Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

INVITATION TO TENDER

RETURN BIDS TO:

Bid Receiving / Agriculture and Agri-Food Canada

Agriculture and Agri-Food Canada
Eastern Service Centre
Tender Receiving Unit
2001 University Street., Suite 671-TEN
Montréal, Quebec
H3A 3N2

TENDER TO:

Agriculture and Agri-Food Canada
We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the construction listed herein and on any attached sheets at the price(s) set out therefor.

Comments

ISSUING OFFICE

Agriculture and Agri-Food Canada
Eastern Service Centre
Tender Receiving Unit
2001 University Street., Suite 671-TEN
Montréal, Quebec
H3A 3N2

Title: NEW FUME HOOD INSTALLATION IN A LABORATORY SPACE	
Solicitation No.: 01B46-15-0036	Date: 2015-05-22
Client Reference No.	
File No.: 01B46-15-0036	
Solicitation Closes: Monday, June 8, 2015, at 02:00 PM, EDT.	
F.O.B: ◯ Plant ◉ Destination ◯ Other	
Address Enquiries to: Samuel Archambault	
Title: Contracting Officer	
Email: samuel.archambault@agr.gc.ca	
Telephone Number: 514 315-6139 Ext.	Fax Number: 514 283-3143
Destination: Agriculture and Agri-Food Canada 4890 Victoria Ave N, Vineland Station, ON L0R 2E0	

Instructions: See Herein

Delivery Required: September 30th, 2015	Delivery Offered
Vendor / Firm Name and Address	
Telephone Number Ext.	Fax Number
Name and title of person authorized to sign on behalf of Vendor / Firm (type or print) Signature	Date

Canada

TABLE OF CONTENTS

Appendix "A"

GENERAL INSTRUCTIONS TO BIDDERS

GENERAL INSTRUCTIONS TO BIDDERS

GI01 COMPLETION OF BID

1) The bid shall be:

   (a) submitted on the BID AND ACCEPTANCE FORM provided by AAFC with the bid package or on a clear and legible reproduced copy of such BID AND ACCEPTANCE FORM that must be identical in content and format to the BID AND ACCEPTANCE FORM provided by AAFC;

   (b) based on the Bid Documents listed in the Special Instructions to Bidders;

   (c) correctly completed in all respects;

   (d) signed, with an original signature, by a duly authorized representative of the Bidder; and

   (e) accompanied by

      (i) bid security as specified in GI07; and
      (ii) any other document or documents specified elsewhere in the solicitation where it is stipulated that said documents are to accompany the bid.

2) Subject to paragraph 6) of GI10, any alteration to the pre-printed or pre-typed sections of the Bid and Acceptance Form, or any condition or qualification placed upon the bid shall be cause for disqualification. Alterations, corrections, changes or erasures made to statements or figures entered on the Bid and Acceptance Form by the Bidder shall be initialed by the person or persons signing the bid. Alterations, corrections, changes or erasures that are not initialed shall be deemed void and without effect.

3) Unless otherwise noted elsewhere in the Bid Documents, facsimile copies of bids are not acceptable.

GI02 IDENTITY OR LEGAL CAPACITY OF THE BIDDER

1) In order to confirm the authority of the person or persons signing the bid or to establish the legal capacity under which the Bidder proposes to enter into Contract, any Bidder who carries on business in other than its own personal name shall, if requested by Canada, provide satisfactory proof of

   (a) such signing authority; and

   (b) the legal capacity under which it carries on business;

   prior to contract award. Proof of signing authority may be in the form of a certified copy of a resolution naming the signatory(ies) that is (are) authorized to sign this bid on behalf of the corporation or partnership. Proof of legal capacity may be in the form of a copy of the articles of incorporation or the registration of the business name of a sole proprietor or partnership.

GI03 APPLICABLE TAXES

1) "Applicable Taxes" means the Goods and Services Tax (GST), the Harmonized Sales Tax (HST), and any provincial tax, by law, payable by Canada such as, the Quebec Sales Tax (QST) as of April 1, 2013.

GI04 CAPITAL DEVELOPMENT AND REDEVELOPMENT CHARGES

1) For the purposes of GC1.8 LAWS, PERMITS AND TAXES in the General Conditions of the Contract, only fees or charges directly related to the processing and issuing of building permits shall be included. The Bidder shall not include any monies in the bid amount for special municipal development, redevelopment or other fees or charges which a municipal authority may seek as a prerequisite to the issuance of building permits.

GI05 REGISTRY AND PRE-QUALIFICATION OF FLOATING PLANT

1) Dredges or other floating plant to be used in the performance of the Work must be of Canadian registry. For dredges or other floating plant that are not of Canadian make or manufacture, the Bidder must obtain a certificate of qualification from Industry Canada and this certificate must accompany the bid. Plant so qualified by Industry Canada may be accepted on this project.

GI06 LISTING OF SUBCONTRACTORS AND SUPPLIERS

1) Notwithstanding any list of Subcontractors that the Bidder may be required to submit as part of the bid, the Bidder shall, within 48 hours of receipt of a notice to do so, submit all information requested in the said notice including the names of Subcontractors and Suppliers for the part or parts of the Work listed. Failure to do so shall result in the disqualification of its bid.

GI07 BID SECURITY REQUIREMENTS

1) The Bidder shall submit bid security with the bid in the form of a bid bond or a security deposit in an amount that is equal to not less than 10 percent of the bid amount. Applicable Taxes shall not be included when calculating the amount of any bid security that may be required. The maximum amount of bid security required with any bid is $2,000,000.00.

2) A bid bond shall be in an approved form http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=14494&section=text#appS, properly completed, with original signature(s) and issued by an approved company whose bonds are acceptable to Canada either at the time of solicitation closing or as identified in Treasury Board Appendix L: Acceptable Bonding Companies.

3) A security deposit shall be an original, properly completed, signed where required and be either:

   (a) a bill of exchange, bank draft or money order made payable to the Receiver General for Canada and certified by an approved financial institution or drawn by an approved financial institution on itself; or

   (b) bonds of, or unconditionally guaranteed as to principal and interest by, the Government of Canada;

4) For the purposes of subparagraph 3) (a) of GI07

   (a) a bill of exchange is an unconditional order in writing signed by the Bidder 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;

   (b) if a bill of exchange, bank draft or money order is certified by or drawn on an institution or corporation other than a chartered bank, it must be accompanied by proof that the said institution or corporation meets at least one of the criteria described in subparagraph 4.c. of GI07, either by letter or by a stamped certification on the bill of exchange, bank draft or money; and

   (c) An approved financial institution is:
      (i) a corporation or institution that is a member of the Canadian Payments Association as defined in the Canadian Payments Act;
      (ii) a corporation that accepts deposits that are insured, to the maximum permitted by law, by the Canada Deposit Insurance Corporation or the "Autorité des marchés financiers";
      (iii) a corporation that accepts deposits from the public if repayment of the deposit is guaranteed by Her Majesty the Queen in right of a province;
      (iv) a corporation, association or federation incorporated or organized as a credit union or co-operative credit society that conforms to the requirements of a credit union which are more particularly described in paragraph 137(6) of the Income Tax Act; or
      (v) Canada Post Corporation.

5) Bonds referred to in subparagraph 3)(b) of GI07 shall be provided on the basis of their market value current at the date of solicitation closing, and shall be:

   (a) payable to bearer;

   (b) 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

   (c) 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.

6) As an alternative to a security deposit an irrevocable standby letter of credit is acceptable to Canada and the amount shall be determined in the same manner as a security deposit referred to above.

7) An irrevocable standby letter of credit referred to in paragraph 6) of GI07 shall

(a) be an arrangement, however named or described, whereby a financial institution (the "Issuer") acting at the request and on the instructions of a customer (the "Applicant) or on its own behalf,

(i) is to make a payment to, or to the order of, the Receiver General for Canada as the beneficiary;

(ii) is to accept and pay bills of exchange drawn by the Receiver General for Canada;

(iii) authorizes another financial institution to effect such payment or accept and pay such bills of exchange; or

(iv) authorizes another financial institution to negotiate against written demand(s) for payment provided that the terms and conditions of the letter of credit are complied with;

(b) state the face amount which may be drawn against it;

(c) state its expiry date;

(d) provide for sight payment to the Receiver General for Canada by way of the financial institution's draft against presentation of a written demand for payment signed by the Departmental Representative identified in the letter of credit by his/her office;

(e) provide that more than one written demand for payment may be presented subject to the sum of those demands not exceeding the face value of the letter of credit;

(f) provide that it is subject to the International Chamber of Commerce (ICC) Uniform Customs and Practice (UCP) for Documentary Credits, 2007 Revision, ICC Publication No. 600; pursuant to the ICC UCP; a credit is irrevocable even if there is no indication to that effect; and

(g) be issued or confirmed, in either official language, by a financial institution which is a member of the Canadian Payments Association and is on the letterhead of the Issuer or Confirmer. The format is left to the discretion of the Issuer or Confirmer.

8) Bid security shall lapse or be returned as soon as practical following:

(a) the solicitation closing date, for those Bidders submitting non-compliant bids; and

(b) the administrative bid review, for those Bidders submitting compliant bids ranked fourth to last on the schedule of bids; and

(c) the award of contract, for those Bidders submitting the second and third ranked bids; and

(d) the receipt of contract security, for the successful Bidder; or

(e) the cancellation of the solicitation, for all Bidders.

9) Notwithstanding the provisions of paragraph 8) of GI07 and provided more than three compliant bids have been received, if one or more of the bids ranked third to first is withdrawn or rejected

for whatever reason then Canada reserves the right to hold the security of the next highest ranked compliant bid in order to retain the bid security of at least three valid and compliant bids.

GI08 SUBMISSION OF BID

1) The Bid and Acceptance Form, duly completed, and the bid security shall be enclosed and sealed in an envelope provided by the Bidder, and shall be addressed and submitted to the office designated on the INVITATION TO TENDER Form for the receipt of bids. The bid must be received on or before the date and time set for solicitation closing.

2) Unless otherwise specified in the Special Instructions to Bidders

   (a) the bid shall be in Canadian currency;

   (b) exchange rate fluctuation protection is not offered; and

   (c) any request for exchange rate fluctuation protection shall not be considered.

3) Prior to submitting the bid, the Bidder shall ensure that the following information is clearly printed or typed on the face of the bid envelope:

   (a) Solicitation Number;

   (b) Name of Bidder;

   (c) Return address; and

   (d) Closing Date and Time.

4) Timely and correct delivery of bids is the sole responsibility of the Bidder.

GI09 REVISION OF BID

1) A bid submitted in accordance with these instructions may be revised by letter or facsimile provided the revision is received at the office designated for the receipt of bids, on or before the date and time set for the closing of the solicitation. The letter or facsimile shall be on the Bidder's letterhead or bear a signature that identifies the Bidder;

2) A revision to a bid that includes unit prices must clearly identify the changes(s) in the unit price(s) and the specific item(s) to which each change applies.

3) A letter or facsimile submitted to confirm an earlier revision shall be clearly identified as a confirmation.

4) Failure to comply with any of the above provisions shall result in the rejection of the non-compliant revision(s) only. The bid shall be evaluated based on the original bid submitted and all other compliant revision(s).

GI10 REJECTION OF BID

1) Canada may accept any bid, whether it is the lowest or not, or may reject any or all bids.

2) Without limiting the generality of paragraph 1) of GI10, Canada may reject a bid if any of the following circumstances is present:

(a) the Bidder, or any employee or subcontractor included as part of the bid, has been convicted under Section 121 ("Frauds on the government" & "Contractor subscribing to election fund"), 124 "Selling or purchasing office"), 380 ("Fraud committed against Her Majesty") or 418 ("Selling defective stores to Her Majesty") of the Criminal Code of Canada, or under paragraph 80(1)(d) ("False entry, certificate or return"), subsection 80(2) ("Fraud against Her Majesty") or Section 154.01 ("Fraud against Her Majesty") of the *Financial Administration Act*;

(b) the Bidder's bidding privileges are suspended or are in the process of being suspended;

(c) the bidding privileges of any employee or subcontractor included as part of the bid are suspended or are in the process of being suspended, which suspension or pending suspension would render that employee or subcontractor ineligible to bid on the Work, or the portion of the Work the employee or subcontractor is to perform;

(d) the Bidder is bankrupt, or where for whatever reason, its activities are rendered inoperable for an extended period;

(e) evidence, satisfactory to Canada, of fraud, bribery, fraudulent misrepresentation or failure to comply with any law protecting individuals against any manner of discrimination, has been received with respect to the Bidder, any of its employees or any subcontractor included as part of its bid;

(f) evidence satisfactory to Canada that based on past conduct or behavior, the Bidder, a sub-contractor or a person who is to perform the Work is unsuitable or has conducted himself/herself improperly;

(g) with respect to current or prior transactions with Canada
  (i) Canada has exercised, or intends to exercise, the contractual remedy of taking the work out of the contractor's hands with respect to a contract with the Bidder, any of its employees or any subcontractor included as part of its bid; or
  (ii) Canada determines that the Bidder's performance on other contracts is sufficiently poor to jeopardize the successful completion of the requirement being bid on.

3) In assessing the Bidder’s performance on other contracts pursuant to subparagraph 2)(g)(ii)of GI10, Canada may consider, but not be limited to, such matters as:

(a) the quality of workmanship in performing the Work;

(b) the timeliness of completion of the Work;

(c) the overall management of the Work and its effect on the level of effort demanded of the department and its representative; and

(d) the completeness and effectiveness of the Contractor’s safety program during the performance of the Work.

4) Without limiting the generality of paragraphs 1), 2) and 3) of GI10, Canada may reject any bid based on an unfavourable assessment of the:

(a) adequacy of the bid price to permit the work to be carried out and, in the case of a bid

providing prices per unit or a combination of lump sum and prices per unit, whether each such price reasonably reflects the cost of performing the part of the work to which that price applies;

(b) Bidder's ability to provide the necessary management structure, skilled personnel, experience and equipment to perform competently the work under the Contract; and

(c) Bidder's performance on other contracts.

