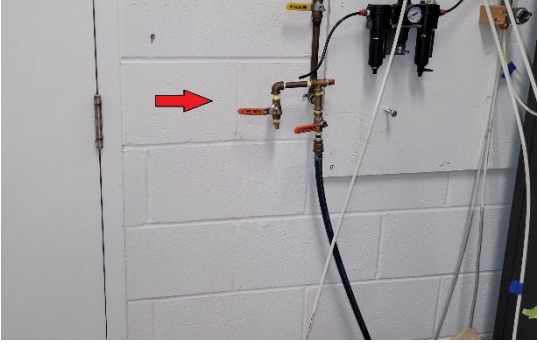

Description ⁽¹⁾ / Location of Material	Condition	Lead Concentration (ug/g)	Sample Number	Lead-Containing Material (Yes/No)	Photographs
White paint (with underlying beige paint layer) / Applied to walls and concrete deck above drop ceiling throughout Project Area	Good	35	L-001	No	
Grey paint / Applied to floor surface within Project Area	Good to Fair	< 5 ⁽²⁾	L-002	No	

Table B.4: Summary of Materials Visually Assessed and Sampled for Lead Analysis

Description ⁽¹⁾ / Location of Material	Condition	Lead Concentration (ug/g)	Sample Number	Lead-Containing Material (Yes/No)	Photographs
Black paint / Applied to doorframes within Project Area	Good to Fair	298	L-003	Yes	
Glazing of beige ceramic tiles / Installed on wall surface of Room 112 shower area within Project Area	Material removed February 2023. No further action required.		L-004	Yes	

Table B.4: Summary of Materials Visually Assessed and Sampled for Lead Analysis

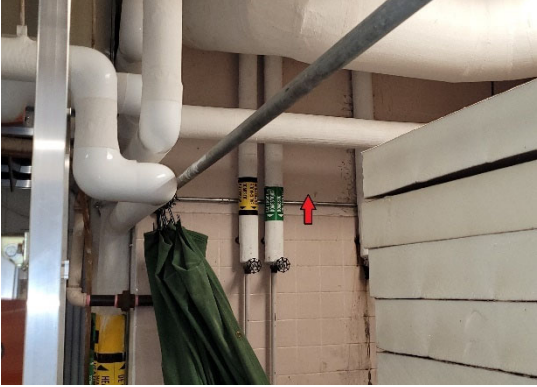


Description ⁽¹⁾ / Location of Material	Condition	Lead Concentration (ug/g)	Sample Number	Lead-Containing Material (Yes/No)	Photographs
<p>Beige paint / Drywall walls within Room 112 shower area within Project Area</p>	<p>Fair</p>	<p>6,950</p>	<p>L-005</p>	<p>Yes</p>	
<p>Grey paint / Metal beam below drop ceiling within Project Area</p>	<p>Fair</p>	<p>1,300</p>	<p>L-006</p>	<p>Yes</p>	

Table B.4: Summary of Materials Visually Assessed and Sampled for Lead Analysis

Description ⁽¹⁾ / Location of Material	Condition	Lead Concentration (ug/g)	Sample Number	Lead-Containing Material (Yes/No)	Photographs
Red Paint / Metal beams above drop ceiling within Project Area	Good	1,030	L-007	Yes	

Notes:

1. All materials found to be in likeness to confirmed lead-containing materials (LCMs) must be considered LCMs unless otherwise confirmed by laboratory analysis.
2. "<" sign indicates that the concentration of lead was below the laboratory method limit of detection.

APPENDIX C

Laboratory Test Reports

Certificate of Analysis

WSP Canada Inc. (Ottawa)

1931 Robertson Rd
Ottawa, ON K2H 5B7
Attn: Gregory Katsuno

Client PO:
Project: 22565806
Custody:

Report Date: 18-Jan-2023
Order Date: 9-Jan-2023

Revised Report

Order #: 2302106

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

Parcel ID	Client ID
2302106-01.1	A-001A
2302106-01.2	A-001A
2302106-02.1	A-001B
2302106-02.2	A-001B
2302106-03	A-001C
2302106-04	A-001D
2302106-05	A-001E
2302106-06	A-002A
2302106-07	A-002B
2302106-08	A-002C
2302106-09	A-003A
2302106-10	A-003B
2302106-11	A-003C
2302106-12	A-004A
2302106-13	A-004B
2302106-14	A-004C
2302106-15	A-005A
2302106-16	A-005B
2302106-17	A-005C
2302106-18	A-006A
2302106-19	A-006B
2302106-20	A-006C
2302106-21	A-007A
2302106-22	A-007B
2302106-23	A-007C
2302106-24	A-008A

Approved By:



Emma Diaz
Senior Analyst

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Certificate of Analysis

Report Date: 18-Jan-2023

Client: **WSP Canada Inc. (Ottawa)**

Order Date: 9-Jan-2023

Client PO:

Project Description: 22565806

2302106-25	A-008B
2302106-26	A-008C
2302106-27	A-009A
2302106-28.1	A-009B
2302106-28.2	A-009B
2302106-28.3	A-009B
2302106-29	A-009C
2302106-30	A-010A
2302106-31	A-010B
2302106-32	A-010C

Certificate of Analysis
 Client: **WSP Canada Inc. (Ottawa)**
 Client PO:

Report Date: 18-Jan-2023
 Order Date: 9-Jan-2023
 Project Description: **22565806**

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

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2302106-01.1	09-Jan-23	Beige	Drywall Joint Compound	Yes	Client ID: A-001A	
					Chrysotile	1
					Non-Fibers	99
2302106-01.2	09-Jan-23	Grey	Drywall Joint Compound	No	Client ID: A-001A	
					Non-Fibers	100
2302106-02.1	09-Jan-23	Beige	Drywall Joint Compound		Client ID: A-001B	
					not analyzed, positive stop	
2302106-02.2	09-Jan-23	Grey	Drywall Joint Compound	No	Client ID: A-001B	
					Non-Fibers	100
2302106-03	09-Jan-23	Beige	Drywall Joint Compound		Client ID: A-001C	
					not analyzed, positive stop	
2302106-04	09-Jan-23	Beige	Drywall Joint Compound		Client ID: A-001D	
					not analyzed, positive stop	
2302106-05	09-Jan-23	Beige	Drywall Joint Compound		Client ID: A-001E	
					not analyzed, positive stop	
2302106-06	09-Jan-23	Grey	Texture Coat	No	Client ID: A-002A	
					Non-Fibers	100
2302106-07	09-Jan-23	Grey	Texture Coat	No	Client ID: A-002B	
					Non-Fibers	100
2302106-08	09-Jan-23	Grey	Texture Coat	No	Client ID: A-002C	
					Non-Fibers	100
2302106-09	09-Jan-23	Grey	Mortar	No	Client ID: A-003A	
					Non-Fibers	100
2302106-10	09-Jan-23	Grey	Mortar	No	Client ID: A-003B	
					Non-Fibers	100

Certificate of Analysis
 Client: **WSP Canada Inc. (Ottawa)**
 Client PO:

Report Date: 18-Jan-2023
 Order Date: 9-Jan-2023
 Project Description: **22565806**

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

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2302106-11	09-Jan-23	Grey	Mortar	No	Client ID: A-003C Non-Fibers	100
2302106-12	09-Jan-23	Black	Baseboard	No	Client ID: A-004A Non-Fibers	100
2302106-13	09-Jan-23	Black	Baseboard	No	Client ID: A-004B Non-Fibers	100
2302106-14	09-Jan-23	Black	Baseboard	No	Client ID: A-004C Non-Fibers	100
2302106-15	09-Jan-23	Brown/Beige	Mastic/Compound	No	Client ID: A-005A Non-Fibers	[AS-LR-NA] 100
2302106-16	09-Jan-23	Brown/Beige	Mastic/Compound	No	Client ID: A-005B Non-Fibers	[AS-LR-NA] 100
2302106-17	09-Jan-23	Brown/Beige	Mastic/Compound	No	Client ID: A-005C Non-Fibers	[AS-LR-NA] 100
2302106-18	09-Jan-23	Brown/Beige	Mastic/Compound	Yes	Client ID: A-006A Chrysotile Non-Fibers	[AS-LR-NA] 1 99
2302106-19	09-Jan-23	Brown/Beige	Mastic/Compound		Client ID: A-006B not analyzed, positive stop	[AS-LR-NA]
2302106-20	09-Jan-23	Brown/Beige	Mastic/Compound		Client ID: A-006C not analyzed, positive stop	[AS-LR-NA]
2302106-21	09-Jan-23	White	Grout	No	Client ID: A-007A Non-Fibers	100
2302106-22	09-Jan-23	White	Grout	No	Client ID: A-007B Non-Fibers	100

Certificate of Analysis
 Client: **WSP Canada Inc. (Ottawa)**
 Client PO:

Report Date: 18-Jan-2023
 Order Date: 9-Jan-2023
 Project Description: **22565806**

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

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2302106-23	09-Jan-23	White	Grout	No	Client ID: A-007C	
					Non-Fibers	100
2302106-24	09-Jan-23	White/Grey	Ceiling Tile	No	Client ID: A-008A	
					MMVF	70
					Non-Fibers	30
2302106-25	09-Jan-23	White/Grey	Ceiling Tile	No	Client ID: A-008B	
					MMVF	70
					Non-Fibers	30
2302106-26	09-Jan-23	White/Grey	Ceiling Tile	No	Client ID: A-008C	
					MMVF	70
					Non-Fibers	30
2302106-27	09-Jan-23	Grey	Caulking	No	Client ID: A-009A	
					Non-Fibers	100
2302106-28.1	09-Jan-23	Grey	Caulking	No	Client ID: A-009B	
					Non-Fibers	100
2302106-28.2	09-Jan-23	Grey	Parging Cement	Yes	Client ID: A-009B	
					Chrysotile	40
					Non-Fibers	60
2302106-28.3	09-Jan-23	Beige	Drywall Joint Compound	Yes	Client ID: A-009B	
					Chrysotile	1
					Non-Fibers	99
2302106-29	09-Jan-23	Grey	Caulking	No	Client ID: A-009C	
					Non-Fibers	100
2302106-30	09-Jan-23	Tan	Epoxy Leveler	No	Client ID: A-010A	
					Non-Fibers	100

Certificate of Analysis
 Client: **WSP Canada Inc. (Ottawa)**
 Client PO:

Report Date: 18-Jan-2023
 Order Date: 9-Jan-2023
 Project Description: **22565806**

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

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
2302106-31	09-Jan-23	Tan	Epoxy Leveler	No	Client ID: A-010B	
					Non-Fibers	100
2302106-32	09-Jan-23	Tan	Epoxy Leveler	No	Client ID: A-010C	
					Non-Fibers	100

* 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	Lab Accreditation	Analysis Date
Asbestos, PLM Visual Estimation	AppE to SubE of 40CFR Part753 and EPA/600/R-93/116	2 - Ottawa West	CALA 1262	13-Jan-23

Ottawa West Lab: 25 Northside Rd, Unit C Nepean, Ontario K2H 8S1

Qualifier Notes

- Sample Qualifiers :
- AS-LR-NA: Layers/materials inseparable, combined and not analyzed separately.
 - Z-01: Analysis of beige compound and grey parging material is strongly recommended.

Work Order Revisions | Comments

Revision 1-Revised report includes analysis of additional layers found on 009B.



Client Name: WSP.	Project Reference: 22565806
Contact Name: Gregory Katsuno, Chris Serres	Quote #:
Address: 1931 Robertson Road, Ottawa, ON, K2H 5B7	PO #:
	Email Address: gregory.katsuno@wsp.com
Telephone: 613-592-9600	chris.serres@wsp.com

Turnaround Time:

Immediate 1 Day
 4 Hour 2 Day
 8 Hour 3 Day
 Regular

Date Required: _____

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

Parcel Order Number:

Sample ID	Sampling Date	Air Volume (L)	Analysis Required	Asbestos - Bulk	
				Identify Distinct Building Materials to Be Analyzed (if not specified, all materials identified will be analyzed) *	Positive Stop?
1 A-001A	09-Jan-2023	N/A	PLM	Drywall Joint Compound	<input checked="" type="checkbox"/>
2 A-001B	09-Jan-2023	N/A	PLM	Drywall Joint Compound	<input checked="" type="checkbox"/>
3 A-001C	09-Jan-2023	N/A	PLM	Drywall Joint Compound	<input checked="" type="checkbox"/>
4 A-001D	09-Jan-2023	N/A	PLM	Drywall Joint Compound	<input checked="" type="checkbox"/>
5 A-001E	09-Jan-2023	N/A	PLM	Drywall Joint Compound	<input checked="" type="checkbox"/>
6 A-002A	09-Jan-2023	N/A	PLM	Drywall Joint Compound	<input checked="" type="checkbox"/>
7 A-002B	09-Jan-2023	N/A	PLM	Cementious Texture Coat	<input checked="" type="checkbox"/>
8 A-002C	09-Jan-2023	N/A	PLM	Cementious Texture Coat	<input checked="" type="checkbox"/>
9 A-003A	09-Jan-2023	N/A	PLM	Cementious Texture Coat	<input checked="" type="checkbox"/>
10 A-003B	09-Jan-2023	N/A	PLM	Concrete Block Mortar	<input checked="" type="checkbox"/>
11 A-003C	09-Jan-2023	N/A	PLM	Concrete Block Mortar	<input checked="" type="checkbox"/>
12 A-004A	09-Jan-2023	N/A	PLM	Concrete Block Mortar	<input checked="" type="checkbox"/>
				Black Vinyl Baseboard	<input checked="" type="checkbox"/>

* If left blank, all distinct materials identified in the samples will be analyzed and reported separately as per EPA 600/R-93/116. Additional charges will apply.

Comments: _____

Paracel Courier

Method of Delivery: *Walk-in*

Relinquished By (Sign): <i>Chris Serres</i>	Received at Depot:	Received at Lab: <i>Chris Serres 4:20 PM</i>	Verified By: <i>[Signature]</i>
Relinquished By (Print): Chris Serres	Date/Time: 09-Jan-2023 4:20	Date/Time: 09/23	Date/Time: 09/23 4:48



Client Name: WSP.	Project Reference: 22565806
Contact Name: Gregory Katsuno, Chris Serres	Quote #:
Address: 1931 Robertson Road, Ottawa, ON, K2H 5B7	PO #:
	Email Address: gregory.katsuno@wsp.com
Telephone: 613-592-9600	chris.serres@wsp.com

Turnaround Time:

Immediate 1 Day
 4 Hour 2 Day
 8 Hour 3 Day
 Regular

Date Required: _____

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

Parcel Order Number:

Sample ID	Sampling Date	Air Volume (L)	Analysis Required	Asbestos - Bulk	
				Identify Distinct Building Materials to Be Analyzed (if not specified, all materials identified will be analyzed) *	Positive Stop?
1 A-004B	09-Jan-2023	N/A	PLM	Black Vinyl Baseboard	<input type="checkbox"/>
2 A-004C	09-Jan-2023	N/A	PLM	Black Vinyl Baseboard	<input checked="" type="checkbox"/>
3 A-005A	09-Jan-2023	N/A	PLM	Mastic from Vinyl Baseboard (A-004)	<input checked="" type="checkbox"/>
4 A-005B	09-Jan-2023	N/A	PLM	Mastic from Vinyl Baseboard (A-004)	<input checked="" type="checkbox"/>
5 A-005C	09-Jan-2023	N/A	PLM	Mastic from Vinyl Baseboard (A-004)	<input checked="" type="checkbox"/>
6 A-006A	09-Jan-2023	N/A	PLM	Mastic Behind Ceramic Tiles	<input checked="" type="checkbox"/>
7 A-006B	09-Jan-2023	N/A	PLM	Mastic Behind Ceramic Tiles	<input checked="" type="checkbox"/>
8 A-006C	09-Jan-2023	N/A	PLM	Mastic Behind Ceramic Tiles	<input checked="" type="checkbox"/>
9 A-007A	09-Jan-2023	N/A	PLM	Grout from Ceramic Tiles	<input checked="" type="checkbox"/>
10 A-007B	09-Jan-2023	N/A	PLM	Grout from Ceramic Tiles	<input checked="" type="checkbox"/>
11 A-007C	09-Jan-2023	N/A	PLM	Grout from Ceramic Tiles	<input checked="" type="checkbox"/>
12 A-008A	09-Jan-2023	N/A	PLM	Acoustic Ceiling Tile w Stucco-like Texture	<input checked="" type="checkbox"/>

* If left blank, all distinct materials identified in the samples will be analyzed and reported separately as per EPA 600/R-93/116. Additional charges will apply.

Comments: _____

Method of Delivery: *Paracel Courier*

Relinquished By (Sign): <i>Chris</i>	Received at Depot:	Received at Lab: <i>[Signature]</i>	Verified By: <i>[Signature]</i>
Relinquished By (Print): Chris Serres	Date/Time: 09-Jan-2023 4:20	Date/Time: 09/23 PM	Date/Time: 01/09/23 4:48



d.
B

Client Name: WSP.	Project Reference: 22565806
Contact Name: Gregory Katsuno, Chris Serres	Quote #:
Address: 1931 Robertson Road, Ottawa, ON, K2H 5B7	PO #:
	Email Address: gregory.katsuno@wsp.com
Telephone: 613-592-9600	chris.serres@wsp.com

Turnaround Time:

Immediate 1 Day
 4 Hour 2 Day
 8 Hour 3 Day
 Regular

Date Required: _____

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

Parcel Order Number:		Sampling Date	Air Volume (L)	Analysis Required	Asbestos - Bulk	
Sample ID					Identify Distinct Building Materials to Be Analyzed (if not specified, all materials identified will be analyzed) *	Positive Stop?
1	A-008B	09-Jan-2023	N/A	PLM	Acoustic Ceiling Tile w Stucco-like Texture	<input checked="" type="checkbox"/>
2	A-008C	09-Jan-2023	N/A	PLM	Acoustic Ceiling Tile w Stucco-like Texture	<input checked="" type="checkbox"/>
3	A-009A	09-Jan-2023	N/A	PLM	Grey Caulking	<input checked="" type="checkbox"/>
4	A-009B	09-Jan-2023	N/A	PLM	Grey Caulking	<input checked="" type="checkbox"/>
5	A-009C	09-Jan-2023	N/A	PLM	Grey Caulking	<input checked="" type="checkbox"/>
6	A-010A	09-Jan-2023	N/A	PLM	Tan Epoxy Floor Leveler	<input checked="" type="checkbox"/>
7	A-010B	09-Jan-2023	N/A	PLM	Tan Epoxy Floor Leveler	<input checked="" type="checkbox"/>
8	A-010C	09-Jan-2023	N/A	PLM	Tan Epoxy Floor Leveler	<input checked="" type="checkbox"/>
9						<input type="checkbox"/>
10						<input type="checkbox"/>
11						<input type="checkbox"/>
12						<input type="checkbox"/>

* If left blank, all distinct materials identified in the samples will be analyzed and reported separately as per EPA 600/R-93/116. Additional charges will apply.