5) Where Canada intends to reject a bid pursuant to a provision of paragraphs 1), 2), 3) or 4) of GI10, other than subparagraph 2)(g)of IT10, the contracting authority will inform the Bidder and provide the Bidder ten (10) days within which to make representations, before making a final decision on the bid rejection.

6) Canada may waive informalities and minor irregularities in bids received if Canada determines that the variation of the bid from the exact requirements set out in the Bid Documents can be corrected or waived without being prejudicial to other Bidders.

GI11 BID COSTS

1) No payment will be made for costs incurred in the preparation and submission of a bid in response to the bid solicitation. Costs associated with preparing and submitting a bid, as well as any costs incurred by the Bidder associated with the evaluation of the bid, are the sole responsibility of the Bidder.

GI12 COMPLIANCE WITH APPLICABLE LAWS

1) By submission of a bid, the Bidder certifies that the Bidder has the legal capacity to enter into a contract and is in possession of all valid licences, permits, registrations, certificates, declarations, filings, or other authorizations necessary to comply with all federal, provincial and municipal laws and regulations applicable to the submission of the bid and entry into any ensuing contract for the performance of the work.

2) For the purpose of validating the certification in paragraph 1) of GI12, a Bidder shall, if requested, provide a copy of every valid licence, permit, registration, certificate, declaration, filing or other authorization listed in the request, and shall provide such documentation within the time limit(s) set out in the said request.

3) Failure to comply with the requirements of paragraph 2) of GI12 shall result in disqualification of the bid.

GI13 APPROVAL OF ALTERNATIVE MATERIALS

1) When materials are specified by trade names or trademarks, or by manufacturers' or suppliers' names, the bid shall be based on use of the named materials. During the solicitation period, alternative materials may be considered provided full technical data is received in writing by the Contracting Officer at least 10 calendar days prior to the solicitation closing date.

GI14 CONFLICT OF INTEREST - UNFAIR ADVANTAGE

1) In order to protect the integrity of the procurement process, bidders are advised that Canada may reject a bid in the following circumstances:

(a) if the Bidder, any of its subcontractors, any of their respective employees or former employees was involved in any manner in the preparation of the bid solicitation or in any situation of conflict of interest or appearance of conflict of interest;

(b) if the Bidder, any of its subcontractors, any of their respective employees or former employees had access to information related to the bid solicitation that was not available to other bidders and that would, in Canada's opinion, give or appear to give the Bidder an unfair advantage.

2) The experience acquired by a bidder who is providing or has provided the goods and services described in the bid solicitation (or similar goods or services) will not, in itself, be considered by Canada as conferring an unfair advantage or creating a conflict of interest. This bidder remains however subject to the criteria established above.

3) Where Canada intends to reject a bid under this section, the Contracting Authority will inform the Bidder and provide the Bidder an opportunity to make representations before making a final decision. Bidders who are in doubt about a particular situation should contact the Contracting Authority before bid closing. By submitting a bid, the Bidder represents that it does not consider itself to be in conflict of interest nor to have an unfair advantage. The Bidder acknowledges that it is within Canada's sole discretion to determine whether a conflict of interest, unfair advantage or an appearance of conflict of interest or unfair advantage exists.

Appendix "B"

SPECIAL INSTRUCTIONS TO BIDDERS

SPECIAL INSTRUCTIONS TO BIDDERS (SI)

SI01 BID DOCUMENTS

1) The following are the bid documents:

(a) INVITATION TO TENDER - Page 1 form AAFC / AAC5323-E;
(b) SPECIAL INSTRUCTIONS TO BIDDERS form AAFC / AAC5301-E;
(c) GENERAL INSTRUCTIONS TO BIDDERS form AAFC / AAC5313-E;
(d) Clauses and Conditions identified in “CONTRACT DOCUMENTS”;
(e) Drawings and Specifications;
(f) BID AND ACCEPTANCE form AAFC / AAC5320-E and any Appendices attached thereto; and,
(g) Any amendment issued prior to solicitation closing.

Submission of a bid constitutes acknowledgement that the Bidder has read and agrees to be bound by these documents.

SI02 ENQUIRIES DURING THE SOLICITATION PERIOD

1) Enquiries regarding this bid must be submitted in writing to the Contracting Officer named on the INVITATION TO TENDER - Page 1 as early as possible within the solicitation period. Except for the approval of alternative materials as described in GI13 of the GENERAL INSTRUCTIONS TO BIDDERS, enquiries should be received no later than five (5) calendar days prior to the date set for solicitation closing to allow sufficient time to provide a response. Enquiries received after that time may not result in an answer being provided.

2) To ensure consistency and quality of the information provided to Bidders, the Contracting Officer shall examine the content of the enquiry and shall decide whether or not to issue an amendment.

3) All enquiries and other communications related to this bid sent throughout the solicitation period are to be directed ONLY to the Contracting Officer named on the INVITATION TO TENDER - Page 1. Non-compliance with this requirement during the solicitation period can, for that reason alone, result in disqualification of a bid.

SI03 NON-MANDATORY SITE VISIT

1) There will be a site visit on Thursday, May, 28 , 2015 at 02:30 ○ AM ◉ PM EDT.

Interested bidders are to meet at:

Agriculture and Agri-Food Canada
4890 Victoria Ave N,
Vineland Station, ON
L0R 2E0

SI04 REVISION OF BID

1) A bid may be revised by letter or facsimile in accordance with GI09 of the GENERAL INSTRUCTIONS TO BIDDERS. The facsimile number for receipt of revisions is 514 283-3143 .

SI05 BID RESULTS

1) Following bid closing, bid results may be obtained from the bid receiving office by email at samuel.archambault@agr.gc.ca .

SI06 INSUFFICIENT FUNDING

1) In the event that the lowest compliant bid exceeds the amount of funding allocated for the Work, Canada in its sole discretion may:
   (a) cancel the solicitation; or
   (b) obtain additional funding and award the Contract to the Bidder submitting the lowest compliant bid; and/or
   (c) negotiate a reduction in the bid price and/or scope of work of not more than 15% with the Bidder submitting the lowest compliant bid. Should an agreement satisfactory to Canada not be reached, Canada shall exercise option (a) or (b).

SI07 BID VALIDITY PERIOD

1) Canada reserves the right to seek an extension to the bid validity period prescribed in Clause 4 of the BID AND ACCEPTANCE Form. Upon notification in writing from Canada, Bidders shall have the option to either accept or reject the proposed extension.

2) If the extension referred to in paragraph 1) of SI07 is accepted, in writing, by all those who submitted bids, then Canada shall continue immediately with the evaluation of the bids and its approvals processes.

3) If the extension referred to in paragraph 1) of SI07 is not accepted in writing by all those who submitted bids then Canada shall, at its sole discretion, either:
   (a) continue to evaluate the bids of those who have accepted the proposed extension and seek the necessary approvals; or
   (b) cancel the invitation to bid.

4) The provisions expressed herein do not in any manner limit Canada's rights in law or under GI10 of the GENERAL INSTRUCTIONS TO BIDDERS.

SPECIAL INSTRUCTIONS TO BIDDERS (Continued)

SI08 CONSTRUCTION DOCUMENTS

1) The successful contractor will be provided with one paper copy of the sealed and signed plans, the specifications and the amendments upon acceptance of the offer. Additional copies, up to a maximum of one (1), will be provided free of charge upon request by the Contractor. Obtaining more copies shall be the responsibility of the Contractor including costs.

SI09 WEB SITES

The connection to some of the Web sites in the solicitation documents is established by the use of hyperlinks. The following is a list of the addresses of the Web sites:

Treasury Board Appendix L, Acceptable Bonding Companies
http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=14494&section=text#appL

Canadian economic sanctions
http://www.international.gc.ca/sanctions/index.aspx?lang=eng

SI10 PERSONNEL SECURITY REQUIREMENTS

1) The successful Bidder's personnel, as well as any subcontractor and its personnel, who are required to perform any part of the work pursuant to the subsequent contract, must meet the following contract security requirements:

- Personnel who are required to perform any part of the work must EACH hold a valid personnel security screening at the level of RELIABILITY STATUS, granted or approved by Agriculture and Agri-Food Canada. Until the security screening of the personnel has been completed satisfactorily by Agriculture and Agri-Food Canada, the Contractor/Subcontractor personnel MAY NOT perform contract work. Each of the proposed staff must complete "Security Clearance Form" (TBS 330-23E) upon request from Canada.

Appendix "C"

BID AND ACCEPTANCE FORM

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

BID AND ACCEPTANCE FORM

CONSTRUCTION CONTRACT - MAJOR WORKS

BA01 IDENTIFICATION

Description of the Work

Work generally involves installing a new fume hood and ventilation fan in a laboratory space. This includes connection of fume hood to existing building automation system and ventilating devices.

Solicitation Number	File / Project Number
01B46-15-0036	

BA02 BUSINESS NAME AND ADDRESS OF BIDDER

Name

Address

Unit/Suite/Apt.	Street number	Number suffix	Street name	Street type	Street direction

PO Box or Route Number	Municipality (City, Town, etc.)	Province	Postal code

Phone number	Fax number	Email address

BA03 THE OFFER

1) The Bidder offers to Canada as represented by the Minister of Agriculture and Agri-food Canada to perform and complete the Work for the above named project in accordance with the Bid Documents for the Total Bid Amount of:

$ _____ excluding Applicable Taxes (GST/HST/QST).

(to be expressed in numbers only)

BA04 BID VALIDITY PERIOD

1) The bid shall not be withdrawn for a period of 60 days following the date of solicitation closing.

BA05 APPENDICES

1) The following appendices are included in this Bid and Acceptance Form:

☒ Appendix 2

BA06 ACCEPTANCE AND CONTRACT

1) Upon acceptance of the Bidder's offer by Canada, a binding Contract shall be formed between Canada and the resulting Contractor. The documents forming the Contract shall be the contract documents referred to in SC01 CONTRACT DOCUMENTS.

BA07 CONSTRUCTION TIME

1) The Contractor shall perform and complete the Work on or before 2015-09-30

BA08 BID SECURITY

1) The Bidder shall enclose bid security with its bid in accordance with GI07 BID SECURITY REQUIREMENTS.

2) If a security deposit is furnished as bid security, it shall be forfeited in the event that the bid is accepted by Canada and the Contractor fails to provide Contract Security in accordance with GC9 CONTRACT SECURITY, provided that Canada may, if it is in the public interest, waive the right of Canada to forfeiture any or all of the security deposit.

BA09 SIGNATURE		
Name and title of person authorized to sign on behalf of Bidder (type or print)	Name	
	Title	
	Signature	Date
	Name	
	Title	
	Signature	Date

BID AND ACCEPTANCE FORM

CONSTRUCTION CONTRACT - MAJOR WORKS

APPENDIX 2

LIST OF SUBCONTRACTORS

The Bidder will subcontract the parts of the work listed below to the subcontractor named for each part. The Bidder agrees not to make changes in the list of subcontractors without the written consent of the Departmental Representative. The Bidder understands that for each part of the work, if more than one subcontractor is named, or no subcontractor is named, or, the Bidder fails to state that the work will be done by its own forces where applicable, the bid will be subject to disqualification.

LIST OF EQUIPMENT

N/A

LIST OF MATERIALS

N/A

Appendix "D"

MAJOR WORKS - GENERAL CONDITIONS

MAJOR WORKS – GENERAL CONDITIONS

MAJOR WORKS GENERAL CONDITIONS FORM AAFC 5321: Revision Date

GC1 GENERAL PROVISIONS

GC1.1 INTERPRETATION

GC1.1.1 Headings and References

1) The headings in the contract documents, other than those in the drawings and specifications, form no part of the Contract but are inserted for convenience of reference only.

2) A reference made to a part of the Contract by means of numbers preceded by letters is 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.

3) A reference to a paragraph or subparagraph followed by an identifying number, letter or combination thereof is, unless specifically stated otherwise, a reference to the paragraph or subparagraph that forms part of the clause within which the reference is made.

GC1.1.2 Terminology

1) In the Contract

"Applicable Taxes" means the Goods and Services Tax (GST), the Harmonized Sales Tax (HST), and any provincial tax, by law, payable by Canada such as, the Quebec Sales Tax (QST) as of April 1, 2013;

"Canada", “Crown”, “Her Majesty” means Her Majesty the Queen in right of Canada;

"Contract" means the contract documents referred to as such therein and every other document specified or referred to in any of them as forming part of the Contract, all as amended by agreement of the parties;

"Contract Amount" means the amount set out in the Contract to be payable to the Contractor for the Work, subject to the terms and conditions of the Contract, exclusive of Applicable Taxes;

"Contract Security" means any security given by the Contractor to Canada in accordance with the Contract;

"Contractor" means the person contracting with Canada to provide or furnish all labour, Material and Plant for the execution of the Work under the Contract, and includes the Contractor's superintendent as designated in writing to Canada.

"Certificate of Completion" means a certificate issued by Canada when the Work reaches Completion;

"Certificate of Measurement" means a certificate issued by Canada certifying the correctness of the final quantities, prices per unit and values of labour, Plant and Material performed, used and supplied by the Contractor for the construction of the part of the Work to which a Unit Price Arrangement applies;

"Certificate of Substantial Performance" means a certificate issued by Canada when the Work reaches Substantial Performance;

"Departmental Representative" means the person designated in the Contract, or by written notice to the Contractor, to act as the Departmental Representative for the purposes of the Contract, and includes a person, designated and authorized in writing by the Departmental Representative to the Contractor;

"herein", "hereby", "hereof", "hereunder" and similar expressions refer to the Contract as a whole and not to any particular section or part thereof;

"Lump Sum Arrangement" means that part of the Contract that prescribes a lump sum as payment for performance of the Work to which it relates;

"Material" includes all commodities, articles, machinery, equipment, fixtures and things required to be furnished in accordance with the Contract for incorporation into the Work;

"person" also includes, unless there is an express stipulation in the Contract to the contrary, any partnership, proprietorship, firm, joint venture, consortium or corporation;

"Plant" includes all tools, implements, machinery, vehicles, structures, equipment, articles and things that are necessary for the performance of the Contract, other than Material and those tools customarily provided by a tradesperson in practicing a trade;

"Subcontractor" means a person having a direct contract with the Contractor, subject to GC3.6 SUBCONTRACTING, to perform a part or parts of the Work, or to supply Material customized for the Work;

"Superintendent" means the employee or representative of the Contractor designated by the Contractor to act pursuant to GC2.6 SUPERINTENDENT;

"Supplementary Conditions" means the part of the Contract that amends or supplements the General Conditions;

"Supplier" means a person having a direct contract with the Contractor to supply Plant or Material not customized for the Work;

“Total Estimated Cost”, “Revised Estimated Cost”, “Increase (Decrease)” on Page 1 of the Contract or Contract Amendment means an amount used for internal administrative purposes only that comprises the Contract Amount, or the revised Contract Amount, or the amount that would increase or decrease the Contract Amount and the Applicable Taxes as evaluated by the Contracting Authority, and does not constitute tax advice on the part of Canada;

"Unit Price Arrangement" means that part of the Contract that prescribes the product of a price per unit of measurement multiplied by a number of units of measurement for performance of the Work to which it relates;

"Unit Price Table" means the table of prices per unit set out in the Contract;

"Work" means, 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 in accordance with the contract documents; and

“Working Day” means a day other than a Saturday, Sunday, or a statutory holiday that is observed by the construction industry in the area of the place of the Work.

GC1.1.3 Application of Certain Provisions

1) Any 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 Lump Sum Arrangement applies.

2) Any provisions of the Contract that are expressly stipulated to be applicable only to a Lump Sum Arrangement are not applicable to any part of the Work to which a Unit Price Arrangement applies.

GC1.1.4 Substantial Performance

1) The Work shall be considered to have reached Substantial Performance when

   (a) the Work or a substantial part thereof has passed inspection and testing and is, in the opinion of Canada, ready for use by Canada or is being used for the intended purposes; and

   (b) the Work is, in the opinion of Canada, capable of completion or correction at a cost of not more than

      (i) 3 percent of the first $500,000;

      (ii) 2 percent of the next $500,000; and

      (iii) 1 percent of the balance

      of the Contract Amount at the time this cost is calculated.

2) Where the Work or a substantial part thereof is ready for use or is being used for the purposes intended and

(a) the remainder of the Work or a part thereof cannot be completed by the time specified in the Contract, or as amended in accordance with GC6.5 DELAYS AND EXTENSION OF TIME, for reasons beyond the control of the Contractor; or

(b) Canada and the Contractor agree not to complete a part of the Work within the specified time;

the cost of that part of the Work that was either beyond the control of the Contractor to complete or Canada and the Contractor have agreed not to complete by the time specified, shall be deducted from the value of the Contract referred to in subparagraph 1)(b) of GC1.1.4 and the said cost shall not form part of the cost of the Work remaining to be done in determining Substantial Performance.

GC1.1.5 Completion

1) The Work shall be deemed to have reached Completion when all labour, Plant and Material required have been performed, used or supplied, and the Contractor has complied with the Contract and all orders and directions made pursuant thereto, all to the satisfaction of Canada.

GC1.2 CONTRACT DOCUMENTS

GC1.2.1 General

1) The contract documents are complementary, and what is required by any one shall be as binding as if required by all.

2) References in the contract documents to the singular shall be considered to include the plural as the context requires.

3) Nothing contained in the contract documents shall create a contractual relationship between Canada and any Subcontractor or Supplier, their subcontractors or suppliers, or their agents or employees.

GC1.2.2 Order of Precedence

1) In the event of any discrepancy or conflict in the contents of the following documents, such documents shall take precedence and govern in the following order:

(a) any amendment or variation of the contract documents that is made in accordance with the General Conditions;

(b) any amendment issued prior to tender closing;

(c) Supplementary Conditions;

(d) General Conditions;

(e) the duly completed Bid and Acceptance Form when accepted;
(f) drawings and specifications.

later dates shall govern within each of the above categories of documents.

2) In the event of any discrepancy or conflict in the information contained in the drawings and specifications, the following rules shall apply:

   (a) specifications shall govern over drawings;

   (b) dimensions shown in figures on a drawings shall govern where they differ from dimensions scaled from the same drawings; and

   (c) drawings of larger scale govern over those of smaller scale.

GC1.2.3 Security and Protection of Documents and Work

1) The Contractor shall guard and protect contract documents, drawings, information, models and copies thereof, whether supplied by Canada or the Contractor, against loss or damage from any cause.

2) The Contractor shall keep confidential all information provided to the Contractor by or on behalf of Canada in connection with the Work, and all information developed by the Contractor as part of the Work, and shall not disclose any such information to any person without the written permission of Canada, except that the Contractor may disclose to a subcontractor, authorized in accordance with the Contract, information necessary to the performance of a subcontract. This section does not apply to any information that

   (a) is publicly available from a source other than the Contractor; or

   (b) is or becomes known to the Contractor from a source other than Canada, except any source that is known to the Contractor to be under an obligation to Canada not to disclose the information.

3) When the Contract, the Work, or any information referred to in paragraph 2) is identified as top secret, secret, confidential, or protected by Canada, the Contractor shall, at all times, take all measures reasonably necessary for the safeguarding of the material so identified, including such measures as may be further specified elsewhere in the Contract or provided, in writing, from time to time by Canada.

4) Without limiting the generality of paragraphs 2) and 3) of GC1.2.3, when the Contract, the Work, or any information referred to in paragraph 2) is identified as top secret, secret, confidential or protected by Canada, Canada shall be entitled to inspect the Contractor's premises and the premises of its subcontractors or suppliers and any other person at any tier, for security purposes at any time during the term of the Contract, and the Contractor shall comply with, and ensure that any such subcontractors or suppliers comply with all written instructions issued by Canada dealing with the material so identified, including any requirement that employees of the Contractor and its subcontractors and suppliers and any other person at any tier execute and deliver declarations relating to reliability screenings, security clearances and other procedures.

5) The Contractor shall safeguard the Work and the Contract, the specifications, drawings and any other information provided by Canada to the Contractor, and shall be liable to Canada for any loss or damage from any causes.

GC1.3 STATUS OF THE CONTRACTOR

1) The Contractor is engaged under the Contract as an independent contractor.

2) The Contractor, its subcontractors and suppliers and any other person at any tier and their employees are not engaged by the Contract as employees, servants or agents of Canada.

3) For the purposes of the contract 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, Employment Insurance, Worker's Compensation, provincial health or insurance plans, and Income Tax.

GC1.4 RIGHTS AND REMEDIES

1) Except as expressly provided in the Contract, the duties and obligations imposed by the Contract and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights, and remedies otherwise imposed or available by law.

GC1.5 TIME OF THE ESSENCE

1) Time is of the essence of the Contract.

GC1.6 INDEMNIFICATION BY THE CONTRACTOR

1) The Contractor shall pay all royalties and patent fees required for the performance of the Contract and, at the Contractor's expense, shall defend all claims, actions or proceedings against Canada charging or claiming that the Work or any part thereof provided or furnished by the Contractor to Canada infringes any patent, industrial design, copyright trademark, trade secret or other proprietary right enforceable in Canada.

2) The Contractor shall indemnify and save Canada harmless from and against all claims, demands, losses, costs, damages, actions, suits, or proceedings by any third party, brought or prosecuted and in any manner based upon, arising out of, related to, occasioned by, or attributable to the activities of the Contractor, its subcontractors and suppliers and any other person at any tier, in performing the Work.

3) For the purposes of paragraph 2) of GC1.6, "activities" means any act improperly carried out, any omission to carry out an act and any delay in carrying out an act.

GC1.7 INDEMNIFICATION BY CANADA

1) Subject to the *Crown Liability and Proceedings Act*, the *Patent Act*, and any other law that affects Canada's rights, powers, privileges or obligations, Canada shall indemnify and save the Contractor harmless from and against all claims, demands, losses, costs, damage, actions, suits or proceedings arising out of the Contractor's activities under the Contract that are directly attributable to

   (a) a lack of or a defect in Canada's title to the Work site if owned by Canada, whether real or alleged; or

   (b) 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 Canada to the Contractor.

GC1.8 LAWS, PERMITS AND TAXES

1) The Contractor shall comply with all federal, provincial and municipal laws and regulations applicable to the performance of the Work or any part thereof including, without limitation, all laws concerning health and labour conditions and the protection of the environment, and shall require compliance therewith by all of its subcontractors and suppliers at any tier as if the Work were being performed for an owner other than Canada. The Contractor shall furnish evidence of compliance with such laws and regulations to Canada at such times as Canada may reasonably request.

2) Unless stipulated otherwise in the Contract, the Contractor shall obtain and maintain all permits, certificates, licences, registrations and authorizations required for the lawful performance of the Work.

3) Prior to the commencement of the Work at the site, the Contractor shall 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 an owner other than Canada.

4) Within 10 days of making a tender pursuant to paragraph 3) of GC1.8, the Contractor shall notify Canada of the amount properly tendered and whether or not the municipal authority has accepted that amount.

5) If the municipal authority has not accepted the amount tendered, the Contractor shall pay that amount to Canada within 6 days after the time stipulated in paragraph 4) of GC1.8.

6) For the purposes of this clause, "municipal authority" means any authority that would have jurisdiction respecting permission to perform the Work if the owner were not Canada.

7) 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.

8) In accordance with the Statutory Declaration referred to in paragraph 4) of GC5.5 SUBSTANTIAL PERFORMANCE OF THE WORK, a Contractor who has neither residence nor place of business in the province or territory in which work under the Contract is being performed shall provide Canada with proof of registration with the provincial sales tax authorities in the said province.

9) For the purpose of the payment of any Applicable Taxes or the furnishing of security for the payment of any Applicable Taxes arising from or related to the performance of the Work, and notwithstanding the provision that all Material, Plant and interest of the Contractor in all real property, licences, powers and privileges, become the property of Canada after the time of purchase in accordance with GC3.10 MATERIAL PLANT AND REAL PROPERTY BECOME PROPERTY OF CANADA, the Contractor shall be liable, as a user or consumer, for the payment or for the furnishing of security for the payment of any Applicable Taxes payable, at the time of the use or consumption of that Material, Plant or interest of the Contractor in accordance with the relevant legislation.

10) Federal government departments and agencies are required to pay Applicable Taxes.

11) Applicable Taxes will be paid by Canada as provided in the request for payment. It is the sole responsibility of the Contractor to charge Applicable Taxes at the correct rate in accordance with applicable legislation. The Contractor agrees to remit to appropriate tax authorities any amounts of Applicable Taxes paid or due.

12) The Contractor is not entitled to use Canada's exemptions from any tax, such as provincial sales taxes, unless otherwise specified by law. The Contractor must pay applicable provincial sales tax, ancillary taxes, and any commodity tax, on taxable goods or services used or consumed in the performance of the Contract (in accordance with applicable legislation), including for material incorporated into real property.

13) In those cases where Applicable Taxes, customs duties, and excise taxes are included in the Contract Amount, the Contract Amount will be adjusted to reflect any increase, or decrease, of Applicable Taxes, customs duties, and excise taxes that will have occurred between bid submission and contract award. However, there will be no adjustment for any change to increase the Contract Amount if public notice of the change was given before bid submission date in sufficient detail to have permitted the Contractor to calculate the effect of the change.

14) Tax Withholding of 15 Percent – Canada Revenue Agency

Pursuant to the *Income Tax Act*, 1985, c. 1 (5th Supp.) and the *Income Tax Regulations*, Canada must withhold 15 percent of the amount to be paid to the Contractor in respect of services provided in Canada if the Contractor is not a resident of Canada, unless the Contractor obtains a valid waiver from the Canada Revenue Agency. The amount withheld will be held on account for the Contractor in respect to any tax liability which may be owed to Canada.

GC1.9 WORKERS' COMPENSATION

1) Prior to commencement of Work, at the time of Substantial Performance of the Work, and prior to issuance of the Certificate of Completion, the Contractor shall provide evidence of compliance with workers' compensation legislation applicable to the place of the Work, including payments due thereunder.

2) At any time during the term of the Contract, when requested by Canada, the Contractor shall provide such evidence of compliance by the Contractor, its subcontractors and any other person at any tier and any other person performing part of the Work who is required to comply with such legislation.

GC1.10 NATIONAL SECURITY

1) If Canada determines that the Work is of a class or kind that involves national security, Canada may order the Contractor to

(a) provide Canada with any information concerning persons employed or to be employed by the Contractor for purposes of the Contract; and

(b) remove any person from the site of the Work if, in the opinion of Canada, that person may be a risk to the national security;

and the Contractor shall comply with the order.

2) In all contracts with persons who are to be employed in the performance of the Contract, the Contractor shall make provision for the performance of any obligation that may be imposed upon the Contractor under paragraph 1) of GC1.10.

GC1.11 UNSUITABLE WORKERS

1) Canada shall instruct the Contractor to remove from the site of the Work any person employed by the Contractor for purposes of the Contract who, in the opinion of Canada, is incompetent or is guilty of improper conduct, and the Contractor shall not permit a person who has been removed to return to the site of the Work.

GC1.12 PUBLIC CEREMONIES AND SIGNS

1) The Contractor shall not permit any public ceremony in connection with the Work without the prior consent of Canada.

2) The Contractor shall not erect nor permit the erection of any sign or advertising on the Work or its site without the prior consent of Canada.