Comments: _____

Relinquished By (Sign): *Chris Serres* Received at Depot: _____ Received at Lab: *Chris Serres 4:20* Verified By: *[Signature]*

Relinquished By (Print): Chris Serres Date/Time: 09-Jan-2023 4:20 Date/Time: 09/23/23 Date/Time: 01/09/23 4:48

Method of Delivery: *Walk-in*

Certificate of Analysis

WSP Canada Inc. (Ottawa)

1931 Robertson Rd
Ottawa, ON K2H 5B7
Attn: Gregory Katsuno

Client PO:
Project: 22565806
Custody:

Report Date: 11-Jan-2023
Order Date: 9-Jan-2023

Order #: 2302127

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

Parcel ID	Client ID
2302127-01	L-001 / Room 111 walls (white paint w underlying beige)
2302127-02	L-002 / Room 111 floor (grey paint)
2302127-03	L-003 / Room 111 Doorframe (black paint)
2302127-04	L-004 / Room 111 walls and floor (beige ceramic tile)
2302127-05	L-005 / Room 111 walls ((beige paint)
2302127-06	L-006 / Room 111 metal beam(s) (grey paint)
2302127-07	L-007 / Room 111 metal beams (red paint)

Approved By:



Dale Robertson, BSc
Laboratory Director

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of Analysis
Client: **WSP Canada Inc. (Ottawa)**
Client PO:

Report Date: 11-Jan-2023
Order Date: 9-Jan-2023
Project Description: **22565806**

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-MS	EPA 6020 - Digestion - ICP-MS	11-Jan-23	11-Jan-23

Qualifier Notes:

Login Qualifiers :

Container and COC sample IDs don't match - COC reads L006, bag labelled as L007.
Applies to samples: L-006 / Room 111 metal beam(s) (grey paint)

Container and COC sample IDs don't match - COC reads L007, bag labelled as L006.
Applies to samples: L-007 / Room 111 metal beams (red paint)

Sample Qualifiers :

1 : Complete separation of paint from substrate not possible for this sample and a small amount of substrate has been included in the paint digestion.

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Certificate of Analysis
 Client: **WSP Canada Inc. (Ottawa)**
 Client PO:

Report Date: 11-Jan-2023
 Order Date: 9-Jan-2023
 Project Description: **22565806**

Sample Results

Lead						Matrix: Other
Parcel ID	Client ID	Sample Date	Units	MDL	Result	
2302127-04	L-004 / Room 111 walls and floor (beige ceramic tile)	9-Jan-23	ug/g	1	781	

Lead						Matrix: Paint
Parcel ID	Client ID	Sample Date	Units	MDL	Result	
2302127-01	L-001 / Room 111 walls (white paint w underlying beige)	9-Jan-23	ug/g	5	35	
2302127-02	L-002 / Room 111 floor (grey paint)	9-Jan-23	ug/g	5	<5 [1]	
2302127-03	L-003 / Room 111 Doorframe (black paint)	9-Jan-23	ug/g	5	298 [1]	
2302127-05	L-005 / Room 111 walls ((beige paint)	9-Jan-23	ug/g	5	6950	
2302127-06	L-006 / Room 111 metal beam(s) (grey paint)	9-Jan-23	ug/g	5	1300	
2302127-07	L-007 / Room 111 metal beams (red paint)	9-Jan-23	ug/g	5	1030	

Laboratory Internal QA/QC

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Matrix Blank									
Lead	ND	5	ug/g						
Matrix Duplicate									
Lead	4.2	1	ug/g	4.6			8.98	30	
Matrix Spike									
Lead	43.6	1.00	ug/g	1.9	83.6	70-130			



Parcel ID: 2302127



Head Office
300-2319 St. Laurent Blvd.
Ottawa, Ontario K1G 4J8
p: 1-800-749-1947
e: paracel@paracellabs.com

Chain of Custody
(Lab Use Only)

Page 1 of 1

Client Name: WSP	Project Reference: 22565806	Turnaround Time: <input type="checkbox"/> 1 Day <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input checked="" type="checkbox"/> Regular Date Required: _____
Contact Name: Gregory Katsuno, Chris Serres	Quote #	
Address: 1931 Robertson Road, Ottawa, ON, K2H 5B7	PO #	
Telephone: (613) 592-9600	Email Address: greg.katsuno@wsp.com, chris.serres@wsp.com	

Criteria: O. Reg. 153/04 (As Amended) Table RSC Filing O. Reg. 558/00 PWQO CCME SUB (Storm) SUB (Sanitary) Municipality: _____ Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm Sanitary Sewer) P (Paint) A (Air) O (Other) **Required Analyses**

Parcel Order Number: <i>2302127</i>		Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CVI	B (HWS)	Lead via ICP-MS							
Sample ID/Location Name					Date	Time															
1	L-001 / Room 111 walls (white paint w underlying beige)	P	N/A	1	09-Jan-2023	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	L-002 / Room 111 floor (grey paint)	P	N/A	1	09-Jan-2023	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	L-003 / Room 111 Doorframe (black paint)	P	N/A	1	09-Jan-2023	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	L-004 / Room 112 walls and floor (beige ceramic tile)	P	N/A	1	09-Jan-2023	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	L-005 / Room 111 walls ((beige paint)	P	N/A	1	09-Jan-2023	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	L-006 / Room 111 metal beam(s) (grey paint)	P	N/A	1	09-Jan-2023	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	L-007 / Room 111 metal beams (red paint)	P	N/A	1	09-Jan-2023	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

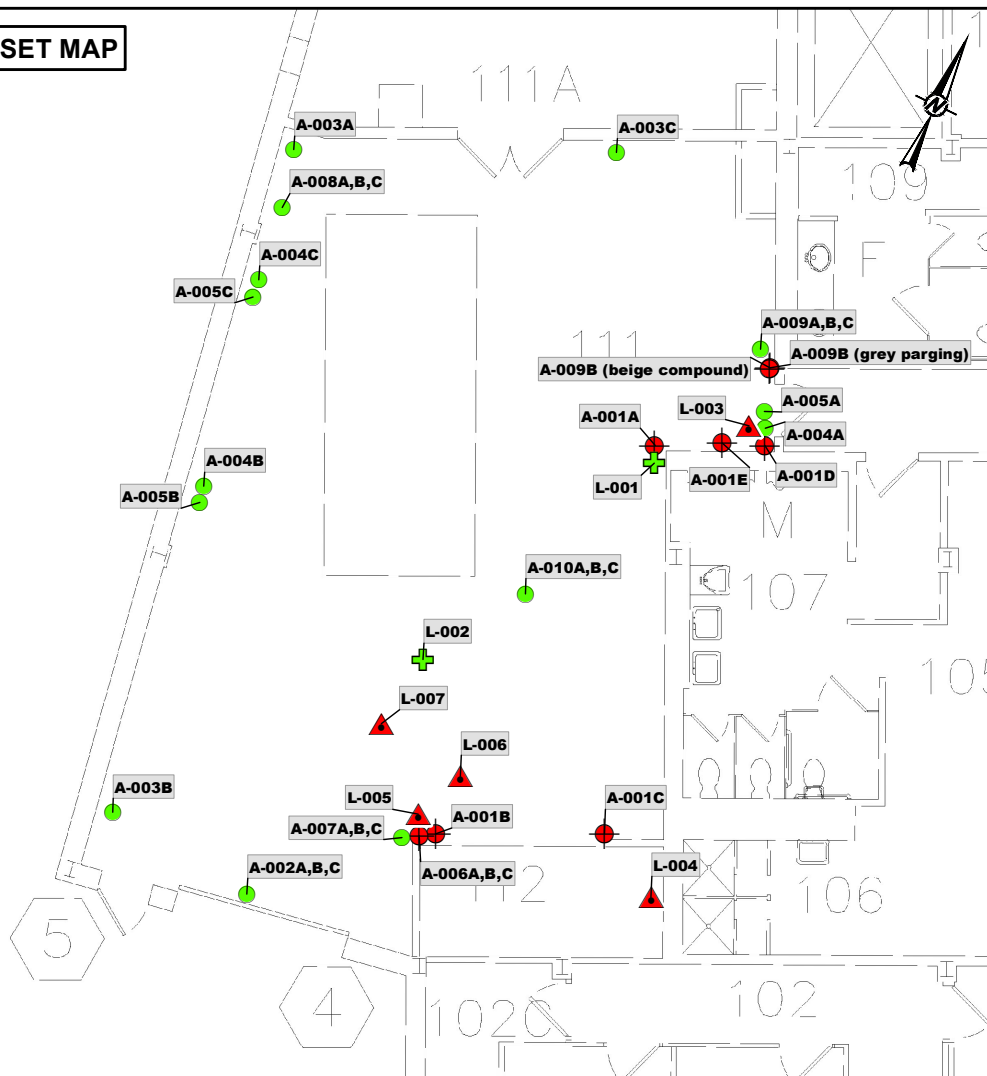
Comments: _____ Method of Delivery: *WSP/2/20*

Relinquished By (Sign): <i>Chris Serres</i>	Received by Driver/Depot: <i>[Signature]</i>	Received at Lab: <i>Juneeparm</i>	Verified By: <i>[Signature]</i>
Relinquished By (Print): Chris Serres	Date/Time: <i>Jan 09/23 4:20 PM</i>	Date/Time: <i>JAN 10, 2023 12:28</i>	Date/Time: <i>Jan 10/23</i>
Date/Time: 09-Jan-2023 4:20	Temperature: _____ °C	Temperature: _____ °C	pH Verified [] By: _____

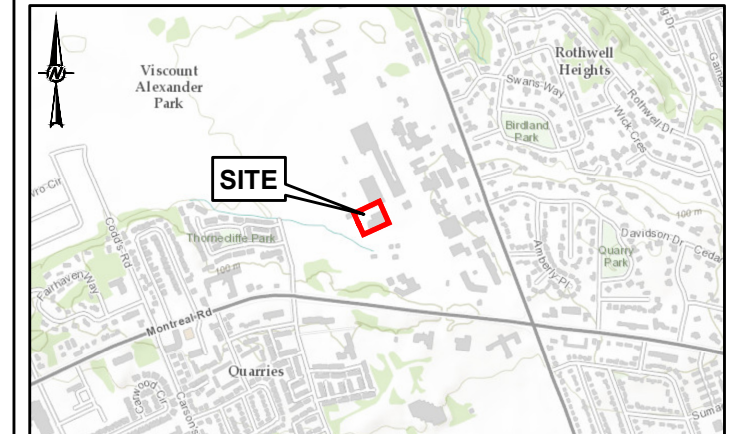
APPENDIX D

**Figure - Approximate Sample
Locations**

INSET MAP



KEY MAP



SCALE 1:25,000

LEGEND

- APPROXIMATE LOCATION OF NON-ASBESTOS-CONTAINING MATERIAL SAMPLE
- APPROXIMATE LOCATION OF ASBESTOS-CONTAINING MATERIAL
- + APPROXIMATE LOCATION OF NON-LEAD-CONTAINING PAINT SAMPLE
- ▲ APPROXIMATE LOCATION OF LEAD-CONTAINING PAINT SAMPLE

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. FLOOR PLAN PROVIDED BY CLIENT IN PDF FORMAT.
2. IMAGERY CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 18N

CLIENT

NATIONAL RESEARCH COUNCIL CANADA

PROJECT

DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS CONSULTING SERVICES RELATED TO THE M-24, ROOM 111 NEW FIT-UP PROJECT AT THE MONTREAL ROAD CAMPUS OF THE NATIONAL RESEARCH COUNCIL CANADA, IN OTTAWA, ONTARIO

TITLE

M-24 – FIRST FLOOR, ROOM 111 – SAMPLE LOCATION PLAN

CONSULTANT

YYYY-MM-DD	2023-01-20
DESIGNED	GLK
PREPARED	BR
REVIEWED	GLK
APPROVED	AY

PROJECT NO.
22565806

CONTROL
0001

REV.
0

FIGURE
1





TP1 Amount Payable – General

1.1 Subject to any other provisions of the contract, Her Majesty shall pay the Contractor, at the times and in the manner hereinafter set out, the amount by which

1.1.1 the aggregate of the amounts described in TP2 exceeds

1.1.2 the aggregate of the amounts described in TP3

and the Contractor shall accept that amount as payment in full satisfaction for everything furnished and done by him in respect of the work to which the payment relates.

TP2 Amounts Payable to the Contractor

2.1 The amounts referred to in TP1.1.1 are the aggregate of

2.1.1 the amounts referred to in the Articles of Agreement, and

2.1.2 the amounts, if any, that are payable to the Contractor pursuant to the General Conditions.

TP3 Amounts Payable to Her Majesty

3.1 The amounts referred to in TP1.1.2 are the aggregate of the amounts, in any, that the Contractor is liable to pay Her Majesty pursuant to the contract.

3.2 When making any payments to the Contractor, the failure of Her Majesty to deduct an amount referred to in TP3.1 from an amount referred to in TP2 shall not constitute a waiver of the right to do so, or an admission of lack of entitlement to do so in any subsequent payment to the Contractor.

TP4 Time of Payment

4.1 In these Terms of Payment

4.1.1 The “payment period” means a period of 30 consecutive days or such other longer period as is agreed between the Contractor and the Departmental Representative.

4.1.2 An amount is “due and payable” when it is due and payable by Her Majesty to the Contractor according to TP4.4, TP4.7 or TP4.10.

4.1.3 An amount is overdue when it is unpaid on the first day following the day upon which it is due and payable.

4.1.4 The “date of payment” means the date of the negotiable instrument of an amount due and payable by the Receiver General for Canada and given for payment.

4.1.5 The “Bank Rate” means the discount rate of interest set by the Bank of Canada in effect at the opening of business on the date of payment.



- 4.2 The Contractor shall, on the expiration of a payment period, deliver to the Departmental Representative in respect of that payment period a written progress claim that fully describes any part of the work that has been completed, and any material that was delivered to the work site but not incorporated into the work during that payment period.
- 4.3 The Departmental Representative shall, not later than ten days after receipt by him of a progress claim referred to in TP4.2,
- 4.3.1 inspect the part of the work and the material described in the progress claim; and
- 4.3.2 issue a progress report, a copy of which the Departmental Representative will give to the Contractor, that indicates the value of the part of the work and the material described in the progress claim that, in the opinion of the Departmental Representative,
- 4.3.2.1 is in accordance with the contract, and
- 4.3.2.2 was not included in any other progress report relating to the contract.
- 4.4 Subject to TP1 and TP4.5 Her Majesty shall, not later than 30 days after receipt by the Departmental Representative of a progress claim referred to in TP4.2, pay the Contractor
- 4.4.1 an amount that is equal to 95% of the value that is indicated in the progress report referred to in TP4.3.2 if a labour and material payment bond has been furnished by the Contractor, or
- 4.4.2 an amount that is equal to 90% of the value that is indicated in the progress report referred to in TP4.3.2 if a labour and material payment bond has not been furnished by the Contractor.
- 4.5 It is a condition precedent to Her Majesty's obligation under TP4.4 that the Contractor has made and delivered to the Departmental Representative,
- 4.5.1 a statutory declaration described in TP4.6 in respect of a progress claim referred to in TP4.2,
- 4.5.2 in the case of the Contractor's first progress claim, a construction schedule in accordance with the relevant sections of the Specifications, and
- 4.5.3 if the requirement for a schedule is specified, an update of the said schedule at the times identified in the relevant sections of the Specifications.
- 4.6 A statutory declaration referred to in TP4.5 shall contain a deposition by the Contractor that
- 4.6.1 up to the date of the Contractor's progress claim, the Contractor has complied with all his lawful obligations with respect to the Labour Conditions; and
- 4.6.2 up to the date of the Contractor's immediately preceding progress claim, all lawful obligations of the Contractor to subcontractors and suppliers of material in respect of the



work under the contract have been fully discharged.

- 4.7 Subject to TP1 and TP4.8, Her Majesty shall, not later than 30 days after the date of issue of an Interim Certificate of Completion referred to in GC44.2, pay the Contractor the amount referred to in TP1 less the aggregate of
- 4.7.1 the sum of all payments that were made pursuant to TP4.4;
 - 4.7.2 an amount that is equal to the Departmental Representative's estimate of the cost to Her Majesty or rectifying defects described in the Interim Certificate of Completion; and
 - 4.7.3 an amount that is equal to the Departmental Representative's estimate of the cost to Her Majesty of completing the parts of the work described in the Interim Certificate of Completion other than the defects referred to in TP4.7.2.
- 4.8 It is a condition precedent to Her Majesty's obligation under TP4.7 that the Contractor has made and delivered to the Departmental Representative,
- 4.8.1 a statutory declaration described in TP4.9 in respect of an Interim Certificate of Completion referred to in GC44.2, and
 - 4.8.2 if so specified in the relevant sections of the Specifications, and update of the construction schedule referred to in TP4.5.2 and the updated schedule shall, in addition to the specified requirements, clearly show a detailed timetable that is acceptable to the Departmental Representative for the completion of any unfinished work and the correction of all defects.
- 4.9 A statutory declaration referred to in TP4.8 shall contain a deposition by the contractor that up to the date of the Interim Certificate of Completion the Contractor has
- 4.9.1 complied with all of the Contractor's lawful obligations with respect to the Labour Conditions;
 - 4.9.2 discharged all of the Contractor's lawful obligations to the subcontractors and suppliers of material in respect of the work under the contract; and
 - 4.9.3 discharged the Contractor's lawful obligations referred to in GC14.6.
- 4.10 Subject to TP1 and TP4.11, Her Majesty shall, not later than 60 days after the date of issue of a Final Certificate of Completion referred to in GC44.1, pay the Contractor the amount referred to in TP1 less the aggregate of
- 4.10.1 the sum of all payments that were made pursuant to TP4.4; and
 - 4.10.2 the sum of all payments that were made pursuant to TP4.7.
- 4.11 It is a condition precedent to Her Majesty's obligation under TP4.10 that the Contractor has made and delivered a statutory declaration described in TP4.12 to the Departmental Representative.