GC1.13 CONFLICT OF INTEREST

1) It is a term of the Contract that no individual, for whom the post-employment provisions of the Conflict of Interest and Post-Employment Code for Public Office Holders or the Values and Ethics Code for the Public Service apply, shall derive a direct benefit from the Contract unless that individual is in compliance with the applicable post-employment provisions.

GC1.14 AGREEMENTS AND AMENDMENTS

1) The Contract constitutes the entire and sole agreement between the parties with respect to the subject matter of the Contract and supersedes all previous negotiations, communications and other agreements, whether written or oral, relating to it, unless they are incorporated by reference in the Contract. There are no terms, covenants, representations, statements or conditions binding on the parties other than those contained in the Contract.

2) The failure of either party at any time to require performance by the other party of any provision hereof shall not affect the right thereafter to enforce such provision. Nor shall the waiver by either party of any breach of any covenant, term or condition hereof be taken to be held to be a waiver of any further breach of the same covenant, term or condition.

3) The Contract may be amended only as provided for in the Contract.

GC1.15 SUCCESSION

1) The Contract shall inure to the benefit of and be binding upon the parties hereto and their lawful heirs, executors, administrators, successors and, subject to GC1.16 ASSIGNMENT, permitted assigns.

GC1.16 ASSIGNMENT

1) The Contractor shall not make any assignment of the Contract, either in whole or in part, without the written consent of Canada.

GC1.17 NO BRIBE

1) The Contractor represents and covenants that no bribe, gift, benefit, nor other inducement has been nor shall be paid, given, promised or offered directly or indirectly to any official or employee of Canada or to a member of the family of such a person, with a view to influencing the entry into the Contract or the administration of the Contract.

GC1.18 CERTIFICATION - CONTINGENCY FEES

1) In this clause

   (a) "contingency fee" means any payment or other compensation that is contingent upon or is calculated upon the basis of a degree of success in soliciting or obtaining a Government contract or negotiating the whole or any part of its terms;

   (b) "employee" means a person with whom the Contractor has an employer/employee relationship; and

   (c) "person" includes an individual or a group of individuals, a corporation, a partnership, an organization and an association and, without restricting the generality of the foregoing, includes any individual who is required to file a return with the registrar pursuant to section 5 of the *Lobbying Act* R.S.C. 1985 c.44 (4th Supplement) as the same may be amended from time to time.

2) The Contractor certifies that it has not directly or indirectly paid nor agreed to pay and covenants that it shall not directly or indirectly pay nor agree to pay a contingency fee for the solicitation, negotiation or obtaining of the Contract to any person other than an employee acting in the normal course of the employee's duties.

3) All accounts and records pertaining to payments of fees or other compensation for the solicitation, obtaining or negotiation of the Contract shall be subject to the accounts and audit provisions of the Contract.

4) If the Contractor certifies falsely under this section or is in default of the obligations contained therein, Canada may either take the Work out of the Contractor's hands in accordance with the provisions of the Contract or recover from the Contractor by way of reduction to the Contract Amount or otherwise, the full amount of the contingency fee.

GC1.19 INTERNATIONAL SANCTIONS

1) Persons and companies in Canada, and Canadians outside of Canada are bound by economic sanctions imposed by Canada. As a result, the Government of Canada cannot accept delivery of goods or services that originate, either directly or indirectly, from the countries or persons subject to economic sanctions

2) It is a condition of the Contract that the Contractor not supply to the Government of Canada any goods or services which are subject to economic sanctions.
3) By law, the Contractor must comply with changes to the regulations imposed during the life of the Contract. During the performance of the Contract should the imposition of sanctions against a country or person or the addition of a good or service to the list of sanctioned goods or services cause an impossibility of performance for the Contractor, the Contractor may request that the Contract be terminated in accordance with GC7.3 TERMINATION OF CONTRACT.

GC2 ADMINISTRATION OF THE CONTRACT

GC2.1 DEPARTMENTAL REPRESENTATIVE'S AUTHORITY

1) Canada shall designate a Departmental Representative and shall notify the Contractor of the name, address and telephone number of the Departmental Representative.

2) The Departmental Representative shall perform Canada's duties and functions under the contract.

3) The Departmental Representative shall be authorized to issue notices, instructions and directions to the Contractor and to accept on behalf of Canada any notice, order or other communication from the contractor relating to the Work.

4) The Departmental Representative shall, within a reasonable time, review and respond to submissions made by the Contractor in accordance with the requirements of the Contract.

GC2.2 INTERPRETATION OF CONTRACT

1) If, at any time before Canada has issued a Certificate of Completion, 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

   (a) the meaning of anything in the drawings and specifications;

   (b) the meaning to be given to the drawings and specifications in case of any error therein, omission therefrom, or obscurity or discrepancy in their wording or intention;

   (c) 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;

   (d) whether or not the labour, Plant or Material performed, used and supplied by the Contractor for performing the Work and carrying out the Contract are adequate to ensure that the Work shall be performed in accordance with the Contract and that the Contract shall be carried out in accordance with its terms;

   (e) what quantity of any of the Work has been completed by the Contractor; or

   (f) the timing and scheduling of the various phases of the performance of the Work as specified in the Contract;

   the question shall be decided, subject to the provisions of GC8 DISPUTE RESOLUTION, by Canada.

2) The Contractor shall perform the Work in accordance with any decisions of Canada that are made under paragraph 1) of GC2.2 and in accordance with any consequential directions given by Canada.

3) If the Contractor fails to comply with any instruction or direction issued by Canada pursuant to the Contract, Canada may employ such methods as Canada deems advisable to do what the Contractor failed to do, and the Contractor shall, on demand, pay Canada an amount that is equal to the aggregate of all costs, expenses and damages incurred or sustained by Canada by reason of the Contractor's failure to comply with such instruction or direction, including the cost of any methods employed by Canada in doing what the Contractor failed to do.

GC2.3 NOTICES

1) Subject to paragraph 3) of GC2.3, any notice, order or other communication may be given in any manner, and if required to be in writing, shall be addressed to the party to whom it is intended at the address in the Contract or at the last address of which the sender has received written notice in accordance with this section.

2) Any notice, order or other communication given in writing in accordance with paragraph 1) of GC2.3 shall be deemed to have been received by either party

   (a) if delivered personally, on the day that it was delivered;

   (b) if forwarded by mail, on the earlier of the day it was received or the sixth day after it was mailed; and

   (c) if forwarded by facsimile or electronic mail, 24 hours after it was transmitted.

3) A notice given under GC7.1 TAKING THE WORK OUT OF THE CONTRACTOR'S HANDS, GC7.2 SUSPENSION OF WORK, and GC7.3 TERMINATION OF CONTRACT shall be given in writing and, if delivered personally, shall be delivered, if the Contractor is a sole proprietor, to the Contractor or, if the Contractor is a partnership or corporation, to an officer thereof.

GC2.4 SITE MEETINGS

1) In consultation with Canada, the Contractor shall arrange site meetings at regular intervals, with all involved parties who are to attend, in order to ensure, among other things, the proper co-ordination of the Work.

GC2.5 REVIEW AND INSPECTION OF WORK

1) Canada shall review the Work to determine if it is proceeding in conformity with the Contract and to record the necessary data to make an assessment of the value of Work completed. Canada shall measure and record the quantities of labour, Plant and Material performed, used or supplied by the Contractor in performing the Work or any part thereof that is subject to a Unit Price Arrangement and, on request, shall inform the Contractor of those measurements, and permit the Contractor to inspect any records pertaining thereto.

2) Canada shall reject Work or Material which in Canada's opinion does not conform to the requirements of the Contract, and shall require inspection or testing of Work, whether or not such Work is fabricated, installed, or completed. If such Work is not in accordance with the

requirements of the Contract, the Contractor shall correct the Work and shall pay Canada, on demand, all reasonable costs and expenses that were incurred by Canada in having the examination performed.

3) The Contractor shall provide Canada with access to the Work and its site at all times, and at all times shall provide sufficient, safe, and proper facilities for the review and inspection of the Work by persons authorized by Canada and any representatives of those authorities having jurisdiction. If parts of the Work are in preparation at locations other than the site of the Work, Canada shall be given access to such Work whenever it is in progress.

4) The Contractor shall furnish Canada with such information respecting the performance of the Contract as Canada may require, and render every possible assistance to enable Canada to verify that the Work is performed in accordance with the Contract, carry out any other duties and exercise any powers in accordance with the Contract.

5) If Work is designated for tests, inspections, or approvals in the Contract or by Canada's instructions, or by laws or ordinances of the place of the Work, the Contractor shall give Canada reasonable notice of when such Work shall be ready for review and inspection. The Contractor shall arrange for and shall give Canada reasonable notice of the date and time of inspections, tests or approvals.

6) If the Contractor covers, or permits to be covered, Work that has been designated for tests, inspections or approvals before such tests, inspections or approvals are made, completed or given, the Contractor shall, if so directed by Canada, uncover such Work, have the inspections, tests or approvals satisfactorily made, completed or given and make good the covering of the Work at the Contractor's expense.

GC2.6 SUPERINTENDENT

1) Prior to commencing the Work, the Contractor shall designate a Superintendent and shall notify Canada of the name, address and telephone number of the Superintendent. The Contractor shall keep the Superintendent at the Work site during working hours until the Work has reached completion.

2) The Superintendent shall be in full charge of the operations of the Contractor during the performance of the Work and shall be authorized to accept on behalf of the Contractor any notice, order or other communication given to the Superintendent or the Contractor relating to the Work.

3) Upon request of Canada, the Contractor shall remove any Superintendent who, in the opinion of Canada, is incompetent or has been guilty of improper conduct, and shall forthwith designate another Superintendent who is acceptable to Canada.

4) The Contractor shall not substitute a Superintendent without the written consent of Canada. If a Superintendent is substituted without such consent, Canada shall be entitled to refuse to issue any documentation or certification relating to progress payments, Substantial Performance or Completion of the Work until the Superintendent has returned to the Work site or another Superintendent who is acceptable to Canada has been substituted.

GC2.7 NON-DISCRIMINATION IN HIRING AND EMPLOYMENT OF LABOUR

1) For the purposes of this clause, “persons" include the Contractor, its subcontractors and suppliers at any tier and their respective employees, agents, licensees or invitees and any other individual involved in the performance of the Work or granted access to the Work site.

A “person” includes any partnership, proprietorship, firm, joint venture, consortium and corporation.

2) Without restricting the provisions of paragraph 3) of GC2.6, SUPERINTENDENT, the Contractor shall not refuse to employ and shall not discriminate in any manner against any person because

(a) of that person's race, national or ethnic origin, colour, religion, age, sex, sexual orientation, marital status, disability, conviction for which a pardon has been granted, or family status;

(b) of the race, national or ethnic origin, colour, religion, age, sex, sexual orientation, marital status, disability, conviction for which a pardon has been granted, or family status of any person having a relationship or association with that person, or

(c) a complaint has been made or information has been given in respect of that person relating to an alleged failure by the Contractor to comply with subparagraph (a) or (b).

3) Within two working days immediately following receipt of a written complaint pursuant to paragraph 2) of GC2.7, the Contractor shall

(a) cause to have issued a written direction to the person or persons named by the complainant to cease all actions that form the basis of the complaint;

(b) forward a copy of the complaint to Canada by registered mail or courier service; and

(c) when the Labour Conditions are applicable under the circumstances of the complaint, forward a copy of the complaint to HRSDC - Labour to the attention of the appropriate Director as described in the Labour Conditions (“HRSDC - Labour" means the labour component of the federal Department of Human Resources and Social Development).

4) Within twenty four (24) hours immediately following receipt of a direction from Canada to do so, the Contractor shall cause to have removed from the site of the Work and from the performance of Work under the Contract, any person or persons whom Canada believes to be in breach of the provisions of paragraph 2) of GC2.7.

5) No later than thirty (30) days after receipt of the direction referred to in paragraph 4) of GC2.7, the Contractor shall cause the necessary action to be commenced to remedy the breach described in the direction.

6) If a direction is issued pursuant to paragraph 4) of GC2.7, Canada may withhold from monies that are due and payable to the Contractor or setoff pursuant to GC5.9 RIGHT OF SETOFF, whichever is applicable, an amount representing the sum of the costs and payment referred to in paragraph 8) of GC2.7.

7) If the Contractor fails to proceed in accordance with paragraph 5) of GC2.7, Canada shall take the necessary action to have the breach remedied, and shall determine all supplementary costs incurred by Canada as a result.

8) Canada may make a payment directly to the complainant from monies that are due and payable to the Contractor upon receipt from the complainant of

(a) a written award issued pursuant to the federal *Commercial Arbitration Act*, R.S.C. 1985, c. 17 (2nd Supp.);

(b) a written award issued pursuant to the *Canadian Human Rights Act*, R.S.C. 1985, c. H-6;

(c) a written award issued pursuant to provincial or territorial human rights legislation; or

(d) a judgement issued by a court of competent jurisdiction.

9) If Canada is of the opinion that the Contractor has breached any of the provisions of this clause, Canada may take the Work out of the Contractor's hands pursuant to GC7.1 TAKING THE WORK OUT OF THE CONTRACTOR'S HANDS.

10) Subject to paragraph 7) of GC3.6 SUBCONTRACTING, the Contractor shall ensure that the provisions of this clause are included in all agreements and contracts entered into as a consequence of the Work.

GC2.8 ACCOUNTS AND AUDITS

1) The Contractor shall, in addition to the requirements expressed in paragraph 6) of GC3.4 EXECUTION OF THE WORK, maintain full records of the Contractor's estimated and actual cost of the Work together with all tender calls, quotations, contracts, correspondence, invoices, receipts and vouchers relating thereto, and shall make them available on request to audit and inspection by Canada and the Deputy Receiver General for Canada or by persons designated to act on behalf of either or both of them.