- 4.12 A statutory declaration referred to in TP4.11 shall, in addition to the depositions described in TP4.9, contain a deposition by the Contractor that all of the Contractor's lawful obligations and any lawful claims against the Contractor that arose out of the performance of the contract have been discharged and satisfied.

TP5 Progress Report and Payment Thereunder Not Binding on Her Majesty

- 5.1 Neither a progress report referred to in TP4.3 nor any payment made by Her Majesty pursuant to these Terms of Payment shall be construed as an admission by Her Majesty that the work, material or any part thereof is complete, is satisfactory or is in accordance with the contract.

TP6 Delay in Making Payment

- 6.1 Notwithstanding GC7 any delay by Her Majesty in making any payment when it is due pursuant to these Terms of Payment shall not be a breach of the contract by Her Majesty.
- 6.2 Her Majesty shall pay, without demand from the Contractor, simple interest at the Bank Rate plus 1 -1/4 per centum on any amount which is overdue pursuant to TP4.1.3, and the interest shall apply from and include the day such amount became overdue until the day prior to the date of payment except that
- 6.2.1 interest shall not be payable or paid unless the amount referred to in TP6.2 has been overdue for more than 15 days following
- 6.2.1.1 the date the said amount became due and payable, or
- 6.2.1.2 the receipt by the Departmental Representative of the Statutory Declaration referred to in TP4.5, TP4.8 or TP4.11,
- whichever is the later, and
- 6.6.2 interest shall not be payable or paid on overdue advance payments if any.

TP7 Right of Set-off

- 7.1 Without limiting any right of set-off or deduction given or implied by law or elsewhere in the contract, Her Majesty may set off any amount payable to Her Majesty by the Contractor under this contract or under any current contract against any amount payable to the Contractor under this contract.
- 7.2 For the purposes of TP7.1, "current contract" means a contract between Her Majesty and the Contractor
- 7.2.1 under which the Contractor has an undischarged obligation to perform or supply work, labour or material, or
- 7.2.2 in respect of which Her Majesty has, since the date of which the Articles of Agreement were made, exercised any right to take the work that is the subject of the contract out of the Contractor's hands.



TP8 Payment in Event of Termination

- 8.1 If the contract is terminated pursuant to GC41, Her Majesty shall pay the Contractor any amount that is lawfully due and payable to the Contractor as soon as is practicable under the circumstances.

TP9 Interest on Settled Claims

- 9.1 Her Majesty shall pay to the Contractor simple interest on the amount of a settled claim at an average Bank Rate plus 1 ¼ per centum from the date the settled claim was outstanding until the day prior to the date of payment.
- 9.2 For the purposes of TP9.1,
- 9.2.1 a claim is deemed to have been settled when an agreement in writing is signed by the Departmental Representative and the Contractor setting out the amount of the claim to be paid by Her Majesty and the items or work for which the said amount is to be paid.
- 9.2.2 an "average Bank Rate" means the discount rate of interest set by the Bank of Canada in effect at the end of each calendar month averaged over the period the settled claim was outstanding.
- 9.2.3 a settled claim is deemed to be outstanding from the day immediately following the date the said claim would have been due and payable under the contract had it not been disputed.
- 9.3 For the purposes of TP9 a claim means a disputed amount subject to negotiation between Her Majesty and the Contractor under the contract.



Section	Page	Heading
GC1	1	Interpretation
GC2	2	Successors and Assigns
GC3	2	Assignment of Contract
GC4	2	Subcontracting by Contractor
GC5	2	Amendments
GC6	3	No Implied Obligations
GC7	3	Time of Essence
GC8	3	Indemnification by Contractor
GC9	3	Indemnification by Her Majesty
GC10	3	Members of House of Commons Not to Benefit
GC11	4	Notices
GC12	4	Material, Plant and Real Property Supplied by Her Majesty
GC13	5	Material, Plant and Real Property Become Property of Her Majesty
GC14	5	Permits and Taxes Payable
GC15	6	Performance of Work under Direction of Departmental Representative
GC16	6	Cooperation with Other Contractors
GC17	7	Examination of Work
GC18	7	Clearing of Site
GC19	7	Contractor's Superintendent
GC20	8	National Security
GC21	8	Unsuitable Workers
GC22	8	Increased or Decreased Costs
GC23	9	Canadian Labour and Material
GC24	9	Protection of Work and Documents
GC25	10	Public Ceremonies and Signs
GC26	10	Precautions against Damage, Infringement of Rights, Fire, and Other Hazards
GC27	11	Insurance
GC28	11	Insurance Proceeds
GC29	12	Contract Security
GC30	12	Changes in the Work
GC31	13	Interpretation of Contract by Departmental Representative
GC32	14	Warranty and Rectification of Defects in Work
GC33	14	Non-Compliance by Contractor
GC34	14	Protesting Departmental Representative's Decisions
GC35	15	Changes in Soil Conditions and Neglect or Delay by Her Majesty
GC36	16	Extension of Time
GC37	16	Assessments and Damages for Late Completion
GC38	17	Taking the Work Out of the Contractor's Hands
GC39	18	Effect of Taking the Work Out of the Contractor's Hands
GC40	18	Suspension of Work by Minister
GC41	19	Termination of Contract
GC42	19	Claims Against and Obligations of the Contractor or Subcontractor
GC43	21	Security Deposit – Forfeiture or Return
GC44	22	Departmental Representative's Certificates
GC45	23	Return of Security Deposit
GC46	24	Clarification of Terms in GC47 to GC50
GC47	24	Additions or Amendments to Unit Price Table
GC48	24	Determination of Cost – Unit Price Table
GC49	25	Determination of Cost – Negotiation
GC50	25	Determination of Cost – Failing Negotiation
GC51	26	Records to be kept by Contractor
GC52	27	Conflict of Interest
GC53	27	Contractor Status



GC1 Interpretation

1.1 In the contract

- 1.1.1 where reference is made to a part of the contract by means of numbers preceded by letters, the reference shall be construed to be a reference to the particular part of the contract that is identified by that combination of letters and numbers and to any other part of the contract referred to therein;
- 1.1.2 “contract” means the contract document referred to in the Articles of Agreement;
- 1.1.3 “contract security” means any security given by the Contractor to Her Majesty in accordance with the contract;
- 1.1.4 “Departmental Representative” means the officer or employee of Her Majesty who is designated pursuant to the Articles of Agreement and includes a person specially authorized by him to perform, on his behalf, any of his functions under the contract and is so designated in writing to the Contractor;
- 1.1.5 “material” includes all commodities, articles and things required to be furnished by or for the Contractor under the contract for incorporation into the work;
- 1.1.6 “Minister” includes a person acting for, or if the office is vacant, in place of the Minister and his successors in the office, and his or their lawful deputy and any of his or their representatives appointed for the purposes of the contract;
- 1.1.7 “person” includes, unless the context otherwise requires, a partnership, proprietorship, firm, joint venture, consortium and a corporation;
- 1.1.8 “plant” includes all animals, tools, implements, machinery, vehicles, buildings, structures, equipment and commodities, articles and things other than material, that are necessary for the due performance of the contract;
- 1.1.9 “subcontractor” means a person to whom the Contractor has, subject to GC4, subcontracted the whole or any part of the work;
- 1.1.10 “superintendent” means the employee of the Contractor who is designated by the Contractor to act pursuant to GC19;
- 1.1.11 “work includes, subject only to any express stipulation in the contract to the contrary, everything that is necessary to be done, furnished or delivered by the Contractor to perform the contract.

1.2 The headings in the contract documents, other than in the Plans and Specifications, form no part of the contract but are inserted for convenience of reference only.

1.3 In interpreting the contract, in the event of discrepancies or conflicts between anything in the Plans and Specifications and the General Conditions, the General Conditions govern.



- 1.4 In interpreting the Plans and Specifications, in the event of discrepancies or conflicts between
- 1.4.1 the Plans and Specifications, the Specifications govern;
 - 1.4.2 the Plans, the Plans drawn with the largest scale govern; and
 - 1.4.3 figured dimensions and scaled dimensions, the figured dimensions govern.

GC2 Successors and Assigns

- 2.1 The contract shall inure to the benefit of and be binding upon the parties hereto and their lawful heirs, executors, administrators, successors and assigns.

GC3 Assignment of Contract

- 3.1 The contract may not be assigned by the Contractor, either in whole or in part, without the written consent of the Minister.

GC4 Subcontracting by Contractor

- 4.1 Subject to this General Condition, the Contractor may subcontract any part of the work.
- 4.2 The Contractor shall notify the Departmental Representative in writing of his intention to subcontract.
- 4.3 A notification referred to in GC4.2 shall identify the part of the work, and the subcontractor with whom it is intended to subcontract.
- 4.4 The Departmental Representative may object to the intended subcontracting by notifying the Contractor in writing within six days of receipt by the Departmental Representative of a notification referred to in GC4.2.
- 4.5 If the Departmental Representative objects to a subcontracting pursuant to GC4.4, the Contractor shall not enter into the intended subcontract.
- 4.6 The contractor shall not, without the written consent of the Departmental Representative, change a subcontractor who has been engaged by him in accordance with this General Condition.
- 4.7 Every subcontract entered into by the Contractor shall adopt all of the terms and conditions of this contract that are of general application.
- 4.8 Neither a subcontracting nor the Departmental Representative's consent to a subcontracting by the Contractor shall be construed to relieve the Contractor from any obligation under the contract or to impose any liability upon Her Majesty.

GC5 Amendments



- 5.1 No amendment or change in any of the provisions of the contract shall have any force or effect until it is reduced to writing.

GC6 No Implied Obligations

- 6.1 No implied terms or obligations of any kind by or on behalf of Her Majesty shall arise from anything in the contract and the express covenants and agreements therein contained and made by Her Majesty are the only covenants and agreements upon which any rights against Her Majesty are to be founded.
- 6.2 The contract supersedes all communications, negotiations and agreements, either written or oral, relating to the work that were made prior to the date of the contract.

GC7 Time of Essence

- 7.1 Time is of the essence of the contract.

GC8 Indemnification by Contractor

- 8.1 The Contractor shall indemnify and save Her Majesty harmless from and against all claims, demand, losses, costs, damages, actions, suits, or proceedings by whomever made, brought or prosecuted and in any manner based upon, arising out of, related to, occasioned by or attributable to the activities of the Contractor, his servants, agents, subcontractors and sub-subcontractors in performing the work including an infringement or an alleged infringement of a patent of invention or any other kind of intellectual property.
- 8.2 For the purpose of GC8.1, "activities" includes any act improperly carried out, any omission to carry out an act and any delay in carrying out an act.

GC9 Indemnification by Her Majesty

- 9.1 Her Majesty shall, subject to the Crown Liability Act, the Patent Act, and any other law that affects Her Majesty's rights, powers, privileges or obligations, indemnify and save the Contractor harmless from and against all claims, demands, losses, costs, damage, actions, suits or proceedings arising out of his activities under the contract that are directly attributable to
- 9.1.1 lack of or a defect in Her Majesty's title to the work site whether real or alleged; or
- 9.1.2 an infringement or an alleged infringement by the Contractor of any patent of invention or any other kind of intellectual property occurring while the Contractor was performing any act for the purposes of the contract employing a model, plan or design or any other thing related to the work that was supplied by Her Majesty to the Contractor.

GC10 Members of House of Commons Not to Benefit



- 10.1 As required by the Parliament of Canada Act, it is an express condition of the contract that no member of the House of Commons shall be admitted to any share of part of the contract or to any benefit arising therefrom.

GC11 Notices

- 11.1 Any notice, consent, order, decision, direction or other communication, other than a notice referred to in GC11.4, that may be given to the Contractor pursuant to the contract may be given in any manner.
- 11.2 Any notice, consent, order, decision, direction or other communication required to be given in writing, to any party pursuant to the contract shall, subject to GC11.4, be deemed to have been effectively given
- 11.2.1 to the Contractor, if delivered personally to the Contractor or the Contractor's superintendent, or forwarded by mail, telex or facsimile to the Contractor at the address set out in A4.1, or
- 11.2.2 to Her Majesty, if delivered personally to the Departmental Representative, or forwarded by mail, telex or facsimile to the Departmental Representative at the address set out in A1.2.1.
- 11.3 Any such notice, consent, order, decision, direction or other communication given in accordance with GC11.2 shall be deemed to have been received by either party
- 11.3.1 if delivered personally, on the day that it was delivered,
- 11.3.2 if forwarded by mail, on the earlier of the day it was received and the sixth day after it was mailed, and
- 11.3.3 if forwarded by telex or facsimile, 24 hours after it was transmitted.
- 11.4 A notice given under GC38.1.1, GC40 and GC41, if delivered personally, shall be delivered to the Contractor if the Contractor is doing business as sole proprietor or, if the Contractor is a partnership or corporation, to an officer thereof.

GC12 Material, Plant and Real Property Supplied by Her Majesty

- 12.1 Subject to GC12.2, the Contractor is liable to Her Majesty for any loss of or damage to material, plant or real property that is supplied or placed in the care, custody and control of the Contractor by Her Majesty for use in connection with the contract, whether or not that loss or damage is attributable to causes beyond the Contractor's control.
- 12.2 The Contractor is not liable to Her Majesty for any loss or damage to material, plant or real property referred to in GC12.1 if that loss or damage results from and is directly attributable to reasonable wear and tear.
- 12.3 The Contractor shall not use any material, plant or real property referred to in GC12.1 except for



the purpose of performing this contract.

- 12.4 When the Contractor fails to make good any loss or damage for which he is liable under GC12.1 within a reasonable time after being required to do so by the Departmental Representative, the Departmental Representative may cause the loss or damage to be made good at the Contractor's expense, and the Contractor shall thereupon be liable to Her Majesty for the cost thereof and shall, on demand, pay to Her Majesty an amount equal to that cost.
- 12.5 The Contractor shall keep such records of all material, plant and real property referred to in GC12.1 as the Departmental Representative from time to time requires and shall satisfy the Departmental Representative, when requested, that such material, plant and real property are at the place and in the condition which they ought to be.

GC13 Material, Plant and Real Property Become Property of Her Majesty

- 13.1 Subject to GC14.7 all material and plant and the interest of the Contractor in all real property, licenses, powers and privileges purchased, used or consumed by the Contractor for the contract shall, after the time of their purchase, use or consumption be the property of Her Majesty for the purposes of the work and they shall continue to be the property of Her Majesty.
- 13.1.1 in the case of material, until the Departmental Representative indicates that he is satisfied that it will not be required for the work, and
- 13.1.2 in the case of plant, real property, licenses, powers and privileges, until the Departmental Representative indicates that he is satisfied that the interest vested in Her Majesty therein is no longer required for the purposes of the work.
- 13.2 Material or plant that is the property of Her Majesty by virtue of GC13.1 shall not be taken away from the work site or used or disposed of except for the purposes of the work without the written consent of the Departmental Representative.
- 13.3 Her Majesty is not liable for loss of or damage from any cause to the material or plant referred to in GC13.1 and the Contractor is liable for such loss or damage notwithstanding that the material or plant is the property of Her Majesty.

GC14 Permits and Taxes Payable

- 14.1 The Contractor shall, within 30 days after the date of the contract, tender to a municipal authority an amount equal to all fees and charges that would be lawfully payable to that municipal authority in respect of building permits as if the work were being performed for a person other than Her Majesty.
- 14.2 Within 10 days of making a tender pursuant to GC14.1, the Contractor shall notify the Departmental Representative of his action and of the amount tendered and whether or not the municipal authority has accepted that amount.
- 14.3 If the municipal authority does not accept the amount tendered pursuant to GC14.1 the Contractor shall pay that amount to Her Majesty within 6 days after the time stipulated in GC14.2.



- 14.4 For the purposes of GC14.1 to GC14.3 “municipal authority” means any authority that would have jurisdiction respecting permission to perform the work if the owner were not Her Majesty.
- 14.5 Notwithstanding the residency of the Contractor, the Contractor shall pay any applicable tax arising from or related to the performance of the work under the contract.
- 14.6 In accordance with the Statutory Declaration referred to in TP4.9, a Contractor who has neither residence nor place of business in the province in which work under the contract is being performed shall provide Her Majesty with proof of registration with the provincial sales tax authorities in the said province.
- 14.7 For the purpose of the payment of any applicable tax or the furnishing of security for the payment of any applicable tax arising from or related to the performance of the work under the contract, the Contractor shall, notwithstanding the fact that all material, plant and interest of the Contractor in all real property, licenses, powers and privileges, have become the property of Her Majesty after the time of purchase, be liable, as a user or consumer, for the payment or for the furnishing of security for the payment of any applicable tax payable, at the time of the use or consumption of that material, plant or interest of the Contractor in accordance with the relevant legislation.

GC15 Performance of Work under Direction of Departmental Representative

- 15.1 The Contractor shall
- 15.1.1 permit the Departmental Representative to have access to the work and its site at all times during the performance of the contract;
 - 15.1.2 furnish the Departmental Representative with such information respecting the performance of the contract as he may require; and
 - 15.1.3 give the Departmental Representative every possible assistance to enable the Departmental Representative to carry out his duty to see that the work is performed in accordance with the contract and to carry out any other duties and exercise any powers specially imposed or conferred on the Departmental Representative under the contract.

CG16 Cooperation with Other Contractors

- 16.1 Where, in the opinion of the Departmental Representative, it is necessary that other contractors or workers with or without plant and material, be sent onto the work or its site, the Contractor shall, to the satisfaction of the Departmental Representative, allow them access and cooperate with them in the carrying out of their duties and obligation.
- 16.2 If
- 16.2.1 the sending onto the work or its site of other contractors or workers pursuant to GC16.1 could not have been reasonably foreseen or anticipated by the Contractor when entering into the contract, and



16.2.2 the Contractor incurs, in the opinion of the Departmental Representative, extra expense in complying with GC16.1, and

16.2.3 The Contractor has given the Departmental Representative written notice of his claim for the extra expense referred to in GC16.2.2 within 30 days of the date that the other contractors or workers were sent onto the work or its site,

Her Majesty shall pay the Contractor the cost, calculated in accordance with GC48 to GC50, of the extra labour, plant and material that was necessarily incurred.

GC17 Examination of Work

17.1 If, at any time after the commencement of the work but prior to the expiry of the warranty or guarantee period, the Departmental Representative has reason to believe that the work or any part thereof has not been performed in accordance with the contract, the Departmental Representative may have that work examined by an expert of his choice.

17.2 If, as a result of an examination of the work referred to in GC17.1, it is established that the work was not performed in accordance with the contract, then, in addition to and without limiting or otherwise affecting any of Her Majesty's rights and remedies under the contract either at law or in equity, the Contractor shall pay Her Majesty, on demand, all reasonable costs and expenses that were incurred by Her Majesty in having that examination performed.

GC18 Clearing of Site

18.1 The Contractor shall maintain the work and its site in a tidy condition and free from the accumulation of waste material and debris, in accordance with any directions of the Departmental Representative.

18.2 Before the issue of an interim certificate referred to in GC44.2, the Contractor shall remove all the plant and material not required for the performance of the remaining work, and all waste material and other debris, and shall cause the work and its site to be clean and suitable for occupancy by Her Majesty's servants, unless otherwise stipulated in the contract.

18.3 Before the issue of a final certificate referred to in GC44.1, the Contractor, shall remove from the work and its site all of the surplus plant and material and any waste material and other debris.

18.4 The Contractor's obligations described in GC18.1 to GC18.3 do not extend to waste material and other debris caused by Her Majesty's servants or contractors and workers referred to in GC16.1.

GC19 Contractor's Superintendent

19.1 The Contractor shall, forthwith upon the award of the contract, designate a superintendent.

19.2 The Contractor shall forthwith notify the Departmental Representative of the name, address and telephone number of a superintendent designate pursuant to GC19.1.



- 19.3 A superintendent designated pursuant to GC19.1 shall be in full charge of the operations of the Contractor in the performance of the work and is authorized to accept any notice, consent, order, direction, decision or other communication on behalf of the Contractor that may be given to the superintendent under the contract.
- 19.4 The Contractor shall, until the work has been completed, keep a competent superintendent at the work site during working hours.
- 19.5 The Contractor shall, upon the request of the Departmental Representative, remove any superintendent who, in the opinion of the Departmental Representative, is incompetent or has been conducting himself improperly and shall forthwith designate another superintendent who is acceptable to the Departmental Representative.
- 19.6 Subject to GC19.5, the Contractor shall not substitute a superintendent without the written consent of the Departmental Representative.
- 19.7 A breach by the Contractor of GC19.6 entitles the Departmental Representative to refuse to issue any certificate referred to in GC44 until the superintendent has returned to the work site or another superintendent who is acceptable to the Departmental Representative has been substituted.

GC20 National Security

- 20.1 If the Minister is of the opinion that the work is of a class or kind that involves the national security, he may order the Contractor
- 20.1.1 to provide him with any information concerning persons employed or to be employed by him for purposes of the contract; and
 - 20.1.2 to remove any person from the work and its site if, in the opinion of the Minister, that person may be a risk to the national security.
- 20.2 The Contractor shall, in all contracts with persons who are to be employed in the performance of the contract, make provision for his performance of any obligation that may be imposed upon him under GC19 to GC21.
- 20.3 The Contractor shall comply with an order of the Minister under GC20.1

GC21 Unsuitable Workers

- 21.1 The Contractor shall, upon the request of the Departmental Representative, remove any person employed by him for purposes of the contract who, in the opinion of the Departmental Representative, is incompetent or has conducted himself improperly, and the Contractor shall not permit a person who has been removed to return to the work site.

GC22 Increased or Decreased Costs



- 22.1 The amount set out in the Articles of Agreement shall not be increased or decreased by reason of any increase or decrease in the cost of the work that is brought about by an increase or decrease in the cost of labour, plant or material or any wage adjustment arising pursuant to the Labour Conditions.
- 22.2 Notwithstanding GC22.1 and GC35, an amount set out in the Articles of Agreement shall be adjusted in the manner provided in GC22.3, if any change in a tax imposed under the Excise Act, the Excise Tax Act, the Old Age Security Act, the Customs Act, the Customs Tariff or any provincial sales tax legislation imposing a retail sales tax on the purchase of tangible personal property incorporated into Real Property
- 22.2.1 occurs after the date of the submission by the Contractor of his tender for the contract,
- 22.2.2 applies to material, and
- 22.2.3 affects the cost to the Contractor of that material.
- 22.3 If a change referred to in GC22.2 occurs, the appropriate amount set out in the Articles of Agreement shall be increased or decreased by an amount equal to the amount that is established by an examination of the relevant records of the Contractor referred to in GC51 to be the increase or decrease in the cost incurred that is directly attributable to that change.
- 22.4 For the purpose of GC22.2, where a tax is changed after the date of submission of the tender but public notice of the change has been given by the Minister of Finance before that date, the change shall be deemed to have occurred before the date of submission of the tender.

GC23 Canadian Labour and Material

- 23.1 The Contractor shall use Canadian labour and material in the performance of the work to the full extent to which they are procurable, consistent with proper economy and expeditious carrying out of the work.
- 23.2 Subject to GC23.1, the Contractor shall, in the performance of the work, employ labour from the locality where the work is being performed to the extent to which it is available, and shall use the offices of the Canada Employment Centres for the recruitment of workers wherever practicable.
- 23.3 Subject to GC23.1 and GC23.2, the Contractor shall, in the performance of the work, employ a reasonable proportion of persons who have been on active service with the armed forces of Canada and have been honourably discharged therefrom.

GC24 Protection of Work and Documents

- 24.1 The Contractor shall guard or otherwise protect the work and its site, and protect the contract, specifications, plans, drawings, information, material, plant and real property, whether or not they are supplied by Her Majesty to the Contractor, against loss or damage from any cause, and he shall not use, issue, disclose or dispose of them without the written consent of the Minister, except as may be essential for the performance of the work.



- 24.2 If any document or information given or disclosed to the Contractor is assigned a security rating by the person who gave or disclosed it, the Contractor shall take all measures directed by the Departmental Representative to be taken to ensure the maintenance of the degree of security that is ascribed to that rating.
- 24.3 The Contractor shall provide all facilities necessary for the purpose of maintaining security, and shall assist any person authorized by the Minister to inspect or to take security measures in respect of the work and its site.
- 24.4 The Departmental Representative may direct the Contractor to do such things and to perform such additional work as the Departmental Representative considers reasonable and necessary to ensure compliance with or to remedy a breach of GC24.1 to GC24.3.

GC25 Public Ceremonies and Signs

- 25.1 The Contractor shall not permit any public ceremony in connection with the work without the prior consent of the Minister.
- 25.2 The Contractor shall not erect or permit the erection of any sign or advertising on the work or its site without the prior consent of the Departmental Representative.

GC26 Precautions against Damage, Infringement of Rights, Fire, and Other Hazards

- 26.1 The Contractor shall, at his own expense, do whatever is necessary to ensure that
- 26.1.1 no person, property, right, easement or privilege is injured, damaged or infringed by reasons of the Contractor's activities in performing the contract;
 - 26.1.2 pedestrian and other traffic on any public or private road or waterway is not unduly impeded, interrupted or endangered by the performance or existence of the work or plant;
 - 26.1.3 fire hazards in or about the work or its site are eliminated and, subject to any direction that may be given by the Departmental Representative, any fire is promptly extinguished;
 - 26.1.4 the health and safety of all persons employed in the performance of the work is not endangered by the method or means of its performance;
 - 26.1.5 adequate medical services are available to all persons employed on the work or its site at all times during the performance of the work;
 - 26.1.6 adequate sanitation measures are taken in respect of the work and its site; and
 - 26.1.7 all stakes, buoys and marks placed on the work or its site by or under the authority of the Departmental Representative are protected and are not removed, defaced, altered or destroyed.
- 26.2 The Departmental Representative may direct the Contractor to do such things and to perform such additional work as the Departmental Representative considers reasonable and necessary to ensure



compliance with or to remedy a breach of GC26.1.

- 26.3 The Contractor shall, at his own expense, comply with a direction of the Departmental Representative made under GC26.2.

GC27 Insurance

- 27.1 The Contractor shall, at his own expense, obtain and maintain insurance contracts in respect of the work and shall provide evidence thereof to the Departmental Representative in accordance with the requirements of the Insurance Conditions "E".

- 27.2 The insurance contracts referred to in GC27.1 shall

27.2.1 be in a form, of the nature, in the amounts, for the periods and containing the terms and conditions specified in Insurance Conditions "E", and

27.2.2 provide for the payment of claims under such insurance contracts in accordance with GC28.

GC28 Insurance Proceeds

- 28.1 In the case of a claim payable under a Builders Risk/Installation (All Risks) insurance contract maintained by the Contractor pursuant to GC27, the proceeds of the claim shall be paid directly to Her Majesty, and

28.1.1 the monies so paid shall be held by Her Majesty for the purposes of the contract, or

28.1.2 if Her Majesty elects, shall be retained by Her Majesty, in which event they vest in Her Majesty absolutely.

- 28.2 In the case of a claim payable under a General Liability insurance contract maintained by the Contractor pursuant to GC27, the proceeds of the claim shall be paid by the insurer directly to the claimant.

- 28.3 If an election is made pursuant to GC28.1, the Minister may cause an audit to be made of the accounts of the Contractor and of Her Majesty in respect of the part of the work that was lost, damaged or destroyed for the purpose of establishing the difference, if any, between

28.3.1 the aggregate of the amount of the loss or damage suffered or sustained by Her Majesty, including any cost incurred in respect of the clearing and cleaning of the work and its site and any other amount that is payable by the Contractor to Her Majesty under the contract, minus any monies retained pursuant to GC28.12, and

28.3.2 the aggregate of the amounts payable by Her Majesty to the Contractor pursuant to the contract up to the date of the loss or damage.

- 28.4 A difference that is established pursuant to GC28.3 shall be paid forthwith by the party who is determined by the audit to be the debtor to the party who is determined by the audit to be the



creditor.

- 28.5 When payment of a deficiency has been made pursuant to GC28.4, all rights and obligations of Her Majesty and the Contractor under the contract shall, with respect only to the part of the work that was the subject of the audit referred to in GC28.3, be deemed to have been expended and discharged.
- 28.6 If an election is not made pursuant to GC28.1.2 the Contractor shall, subject to GC28.7, clear and clean the work and its site and restore and replace the part of the work that was lost, damaged or destroyed at his own expense as if that part of the work had not yet been performed.
- 28.7 When the Contractor clears and cleans the work and its site and restores and replaces the work referred to in GC 28.6, Her Majesty shall pay him out of the monies referred to in GC28.1 so far as they will thereunto extend.
- 28.8 Subject to GC28.7, payment by Her Majesty pursuant to GC28.7 shall be made in accordance with the contract but the amount of each payment shall be 100% of the amount claimed notwithstanding TP4.4.1 and TP4.4.2.

GC29 Contract Security

- 29.1 The Contractor shall obtain and deliver contract security to the Departmental Representative in accordance with the provisions of the Contract Security Conditions.
- 29.2 If the whole or a part of the contract security referred to in GC29.1 is in the form of a security deposit, it shall be held and disposed of in accordance with GC43 and GC45.
- 29.3 If a part of the contract security referred to in GC29.1 is in the form of a labour and material payment bond, the Contractor shall post a copy of that bond on the work site.

GC30 Changes in the Work

- 30.1 Subject to GC5, the Departmental Representative may, at any time before he issues his Final Certificate of Completion,
- 30.1.1 order work or material in addition to that provided for in the Plans and Specifications;
and
- 30.1.2 delete or change the dimensions, character, quantity, quality, description, location or position of the whole or any part of the work or material provided for in the Plans and Specifications or in any order made pursuant to GC30.1.1,
- if that additional work or material, deletion, or change is, in his opinion, consistent with the general intent of the original contract.
- 30.2 The Contractor shall perform the work in accordance with such orders, deletions and changes that are made by the Departmental Representative pursuant to GC30.1 from time to time as if they had appeared in and been part of the Plans and Specifications.



- 30.3 The Departmental Representative shall determine whether or not anything done or omitted by the Contractor pursuant to an order, deletion or change referred to in GC30.1 increased or decreased the cost of the work to the Contractor.
- 30.4 If the Departmental Representative determines pursuant to GC30.3 that the cost of the work to the Contractor has been increased, Her Majesty shall pay the Contractor the increased cost that the Contractor necessarily incurred for the additional work calculated in accordance with GC49 or GC50.
- 30.5 If the Departmental Representative determines pursuant to GC30.3 that the cost of the work to the Contractor has been decreased, Her Majesty shall reduce the amount payable to the Contractor under the contract by an amount equal to the decrease in the cost caused by the deletion or change referred to in GC30.1.2 and calculated in accordance with GC49.
- 30.6 GC30.3 to GC30.5 are applicable only to a contract or a portion of a contract for which a Fixed Price Arrangement is stipulated in the contract.
- 30.7 An order, deletion or change referred to in GC30.1 shall be in writing, signed by the Departmental Representative and given to the Contractor in accordance with GC11.

GC31 Interpretation of Contract by Departmental Representative

- 31.1 If, at any time before the Departmental Representative has issued a Final Certificate of Completion referred to in GC44.1, any question arises between the parties about whether anything has been done as required by the contract or about what the Contractor is required by the contract to do, and, in particular but without limiting the generality of the foregoing, about
- 31.1.1 the meaning of anything in the Plans and Specification,
 - 31.1.2 the meaning to be given to the Plans and Specifications in case of any error therein, omission therefrom, or obscurity or discrepancy in their working or intention,
 - 31.1.3 whether or not the quality or quantity of any material or workmanship supplied or proposed to be supplied by the Contractor meets the requirements of the contract,
 - 31.1.4 whether or not the labour, plant or material provided by the Contractor for performing the work and carrying out the contract are adequate to ensure that the work will be performed in accordance with the contract and that the contract will be carried out in accordance with its terms,
 - 31.1.5 what quantity of any kind of work has been completed by the Contractor, or
 - 31.1.6 the timing and scheduling of the various phases of the performance of the work,
- the question shall be decided by the Departmental Representative whose decision shall be final and conclusive in respect of the work.
- 31.2 The Contractor shall perform the work in accordance with any decisions of the Departmental



Representative that are made under GC31.1 and in accordance with any consequential directions given by the Departmental Representative.

GC32 Warranty and Rectification of Defects in Work

- 32.1 Without restricting any warranty or guarantee implied or imposed by law or contained in the contract documents, the Contractor shall, at his own expense,
- 32.1.1 rectify and make good any defect or fault that appears in the work or comes to the attention of the Minister with respect to those parts of the work accepted in connection with the Interim Certificate of Completion referred to GC44.2 within 12 months from the date of the Interim Certificate of Completion;
- 32.1.2 rectify and make good any defect or fault that appears in or comes to the attention of the Minister in connection with those parts of the work described in the Interim Certificate of Completion referred to in GC44.2 within 12 months from the date of the Final Certificate of Completion referred to in GC44.1.
- 32.2 The Departmental Representative may direct the Contractor to rectify and make good any defect or fault referred to in GC32.1 or covered by any other expressed or implied warranty or guarantee.
- 32.3 A direction referred to in GC32.2 shall be in writing, may include a stipulation in respect of the time within which a defect or fault is required to be rectified and made good by the Contractor, and shall be given to the Contractor in accordance with GC11.
- 32.4 The Contractor shall rectify and make good any defect or fault described in a direction given pursuant to GC32.2 within the time stipulated therein.

GC33 Non-Compliance by Contractor

- 33.1 If the Contractor fails to comply with any decision or direction given by the Departmental Representative pursuant to GC18, GC24, GC26, GC31 or GC32, the Departmental Representative may employ such methods as he deems advisable to do that which the Contractor failed to do.
- 33.2 The Contractor shall, on demand, pay Her Majesty an amount that is equal to the aggregate of all cost, expenses and damage incurred or sustained by Her Majesty by reason of the Contractor's failure to comply with any decision or direction referred to in GC33.1, including the cost of any methods employed by the Departmental Representative pursuant to GC33.1.

GC34 Protesting Departmental Representative's Decisions

- 34.1 The Contractor may, within ten days after the communication to him of any decision or direction referred to in GC30.3 or GC33.1, protest that decision or direction.
- 34.2 A protest referred to in GC34.1 shall be in writing, contain full reasons for the protest, be signed



by the Contractor and be given to Her Majesty by delivery to the Departmental Representative.

- 34.3 If the Contractor gives a protest pursuant to GC34.2, any compliance by the Contractor with the decision or direction that was protested shall not be construed as an admission by the Contractor of the correctness of that decision or direction, or prevent the Contractor from taking whatever action he considers appropriate in the circumstances.
- 34.4 The giving of a protest by the Contractor pursuant to GC34.2 shall not relieve him from complying with the decision or direction that is the subject of the protest.
- 34.5 Subject to GC34.6, the Contractor shall take any action referred to in GC34.3 within three months after the date that a Final Certificate of Completion is issued under GC44.1 and not afterwards.
- 34.6 The Contractor shall take any action referred to in GC34.3 resulting from a direction under GC32 within three months after the expiry of a warranty or guarantee period and not afterwards.
- 34.7 Subject to GC34.8, if Her Majesty determines that the Contractor's protest is justified, Her Majesty shall pay the Contractor the cost of the additional labour, plant and material necessarily incurred by the Contractor in carrying out the protested decision or direction.
- 34.8 Costs referred to in GC34.7 shall be calculated in accordance with GC48 to GC50.

GC35 Changes in Soil Conditions and Neglect or Delay by Her Majesty

35.1 Subject to GC35.2 no payment, other than a payment that is expressly stipulated in the contract, shall be made by Her Majesty to the Contractor for any extra expense or any loss or damage incurred or sustained by the Contractor.

35.2 If the Contractor incurs or sustains any extra expense or any loss or damage that is directly attributable to

35.2.1 a substantial difference between the information relating to soil conditions at the work site that is contained in the Plans and Specifications or other documents supplied to the Contractor for his use in preparing his tender or a reasonable assumption of fact based thereon made by the Contractor, and the actual soil conditions encountered by the Contractor at the work site during the performance of the contract, or

35.2.2 any neglect or delay that occurs after the date of the contract on the part of Her Majesty in providing any information or in doing any act that the contract either expressly requires Her Majesty to do or that would ordinarily be done by an owner in accordance with the usage of the trade,

he shall, within ten days of the date the actual soil conditions described in GC35.2.1 were encountered or the neglect or delay described in GC35.2.2 occurred, give the Departmental Representative written notice of his intention to claim for that extra expense or that loss or damage.

35.3 When the Contractor has given a notice referred to in GC35.2, he shall give the Departmental Representative a written claim for extra expense or loss or damage within 30 days of the date that



a Final Certificate of Completion referred to in GC44.1 is issued and not afterwards.