2) The Contractor shall allow any of the persons referred to in paragraph 1) of GC2.8 to make copies of and take extracts from any of the records and material, and shall furnish such persons or entities with any information those persons or entities may require from time to time in connection with such records and material.

3) The Contractor shall maintain and keep the records intact until the expiration of two years after the date that a Certificate of Completion has been issued or until the expiration of such other period of time as Canada may direct.

4) The Contractor shall cause all subcontractors at any tier 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 the requirements of this clause as if they were the Contractor.

GC3 EXECUTION AND CONTROL OF THE WORK

GC3.1 PROGRESS SCHEDULE

1) The Contractor shall

   (a) prepare and submit to Canada, prior to the submission of the Contractor's first progress claim, a progress schedule in accordance with the requirements set out in the Contract;

   (b) monitor the progress of the Work relative to the schedule and update the schedule as stipulated by the contract documents;

   (c) advise Canada of any revisions to the schedule required as the result of any extension of time for completion of the Contract that was approved by Canada; and

   (d) prepare and submit to Canada, at the time of issuance of a Certificate of Substantial Performance, an update of any schedule clearly showing a detailed timetable that is acceptable to Canada for the completion of any unfinished Work and the correction of all listed defects.

GC3.2 ERRORS AND OMISSIONS

1) The Contractor shall report promptly to Canada any errors, discrepancies, or omissions the Contractor may discover when reviewing the contract documents. In making a review, the Contractor does not assume any responsibility to Canada for the accuracy of the review. The Contractor shall not be liable for damage or costs resulting from such errors, discrepancies, or omissions in the contract documents prepared by or on behalf of Canada that the Contractor did not discover.

GC3.3 CONSTRUCTION SAFETY

1) Subject to GC3.7 CONSTRUCTION BY OTHER CONTRACTORS OR WORKERS, the Contractor shall be solely responsible for construction safety at the place of the Work and for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Work. In any emergency, the Contractor shall either stop the Work, make changes or order extra work to ensure the safety of life and the protection of the Work and neighbouring property.

2) Prior to commencing the Work, the Contractor shall notify the authorities having jurisdiction for construction safety at the site of the Work with respect to the intended commencement of the Work, and shall provide such authority with whatever additional information may be required by that authority.

GC3.4 EXECUTION OF THE WORK

1) The Contractor shall perform, use or supply and pay for, all labour, Plant, Material, tools, construction machinery and equipment, water, heat, light, power, transportation and other facilities and services necessary for the performance of the Work in accordance with the Contract.

2) The Contractor shall, at all times, perform the Work in a proper, diligent and expeditious manner as is consistent with construction industry standards and in accordance with the progress schedule prepared pursuant to GC3.1 PROGRESS SCHEDULE and shall provide sufficient personnel to fulfil the Contractor's obligations in accordance with that schedule.

3) Subject to paragraph 4) of GC3.4, the Contractor shall have complete care, custody and control of the Work and shall direct and supervise the Work so as to ensure compliance with the Contract. The Contractor shall be responsible for construction means, methods, techniques, sequences and procedures and for co-ordinating the various parts of the Work.

4) When requested in writing by Canada, the Contractor shall make appropriate alterations in the method, Plant or workforce at any time Canada considers the Contractor's actions to be unsafe or damaging to either the Work, existing facilities, persons at the site of the Work or the environment.

5) The Contractor shall have sole responsibility for the design, erection, operation, maintenance and removal of temporary structures and other temporary facilities and for the construction methods used in their erection, operation, maintenance and removal. The Contractor shall engage and pay for registered professional engineering personnel, skilled in the appropriate discipline to perform these functions if required by law or by the Contract, and in all cases when such temporary facilities and their methods of construction are of such a nature that professional engineering skill is required to produce safe and satisfactory results.

6) The Contractor shall keep at least one copy of current contract documents, submittals, reports, and records of meetings at the site of the Work, in good order and available to Canada.

7) Except for any part of the Work that is necessarily performed away from or off the site of the Work, the Contractor shall confine Plant, storage of Material, and operations of employees to limits indicated by laws, ordinances, permits or the contract documents.

GC3.5 MATERIAL

1) Unless otherwise specified in the Contract, all Material incorporated in the Work shall be new.

2) Subject to paragraph 3) of GC3.5, if a specified reused, refurbished, or recycled item of Material is not available, the Contractor shall apply to Canada to substitute a similar item for the one specified.

3) If Canada agrees that the Contractor's application for substitution of a reused, refurbished or recycled item is warranted, and that the substitute item is of acceptable quality and value to

that specified and is suitable for the intended purpose, Canada may approve the substitution, subject to the following:

(a) the request for substitution shall be made in writing to Canada and shall be substantiated by information in the form of the manufacturer's literature, samples and other data that may be required by Canada;

(b) the Contractor shall make the request for substitution in a manner that shall not negatively affect the progress schedule of the Contract and well in advance of the time the item of Material must be ordered;

(c) substitution of Material shall be permitted only with the prior written approval of Canada, and any substituted items that are supplied or installed without such approval shall be removed from the site of the Work at the expense of the Contractor, and specified items installed at no additional cost to Canada; and

(d) the Contractor shall be responsible for all additional expenses incurred by Canada, the Contractor, its subcontractors and suppliers at any tier due to the Contractor's use of the substitute.

GC3.6 SUBCONTRACTING

1) Subject to the provisions of this clause, the Contractor may subcontract any part of the Work but not the whole of the Work.

2) The Contractor shall notify Canada in writing of the Contractor's intention to subcontract.

3) A notification referred to in paragraph 2) of GC3.6 shall identify the part of the Work and the Subcontractor with whom the Contractor intends to subcontract.

4) Canada may for reasonable cause, object to the intended subcontracting by notifying the Contractor in writing within six (6) days of receipt by Canada of a notification referred to in paragraph 2) of GC3.6.

5) If Canada objects to a subcontracting, the Contractor shall not enter into the intended subcontract.

6) The Contractor shall not change, nor permit to be changed, a Subcontractor engaged by the Contractor, in accordance with this clause, without the written consent of Canada.

7) The Contractor shall ensure that all the terms and conditions of the Contract that are of general application shall be incorporated in every other contract issued as a consequence of the Contract, at whatever tier, except those contracts issued solely to suppliers at any tier for the supply of Plant or Material.

8) Neither a subcontracting nor Canada's consent to a subcontracting shall be construed to relieve the Contractor from any obligation under the Contract or to impose any liability upon Canada.

GC3.7 CONSTRUCTION BY OTHER CONTRACTORS OR WORKERS

1) Canada reserves the right to send other contractors or workers, with or without Plant and Material, onto the site of the Work.

2) When other contractors or workers are sent on to the site of the Work, Canada shall

   (a) enter into separate contracts, to the extent it is possible, with the other contractors under conditions of contract that are compatible with the conditions of the Contract;

   (b) ensure that the insurance coverage provided by the other contractors is co-ordinated with the insurance coverage of the Contractor as it affects the Work; and

   (c) take all reasonable precautions to avoid labour disputes or other disputes arising from the work of the other contractors or workers.

3) When other contractors or workers are sent on to the site of the Work, the Contractor shall

   (a) co-operate with them in the carrying out of their duties and obligations;

   (b) co-ordinate and schedule the Work with the work of the other contractors and workers;

   (c) participate with other contractors and workers in reviewing their construction schedules when directed to do so;

   (d) where part of the Work is affected by or depends upon the work of other contractors or workers for its proper execution, promptly report to Canada in writing and prior to proceeding with that part of the Work, any apparent deficiencies in such work. Failure by the Contractor to so report shall invalidate any claims against Canada by reason of the deficiencies in the work of other contractors or workers except those deficiencies that are not then reasonably discoverable; and

   (e) when designated as being responsible for construction safety at the place of work in accordance with the applicable provincial or territorial laws, carry out its duties in that role and in accordance with those laws.

4) If, when entering into the Contract, the Contractor could not have reasonably foreseen nor anticipated the sending of other contractors or workers on to the site of the Work and provided the Contractor

   (a) incurs extra expense in complying with the requirements of paragraph 3) of GC3.7; and

   (b) gives Canada written notice of a claim for that extra expense within thirty (30) days of the date that the other contractors or workers were sent onto the Work or its site;

   Canada shall pay the Contractor the cost of the extra labour, Plant and Material that was necessarily incurred, calculated in accordance with GC6.4 DETERMINATION OF PRICE.

GC3.8 LABOUR

1) To the extent to which they are available, consistent with proper economy and the expeditious carrying out of the Work, the Contractor shall, in the performance of the Work, employ a reasonable number of persons who have been on active service with the Armed Forces of Canada and have been honourably discharged therefrom.

2) The Contractor shall maintain good order and discipline among the Contractor's employees and workers engaged in the Work and shall not employ on the site of the Work anyone not skilled in the tasks assigned.

GC3.9 TRUCK HAULAGE RATES

CANCELLED

GC3.10 MATERIAL, PLANT AND REAL PROPERTY BECOME PROPERTY OF CANADA

1) Subject to paragraph 9) of GC1.8 LAWS PERMITS AND TAXES, all Material and Plant and the interest of the Contractor in all real property, licences, powers and privileges purchased, used or consumed by the Contractor for the Work shall, immediately after the time of their purchase, use or consumption be the property of Canada for the purposes of the Work and they shall continue to be the property of Canada

   (a) in the case of Material, until Canada indicates that the Materials shall not be required for the Work; and

   (b) in the case of Plant, real property, licences, powers and privileges, until Canada indicates that the interest vested in Canada therein is no longer required for the purposes of the Work.

2) Material or Plant, that is the property of Canada by virtue of paragraph 1) of GC3.10, shall not be taken away from the site of the Work nor used nor disposed of except for the purposes of the Work without the written consent of Canada.

3) Canada is not liable for loss of nor damage from any cause to the Material or Plant referred to in paragraph 1) of GC3.10, and the Contractor is liable for such loss or damage notwithstanding that the Material or Plant is the property of Canada.

GC3.11 DEFECTIVE WORK

1) The Contractor shall promptly remove from the site of the Work and replace or re-execute defective Work whether or not the defective Work has been incorporated in the Work and whether or not the defect is the result of poor workmanship, use of defective Material, or damage through carelessness or other act or omission of the Contractor.

2) The Contractor, at the Contractor's expense, shall promptly make good other work destroyed or damaged by such removals or replacements.

3) If, in the opinion of Canada, it is not expedient to correct defective Work or Work not performed as provided for in the Contract documents, Canada may deduct from the amount otherwise due to the Contractor the difference in value between the Work as performed and that called for by the contract documents.

4) The failure of Canada to reject any defective Work or Material shall not constitute acceptance of the defective Work or Material.

GC3.12 CLEANUP OF SITE

1) The Contractor shall maintain the Work and its site in a tidy condition and free from an accumulation of waste material and debris.

2) Before the issue of a Certificate of Substantial Performance, the Contractor shall remove waste material and debris, and all Plant and Material not required for the performance of the remaining Work and, unless otherwise stipulated in the Contract Documents, shall cause the Work and its site to be clean and suitable for occupancy by Canada.

3) Before the issue of a Certificate of Completion, the Contractor shall remove all surplus Plant and Materials and any waste products and debris from the site of the Work.

4) The Contractor's obligations described in paragraphs 1) to 3) of GC3.12 do not extend to waste products and other debris caused by Canada's servants, or by other contractors and workers referred to in GC3.7 CONSTRUCTION BY OTHER CONTRACTORS OR WORKERS.

GC3.13 WARRANTY AND RECTIFICATION OF DEFECTS IN WORK

1) Without restricting any warranty or guarantee implied or imposed by law or contained in the Contract, the Contractor shall, at the Contractor's expense

   (a) rectify and make good any defect or fault that appears in the Work or comes to the attention of Canada with respect to those parts of the Work accepted in connection with the Certificate of Substantial Performance within 12 months from the date of Substantial Performance; and

   (b) rectify and make good any defect or fault that appears in or comes to the attention of Canada in connection with those parts of the Work described in the Certificate of Substantial Performance within 12 months from the date of the Certificate of Completion.

   (c) transfer and assign, to Canada, any subcontractor, manufacturer or supplier extended warranties or guarantees implied or imposed by law or contained in the Contract covering periods beyond the 12 months stipulated above. Extended warranties or guarantees referred to herein shall not extend the 12-month period whereby the Contractor, except as may be provided elsewhere in the Contract, must rectify and make good any defect or fault that appears in the Work or comes to the attention of Canada.

   (d) provide, to Canada prior to the issuance of the Certificate of Completion, a list of all extended warranties and guarantees referred to in paragraph (c) above.

2) Canada may direct the Contractor to rectify and make good any defect or fault referred to in paragraph 1) of GC3.13 or covered by any other expressed or implied warranty or guarantee and the Contractor shall rectify and make good such defect within the time stipulated in the direction.

3) A direction referred to in paragraph 2) GC3.13 shall be in writing and shall be given to the Contractor in accordance with GC2.3 NOTICES.

GC4 PROTECTIVE MEASURES

GC4.1 PROTECTION OF WORK AND PROPERTY

1) The Contractor shall protect the Work and its site against loss or damage from any cause and shall similarly protect all Material, Plant and real property under the Contractor's care, custody and control whether or not such Material, Plant and real property are supplied by Canada to the Contractor.

2) The Contractor shall provide all facilities necessary for the purpose of maintaining security, and shall assist any person authorized by Canada to inspect or to take security measures in respect of the Work and its site.

3) Canada may direct the Contractor to do such things and to perform such work as Canada considers reasonable and necessary to ensure compliance with or to remedy a breach of paragraphs 1) or 2) of GC4.1, and the Contractor, shall comply with such direction.