- 35.4 A written claim referred to in GC35.3 shall contain a sufficient description of the facts and circumstances of the occurrence that is the subject of the claim to enable the Departmental Representative to determine whether or not the claim is justified and the Contractor shall supply such further and other information for that purpose as the Departmental Representative requires from time to time.
- 35.5 If the Departmental Representative determines that a claim referred to in GC35.3 is justified, Her Majesty shall make an extra payment to the Contractor in an amount that is calculated in accordance with GC47 to GC50.
- 35.6 If, in the opinion of the Departmental Representative, an occurrence described in GC35.2.1 results in a savings of expenditure by the Contractor in performing the contract, the amount set out in the Articles of Agreement shall, subject to GC35.7, be reduced by an amount that is equal to the saving.
- 35.7 The amount of the saving referred to in GC35.6 shall be determined in accordance with GC47 to GC49.
- 35.8 If the Contractor fails to give a notice referred to in GC35.2 and a claim referred to in GC35.3 within the times stipulated, an extra payment shall not be made to him in respect of the occurrence.

GC36 Extension of Time

- 36.1 Subject to GC36.2, the Departmental Representative may, on the application of the Contractor made before the day fixed by the Articles of Agreement for completion of the work or before any other date previously fixed under this General Condition, extend the time for its completion by fixing a new date if, in the opinion of the Departmental Representative, causes beyond the control of the Contractor have delayed its completion.
- 36.2 An application referred to in GC36.1 shall be accompanied by the written consent of the bonding company whose bond forms part of the contract security.

GC37 Assessments and Damages for Late Completion

- 37.1 For the purposes of this General Condition
- 37.1.1 the work shall be deemed to be completed on the date that an Interim Certificate of Completion referred to in GC44.2 is issued, and
- 37.1.2 "period of delay" means the number of days commencing on the day fixed by the Articles of Agreement for completion of the work and ending on the day immediately preceding the day on which the work is completed but does not include any day within a period of extension granted pursuant to GC36.1, and any other day on which, in the opinion of the Departmental Representative, completion of the work was delayed for reasons beyond the control of the Contractor.



- 37.2 If the Contractor does not complete the work by the day fixed for its completion by the Articles of Agreement but completes it thereafter, the Contractor shall pay Her Majesty an amount equal to the aggregate of
- 37.2.1 all salaries, wages and travelling expenses incurred by Her Majesty in respect of persons overseeing the performance of the work during the period of delay;
 - 37.2.2 the cost incurred by Her Majesty as a result of the inability to use the completed work for the period of delay; and
 - 37.2.3 all other expenses and damages incurred or sustained by Her Majesty during the period of delay as a result of the work not being completed by the day fixed for its completion.
- 37.3 The Minister may waive the right of Her Majesty to the whole or any part of the amount payable by the Contractor pursuant to GC37.2 I, in the opinion of the Minister, it is in the public interest to do so.

GC38 Taking the Work Out of the Contractor's Hands

- 38.1 The Minister may, at his sole discretion, by giving a notice in writing to the Contractor in accordance with GC11, take all or any part of the work out of the Contractor's hands, and may employ such means as he sees fit to have the work completed if the Contractor
- 38.1.1 Has not, within six days of the Minister or the Departmental Representative giving notice to the Contractor in writing in accordance with GC11, remedied any delay in the commencement or any default in the diligent performance of the work to the satisfaction of the Departmental Representative;
 - 38.1.2 has defaulted in the completion of any part of the work within the time fixed for its completion by the contract;
 - 38.1.3 has become insolvent;
 - 38.1.4 has committed an act of bankruptcy;
 - 38.1.5 has abandoned the work;
 - 38.1.6 has made an assignment of the contract without the consent required by GC3.1; or
 - 38.1.7 has otherwise failed to observe or perform any of the provisions of the contract.
- 38.2 If the whole or any part of the work is taken out of the Contractor's hands pursuant to GC38.1,
- 38.2.1 the Contractor's right to any further payment that is due or accruing due under the contract is, subject only to GC38.4, extinguished, and
 - 38.2.2 the Contractor is liable to pay Her Majesty, upon demand, an amount that is equal to the amount of all loss and damage incurred or sustained by Her Majesty in respect of the



Contractor's failure to complete the work.

- 38.3 If the whole or any part of the work that is taken out of the Contractor's hands pursuant to GC38.1 is completed by Her Majesty, the Departmental Representative shall determine the amount, if any, of the holdback or a progress claim that had accrued and was due prior to the date on which the work was taken out of the Contractor's hands and that is not required for the purposes of having the work performed or of compensating Her Majesty for any other loss or damage incurred or sustained by reason of the Contractor's default.
- 38.4 Her Majesty may pay the Contractor the amount determined not to be required pursuant to GC38.3.

GC39 Effect of Taking the Work Out of the Contractor's Hands

- 39.1 The taking of the work or any part thereof out of the Contractor's hands pursuant to GC38 does not operate so as to relieve or discharge him from any obligation under the contract or imposed upon him by law except the obligation to complete the performance of that part of the work that was taken out of his hands.
- 39.2 If the work or any part thereof is taken out of the Contractor's hands pursuant to GC38, all plant and material and the interest of the Contractor is all real property, licenses, powers and privileges acquired, used or provided by the Contractor under the contract shall continue to be the property of Her Majesty without compensation to the Contractor.
- 39.3 When the Departmental Representative certifies that any plant, material, or any interest of the Contractor referred to in GC39.2 is no longer required for the purposes of the work, or that it is not in the interest of Her Majesty to retain that plant, material or interest, it shall revert to the Contractor.

G40 Suspension of Work by Minister

- 40.1 The Minister may, when in his opinion it is in the public interest to do so, require the Contractor to suspend performance of the work either for a specified or an unspecified period by giving a notice of suspension in writing to the Contractor in accordance with GC11.
- 40.2 When a notice referred to in GC40.1 is received by the Contractor in accordance with GC11, he shall suspend all operations in respect of the work except those that, in the opinion of the Departmental Representative, are necessary for the care and preservation of the work, plant and material.
- 40.3 The Contractor shall not, during a period of suspension, remove any part of the work, plant or material from its site without the consent of the Departmental Representative.
- 40.4 If a period of suspension is 30 days or less, the Contractor shall, upon the expiration of that period, resume the performance of the work and he is entitled to be paid the extra cost, calculated in accordance with GC48 to GC50, of any labour, plant and material necessarily incurred by him as a result of the suspension.



- 40.5 If, upon the expiration of a period of suspension of more than 30 days, the Minister and the Contractor agree that the performance of the work will be continued by the Contractor, the Contractor shall resume performance of the work subject to any terms and conditions agreed upon by the Minister and the Contractor.
- 40.6 If, upon the expiration of a period of suspension of more than 30 days, the Minister and the Contractor do not agree that performance of the work will be continued by the Contractor or upon the terms and conditions under which the Contractor will continue the work, the notice of suspension shall be deemed to be a notice of termination pursuant to GC41.

GC41 Termination of Contract

- 41.1 The Minister may terminate the contract at any time by giving a notice of termination in writing to the Contractor in accordance with GC11.
- 41.2 When a notice referred to in GC41.1 is received by the Contractor in accordance with GC11, he shall, subject to any conditions stipulated in the notice, forthwith cease all operations in performance of the contract.
- 41.3 If the contract is terminated pursuant to GC41.1, Her Majesty shall pay the Contractor, subject to GC41.4, an amount equal to
- 41.3.1 the cost to the contractor of all labour, plant and material supplied by him under the contract up to the date of termination in respect of a contract or part thereof for which a Unit Price Arrangement is stipulated in the contract, or
 - 41.3.2 the lesser of
 - 41.3.2.1 an amount, calculated in accordance with the Terms and Payment, that would have been payable to the Contractor had he completed the work, and
 - 41.3.2.2 an amount that is determined to be due to the Contractor pursuant to GC49 in respect of a contract or part thereof for which a Fixed Price Arrangement is stipulated in the contract
- less the aggregate of all amounts that were paid to the Contractor by Her Majesty and all amounts that are due to Her Majesty from the Contractor pursuant to the contract.
- 41.4 If Her Majesty and the Contractor are unable to agree about an amount referred to in GC41.3 that amount shall be determined by the method referred to in GC50.

GC42 Claims Against and Obligations of the Contractor or Subcontractor

- 42.1 Her Majesty may, in order to discharge lawful obligations of and satisfy claims against the Contractor or a subcontractor arising out of the performance of the contract, pay any amount that is due and payable to the Contractor pursuant to the contract directly to the obligees of and the claimants against the Contractor or the subcontractor but such amount if any, as is paid by Her Majesty, shall not exceed that amount which the Contractor would have been obliged to pay to



such claimant had the provisions of the Provincial or Territorial lien legislation, or, in the Province of Quebec, the law relating to privileges, been applicable to the work. Any such claimant need not comply with the provisions of such legislation setting out the steps by way of notice, registration or otherwise as might have been necessary to preserve or perfect any claim for lien or privilege which claimant might have had;

- 42.2 Her Majesty will not make any payment as described in GC42.1 unless and until that claimant shall have delivered to Her Majesty:
- 42.2.1 a binding and enforceable Judgment or Order of a court of competent jurisdiction setting forth such amount as would have been payable by the Contractor to the claimant pursuant to the provisions of the applicable Provincial or Territorial lien legislation, or, in the Province of Quebec, the law relating to privileges, had such legislation been applicable to the work; or
 - 42.2.2 a final and enforceable award of an arbitrator setting forth such amount as would have been payable by the Contractor to the claimant pursuant to the provisions of the applicable Provincial or Territorial lien legislation, or, in the Province of Quebec, the law relating to privileges, had such legislation been applicable to the work; or
 - 42.2.3 the consent of the Contractor authorizing a payment.
- For the purposes of determining the entitlement of a claimant pursuant to GC42.2.1 and GC42.2.2, the notice required by GC42.8 shall be deemed to replace the registration or provision of notice after the performance of work as required by any applicable legislation and no claim shall be deemed to have expired, become void or unenforceable by reason of the claimant not commencing any action within the time prescribed by any applicable legislation.
- 42.3 The Contractor shall, by the execution of his contract, be deemed to have consented to submit to binding arbitration at the request of any claimant those questions that need be answered to establish the entitlement of the claimant to payment pursuant to the provisions of GC42.1 and such arbitration shall have as parties to it any subcontractor to whom the claimant supplied material, performed work or rented equipment should such subcontractor wish to be adjoined and the Crown shall not be a party to such arbitration and, subject to any agreement between the Contractor and the claimant to the contrary, the arbitration shall be conducted in accordance with the Provincial or Territorial legislation governing arbitration applicable in the Province or Territory in which the work is located.
- 42.4 A payment made pursuant to GC42.1 is, to the extent of the payment, a discharge of Her Majesty's liability to the Contractor under the contract and may be deducted from any amount payable to the Contractor under the contract.
- 42.5 To the extent that the circumstances of the work being performed for Her Majesty permit, the Contractor shall comply with all laws in force in the Province or Territory where the work is being performed relating to payment period, mandatory holdbacks, and creation and enforcement of mechanics' liens, builders' liens or similar legislation or in the Province of Quebec, the law relating to privileges.
- 42.6 The Contractor shall discharge all his lawful obligations and shall satisfy all lawful claims against him arising out of the performance of the work at least as often as the contract requires Her



Majesty to pay the Contractor.

- 42.7 The Contractor shall, whenever requested to do so by the Departmental Representative, make a statutory declaration deposing to the existence and condition of any obligations and claims referred to in GC42.6.
- 42.8 GC42.1 shall only apply to claims and obligations
- 42.8.1 the notification of which has been received by the Departmental Representative in writing before payment is made to the Contractor pursuant to TP4.10 and within 120 days of the date on which the claimant
- 42.8.1.1 should have been paid in full under the claimant's contract with the Contractor or subcontractor where the claim is for money that was lawfully required to be held back from the claimant; or
- 42.8.1.2 performed the last of the services, work or labour, or furnished the last of the material pursuant to the claimant's contract with the Contractor or subcontractor where the claim is not for money referred to in GC42.8.1.1, and
- 42.8.2 the proceedings to determine the right to payment of which, pursuant to GC42.2. shall have commenced within one year from the date that the notice referred to in GC42.8.1 was received by the Departmental Representative, and
- the notification required by GC42.8.1 shall set forth the amount claimed to be owing and the person who by contract is primarily liable.
- 42.9 Her Majesty may, upon receipt of a notice of claim under GC42.8.1, withhold from any amount that is due and payable to the Contractor pursuant to the contract the full amount of the claim or any portion thereof.
- 42.10 The Departmental Representative shall notify the Contractor in writing of receipt of any claim referred to in GC42.8.1 and of the intention of Her Majesty to withhold funds pursuant to GC42.9 and the Contractor may, at any time thereafter and until payment is made to the claimant, be entitled to post, with Her Majesty, security in a form acceptable to Her Majesty in an amount equal to the value of the claim, the notice of which is received by the Departmental Representative and upon receipt of such security Her Majesty shall release to the Contractor any funds which would be otherwise payable to the Contractor, that were withheld pursuant to the provisions of GC42.9 in respect of the claim of any claimant for whom the security stands.

GC43 Security Deposit – Forfeiture or Return

- 43.1 If
- 43.1.1 the work is taken out of the Contractor's hands pursuant to GC38,
- 43.1.2 the contract is terminated pursuant to GC41, or
- 43.1.3 the Contractor is in breach of or in default under the contract,



Her Majesty may convert the security deposit, if any, to Her own use.

- 43.2 If Her Majesty converts the contract security pursuant to GC43.1, the amount realized shall be deemed to be an amount due from Her Majesty to the Contractor under the contract.
- 43.3 Any balance of an amount referred to in GC43.2 that remains after payment of all losses, damage and claims of Her Majesty and others shall be paid by Her Majesty to the Contractor if, in the opinion of the Departmental Representative, it is not required for the purposes of the contract.

GC44 Departmental Representative's Certificates

44.1 On the date that

44.1.1 the work has been completed, and

44.1.2 the Contractor has complied with the contract and all orders and directions made pursuant thereto,

both to the satisfaction of the Departmental Representative, the Departmental Representative shall issue a Final Certificate of Completion to the Contractor.

44.2 If the Departmental Representative is satisfied that the work is substantially complete he shall, at any time before he issues a certificate referred to in GC44.1, issue an Interim Certificate of Completion to the Contractor, and

44.2.1 for the purposes of GC44.2 the work will be considered to be substantially complete,

44.2.1.1 when the work under the contract or a substantial part thereof is, in the opinion of the Departmental Representative, ready for use by Her Majesty or is being used for the purpose intended; and

44.2.1.2 when the work remaining to be done under the contract is, in the opinion of the Departmental Representative, capable of completion or correction at accost of not more than

44.2.1.2.1 -3% of the first \$500,000, and

44.2.1.2.2 -2% of the next \$500,000, and

44.2.1.2.3 -1% of the balance

of the value of the contract at the time this cost is calculated.

44.3 For the sole purpose of GC44.2.1.2, where the work or a substantial part thereof is ready for use or is being used for the purposes intended and the remainder of the work or a part thereof cannot be completed by the time specified in A2.1, or as amended pursuant to GC36, for reasons beyond the control of the Contractor or where the Departmental Representative and the Contractor agree not to complete a part of the work within the specified time, the cost of that part of the work



which was either beyond the control of the Contractor to complete or the Departmental Representative and the Contractor have agreed not to complete by the time specified shall be deducted from the value of the contract referred to GC44.2.1.2 and the said cost shall not form part of the cost of the work remaining to be done in determining substantial completion.

44.4 An Interim Certificate of Completion referred to in GC44.2 shall describe the parts of the work not completed to the satisfaction of the Departmental Representative and all things that must be done by the Contractor

44.4.1 before a Final Certificate of Completion referred to in GC44.1 will be issued, and

44.4.2 before the 12-month period referred to in GC32.1.2 shall commence for the said parts and all the said things.

44.5 The Departmental Representative may, in addition to the parts of the work described in an Interim Certificate of Completion referred to in GC44.2, require the Contractor to rectify any other parts of the work not completed to his satisfaction and to do any other things that are necessary for the satisfactory completion of the work.

44.6 If the contract or a part thereof is subject to a Unit Price Arrangement, the Departmental Representative shall measure and record the quantities of labour, plant and material, performed, used and supplied by the Contractor in performing the work and shall, at the request of the Contractor, inform him of those measurements.

44.7 The Contractor shall assist and co-operate with the Departmental Representative in the performance of his duties referred to in GC44.6 and shall be entitled to inspect any record made by the Departmental Representative pursuant to GC44.6.

44.8 After the Departmental Representative has issued a Final Certificate of Completion referred to in GC44.1, he shall, if GC44.6 applies, issue a Final Certificate of Measurement.

44.9 A Final Certificate of Measurement referred to in GC44.8 shall

44.9.1 contain the aggregate of all measurements of quantities referred to in GC44.6, and

44.9.2 be binding upon and conclusive between Her Majesty and the Contractor as to the quantities referred to therein.

GC45 Return of Security Deposit

45.1 After an Interim Certificate of Completion referred to in GC44.2 has been issued, Her Majesty shall, if the Contractor is not in breach of or in default under the contract, return to the Contractor all or any part of the security deposit that, in the opinion of the Departmental Representative, is not required for the purposes of the contract.

45.2 After a Final Certificate of Completion referred to in GC44.1 has been issued, Her Majesty shall return to the Contractor the remainder of any security deposit unless the contract stipulates otherwise.



- 45.3 If the security deposit was paid into the Consolidated Revenue Fund of Canada, Her Majesty shall pay interest thereon to the Contractor at a rate established from time to time pursuant to section 21(2) of the Financial Administration Act.

GC46 Clarification of Terms in GC47 to GC50

- 46.1 For the purposes of GC47 to GC50,
- 46.1.1 "Unit Price Table" means the table set out in the Articles of Agreement, and
- 46.1.2 "plant" does not include tools customarily provided by a tradesman in practicing his trade.

GC47 Additions or Amendments to Unit Price Table

- 47.1 Where a Unit Price Arrangement applies to the contract or a part thereof the Departmental Representative and the Contractor may, by an agreement in writing,
- 47.1.1 add classes of labour or material, and units of measurement, prices per unit and estimated quantities to the Unit Price Table if any labour, plant or material that is to be included in the Final Certificate of Measurement referred to in GC44.8 is not included in any class of labour, plant or material set out in the Unit Price Table; or
- 47.1.2 subject to GC47.2 and GC47.3, amend a price set out in the Unit Price Table for any class of labour, plant or material included therein if the Final Certificate of Measurement referred to in GC44.8 shows or is expected to show that the total quantity of that class of labour, plant or material actually performed, used or supplied by the Contractor in performing the work is
- 47.1.2.1 less than 85% of that estimated total quantity, or
- 47.1.2.2 in excess of 115% of that estimated total quantity.
- 47.2 In no event shall the total cost of an item set out in the Unit Price Table that has been amended pursuant to GC47.1.2.1 exceed the amount that would have been payable to the Contractor had the estimated total quantity actually been performed, used or supplied.
- 47.3 An amendment that is made necessary by GC47.1.2.2 shall apply only to the quantities that are in excess of 115%.
- 47.4 If the Departmental Representative and the Contractor do not agree as contemplated in GC47.1, the Departmental Representative shall determine the class and the unit of measurement of the labour, plant or material and, subject to GC47.2 and GC47.3, the price per unit therefore shall be determined in accordance with GC50.

GC48 Determination of Cost – Unit Price Table



- 48.1 Whenever, for the purposes of the contract, it is necessary to determine the cost of labour, plant or material, it shall be determined by multiplying the quantity of that labour, plant or material expressed in the unit set out in column 3 of the Unit Price Table by the price of that unit set out in column 5 of the Unit Price Table.

GC49 Determination of Cost – Negotiation

- 49.1 If the method described in GC48 cannot be used because the labour, plant or material is of a kind or class that is not set out in the Unit Price Table, the cost of that labour, plant or material for the purposes of the contract shall be the amount agreed upon from time to time by the Contractor and the Departmental Representative.
- 49.2 For the purposes of GC49.1, the Contractor shall submit to the Departmental Representative any necessary cost information requested by the Departmental Representative in respect of the labour, plant and material referred to in GC49.1

GC50 Determination of Cost – Failing Negotiation

- 50.1 If the methods described in GC47, GC48 or GC49 fail for any reason to achieve a determination of the cost of labour, plant and material for the purposes referred to therein, that cost shall be equal to the aggregate of
- 50.1.1 all reasonable and proper amounts actually expended or legally payable by the Contractor in respect of the labour, plant and material that falls within one of the classes of expenditure described in GC50.2 that are directly attributable to the performance of the contract,
 - 50.1.2 an allowance for profit and all other expenditures or costs, including overhead, general administration cost, financing and interest charges, and every other cost, charge and expenses, but not including those referred to in GC50.1.1 or GC50.1.3 or a class referred to in GC50.2, in an amount that is equal to 10% of the sum of the expenses referred to in GC50.1.1, and
 - 50.1.3 interest on the cost determined under GC50.1.1 and GC50.1.2, which interest shall be calculated in accordance with TP9,

provide that the total cost of an item set out in the Unit Price Table that is subject to the provisions of GC47.1.2.1 does not exceed the amount that would have been payable to the Contractor had the estimated total quantity of the said item actually be performed, used or supplied.

- 50.2 For purposes of GC50.1.1 the classes of expenditure that may be taken into account in determining the cost of labour, plant and material are,
- 50.2.1 payments to subcontractors;
 - 50.2.2 wages, salaries and travelling expenses of employees of the Contractor while they are actually and properly engaged on the work, other than wages, salaries, bonuses, living



and travelling expenses of personnel of the Contractor generally employed at the head office or at a general office of the Contractor unless they are engaged at the work site with the approval of the Departmental Representative,

- 50.2.3 assessments payable under any statutory authority relating to workmen's compensation, unemployment insurance, pension plan or holidays with pay;
- 50.2.4 rent that is paid for plant or an amount equivalent of the said rent if the plant is owned by the Contractor that is necessary for and used in the performance of the work, if the rent of the equivalent amount is reasonable and use of that plant has been approved by the Departmental Representative;
- 50.2.5 payments for maintaining and operating plant necessary for and used in the performance of the work, and payments for effecting such repairs thereto as, in the opinion of the Departmental Representative, are necessary to the proper performance of the contract other than payments for any repairs to the plant arising out of defects existing before its allocation to the work;
- 50.2.6 payments for material that is necessary for and incorporated in the work, or that is necessary for and consumed in the performance of the contract;
- 50.2.7 payments for preparation, delivery, handling, erection, installation, inspection protection and removal of the plant and material necessary for and used in the performance of the contract; and
- 50.2.8 any other payments made by the Contractor with the approval of the Departmental Representative that are necessary for the performance of the contract.

GC51 Records to be kept by Contractor

51.1 The Contractor shall

- 51.1.1 maintain full records of his estimated and actual cost of the work together with all tender calls, quotations, contracts, correspondence, invoices, receipts and vouchers relating thereto.
- 51.1.2 make all records and material referred to in GC5.1.1 available to audit and inspection by the Minister and the Deputy Receiver General for Canada or by persons acting on behalf of either of both of them, when requested;
- 51.1.3 allow any of the person referred to in GC51.1.2 to make copies of and to take extracts from any of the records and material referred to in GC51.1.1; and
- 51.1.4 furnish any person referred to in GC51.1.2 with any information he may require from time to time in connection with such records and material.

- 51.2 The records maintained by the Contractor pursuant to GC51.1.1 shall be kept intact by the Contractor until the expiration of two years after the date that a Final Certificate of Completion referred to in GC44.1 was issued or until the expiration of such other period of time as the



Minister may direct.

- 51.3 The Contractor shall cause all subcontractors and all other persons directly or indirectly controlled by or affiliated with the Contractor and all persons directly or indirectly having control of the Contractor to comply with GC51.1 and GC51.2 as if they were the Contractor.

GC52 Conflict of Interest

- 52.1 It is a term of this contract that no former public office holder who is not in compliance with the Conflict of Interest and Post-Employment Code for Public Office Holders shall derive a direct benefit from this contract.

GC53 Contractor Status

- 53.1 The Contractor shall be engaged under the contract as an independent contractor.
- 53.2 The Contractor and any employee of the said Contractor is not engaged by the contract as an employee, servant or agent of Her Majesty.
- 53.3 For the purposes of GC53.1 and GC53.2 the Contractor shall be solely responsible for any and all payments and deductions required to be made by law including those required for Canada or Quebec Pension Plans, Unemployment Insurance, Worker's Compensation or Income Tax.



GENERAL CONDITONS

- IC 1 Proof of Insurance**
- IC 2 Risk Management**
- IC 3 Payment of Deductible**
- IC 4 Insurance Coverage**

GENERAL INSUANCE COVERAGES

- GCI 1 Insured**
- GIC 2 Period of Insurance**
- GIC 3 Proof of Insurance**
- GIC 4 Notification**

COMMERCIAL GENERAL LIABILITY

- CGL 1 Scope of Policy**
- CGL 2 Coverages/Provisions**
- CGL 3 Additional Exposures**
- CGL 4 Insurance Proceeds**
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BUILDER'S RISK – INSTALLATION FLOATER – ALL RISKS

- BR 1 Scope of Policy**
- BR 2 Property Insured**
- BR 3 Insurance Proceeds**
- BR 4 Amount of Insurance**
- BR 5 Deductible**
- BR 6 Subrogation**
- BR 7 Exclusion Qualifications**

INSURER'S CERTIFICATE OF INSURANCE



General Conditions

IC 1 Proof of Insurance (02/12/03)

Within thirty (30) days after acceptance of the Contractor's tender, the Contractor shall, unless otherwise directed in writing by the Contracting Officer, deposit with the Contracting Officer an Insurer's Certificate of Insurance in the form displayed in this document and, if requested by the Contracting Officer, the originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the Insurance Coverage Requirements shown hereunder.

IC 2 Risk Management (01/10/94)

The provisions of the Insurance Coverage Requirements contained hereunder are not intended to cover all of the Contractor's obligations under GC8 of the General Conditions "C" of the contract. Any additional risk management measures or additional insurance coverages the Contractor may deem necessary to fulfill its obligations under GC8 shall be at its own discretion and expense.

IC 3 Payment of Deductible (01/10/94)

The payment of monies up to the deductible amount made in satisfaction of a claim shall be borne by the Contractor.

IC 4 Insurance Coverage (02/12/03)

The Contractor has represented that it has in place and effect the appropriate and usual liability insurance coverage as required by these Insurance Conditions and the Contractor has warranted that it shall obtain, in a timely manner and prior to commencement of the Work, the appropriate and usual property insurance coverage as required by these Insurance Conditions and, further, that it shall maintain all required insurance policies in place and effect as required by these Insurance Conditions.



INSURANCE COVERAGE REQUIREMENTS

PART I GENERAL INSURANCE COVERAGES (GIC)

GCI 1 Insured (02/12/03)

Each insurance policy shall insure the Contractor, and shall include, as an Additional Named Insured, Her Majesty the Queen in right of Canada, represented by the National Research Council Canada.

GIC 2 Period of Insurance (02/12/03)

Unless otherwise directed in writing by the Contracting Officer or otherwise stipulated elsewhere in these Insurance Conditions, the policies required hereunder shall be in force and be maintained from the date of the contract award until the day of issue of the Departmental Representative's Final Certificate of Completion.

GIC 3 Proof of Insurance (01/10/94)

Within twenty five (25) days after acceptance of the Contractor's tender, the Insurer shall, unless otherwise directed by the Contractor, deposit with the Contractor an Insurer's Certificate of Insurance in the form displayed in the document and, if requested, the originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the requirements of these Insurance Coverages.

GIC 4 Notification (01/10/94)

Each Insurance policy shall contain a provision that (30) days prior written notice shall be given by the Insurer to Her Majesty in the event of any material change in or cancellation of coverage. Any such notice received by the Contractor shall be transmitted forthwith to Her Majesty.

PART II COMMERCIAL GENERAL LIABILITY

CGL 1 Scope of Policy (01/10/94)

The policy shall be written on a form similar to that known and referred to in the insurance industry as IBC 2100 – Commercial General Liability policy (Occurrence form) and shall provide for limit of liability of not less than \$2,000,000 inclusive for Bodily Injury and Property Damage for any one occurrence or series of occurrences arising out of one cause. Legal or defence cost incurred in respect of a claim or claims shall not operate to decrease the limit of liability.

CGL 2 Coverages/Provisions (01/10/94)



The policy shall include but not necessarily be limited to the following coverages/provisions.

- 2.1 Liability arising out of or resulting from the ownership, existence, maintenance or use of premises by the Contractor and operations necessary or incidental to the performance of this contract.
- 2.2 "Broad Form" Property Damage including the loss of use of property.
- 2.3 Removal or weakening of support of any building or land whether such support be natural or otherwise.
- 2.4 Elevator liability (including escalators, hoists and similar devices).
- 2.5 Contractor's Protective Liability
- 2.6 Contractual and Assumed Liabilities un this contact.
- 2.7 Completed Operations Liability – The insurance, including all aspects of this Part II of these Insurance Conditions shall continue for a period of at least one (1) year beyond the date of the Departmental Representative's Final Certificate of Completion for the Completed Operations.
- 2.8 Cross Liability – The Clause shall be written as follows:

Cross Liability – The insurance as is afforded by this policy shall apply in respect to any claim or action brought against any one Insured by any other Insured. The coverage shall apply in the same manner and to the same extent as though a separate policy had been issued to each Insured. The inclusion herein of more than one Insured shall not increase the limit of the Insurer's liability.

- 2.9 Severability of Interests – The Clause shall be written as follows:

Severability of Interests – This policy, subject to the limits of liability stated herein, shall apply separately to each Insured in the same manner and to the same extent as if a separate policy had been issued to each. The inclusion herein of more than one insured shall not increase the limit of the Insurer's liability.

CGL 3 Additional Exposures (02/12/03)

The policy shall either include or be endorsed to include the following exposures of hazards if the Work is subject thereto:

- 3.1 Blasting
- 3.2 Pile driving and calsson work
- 3.3 Underpinning
- 3.4 Risks associated with the activities of the Contractor on an active airport



- 3.5 Radioactive contamination resulting from the use of commercial isotopes
- 3.6 Damage to the portion of an existing building beyond that directly associated with an addition, renovation or installation contract.
- 3.7 Marine risks associated with the contraction of piers, wharves and docks.

**CGL 4 Insurance Proceeds
(01/10/94)**

Insurance Proceeds from this policy are usually payable directly to a Claimant/Third Party.

**CGL 5 Deductible
(02/12/03)**

This policy shall be issued with a deductible amount of not more than \$10,000 per occurrence applying to Property Damage claims only.

**PART III
BUILDER'S RISK – INSTALLATION FLOATER – ALL RISKS**

**BR 1 Scope of Policy
(01/10/94)**

The policy shall be written on an "All Risks" basis granting coverages similar to those provided by the forms known and referred to in the insurance industry as "Builder's Risk Comprehensive Form" or "Installation Floater – All Risks".

**BR 2 Property Insured
(01/10/94)**

The property insured shall include:

- 2.1 The Work and all property, equipment and materials intended to become part of the finished Work at the site of the project while awaiting, during and after installation, erection or construction including testing.
- 2.2 Expenses incurred in the removal from the construction site of debris of the property insured, including demolition of damaged property, de-icing and dewatering, occasioned by loss, destruction or damage to such property and in respect of which insurance is provided by this policy.

**BR 3 Insurance Proceeds
(01/10/94)**

- 3.1 Insurance proceeds from this policy are payable in accordance with GC28 of the General Conditions "C" of the contract.
- 3.2 This policy shall provide that the proceeds thereof are payable to Her Majesty or as the Minister may direct.



- 3.3 The Contractor shall do such things and execute such documents as are necessary to effect payment of the proceeds.

BR 4 Amount of Insurance
(01/10/94)

The amount of insurance shall not be less than the sum of the contract value plus the declared value (if any) set forth in the contract documents of all material and equipment supplied by Her Majesty at the site of the project to be incorporated into and form part of the finished Work.

BR 5 Deductible
(02/12/03)

The Policy shall be issued with a deductible amount of not more than \$10,000.

BR 6 Subrogation
(01/10/94)

The following Clause shall be included in the policy:

"All rights of subrogation or transfer of rights are hereby waived against any corporation, firm, individual or other interest, with respect to which, insurance is provided by this policy".

BR 7 Exclusion Qualifications
(01/10/94)

The policy may be subject to the standard exclusions but the following qualifications shall apply:

- 7.1 Faulty materials, workmanship or design may be excluded only to the extent of the cost of making good thereof and shall not apply to loss or damage resulting therefrom.
- 7.2 Loss or damage caused by contamination by radioactive material may be excluded except for loss or damage resulting from commercial isotopes used for industrial measurements, inspection, quality control radiographic or photographic use.
- 7.3 Use and occupancy of the project or any part of section thereof shall be permitted where such use and occupancy is for the purpose for which the project is intended upon completion.



INSURER'S CERTIFICATE OF INSURANCE

(TO BE COMPLETED BY INSURER (NOT BOKER) AND DELIVERD TO NATIONAL RESEARCH COUNCIL CANADA WITH 30 DAYS FOLLOWING ACCEPTANCE OF TENDER)

CONTRACT

DESCRIPTION OF WORK	CONTRACT NUMBER	AWARD DATE
LOCATION		

INSURER

NAME
ADDRESS

BROKER

NAME
ADDRESS

INSURED

NAME OF CONTRACTOR
ADDRESS

ADDITIONAL INSURED

HER MAJESTY THE QUEEN IN RIGHT OF CANADA AS REPRESENTED BY THE NATIONAL RESEARCH COUNCIL CANADA

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 CS2.1.2 plus an additional amount that is equal to 10% of the contract amount referred to in the Articles of Agreement.
- 2.2 A performance bond and a labour and material payment bond referred to in CS2.1 shall be in a form and be issued by a bonding or surety company that is approved by Her Majesty.
- 2.3 The amount of a security deposit referred to in CS2.1.2 shall not exceed \$250,000 regardless of the contract amount referred to in the Articles of Agreement.
- 2.4 A security deposit referred to in CS2.1.2 and CS2.1.3 shall be in the form of
 - 2.4.1 a bill of exchange made payable to the Receiver General of Canada and certified by an approved financial institution or drawn by an approved financial institution on itself, or
 - 2.4.2 bonds of or unconditionally guaranteed as to principal and interest by the Government of Canada.
- 2.5 For the purposes of CS2.4
 - 2.5.1 a bill of exchange is an unconditional order in writing signed by the Contractor and addressed to an approved financial institution, requiring the said institution to pay, on demand, at a fixed or determinable future time a sum certain of money to, or to the order



of, the Receiver General for Canada, and

- 2.5.2 If a bill of exchange is certified by a financial institution other than a chartered bank then it must be accompanied by a letter or stamped certification confirming that the financial institution is in at least one of the categories referred to in CS2.5.3
- 2.5.3 an approved financial institution is
 - 2.5.3.1 any corporation or institution that is a member of the Canadian Payments Association,
 - 2.5.3.2 a corporation that accepts deposits that are insured by the Canada Deposit Insurance Corporation or the Régie de l'assurance-dépôts du Québec to the maximum permitted by law,
 - 2.5.3.3 a credit union as defined in paragraph 137(6)(b) of the *Income Tax Act*,
 - 2.5.3.4 a corporation that accepts deposits from the public, if repayment of the deposit is guaranteed by Her Majesty in right of a province, or
 - 2.5.3.5 The Canada Post Corporation.
- 2.5.4 the bonds referred to in CS2.4.2 shall be
 - 2.5.4.1 made payable to bearer, or
 - 2.5.4.2 accompanied by a duly executed instrument of transfer of the bonds to the Receiver General for Canada in the form prescribed by the Domestic Bonds of Canada Regulations, or
 - 2.5.4.3 registered, as to principal or as to principal and interest in the name of the Receiver General for Canada pursuant to the Domestic Bonds of Canada Regulations, and
 - 2.5.4.4 provided on the basis of their market value current at the date of the contract.