GC4.2 PRECAUTIONS AGAINST DAMAGE, INFRINGEMENT OF RIGHTS, FIRE AND OTHER HAZARDS

1) The Contractor shall do whatever is necessary to ensure that

   (a) no person, property, right, easement nor privilege is injured, damaged or infringed upon by reasons of the Contractor's activities in performing the Work;

   (b) pedestrian and other traffic on any public or private road or waterway is not unduly impeded, interrupted nor endangered by the performance or existence of the Work, Material or Plant;

   (c) fire hazards in or about the site of the Work are eliminated and any fire is promptly extinguished;

   (d) the health and safety of all persons employed in the performance of the Work is not endangered by the methods nor means of their performance;

   (e) adequate medical services are available to all persons employed on the Work or its site at all times during the performance of the Work;

   (f) adequate sanitation measures are taken in respect of the Work and its site; and

   (g) all stakes, buoys and marks placed on the Work or its site by Canada are protected and are not removed, defaced, altered nor destroyed.

2) Canada may direct the Contractor to do such things and to perform such work as Canada considers reasonable and necessary to ensure compliance with or to remedy a breach of paragraph 1) of GC4.2, and the Contractor shall comply with the direction of Canada.

GC4.3 MATERIAL, PLANT AND REAL PROPERTY SUPPLIED BY CANADA

1) Subject to paragraph 2) of GC4.3, the Contractor is liable to Canada 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 Canada for use in connection with the Contract, whether or not that loss or damage is attributable to causes beyond the Contractor's control.

2) The Contractor is not liable to Canada for any loss or damage to Material, Plant or real property referred to in paragraph 1) of GC4.3 if that loss or damage results from and is directly attributable to reasonable wear and tear.

3) The Contractor shall not use any Material, Plant or real property supplied by Canada except for the purpose of performing the Contract.

4) When the Contractor fails to make good any loss or damage for which the Contractor is liable under paragraph 1) within a reasonable time, Canada may cause the loss or damage to be made good at the Contractor's expense, and the Contractor shall thereupon be liable to Canada for the cost thereof and shall, on demand, pay to Canada an amount equal to that cost.

5) The Contractor shall keep records of all Material, Plant and real property supplied by Canada as Canada requires and shall satisfy Canada, when requested, that such Material, Plant and real property are at the place and in the condition in which they ought to be.

GC4.4 CONTAMINATED SITE CONDITIONS

1) For the purposes of GC4.4, a contaminated site condition exists when a solid, liquid, gaseous, thermal or radioactive irritant or contaminant, or other hazardous or toxic substance or material, including moulds and other forms of fungi, is present at the site of the Work to an extent that constitutes a hazard, or potential hazard, to the environment, property, or the health or safety of any person.

2) If the Contractor encounters a contaminated site condition of which the Contractor is not aware or about which the Contractor has not been advised, or if the Contractor has reasonable grounds to believe that such a site condition exists at the site of the Work, the Contractor shall

   (a) take all reasonable steps, including stopping the Work, to ensure that no person suffers injury, sickness or death, and that neither property nor the environment is injured or destroyed as a result of the contaminated site condition;

   (b) immediately notify Canada of the circumstances in writing; and

   (c) take all reasonable steps to minimize additional costs that may accrue as a result of any work stoppage.

3) Upon receipt of a notification from the Contractor, Canada shall promptly determine whether a contaminated site condition exists, and shall notify the Contractor in writing of any action to be taken, or work to be performed, by the Contractor as a result of Canada's determination.

4) If the Contractor's services are required by Canada, the Contractor shall follow the direction of Canada with regard to any excavation, treatment, removal and disposal of any polluting substance or material.

5) Canada, at Canada's sole discretion, may enlist the services of experts and specialty contractors to assist in determining the existence of, and the extent and treatment of contaminated site conditions, and the Contractor shall allow them access and co-operate with them in the carrying out of their duties and obligations.

6) Except as may be otherwise provided for in the Contract, the provisions of GC6.4 DETERMINATION OF PRICE shall apply to any additional work made necessary because of a contaminated site condition.

GC5 TERMS OF PAYMENT

GC5.1 INTERPRETATION

In these Terms of Payment

1) The "payment period" means a period of 30 consecutive days or such other longer period as may be agreed between the Contractor and Canada.

2) An amount is "due and payable" when it is due and payable by Canada to the Contractor according to GC5.4 PROGRESS PAYMENT, GC5.5 SUBSTANTIAL PERFORMANCE OF THE WORK or GC5.6 FINAL COMPLETION.

3) An amount is “overdue” when it remains unpaid on the first day following the day upon which it is due and payable.

4) The "date of payment" means the date of the negotiable instrument of an amount due and payable by the Receiver General for Canada.

5) The "Bank Rate" means the rate of interest established by the Bank of Canada as the minimum rate at which it makes short term advances to members of the Canadian Payments Association.

6) The "Average Bank Rate" means the simple arithmetic mean of the Bank Rate in effect at 4:00 p.m. Eastern Time each day during the calendar month which immediately precedes the calendar month in which payment is made.

GC5.2 AMOUNT PAYABLE

1) Subject to any other provisions of the Contract, Canada shall pay the Contractor, at the times and in the manner hereinafter set out, the amount by which the amounts payable by Canada to the Contractor in accordance with the Contract exceed the amounts payable by the Contractor to Canada, and the Contractor shall accept that amount as payment in full satisfaction for everything furnished and done by the Contractor in respect of the Work to which the payment relates.

2) When making any payment to the Contractor, the failure of Canada to deduct an amount payable to Canada by the Contractor 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.

3) Should any payment be made by Canada in excess of what is owed to the Contractor for the actual work performed, the Contractor will reimburse Canada the excess immediately, with or without demand, and any amounts outstanding shall bear simple interest at the Average Bank rate plus 3 percent per annum from the date of overpayment until the day prior to the date of repayment by the Contractor.

4) No payment other than a payment that is expressly stipulated in the Contract shall be made by Canada to the Contractor for any extra expense or any loss or damage incurred or sustained by the Contractor.

GC5.3 INCREASED OR DECREASED COSTS

1) The Contract Amount shall not be increased nor 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, Material or any wage adjustment arising pursuant to the Labour Conditions.

2) Notwithstanding paragraph 1) of GC5.3, if any change, including a new imposition or repeal, of any tax, customs or other duty, charge, or any similar imposition that is imposed under sales, customs or excise tax legislation of the Government of Canada or any Provincial or Territorial legislation, affects the cost of the Work to the Contractor, and occurs

   (a) after the date of submission by the Contractor of its bid; or

   (b) after the date of submission of the last revision, if the Contractor's bid was revised;

   the Contract Amount shall be adjusted in the manner provided in paragraph 3) of GC5.3.

3) If a change referred to in paragraph 2) of GC5.3 occurs, the Contract Amount shall be increased or decreased by an amount established by an examination by Canada of the relevant records of the Contractor referred to in GC2.8 ACCOUNTS AND AUDITS to be the increase or decrease in the cost incurred by the Contractor that is directly attributable to that change.

4) For the purpose of paragraph 2) of GC5.3, if a tax is changed after the solicitation closing, but public notice of the change has been given by the Minister of Finance or the corresponding Provincial or Territorial authority before that closing, the change shall be deemed to have occurred before the solicitation closing.

5) Notwithstanding paragraphs 2) to 4) of GC5.3, no adjustment to the Contract Amount in respect of the Work or a part thereof shall be made for a change in any imposition referred to in this section that occurs after the date required by the Contract for completion of the Work or that part of the Work.

GC5.4 PROGRESS PAYMENT

1) On the expiration of a payment period, the Contractor shall deliver to Canada

   (a) a written progress claim in a form acceptable to Canada 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, and

   (b) a completed and signed statutory declaration containing a declaration that, up to the date of the progress claim, the Contractor has complied with all lawful obligations with

respect to the Labour Conditions and that, in respect of the Work, all lawful obligations of the Contractor to its Subcontractors and Suppliers, referred to collectively in the declaration as “subcontractors and suppliers”, have been fully discharged.

2) Within 10 days of receipt of a progress claim and statutory declaration from the Contractor, Canada shall inspect, or cause to have inspected, the part of the Work and the Material described in the progress claim, and shall issue a progress report 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 Canada

   (a) is in accordance with the Contract; and

   (b) was not included in any other progress report relating to the Contract.

3) Subject to GC5.2 AMOUNT PAYABLE, and paragraph 5) of GC5.4, Canada shall pay the Contractor an amount that is equal to

   (a) 95 percent of the value that is indicated in Canada's progress report if a labour and material payment bond has been furnished by the Contractor; or

   (b) 90 percent of the value that is indicated in Canada's progress report if a labour and material payment bond has not been furnished by the Contractor.

4) Canada shall pay the amount referred to in paragraph 3) of GC5.4 not later than

   (a) 30 days after receipt by Canada of both a progress claim and a statutory declaration referred to in paragraph 1) of GC5.4; or

   (b) 15 days after receipt by Canada of the Contractor’s progress schedule or updated progress schedule, in accordance with GC3.1 PROGRESS SCHEDULE,

   whichever is later.

5) In the case of the Contractor's first progress claim, it is a condition precedent to Canada's obligation under paragraph 3) of GC5.4 that the Contractor has provided all necessary documentation required by the Contract for the first progress claim.

GC5.5 SUBSTANTIAL PERFORMANCE OF THE WORK

1) If, at any time before the issuance of a Certificate of Completion, Canada determines that the Work has reached Substantial Performance as described in subparagraph 1) (b) of GC1.1.4 SUBSTANTIAL PERFORMANCE, Canada shall issue a Certificate of Substantial Performance to the Contractor. The Certificate of Substantial Performance shall state or describe

   (a) the date of Substantial Performance;

   (b) the parts of the Work not completed to the satisfaction of Canada; and

   (c) all things that must be done by the Contractor before a Certificate of Completion is issued and before the 12-month warranty period referred to in GC3.13 WARRANTY AND RECTIFICATION OF DEFECTS IN WORK commences for the said parts and all the said things.

2) The issuance of a Certificate of Substantial Performance does not relieve the Contractor from the Contractor's obligations under GC3.11 DEFECTIVE WORK.

3) Subject to GC5.2 AMOUNT PAYABLE and paragraph 4) of GC5.5, Canada shall pay the Contractor the amount referred to in paragraph 1) of GC5.2 AMOUNT PAYABLE, less the aggregate of

   (a) the sum of all payments that were made pursuant to GC5.4 PROGRESS PAYMENT;

   (b) an amount that is equal to Canada's estimate of the cost to Canada of rectifying defects described in the Certificate of Substantial Performance; and

   (c) an amount that is equal to Canada's estimate of the cost to Canada of completing the parts of the Work described in the Certificate of Substantial Performance other than defects listed therein.

4) Canada shall pay the amount referred to in paragraph 3) of GC5.5 not later than

   (a) 30 days after the date of issue of a Certificate of Substantial Performance, or

   (b) 15 days after the Contractor has delivered to Canada

      (i) a statutory declaration containing a declaration by the Contractor that up to the date of the Certificate of Substantial Performance, the Contractor has complied with all lawful obligations with respect to the Labour Conditions, discharged all its lawful obligations to its Subcontractors and Suppliers in respect of the work under the Contract, and discharged its lawful obligations referred to in GC1.8 LAWS, PERMITS AND TAXES;

      (ii) evidence of compliance with workers' compensation legislation in accordance with GC1.9 WORKERS' COMPENSATION; and

      (iii) an update of the progress schedule in accordance with the requirements of GC3.1 PROGRESS SCHEDULE;

   whichever is later.

GC5.6 FINAL COMPLETION

1) When Canada is of the opinion that the Contractor has complied with the Contract and all orders and directions made pursuant thereto, and that the Work has been completed as described in GC1.1.5 COMPLETION, Canada shall issue a Certificate of Completion to the Contractor and, if the Work or a portion of the Work is subject to a Unit Price Arrangement, Canada shall issue a Certificate of Measurement that shall, subject to GC8, be binding upon and conclusive between Canada and the Contractor as to the quantities referred to therein.

2) Subject to GC5.2 AMOUNT PAYABLE and paragraph 3) of GC5.6, Canada shall pay the Contractor the amount referred to in GC5.2 AMOUNT PAYABLE, less the aggregate of the sum of all payments that were made pursuant to GC5.4 PROGRESS PAYMENT and GC5.5 SUBSTANTIAL PERFORMANCE OF WORK.

3) Canada shall pay the amount referred to in paragraph 2) of GC5.6 not later than

   (a) 60 days after the date of issue of a Certificate of Completion; or

(b) 15 days after the Contractor has delivered to Canada

(i) a statutory declaration which contains a declaration 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; and

(ii) evidence of compliance with workers' compensation legislation in accordance with GC1.9 WORKERS' COMPENSATION;

whichever is later.

GC5.7 PAYMENT NOT BINDING ON CANADA

1) Neither acceptance of a progress claim or progress report, nor any payment made by Canada under the Contract, nor partial or entire use or occupancy of the Work by Canada shall constitute an acceptance by Canada of any portion of the Work or Material that is not in accordance with the requirements of the Contract.

GC5.8 CLAIMS AND OBLIGATIONS

1) The Contractor shall discharge all the Contractor's lawful obligations and shall satisfy all lawful claims against the Contractor arising out of the performance of the Work at least as often as the Contract requires Canada to pay the Contractor.

2) Whenever requested to do so by Canada, the Contractor shall make a statutory declaration declaring to the existence and condition of any obligations and claims against the Contractor arising out of the performance of the Work.

3) In order to discharge lawful obligations of and satisfy lawful claims against the Contractor or its Subcontractors arising out of the performance of the Contract, Canada may pay an amount that is due and payable to the Contractor directly to the claimant. Such payment is, to the extent of the payment, a discharge of Canada’s liability to the Contractor under the Contract and may be deducted from any amount payable to the Contractor under the Contract.

4) For the purposes of paragraph 3) of GC5.8, and subject to paragraph 6) of GC5.8, a claim or obligation shall be considered lawful when it is so determined by

(a) a court of legal jurisdiction;

(b) an arbitrator duly appointed to arbitrate the claim; or

(c) the written consent of the Contractor authorizing payment of the claim or obligation.

5) If a claim or obligation would have been subject to the provisions of Provincial or Territorial lien legislation or, in the Province of Quebec, the law relating to legal hypothecs had the Contractor been performing the Work for an entity other than Canada

(a) such amount as may be paid by Canada pursuant to paragraphs 3) and 4) of GC5.8 shall not exceed the amount that the Contractor would have been obliged to pay had the provisions of such legislation or law been applicable to the Work;

(b) a 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 the claimant might have had; and

(c) for the purposes of determining the entitlement of a claimant, the notice required by paragraph 8) of GC5.8 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 such legislation.

6) The Contractor shall, at the request of any claimant, submit to binding arbitration those questions that need to be answered to establish the entitlement of the claimant to payment. The arbitration shall have as parties to it any Subcontractor or Supplier to whom the claimant supplied Material, performed work or rented equipment should such Subcontractor or Supplier wish to be adjoined, and Canada shall not be a party to such arbitration. Subject to any agreement between the Contractor and the claimant, the arbitration shall be conducted in accordance with the governing Provincial or Territorial legislation applicable to the site of the Work.

7) Paragraph 3) of GC5.8 shall apply only to claims and obligations

(a) the notification of which has set forth the amount claimed to be owing and the person who by contract is primarily liable and has been received by Canada in writing before final payment is made to the Contractor pursuant to GC5.6 FINAL COMPLETION, and within 120 days of the date on which the claimant

(i) should have been paid in full under the claimant's contract with the Contractor, its Subcontractor or Supplier if the claim is for money that was lawfully required to be held back from the claimant; or

(ii) 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 its Subcontractor or Supplier where the claim is for money not lawfully required to be held back from the claimant; and

(b) the proceedings to determine the right to payment of which, pursuant to paragraph 5) of GC5.8, shall have commenced within one year from the date that the notification required by subparagraph 7)(a) of GC5.8 was received by Canada.

8) Upon receipt of a notice of claim, Canada may 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.

9) Canada shall notify the Contractor in writing in a timely manner of receipt of any claim and of the intention of Canada to withhold funds. At any time thereafter and until payment is made to the claimant, the Contractor may be entitled to post, with Canada, security in a form acceptable to Canada in an amount equal to the value of the claim, and upon receipt of such security Canada shall release to the Contractor any funds that would be otherwise payable to the Contractor, that were withheld pursuant to the provisions of this clause in respect of the claim of any claimant for whom the security stands.

GC5.9 RIGHT OF SETOFF

1) Without limiting any right of setoff or deduction given or implied by law or elsewhere in the Contract, Canada may set off any amount payable to Canada by the Contractor under the

Contract, or under any current contract, against any amount payable to the Contractor under the Contract.

2) For the purposes of paragraph 1) of GC5.9, "current contract" means a contract between Canada and the Contractor

   (a) under which the Contractor has an undischarged obligation to perform or supply work, labour or material; or

   (b) in respect of which Canada has, since the date of the Contract, exercised any right to take the work that is the subject of that contract out of the Contractor's hands.

GC5.10 ASSESSMENTS AND DAMAGES FOR LATE COMPLETION

1) For the purposes of this clause

   (a) the Work shall be deemed to be completed on the date of the Certificate of Completion; and

   (b) the "period of delay" means the number of days commencing on the day fixed 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 GC6.5 DELAYS AND EXTENSION OF TIME and any other day on which, in the opinion of Canada, completion of the Work was delayed for reasons beyond the control of the Contractor.

2) If the Contractor does not complete the Work by the day fixed for its completion but completes it thereafter, the Contractor shall pay Canada an amount equal to the aggregate of

   (a) all salaries, wages and travelling expenses incurred by Canada in respect of persons overseeing the performance of the Work during the period of delay;

   (b) the cost incurred by Canada as a result of the inability to use the completed Work for the period of delay; and

   (c) all other expenses and damages incurred or sustained by Canada during the period of delay as a result of the Work not being completed by the day fixed for its completion.

3) Canada may waive the right of Canada to the whole or any part of the amount payable by the Contractor pursuant to paragraph 2) of GC5.10 if, in the opinion of Canada, it is in the public interest to do so.

GC5.11 DELAY IN MAKING PAYMENT

1) Notwithstanding GC1.5 TIME OF THE ESSENCE, any delay by Canada in making any payment when it is due pursuant to GC5 TERMS OF PAYMENT, shall not be a breach of the Contract by Canada.

2) Subject to paragraph 3) of GC5.11, Canada shall pay to the Contractor simple interest at the Average Bank Rate plus 3 percent per annum on any amount that is overdue pursuant to paragraph 3) of GC5.1 INTERPRETATION, and the interest shall apply from and include the day such amount became overdue until the day prior to the date of payment.

3) Interest shall be paid without demand by the Contractor except that

   (a) in respect of amounts that are less than 15 days overdue, no interest shall be paid in respect of payment made within such 15 days unless the Contractor so demands after such amounts have become due and payable; and

   (b) interest shall not be payable or paid on overdue advance payments, if any.

GC5.12 INTEREST ON SETTLED CLAIMS

1) For the purposes of this clause, a claim means a disputed amount subject to negotiation between Canada and the Contractor under the Contract.

2) A claim is deemed to have been settled when an agreement in writing is signed by Canada and the Contractor setting out the amount of the claim to be paid by Canada and the items of work for which the said amount is to be paid.

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.

4) Canada shall pay to the Contractor simple interest on the amount of a settled claim at the Average Bank Rate plus 3 percent per annum from the date the settled claim was deemed to be outstanding until the day prior to the date of payment.

GC5.13 RETURN OF SECURITY DEPOSIT

1) After a Certificate of Substantial Performance has been issued, and if the Contractor is not in breach of nor in default under the Contract, Canada shall return to the Contractor all or any part of a Security Deposit that, in the opinion of Canada, is not required for the purposes of the Contract.

2) After a Certificate of Completion has been issued, Canada shall return to the Contractor the remainder of any security deposit unless the Contract stipulates otherwise.

3) If the security deposit was paid into the Consolidated Revenue Fund of Canada, Canada shall pay interest thereon to the Contractor at a rate established pursuant to section 21(2) of the *Financial Administration Act (FAA)*.

GC6 DELAYS AND CHANGES IN THE WORK

GC6.1 CHANGES IN THE WORK

1) At any time before issuance of a Certificate of Completion, Canada may issue orders for additions, deletions or other changes to the Work, or changes in the location or position of the whole or any part of the Work, if the addition, deletion, change or other revision is deemed by Canada to be consistent with the general intent of the Contract.

2) An order referred to in paragraph 1) of GC6.1 shall be in writing and given to the Contractor in accordance with GC2.3 NOTICES.

3) Upon receipt of an order, the Contractor shall promptly perform the work in accordance with the order as if the order had appeared in and been part of the original Contract.

4) If anything done or omitted by the Contractor pursuant to an order increases or decreases the cost of the Work to the Contractor, payment for the work shall be made in accordance with GC6.4 DETERMINATION OF PRICE.

GC6.2 CHANGES IN SUBSURFACE CONDITIONS

1) If, during the performance of the Work, the Contractor encounters subsurface conditions that are substantially different from the subsurface conditions described in the tender documents supplied to the Contractor, or a reasonable assumption of fact based thereon, the Contractor shall give notice to Canada immediately upon becoming aware of the situation.

2) If the Contractor is of the opinion that the Contractor may incur or sustain any extra expense or any loss or damage that is directly attributable to the changed subsurface conditions, the Contractor shall within 10 days of the date the changed subsurface conditions were encountered, give Canada written notice of intention to claim for that extra expense, loss or damage.

3) If the Contractor has given a notice referred to in paragraph 2) of GC6.2, the Contractor shall give Canada a written claim for extra expense, loss or damage no later than 30 days after the date that a Certificate of Substantial Performance is issued.

4) A written claim referred to in paragraph 3) of GC6.2 shall contain a sufficient description of the facts and circumstances of the occurrence that is the subject of the claim to enable Canada to determine whether or not the claim is justified, and the Contractor shall supply such further and other information for that purpose as Canada requires.

5) If Canada determines that a claim referred to in paragraph 3) of GC6.2 is justified, Canada shall make an extra payment to the Contractor in an amount that is calculated in accordance with GC6.4 DETERMINATION OF PRICE.

6) If, in the opinion of Canada, the Contractor effects a saving of expenditure that is directly attributable to a substantial difference between the information relating to subsurface conditions at the site of the Work that is contained in the tender documents, or a reasonable assumption of fact based thereon, and the actual subsurface conditions encountered by the Contractor, the Contract Amount shall be reduced by the amount of the saving of expenditure determined in accordance with GC6.4 DETERMINATION OF PRICE.

7) If the Contractor fails to give a notice referred to in paragraph 2) of GC6.2 and a claim referred to in paragraph 3) of GC6.2 within the times stipulated, an extra payment shall not be made to the Contractor in respect of the occurrence.

8) Canada does not warrant the content expressed in any subsurface report available for the perusal of the Contractor that does not form part of the tender and contract documents.

GC6.3 HUMAN REMAINS, ARCHAEOLOGICAL REMAINS AND ITEMS OF HISTORICAL OR SCIENTIFIC INTEREST

1) For the purposes of this clause

   (a) "human remains" means the whole or any part of a deceased human being, irrespective of the time of death;

   (b) "archaeological remains" are items, artefacts or things made, modified or used by human beings in antiquity and may include, but not be limited to, stone, wood or iron structures or monuments, dump deposits, bone artefacts, weapons, tools, coins, and pottery; and

   (c) "items of historical or scientific interest" are naturally occurring or manufactured objects or things of any age that are not archaeological remains but may be of interest to society because of their historical or scientific significance, value, rarity, natural beauty, or other quality.

2) If, during the course of the Work, the Contractor encounters any object, item or thing which is described in paragraph 1) of GC6.3 or which resembles any object, item or thing described in paragraph 1) of GC6.3, the Contractor shall

   (a) take all reasonable steps, including stopping work in the affected area, to protect and preserve the object, item or thing;

   (b) immediately notify Canada of the circumstances in writing; and

   (c) take all reasonable steps to minimize additional costs that may accrue as a result of any work stoppage.

3) Upon receipt of a notification in accordance with subparagraph 2)(b) of GC6.3, Canada shall promptly determine whether the object, item or thing is one described in, or contemplated by paragraph 1) of GC6.3, and shall notify the Contractor in writing of any action to be performed, or work to be carried out, by the Contractor as a result of Canada's determination.

4) Canada may, at any time, enlist the services of experts to assist in the investigation, examination, taking of measurements or other such recordings, placing of permanent protection around or removing of the object, item or thing encountered by the Contractor, and the Contractor shall, to the satisfaction of Canada, allow them access and co-operate with them in the carrying out of their duties and obligations.

5) Human remains, archaeological remains and items of historical or scientific interest encountered at the site of the Work shall be deemed to be the property of Canada.

6) Except as may be otherwise provided for in the Contract, the provisions of GC6.4 DETERMINATION OF PRICE and GC6.5 DELAYS AND EXTENSION OF TIME shall apply.

GC6.4 DETERMINATION OF PRICE

GC6.4.1 Price Determination Prior to Undertaking Changes

1) If a Lump Sum Arrangement applies to the Contract or a part thereof, the price of any change shall be the aggregate estimated cost of labour, Plant and Material that is required for the change as agreed upon in writing by the Contractor and Canada plus a negotiated allowance for supervision, co-ordination, administration, overhead, margin and the risk of undertaking the work within the stipulated amount.

2) If a Unit Price Arrangement applies to the Contract or a part thereof, the Contractor and Canada may, by agreement in writing, add items, units of measurement, estimated quantities and prices per unit to the Unit Price Table.

3) A price per unit referred to in paragraph 2) of GC6.4.1 shall be determined on the basis of the aggregate estimated cost of labour, Plant and Material that is required for the additional item as agreed upon by the Contractor and Canada, plus a negotiated allowance.

4) To facilitate approval of the price of the change or the additional price per unit as applicable, the Contractor shall submit a cost estimate breakdown identifying, as a minimum, the estimated cost of labour, Plant, Material, each subcontract amount, and the amount of the negotiated allowance.

5) If no agreement is reached as contemplated in paragraph 1) of GC6.4.1, the price shall be determined in accordance with GC6.4.2.

6) If no agreement is reached, as contemplated in paragraphs 2) and 3) of GC6.4.1, Canada shall determine the class and the unit of measurement of the item of labour, Plant or Material and the price per unit shall be determined in accordance with GC6.4.2.

GC6.4.2 Price Determination Following Completion of Changes

1) If it is not possible to predetermine, or if there is failure to agree upon the price of a change in the Work, the price of the change shall be equal to the aggregate of

   (a) all reasonable and proper amounts actually expended or legally payable by the Contractor in respect of the labour, Plant and Material that fall within one of the classes of expenditure described in paragraph 2) of GC6.4.2, that are directly attributable to the performance of the Contract;

   (b) an allowance for profit and all other expenditures or costs, including overhead, general administration costs, financing and interest charges, in an amount that is equal to 10 percent of the sum of the expenses referred to in subparagraph 1)(a) of GC6.4.2; and

   (c) interest on the amounts determined under subparagraphs 1)(a) and 1)(b) of GC6.4.2 calculated in accordance with GC5.12 INTEREST ON SETTLED CLAIMS;

2) The cost of labour, Plant and Material referred to in subparagraph 1)(a) of GC6.4.2 shall be limited to the following categories of expenditure:
   (a) payments to Subcontractors and Suppliers;

   (b) wages, salaries, bonuses and, if applicable, travel and lodging expenses of employees of the Contractor located at the site of the Work and that portion of wages, salaries, bonuses and, if applicable, travel and lodging expenses of personnel of the Contractor generally employed at the head office or at a general office of the Contractor provided they are actually and properly engaged on the Work under the Contract;

   (c) assessments payable under any statutory authority relating to workers' compensation, employment insurance, pension plan or holidays with pay, provincial health or insurance plans, environmental reviews, and Applicable Taxes collection costs;

   (d) rent that is paid for Plant, or an amount equivalent to 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 or the equivalent amount is reasonable and use of that Plant has been approved by Canada;

   (e) payments for maintaining and operating Plant necessary for and used in the performance of the Work, and payments for effecting repairs thereto that, in the opinion of Canada, are necessary for 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;

   (f) 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;

   (g) 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

   (h) any other payments made by the Contractor with the approval Canada that are necessary for the performance of the Contract in accordance with the Contract Documents.