Contract Number / Numéro du contrat
Security Classification / Classification de sécurité

**SECURITY REQUIREMENTS CHECK LIST (SRCL)
LISTE DE VÉRIFICATION DES EXIGENCES RELATIVES À LA SÉCURITÉ (LVERS)**

PART A - CONTRACT INFORMATION / PARTIE A - INFORMATION CONTRACTUELLE

1. Originating Government Department or Organization / Ministère ou organisme gouvernemental d'origine	2. Branch or Directorate / Direction générale ou Direction
3. a) Subcontract Number / Numéro du contrat de sous-traitance	3. b) Name and Address of Subcontractor / Nom et adresse du sous-traitant

4. Brief Description of Work / Brève description du travail

5. a) Will the supplier require access to Controlled Goods? / Le fournisseur aura-t-il accès à des marchandises contrôlées? No / Non Yes / Oui

5. b) Will the supplier require access to unclassified military technical data subject to the provisions of the Technical Data Control Regulations? / Le fournisseur aura-t-il accès à des données techniques militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques? No / Non Yes / Oui

6. Indicate the type of access required / Indiquer le type d'accès requis

6. a) Will the supplier and its employees require access to PROTECTED and/or CLASSIFIED information or assets? / Le fournisseur ainsi que les employés auront-ils accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS? No / Non Yes / Oui
(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)

6. b) Will the supplier and its employees (e.g. cleaners, maintenance personnel) require access to restricted access areas? No access to PROTECTED and/or CLASSIFIED information or assets is permitted. / Le fournisseur et ses employés (p. ex. nettoyeurs, personnel d'entretien) auront-ils accès à des zones d'accès restreintes? L'accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS n'est pas autorisé. No / Non Yes / Oui

6. c) Is this a commercial courier or delivery requirement with **no** overnight storage? / S'agit-il d'un contrat de messagerie ou de livraison commerciale **sans** entreposage de nuit? No / Non Yes / Oui

7. a) Indicate the type of information that the supplier will be required to access / Indiquer le type d'information auquel le fournisseur devra avoir accès

Canada <input type="checkbox"/>	NATO / OTAN <input type="checkbox"/>	Foreign / Étranger <input type="checkbox"/>
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7. b) Release restrictions / Restrictions relatives à la diffusion

No release restrictions / Aucune restriction relative à la diffusion <input type="checkbox"/> Not releasable / À ne pas diffuser <input type="checkbox"/> Restricted to: / Limité à: <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays:	All NATO countries / Tous les pays de l'OTAN <input type="checkbox"/> Restricted to: / Limité à: <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays:	No release restrictions / Aucune restriction relative à la diffusion <input type="checkbox"/> Restricted to: / Limité à: <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays:
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7. c) Level of information / Niveau d'information

PROTECTED A / PROTÉGÉ A <input type="checkbox"/>	NATO UNCLASSIFIED / NATO NON CLASSIFIÉ <input type="checkbox"/>	PROTECTED A / PROTÉGÉ A <input type="checkbox"/>
PROTECTED B / PROTÉGÉ B <input type="checkbox"/>	NATO RESTRICTED / NATO DIFFUSION RESTREINTE <input type="checkbox"/>	PROTECTED B / PROTÉGÉ B <input type="checkbox"/>
PROTECTED C / PROTÉGÉ C <input type="checkbox"/>	NATO CONFIDENTIAL / NATO CONFIDENTIEL <input type="checkbox"/>	PROTECTED C / PROTÉGÉ C <input type="checkbox"/>
CONFIDENTIAL / CONFIDENTIEL <input type="checkbox"/>	NATO SECRET / NATO SECRET <input type="checkbox"/>	CONFIDENTIAL / CONFIDENTIEL <input type="checkbox"/>
SECRET / SECRET <input type="checkbox"/>	COSMIC TOP SECRET / COSMIC TRÈS SECRET <input type="checkbox"/>	SECRET / SECRET <input type="checkbox"/>
TOP SECRET / TRÈS SECRET <input type="checkbox"/>		TOP SECRET / TRÈS SECRET <input type="checkbox"/>
TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) <input type="checkbox"/>		TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) <input type="checkbox"/>

Security Classification / Classification de sécurité
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Contract Number / Numéro du contrat
Security Classification / Classification de sécurité

PART A (continued) / PARTIE A (suite)

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets?
 Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS? No / Non Yes / Oui
 If Yes, indicate the level of sensitivity:
 Dans l'affirmative, indiquer le niveau de sensibilité :

9. Will the supplier require access to extremely sensitive INFOSEC information or assets?
 Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate? No / Non Yes / Oui
 Short Title(s) of material / Titre(s) abrégé(s) du matériel :
 Document Number / Numéro du document :

PART B - PERSONNEL (SUPPLIER) / PARTIE B - PERSONNEL (FOURNISSEUR)

10. a) Personnel security screening level required / Niveau de contrôle de la sécurité du personnel requis

<input type="checkbox"/> RELIABILITY STATUS COTE DE FIABILITÉ	<input type="checkbox"/> CONFIDENTIAL CONFIDENTIEL	<input type="checkbox"/> SECRET SECRET	<input type="checkbox"/> TOP SECRET TRÈS SECRET
<input type="checkbox"/> TOP SECRET-SIGINT TRÈS SECRET - SIGINT	<input type="checkbox"/> NATO CONFIDENTIAL NATO CONFIDENTIEL	<input type="checkbox"/> NATO SECRET NATO SECRET	<input type="checkbox"/> COSMIC TOP SECRET COSMIC TRÈS SECRET
<input type="checkbox"/> SITE ACCESS ACCÈS AUX EMBLEMES			

Special comments:
 Commentaires spéciaux : _____

NOTE: If multiple levels of screening are identified, a Security Classification Guide must be provided.
 REMARQUE : Si plusieurs niveaux de contrôle de sécurité sont requis, un guide de classification de la sécurité doit être fourni.

10. b) May unscreened personnel be used for portions of the work?
 Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail? No / Non Yes / Oui
 If Yes, will unscreened personnel be escorted?
 Dans l'affirmative, le personnel en question sera-t-il escorté? No / Non Yes / Oui

PART C - SAFEGUARDS (SUPPLIER) / PARTIE C - MESURES DE PROTECTION (FOURNISSEUR)

INFORMATION / ASSETS / RENSEIGNEMENTS / BIENS

11. a) Will the supplier be required to receive and store PROTECTED and/or CLASSIFIED information or assets on its site or premises?
 Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS? No / Non Yes / Oui

11. b) Will the supplier be required to safeguard COMSEC information or assets?
 Le fournisseur sera-t-il tenu de protéger des renseignements ou des biens COMSEC? No / Non Yes / Oui

PRODUCTION

11. c) Will the production (manufacture, and/or repair and/or modification) of PROTECTED and/or CLASSIFIED material or equipment occur at the supplier's site or premises?
 Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ? No / Non Yes / Oui

INFORMATION TECHNOLOGY (IT) MEDIA / SUPPORT RELATIF À LA TECHNOLOGIE DE L'INFORMATION (TI)

11. d) Will the supplier be required to use its IT systems to electronically process, produce or store PROTECTED and/or CLASSIFIED information or data?
 Le fournisseur sera-t-il tenu d'utiliser ses propres systèmes informatiques pour traiter, produire ou stocker électroniquement des renseignements ou des données PROTÉGÉS et/ou CLASSIFIÉS? No / Non Yes / Oui

11. e) Will there be an electronic link between the supplier's IT systems and the government department or agency?
 Disposera-t-on d'un lien électronique entre le système informatique du fournisseur et celui du ministère ou de l'agence gouvernementale? No / Non Yes / Oui



PART C - (continued) / PARTIE C - (suite)

For users completing the form **manually** use the summary chart below to indicate the category(ies) and level(s) of safeguarding required at the supplier's site(s) or premises.

Les utilisateurs qui remplissent le formulaire **manuellement** doivent utiliser le tableau récapitulatif ci-dessous pour indiquer, pour chaque catégorie, les niveaux de sauvegarde requis aux installations du fournisseur.

For users completing the form **online** (via the Internet), the summary chart is automatically populated by your responses to previous questions.

Dans le cas des utilisateurs qui remplissent le formulaire **en ligne** (par Internet), les réponses aux questions précédentes sont automatiquement saisies dans le tableau récapitulatif.

SUMMARY CHART / TABLEAU RÉCAPITULATIF

Category / Catégorie	PROTECTED / PROTÉGÉ			CLASSIFIED / CLASSIFIÉ			NATO				COMSEC					
	A	B	C	CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET	NATO RESTRICTED / NATO DIFFUSION RESTREINTE	NATO CONFIDENTIAL / NATO CONFIDENTIEL	NATO SECRET	COSMIC TOP SECRET / COSMIC TRÈS SECRET	PROTECTED / PROTÉGÉ			CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET
											A	B	C			
Information / Assets / Renseignements / Biens / Production																
IT Media / Support TI																
IT Link / Lien électronique																

12. a) Is the description of the work contained within this SRCL PROTECTED and/or CLASSIFIED? No / Yes
 La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE? Non / Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification".
Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire.

12. b) Will the documentation attached to this SRCL be PROTECTED and/or CLASSIFIED? No / Yes
 La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE? Non / Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification" and indicate with attachments (e.g. SECRET with Attachments).
Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire et indiquez qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).



Contract Number / Numéro du contrat
Security Classification / Classification de sécurité

PART D - AUTHORIZATION / PARTIE D - AUTORISATION

13. Organization Project Authority / Chargé de projet de l'organisme			
Name (print) - Nom (en lettres moulées)		Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
14. Organization Security Authority / Responsable de la sécurité de l'organisme			
Name (print) - Nom (en lettres moulées)		Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
15. Are there additional instructions (e.g. Security Guide, Security Classification Guide) attached? Des instructions supplémentaires (p. ex. Guide de sécurité, Guide de classification de la sécurité) sont-elles jointes?			<input type="checkbox"/> No / Non <input type="checkbox"/> Yes / Oui
16. Procurement Officer / Agent d'approvisionnement			
Name (print) - Nom (en lettres moulées)		Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
17. Contracting Security Authority / Autorité contractante en matière de sécurité			
Name (print) - Nom (en lettres moulées)		Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date

As per the Directive on Security Management, throughout the contract or arrangement, the project authority (signed above at section 13) must monitor the supplier, partner and departmental compliance of security requirements identified on this SRCL, and take corrective actions to address issues of non-compliance.

Instructions for completion of a Security Requirements Check List (SRCL)

The instruction sheet should remain attached until Block #17 has been completed.

GENERAL - PROCESSING THIS FORM

The project authority shall arrange to complete this form.

The organization security officer shall review and approve the security requirements identified in the form, in cooperation with the project authority.

The contracting security authority is the organization responsible for ensuring that the suppliers are compliant with the security requirements identified in the SRCL.

All requisitions and subsequent tender / contractual documents including subcontracts that contain PROTECTED and/or CLASSIFIED requirements must be accompanied by a completed SRCL.

It is important to identify the level of PROTECTED information or assets as Level "A," "B" or "C," when applicable; however, certain types of information may only be identified as "PROTECTED". No information pertaining to a PROTECTED and/or CLASSIFIED government contract may be released by suppliers, without prior written approval of the individual identified in Block 17 of this form.

The classification assigned to a particular stage in the contractual process does not mean that everything applicable to that stage is to be given the same classification. Every item shall be PROTECTED and/or CLASSIFIED according to its own content. If a supplier is in doubt as to the actual level to be assigned, they should consult with the individual identified in Block 17 of this form.

PART A - CONTRACT INFORMATION

Contract Number (top of the form)

This number must be the same as that found on the requisition and should be the one used when issuing an RFP or contract. This is a unique number (i.e. no two requirements will have the same number). A new SRCL must be used for each new requirement or requisition (e.g. new contract number, new SRCL, new signatures).

1. Originating Government Department or Organization

Enter the department or client organization name or the prime contractor name for which the work is being performed.

2. Directorate / Branch

This block is used to further identify the area within the department or organization for which the work will be conducted.

3. a) Subcontract Number

If applicable, this number corresponds to the number generated by the Prime Contractor to manage the work with its subcontractor.

b) Name and Address of Subcontractor

Indicate the full name and address of the Subcontractor if applicable.

4. Brief Description of Work

Provide a brief explanation of the nature of the requirement or work to be performed.

5. a) Will the supplier require access to Controlled Goods?

*The Defence Production Act (DPA) defines "Controlled Goods" as certain goods listed in the Export Control List, a regulation made pursuant to the *Export and Import Permits Act* (EIPA). Suppliers who examine, possess, or transfer Controlled Goods within Canada must register in the Controlled Goods Directorate or be exempt from registration. More information may be found at www.cgd.gc.ca.*

b) Will the supplier require access to unclassified military technical data subject to the provisions of the Technical Data Control Regulations?

The prime contractor and any subcontractors must be certified under the U.S./Canada Joint Certification Program if the work involves access to unclassified military data subject to the provisions of the Technical Data Control Regulations. More information may be found at www.dlis.dla.mil/jcp.

6. Indicate the type of access required

Identify the nature of the work to be performed for this requirement. The user is to select one of the following types:

a) Will the supplier and its employees require access to PROTECTED and/or CLASSIFIED information or assets?

The supplier would select this option if they require access to PROTECTED and/or CLASSIFIED information or assets to perform the duties of the requirement.

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.

The supplier would select this option if they require regular access to government premises or a secure work site only. The supplier will not have access to PROTECTED and/or CLASSIFIED information or assets under this option.

c) Is this a commercial courier or delivery requirement with no overnight storage?

The supplier would select this option if there is a commercial courier or delivery requirement. The supplier will not be allowed to keep a package overnight. The package must be returned if it cannot be delivered.

7. Type of information / Release restrictions / Level of information

Identify the type(s) of information that the supplier may require access to, list any possible release restrictions, and if applicable, provide the level(s) of the information. The user can make multiple selections based on the nature of the work to be performed.

Departments must process SRCLs through PWGSC where:

- contracts that afford access to PROTECTED and/or CLASSIFIED foreign government information and assets;
- contracts that afford foreign contractors access to PROTECTED and/or CLASSIFIED Canadian government information and assets; or
- contracts that afford foreign or Canadian contractors access to PROTECTED and/or CLASSIFIED information and assets as defined in the documents entitled Identifying INFOSEC and INFOSEC Release.

a) Indicate the type of information that the supplier will be required to access

Canadian government information and/or assets

If Canadian information and/or assets are identified, the supplier will have access to PROTECTED and/or CLASSIFIED information and/or assets that are owned by the Canadian government.

NATO information and/or assets

If NATO information and/or assets are identified, this indicates that as part of this requirement, the supplier will have access to PROTECTED and/or CLASSIFIED information and/or assets that are owned by NATO governments. NATO information and/or assets are developed and/or owned by NATO countries and are not to be divulged to any country that is not a NATO member nation. Persons dealing with NATO information and/or assets must hold a NATO security clearance and have the required need-to-know.

Requirements involving CLASSIFIED NATO information must be awarded by PWGSC. PWGSC / CIISD is the Designated Security Authority for industrial security matters in Canada.

Foreign government information and/or assets

If foreign information and/or assets are identified, this requirement will allow access to information and/or assets owned by a country other than Canada.

b) Release restrictions

If **Not Releasable** is selected, this indicates that the information and/or assets are for **Canadian Eyes Only (CEO)**. Only Canadian suppliers based in Canada can bid on this type of requirement. NOTE: If Canadian information and/or assets coexists with CEO information and/or assets, the CEO information and/or assets must be stamped **Canadian Eyes Only (CEO)**.

If **No Release Restrictions** is selected, this indicates that access to the information and/or assets are not subject to any restrictions.

If **ALL NATO countries** is selected, bidders for this requirement must be from NATO member countries only.

NOTE: There may be multiple release restrictions associated with a requirement depending on the nature of the work to be performed. In these instances, a security guide should be added to the SRCL clarifying these restrictions. The security guide is normally generated by the organization's project authority and/or security authority.

c) Level of information

Using the following chart, indicate the appropriate level of access to information/assets the supplier must have to perform the duties of the requirement.

PROTECTED	CLASSIFIED	NATO
PROTECTED A	CONFIDENTIAL	NATO UNCLASSIFIED
PROTECTED B	SECRET	NATO RESTRICTED
PROTECTED C	TOP SECRET	NATO CONFIDENTIAL
	TOP SECRET (SIGINT)	NATO SECRET
		COSMIC TOP SECRET

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets?

If Yes, the supplier personnel requiring access to COMSEC information or assets must receive a COMSEC briefing. The briefing will be given to the "holder" of the COMSEC information or assets. In the case of a "personnel assigned" type of contract, the customer department will give the briefing. When the supplier is required to receive and store COMSEC information or assets on the supplier's premises, the supplier's COMSEC Custodian will give the COMSEC briefings to the employees requiring access to COMSEC information or assets. If Yes, the Level of sensitivity must be indicated.

9. Will the supplier require access to extremely sensitive INFOSEC information or assets?

If Yes, the supplier must provide the Short Title of the material and the Document Number. Access to extremely sensitive INFOSEC information or assets will require that the supplier undergo a Foreign Ownership Control or Influence (FOCI) evaluation by CIISD.

PART B - PERSONNEL (SUPPLIER)

10. a) Personnel security screening level required

Identify the screening level required for access to the information/assets or client facility. More than one level may be identified depending on the nature of the work. Please note that Site Access screenings are granted for access to specific sites under prior arrangement with the Treasury Board of Canada Secretariat. A Site Access screening only applies to individuals, and it is not linked to any other screening level that may be granted to individuals or organizations.

RELIABILITY STATUS	CONFIDENTIAL	SECRET
TOP SECRET	TOP SECRET (SIGINT)	NATO CONFIDENTIAL
NATO SECRET	COSMIC TOP SECRET	SITE ACCESS

If multiple levels of screening are identified, a Security Classification Guide must be provided.

b) May unscreened personnel be used for portions of the work?

Indicating Yes means that portions of the work are not PROTECTED and/or CLASSIFIED and may be performed outside a secure environment by unscreened personnel. The following question must be answered if unscreened personnel will be used:

Will unscreened personnel be escorted?

If No, unscreened personnel may not be allowed access to sensitive work sites and must not have access to PROTECTED and/or CLASSIFIED information and/or assets.

If Yes, unscreened personnel must be escorted by an individual who is cleared to the required level of security in order to ensure there will be no access to PROTECTED and/or CLASSIFIED information and/or assets at the work site.

PART C - SAFEGUARDS (SUPPLIER)

11. INFORMATION / ASSETS

a) Will the supplier be required to receive and store PROTECTED and/or CLASSIFIED information and/or assets on its site or premises?

If Yes, specify the security level of the documents and/or equipment that the supplier will be required to safeguard at their own site or premises using the summary chart.

b) Will the supplier be required to safeguard COMSEC information or assets?

If Yes, specify the security level of COMSEC information or assets that the supplier will be required to safeguard at their own site or premises using the summary chart.

PRODUCTION

c) Will the production (manufacture, repair and/or modification) of PROTECTED and/or CLASSIFIED material and/or equipment occur at the supplier's site or premises?

Using the summary chart, specify the security level of material and/or equipment that the supplier manufactured, repaired and/or modified and will be required to safeguard at their own site or premises.

INFORMATION TECHNOLOGY (IT)

d) Will the supplier be required to use its IT systems to electronically process and/or produce or store PROTECTED and/or CLASSIFIED information and/or data?

If Yes, specify the security level in the summary chart. This block details the information and/or data that will be electronically processed or produced and stored on a computer system. The client department and/or organization will be required to specify the IT security requirements for this procurement in a separate technical document. The supplier must also direct their attention to the following document: Treasury Board of Canada Secretariat - Operational Security Standard: Management of Information Technology Security (MITS).

e) Will there be an electronic link between the supplier’s IT systems and the government department or agency?

If Yes, the supplier must have their IT system(s) approved. The Client Department must also provide the Connectivity Criteria detailing the conditions and the level of access for the electronic link (usually not higher than PROTECTED B level).

SUMMARY CHART

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.

For users completing the form **online** (via the Internet), the Summary Chart is automatically populated by your responses to previous questions.

PROTECTED	CLASSIFIED	NATO	COMSEC
PROTECTED A	CONFIDENTIAL	NATO RESTRICTED	PROTECTED A
PROTECTED B	SECRET	NATO CONFIDENTIAL	PROTECTED B
PROTECTED C	TOP SECRET	NATO SECRET	PROTECTED C
	TOP SECRET (SIGINT)	COSMIC TOP SECRET	CONFIDENTIAL
			SECRET
			TOP SECRET

12. a) Is the description of the work contained within this SRCL PROTECTED and/or CLASSIFIED?

If Yes, classify this form by annotating the top and bottom in the area entitled “Security Classification”.

b) Will the documentation attached to this SRCL be PROTECTED and/or CLASSIFIED?

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).

PART D - AUTHORIZATION

13. Organization Project Authority

This block is to be completed and signed by the appropriate project authority within the client department or organization (e.g. the person responsible for this project or the person who has knowledge of the requirement at the client department or organization). This person may on occasion be contacted to clarify information on the form.

14. Organization Security Authority

This block is to be signed by the Departmental Security Officer (DSO) (or delegate) of the department identified in Block 1, or the security official of the prime contractor.

15. Are there additional instructions (e.g. Security Guide, Security Classification Guide) attached?

A Security Guide or Security Classification Guide is used in conjunction with the SRCL to identify additional security requirements which do not appear in the SRCL, and/or to offer clarification to specific areas of the SRCL.

16. Procurement Officer

This block is to be signed by the procurement officer acting as the contract or subcontract manager.

17. Contracting Security Authority

This block is to be signed by the Contract Security Official. Where PWGSC is the Contract Security Authority, Canadian and International Industrial Security Directorate (CIISD) will complete this block.

Instructions pour établir la Liste de vérification des exigences relatives à la sécurité (LVERS)

La feuille d'instructions devrait rester jointe au formulaire jusqu'à ce que la case 17 ait été remplie.

GÉNÉRALITÉS - TRAITEMENT DU PRÉSENT FORMULAIRE

Le responsable du projet doit faire remplir ce formulaire.

L'agent de sécurité de l'organisation doit revoir et approuver les exigences de sécurité qui figurent dans le formulaire, en collaboration avec le responsable du projet.

Le responsable de la sécurité des marchés est le responsable chargé de voir à ce que les fournisseurs se conforment aux exigences de sécurité mentionnées dans la LVERS.

Toutes les demandes d'achat ainsi que tous les appels d'offres et les documents contractuels subséquents, y compris les contrats de sous-traitance, qui comprennent des exigences relatives à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS doivent être accompagnés d'une LVERS dûment remplie.

Il importe d'indiquer si les renseignements ou les biens PROTÉGÉS sont de niveau A, B ou C, le cas échéant; cependant, certains types de renseignements peuvent être indiqués par la mention « PROTÉGÉ » seulement. Aucun renseignement relatif à un contrat gouvernemental PROTÉGÉ ou CLASSIFIÉ ne peut être divulgué par les fournisseurs sans l'approbation écrite préalable de la personne dont le nom figure à la case 17 de ce formulaire.

La classification assignée à un stade particulier du processus contractuel ne signifie pas que tout ce qui se rapporte à ce stade doit recevoir la même classification. Chaque article doit être PROTÉGÉ et/ou CLASSIFIÉ selon sa propre nature. Si un fournisseur ne sait pas quel niveau de classification assigner, il doit consulter la personne dont le nom figure à la case 17 de ce formulaire.

PARTIE A - INFORMATION CONTRACTUELLE

Numéro du contrat (au haut du formulaire)

Ce numéro doit être le même que celui utilisé sur la demande d'achat et services et devrait être celui utilisé dans la DDP ou dans le contrat. Il s'agit d'un numéro unique (c.-à-d. que le même numéro ne sera pas attribué à deux besoins distincts). Une nouvelle LVERS doit être utilisée pour chaque nouveau besoin ou demande (p. ex. un nouveau numéro de contrat, une nouvelle LVERS, de nouvelles signatures).

1. Ministère ou organisme gouvernemental d'origine

Inscrire le nom du ministère ou de l'organisme client ou le nom de l'entrepreneur principal pour qui les travaux sont effectués.

2. Direction générale ou Direction

Cette case peut servir à fournir plus de détails quant à la section du ministère ou de l'organisme pour qui les travaux sont effectués.

3. a) Numéro du contrat de sous-traitance

S'il y a lieu, ce numéro correspond au numéro généré par l'entrepreneur principal pour gérer le travail avec son sous-traitant.

b) Nom et adresse du sous-traitant

Indiquer le nom et l'adresse au complet du sous-traitant, s'il y a lieu.

4. Brève description du travail

Donner un bref aperçu du besoin ou du travail à exécuter.

5. a) Le fournisseur aura-t-il accès à des marchandises contrôlées?

La *Loi sur la production de défense* (LPD) définit « marchandises contrôlées » comme désignant certains biens énumérés dans la Liste des marchandises d'exportation contrôlée, un règlement établi en vertu de la *Loi sur les licences d'exportation et d'importation* (LLEI). Les fournisseurs qui examinent, possèdent ou transfèrent des marchandises contrôlées à l'intérieur du Canada doivent s'inscrire à la Direction des marchandises contrôlées ou être exemptés de l'inscription. On trouvera plus d'information à l'adresse www.cgp.gc.ca.

b) 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?

L'entrepreneur et tout sous-traitant doivent être accrédités en vertu du Programme mixte d'agrément Etats-Unis / Canada si le travail comporte l'accès à des données militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques. On trouvera plus d'information à l'adresse www.dlis.dla.mil/jcp/.

6. Indiquer le type d'accès requis

Indiquer la nature du travail à exécuter pour répondre à ce besoin. L'utilisateur doit choisir un des types suivants :

a) Le fournisseur et ses employés auront-ils accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS?

Le fournisseur choisit cette option s'il doit avoir accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS pour accomplir le travail requis.

b) 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.

Le fournisseur choisit cette option seulement s'il doit avoir accès régulièrement aux locaux du gouvernement ou à un lieu de travail protégé. Le fournisseur n'aura pas accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS en vertu de cette option.

c) S'agit-il d'un contrat de messagerie ou de livraison commerciale sans entreposage de nuit?

Le fournisseur choisit cette option s'il y a nécessité de recourir à un service de messagerie ou de livraison commerciale. Le fournisseur ne sera pas autorisé à garder un colis pendant la nuit. Le colis doit être retourné s'il ne peut pas être livré.

7. Type d'information / Restrictions relatives à la diffusion / Niveau d'information

Indiquer le ou les types d'information auxquels le fournisseur peut devoir avoir accès, énumérer toutes les restrictions possibles relatives à la diffusion, et, s'il y a lieu, indiquer le ou les niveaux d'information. L'utilisateur peut faire plusieurs choix selon la nature du travail à exécuter.

Les ministères doivent soumettre la LVERS à TPSGC lorsque:

- les marchés prévoient l'accès aux renseignements et aux biens de nature PROTÉGÉS et/ou CLASSIFIÉS étrangers ;
- les marchés prévoient aux entrepreneurs étrangers l'accès aux renseignements et aux biens de nature PROTÉGÉS et/ou CLASSIFIÉS canadiens; ou
- les marchés prévoient aux entrepreneurs étrangers ou canadiens l'accès aux renseignements et aux biens de nature PROTÉGÉS et/ou CLASSIFIÉS tels que définis dans les documents intitulés Moyens INFOSEC détermination et Divulgateion de INFOSEC.

a) Indiquer le type d'information auquel le fournisseur devra avoir accès

Renseignements et/ou biens du gouvernement canadien

Si des renseignements et/ou des biens canadiens sont indiqués, le fournisseur aura accès à des renseignements et/ou à des biens PROTÉGÉS et/ou CLASSIFIÉS appartenant au gouvernement canadien.

Renseignements et/ou biens de l'OTAN

Si des renseignements et/ou des biens de l'OTAN sont indiqués, cela signifie que, dans le cadre de ce besoin, le fournisseur aura accès à des renseignements et/ou à des biens PROTÉGÉS et/ou CLASSIFIÉS appartenant à des gouvernements membres de l'OTAN. Les renseignements et/ou les biens de l'OTAN sont élaborés par des pays de l'OTAN ou leur appartiennent et ne doivent être divulgués à aucun pays qui n'est pas un pays membre de l'OTAN. Les personnes qui manient des renseignements et/ou des biens de l'OTAN doivent détenir une autorisation de sécurité de l'OTAN et avoir besoin de savoir.

Les contrats comportant des renseignements CLASSIFIÉS de l'OTAN doivent être attribués par TPSGC. La DSICI de TPSGC est le responsable de la sécurité désigné relativement aux questions de sécurité industrielle au Canada.

Renseignements et/ou biens de gouvernements étrangers

Si des renseignements et/ou des biens de gouvernements étrangers sont indiqués, ce besoin permettra l'accès à des renseignements et/ou à des biens appartenant à un pays autre que le Canada.

b) Restrictions relatives à la diffusion

Si **À ne pas diffuser** est choisi, cela indique que les renseignements et/ou les biens sont **réservés aux Canadiens**. Seuls des fournisseurs canadiens installés au Canada peuvent soumissionner ce genre de besoin. NOTA : Si des renseignements et/ou des biens du gouvernement canadien coexistent avec des renseignements et/ou des biens réservés aux Canadiens, ceux-ci doivent porter la mention **Réservé aux Canadiens**.

Si **Aucune restriction relative à la diffusion** est choisi, cela indique que l'accès aux renseignements et/ou aux biens n'est assujéti à aucune restriction.

Si **Tous les pays de l'OTAN** est choisi, les soumissionnaires doivent appartenir à un pays membre de l'OTAN.

NOTA : Il peut y avoir plus d'une restriction s'appliquant à une demande, selon la nature des travaux à exécuter. Pour ce genre de contrat, un guide de sécurité doit être joint à la LVERS afin de clarifier les restrictions. Ce guide est généralement préparé par le chargé de projet et/ou le responsable de la sécurité de l'organisme.

c) Niveau d'information

À l'aide du tableau ci-dessous, indiquer le niveau approprié d'accès aux renseignements et/ou aux biens que le fournisseur doit avoir pour accomplir les travaux requis.

PROTÉGÉ	CLASSIFIÉ	NATO
PROTÉGÉ A	CONFIDENTIEL	NATO NON CLASSIFIÉ
PROTÉGÉ B	SECRET	NATO DIFFUSION RESTREINTE
PROTÉGÉ C	TRÈS SECRET	NATO CONFIDENTIEL
	TRÈS SECRET (SIGINT)	NATO SECRET
		COSMIC TRÈS SECRET

8. Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS?

Si la réponse est Oui, les membres du personnel du fournisseur qui doivent avoir accès à des renseignements ou à des biens COMSEC doivent participer à une séance d'information COMSEC. Cette séance sera donnée au « détenteur autorisé » des renseignements ou des biens COMSEC. Dans le cas des contrats du type « personnel affecté », cette séance sera donnée par le ministère client. Lorsque le fournisseur doit recevoir et conserver, dans ses locaux, des renseignements ou des biens COMSEC, le responsable de la garde des renseignements ou des biens COMSEC de l'entreprise donnera la séance d'information COMSEC aux membres du personnel qui doivent avoir accès à des renseignements ou à des biens COMSEC.

9. Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate?

Si la réponse est Oui, le fournisseur doit indiquer le titre abrégé du document, le numéro du document et le niveau de sensibilité. L'accès à des renseignements ou à des biens extrêmement délicats INFOSEC exigera que le fournisseur fasse l'objet d'une vérification Participation, contrôle et influence étrangers (PCIE) effectuée par la DSICI.

PARTIE B - PERSONNEL (FOURNISSEUR)

10. a) Niveau de contrôle de la sécurité du personnel requis

Indiquer le niveau d'autorisation de sécurité que le personnel doit détenir pour avoir accès aux renseignements, aux biens ou au site du client. Selon la nature du travail, il peut y avoir plus d'un niveau de sécurité. Veuillez noter que des cotes de sécurité sont accordées pour l'accès à des sites particuliers, selon des dispositions antérieures prises auprès du Secrétariat du Conseil du Trésor du Canada. La cote de sécurité donnant accès à un site s'applique uniquement aux personnes et n'est liée à aucune autre autorisation de sécurité accordée à des personnes ou à des organismes.

COTE DE FIABILITÉ	CONFIDENTIEL	SECRET
TRÈS SECRET	TRÈS SECRET (SIGINT)	NATO CONFIDENTIEL
NATO SECRET	COSMIC TRÈS SECRET	ACCÈS AUX EMBLEMES

Si plusieurs niveaux d'autorisation de sécurité sont indiqués, un guide de classification de sécurité doit être fourni.

b) Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail?

Si la réponse est Oui, cela veut dire que certaines tâches ne sont pas PROTÉGÉES et/ou CLASSIFIÉES et peuvent être exécutées à l'extérieur d'un environnement sécurisé par du personnel n'ayant pas d'autorisation de sécurité. Il faut répondre à la question suivante si l'on a recours à du personnel n'ayant pas d'autorisation de sécurité :

Le personnel n'ayant pas d'autorisation de sécurité sera-t-il escorté?

Si la réponse est Non, le personnel n'ayant pas d'autorisation de sécurité ne pourra pas avoir accès à des lieux de travail dont l'accès est réglementé ni à des renseignements et/ou à des biens PROTÉGÉS et/ou CLASSIFIÉS.

Si la réponse est Oui, le personnel n'ayant pas d'autorisation de sécurité devra être escorté par une personne détenant la cote de sécurité requise, pour faire en sorte que le personnel en question n'ait pas accès à des renseignements et/ou à des biens PROTÉGÉS et/ou CLASSIFIÉS sur les lieux de travail.

PARTIE C - MESURES DE PROTECTION (FOURNISSEUR)

11. RENSEIGNEMENTS / BIENS :

a) Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS?

Si la réponse est Oui, préciser, à l'aide du tableau récapitulatif, le niveau de sécurité des documents ou de l'équipement que le fournisseur devra protéger dans ses installations.

b) Le fournisseur sera-t-il tenu de protéger des renseignements ou des biens COMSEC?

Si la réponse est Oui, préciser, à l'aide du tableau récapitulatif, le niveau de sécurité des renseignements ou des biens COMSEC que le fournisseur devra protéger dans ses installations.

PRODUCTION

c) Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ?

Préciser, à l'aide du tableau récapitulatif, le niveau de sécurité du matériel que le fournisseur fabriquera, réparera et/ou modifiera et devra protéger dans ses installations.

TECHNOLOGIE DE L'INFORMATION (TI)

d) 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?

Si la réponse est Oui, préciser le niveau de sécurité à l'aide du tableau récapitulatif. Cette case porte sur les renseignements qui seront traités ou produits électroniquement et stockés dans un système informatique. Le ministère/organisme client devra préciser les exigences en matière de sécurité de la TI relativement à cet achat dans un document technique distinct. Le fournisseur devra également consulter le document suivant : Secrétariat du Conseil du Trésor du Canada – Norme opérationnelle de sécurité : Gestion de la sécurité des technologies de l'information (GSTI).

e) Y aura-t-il un lien électronique entre les systèmes informatiques du fournisseur et celui du ministère ou de l'agence gouvernementale?

Si la réponse est Oui, le fournisseur doit faire approuver ses systèmes informatiques. Le ministère client doit aussi fournir les critères de connectivité qui décrivent en détail les conditions et le niveau de sécurité relativement au lien électronique (habituellement pas plus haut que le niveau PROTÉGÉ B).

TABLEAU RÉCAPITULATIF

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.

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.

PROTÉGÉ	CLASSIFIÉ	NATO	COMSEC
PROTÉGÉ A	CONFIDENTIEL	NATO DIFFUSION RESTREINTE	PROTÉGÉ A
PROTÉGÉ B	SECRET	NATO CONFIDENTIEL	PROTÉGÉ B
PROTÉGÉ C	TRÈS SECRET	NATO SECRET	PROTÉGÉ C
	TRÈS SECRET (SIGINT)	COSMIC TRÈS SECRET	CONFIDENTIEL
			SECRET
			TRÈS SECRET

12. a) La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE?

Si la réponse est Oui, classifier le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de

sécurité » au haut et au bas du formulaire.

b) La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE?

Si la réponse est Oui, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire et indiquer qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).

PARTIE D - AUTORISATION

13. Chargé de projet de l'organisme

Cette case doit être remplie et signée par le chargé de projet pertinent (c.-à-d. la personne qui est responsable de ce projet ou qui connaît le besoin au ministère ou à l'organisme client. On peut, à l'occasion, communiquer avec cette personne pour clarifier des renseignements figurant sur le formulaire.

14. Responsable de la sécurité de l'organisme

Cette case doit être signée par l'agent de la sécurité du ministère (ASM) du ministère indiqué à la case 1 ou par son remplaçant ou par le responsable de la sécurité du fournisseur.

15. Des instructions supplémentaires (p. ex. Guide de sécurité, Guide de classification de la sécurité) sont-elles jointes?

Un Guide de sécurité ou un Guide de classification de sécurité sont utilisés de concert avec la LVERS pour faire part d'exigences supplémentaires en matière de sécurité qui n'apparaissent pas dans la LVERS et/ou pour éclaircir certaines parties de la LVERS.

16. Agent d'approvisionnement

Cette case doit être signée par l'agent des achats qui fait fonction de gestionnaire du contrat ou du contrat de sous-traitance.

17. Autorité contractante en matière de sécurité

Cette case doit être signée par l'agent de la sécurité du marché. Lorsque TPSGC est le responsable de la sécurité du marché, la Direction de la sécurité industrielle canadienne et internationale (DSICI) doit remplir cette case.