GC6.4.3 Price Determination - Variations in Tendered Quantities

1) Except as provided in paragraphs 2), 3), 4) and 5) of GC6.4.3, if it appears that the final quantity of labour, Plant and Material under a price per unit item shall exceed or be less than the estimated tendered quantity, the Contractor shall perform the Work or supply the Plant and Material required to complete the item and payment shall be made for the actual Work performed or Plant and Material supplied at the price per unit set out in the Contract.

2) If the final quantity of the price per unit item exceeds the estimated tendered quantity by more than 15 percent, either party to the Contract may make a written request to the other party to negotiate an amended price per unit for that portion of the item which exceeds 115 percent of the estimated tendered quantity, and to facilitate approval of any amended price per unit, the Contractor shall, on request, provide Canada with

   (a) detailed records of the actual cost to the Contractor of performing or supplying the tendered quantity for the price per unit item up to the time the negotiation was requested; and

(b) the estimated unit cost of labour, Plant and Material required for the portion of the item that is in excess of 115 percent of the tendered quantity.

3) If agreement is not reached as contemplated in paragraph 2) of GC6.4.3, the price per unit shall be determined in accordance with GC6.4.2.

4) If it appears that the final quantity of labour, Plant and Material under a price per unit item shall be less than 85 percent of the estimated tendered quantity, either party to the Contract may make a written request to the other party to negotiate a change to the price per unit for the item if

(a) there is a demonstrable difference between the unit cost to the Contractor of performing or supplying the estimated tendered quantity and the unit cost to the Contractor for performing or supplying the final quantity; and

(b) the difference in unit cost is due solely to the decrease in quantity and not to any other cause.

5) For the purposes of the negotiation referred to in paragraph 4) of GC6.4.3

(a) the onus of establishing, justifying and quantifying a proposed change lies with the party making the request for negotiation; and

(b) in no event shall the total price for an item that has been amended as a result of a reduction in quantity pursuant to paragraph 4) of GC6.4.3 exceed the amount that would have been payable to the Contractor had 85 percent of the tendered quantity actually been performed or supplied.

GC6.5 DELAYS AND EXTENSION OF TIME

1) Upon application of the Contractor made before the date first fixed for completion of the Work or before any other date previously fixed under this clause, Canada may extend the time for completion of the Work by fixing a new date if Canada determines that causes beyond the control of the Contractor have delayed its completion.

2) The Contractor's application shall be accompanied by the written consent of the bonding company whose bond forms part of the Contract Security.

3) Subject to paragraph 4) of GC6.5, no payment, other than a payment that is expressly stipulated in the Contract, shall be made by Canada to the Contractor for any extra expense, loss or damage incurred or sustained by the Contractor due to delay, whether or not the delay is caused by circumstances beyond the control of the Contractor.

4) If the Contractor incurs or sustains any extra expense or any loss or damage that is directly attributable to any neglect or delay that occurs after the date of the Contract on the part of Canada in providing any information or in doing any act that the Contract either expressly requires Canada to do or that would ordinarily be done by an owner in accordance with the practice of the trade, the Contractor shall give Canada written notice of intention to claim for that extra expense or loss or damage within ten working days of the date the neglect or delay first occurred.

5) When the Contractor has given a notice referred to in paragraph 4) of GC6.5, the Contractor shall give Canada a written claim for the extra expense, loss or damage no later than 30 days after the date that a Certificate of Completion is issued and not afterwards.

6) A written claim referred to in paragraph 5) of GC6.5 shall contain a sufficient description of the facts and circumstances of the occurrence that is the subject of the claim to enable Canada to determine whether or not the claim is justified and the Contractor shall supply such further and other information for that purpose as Canada may require.

7) If Canada determines that a claim referred to in paragraph 5) of GC6.5 is justified, Canada shall make an extra payment to the Contractor in an amount that is calculated in accordance with GC6.4 DETERMINATION OF PRICE.

8) If the Contractor fails to give a notice referred to in paragraph 4) and a claim referred to in paragraph 5) of GC6.5 within the times stipulated, an extra payment shall not be made to the Contractor in respect of the occurrence.

GC7 DEFAULT, SUSPENSION OR TERMINATION OF CONTRACT

GC7.1 TAKING THE WORK OUT OF THE CONTRACTOR'S HANDS

1) By giving notice in writing to the Contractor in accordance with GC2.3 NOTICES, Canada, without any other authorization, may take all or any part of the Work out of the Contractor's hands, and may employ such means as Canada sees fit to have the Work completed if the Contractor:

   (a) fails to remedy any delay in the commencement or default in the diligent performance of the Work to the satisfaction of Canada within six days of Canada giving notice to the Contractor in writing in accordance with GC2.3 NOTICES;

   (b) defaults in the completion of any part of the Work within the time fixed for its completion by the Contract;

   (c) becomes insolvent, or has committed an act of bankruptcy, and has neither made a proposal to its creditors nor filed a notice of intention to make such a proposal, pursuant to the *Bankruptcy and Insolvency Act*;

   (d) abandons the work;

   (e) makes an assignment of the Contract without the consent required by GC1.16 ASSIGNMENT; or

   (f) otherwise fails to observe or perform any of the provisions of the Contract.

2) If the whole or any part of the Work is taken out of the Contractor's hands, the Contractor's right to any further payment that is due or accruing due under the Contract is, subject only to paragraph 3) of GC7.1, extinguished, and the Contractor is liable to pay Canada, upon demand, an amount that is equal to the amount of all loss and damage incurred or sustained by Canada in respect of the Contractor's failure to complete the Work.

3) If the whole or any part of the Work that is taken out of the Contractor's hands is completed by Canada, Canada may pay the Contractor the amount, if any, of the holdback or a progress claim as determined by Canada 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 Canada for any other loss or damage incurred or sustained by reason of the Contractor's default.

4) The taking of the Work or any part thereof out of the Contractor's hands does not relieve the Contractor from any obligation under the Contract or imposed by law except the obligation to complete the performance of that part of the Work that was taken out of the Contractor's hands.

5) If the Work or any part thereof is taken out of the Contractor's hands, all Plant and Material and the interest of the Contractor, or its suppliers or subcontractors at any tier, in all real property, licences, powers and privileges acquired, used or provided by the Contractor, or its suppliers or subcontractors at any tier, under the Contract shall continue to be the property of Canada without compensation.

6) When Canada certifies that any Plant, Material, or any interest of the Contractor is no longer required for the purposes of the Work, or that it is not in the interests of Canada to retain that Plant, Material, or interest, it shall revert to the Contractor.

7) If the Contractor has become insolvent or has committed an act of bankruptcy, and has either made a proposal to its creditors or filed a notice of intention to make such a proposal, pursuant to the *Bankruptcy and Insolvency Act*, the Contractor shall immediately forward a copy of the proposal or the notice of intention to Canada.

GC7.2 SUSPENSION OF WORK

1) When, in Canada's opinion, it is in the public interest to do so, Canada may 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 GC2.3 NOTICES.

2) When a notice of suspension is received by the Contractor, the Contractor shall suspend all operations in respect of the Work except those that Canada determines are necessary for the care and preservation of the Work, Plant and Material.

3) During a period of suspension, the Contractor shall not remove any part of the Work, Plant or Material from its site without the consent of Canada.

4) If a period of suspension is 60 days or less, the Contractor shall resume the performance of the Work on the expiration of that period, and the Contractor is entitled to be paid the extra costs necessarily incurred by the Contractor as a result of the suspension, determined in accordance with GC6.4 DETERMINATION OF PRICE.

5) If a period of suspension is more than 60 days, Canada and the Contractor may agree that the performance of the Work shall be continued by the Contractor, and the Contractor shall resume performance of the Work subject to any terms and conditions agreed upon by Canada and the Contractor. If Canada and the Contractor do not agree that performance of the Work shall be continued by the Contractor, or upon the terms and conditions under which the Contractor shall continue the Work, the notice of suspension shall be deemed to be a notice of termination pursuant to GC7.3 TERMINATION OF CONTRACT.

GC7.3 TERMINATION OF CONTRACT

1) Canada may terminate the Contract at any time by giving a notice of termination in writing to the Contractor in accordance with GC2.3 NOTICES.

2) If the Contractor receives a notice of termination, the Contractor shall forthwith cease all operations in performance of the Contract, subject to any conditions stipulated in the notice.

3) Subject to paragraph 4) of GC7.3, if the Contract is terminated, Canada shall pay the Contractor an amount determined to be due to the Contractor pursuant to GC6.4 DETERMINATION OF PRICE less the aggregate of all amounts that were paid to the Contractor by Canada and all amounts that are due to Canada from the Contractor pursuant to the Contract.

4) In no event shall the total amount payable by Canada to the Contractor exceed the amount, calculated in accordance with GC5 TERMS OF PAYMENT, that would have been payable to the Contractor had the Contractor completed the Work.

5) Payment to the Contractor, if any, shall be made as soon as practicable under the circumstances.

GC7.4 SECURITY DEPOSIT - FORFEITURE OR RETURN

1) If the Work is taken out of the Contractor's hands, or the Contractor is in breach of, or in default under, the Contract, Canada may convert a security deposit to Canada's own use.

2) If Canada converts a security deposit, the amount realized shall be deemed to be an amount due from Canada to the Contractor under the Contract.

3) Any balance of the amount realized that remains after payment of all losses, damage and claims of Canada and others shall be paid by Canada to the Contractor if, in the opinion of Canada, it is not required for the purposes of the Contract.

GC8 DISPUTE RESOLUTION

GC8.1 INTERPRETATION

1) "dispute" means any disagreement regarding any issue identified by the Contractor in the notice submitted to Canada in accordance with paragraph 2 of GC8.3 NOTICE OF DISPUTE, and includes any claim by the Contractor arising from such disagreement and any counterclaim by Canada, but does not include any claim by either party for punitive or exemplary damages, injury to persons, death, or any claim based on an allegation of libel or slander.

2) The alternative dispute resolution procedures set out in GC8, do not apply to any claim by Canada against the Contractor except any counterclaim in a dispute as defined in paragraph 1 of GC8.1, including, but not limited to, any claim of setoff regarding any amount due to Canada under GC5.10 ASSESSMENT AND DAMAGES FOR LATE COMPLETION.

GC8.2 CONSULTATION AND CO-OPERATION

1) The parties agree to maintain open and honest communication throughout the performance of the Contract.

2) The parties agree to consult and co-operate with each other in the furtherance of the Work and the resolution of problems or differences that may arise.

GC8.3 NOTICE OF DISPUTE

1) Any difference between the parties to the Contract of any nature arising out of or in connection with the Contract which could result in a claim by the Contractor against Canada, and which is not settled by consultation and co-operation as envisaged in GC8.2 CONSULTATION AND CO-OPERATION, shall be resolved in the first instance by Canada, whose written decision or direction shall be final and binding subject only to the provisions of

GC8. Such written decision or direction includes, but is not limited to, any written decision or direction by Canada under any provision of the General Conditions.

2) The Contractor shall be deemed to have accepted the decision or direction of Canada referred to in paragraph 1) of GC8.3 and to have expressly waived and released Canada from any claim in respect of the particular matter dealt with in that decision or direction unless, within 15 working days after receipt of the decision or direction, the Contractor submits to Canada a written notice of dispute requesting formal negotiation under GC8.4 NEGOTIATION. Such notice shall refer specifically to GC8.4 NEGOTIATION, and shall specify the issues in contention and the relevant provisions of the Contract.

3) The giving of a written notice in accordance with paragraph 2) of GC8.3 shall not relieve the Contractor from complying with the decision or direction that is the subject of the dispute. Such compliance, however, shall not be construed as an admission by the Contractor of the correctness of such decision or direction.

4) If a dispute is not resolved promptly, Canada shall give such instructions as, in Canada's opinion, are necessary for the proper performance of the Work and to prevent delays pending a resolution of the matter. Unless Canada terminates the Contract, orders the Contractor to suspend the Work, or takes the Work out of the hands of the Contractor, the Contractor shall continue to perform the Work in accordance with the provisions and requirements of the Contract and the instructions of Canada. Such performance shall not prejudice any claim that the Contractor may have.

5) Nothing in GC8 relieves the Contractor from its obligation to provide any other notice required by the Contract within the time specified in the Contract, including but not limited to, any notice required under GC6.2 CHANGES IN SUBSURFACE CONDITIONS.

GC8.4 NEGOTIATION

1) Within 10 working days after receipt by Canada of a notice referred to in paragraph 2) of GC8.3 NOTICE OF DISPUTE, or within such other period of time as may be mutually agreed to, the parties shall commence formal negotiations in order to resolve the dispute. Negotiations shall occur initially between representatives of the Contractor and Canada who play a direct supervisory role in the performance, administration or management of the Contract.

2) If the representatives referred to in paragraph 1) of GC8.4 are unable to resolve some or all of the issues which are the subject of the negotiations within 10 working days, the parties shall refer the remaining issues which are in dispute to a second level of negotiation between a principal or principals of the Contractor and a senior level manager or senior level managers representing Canada.

3) If negotiations fail to resolve the dispute within 30 working days from the date of delivery of the notice referred to in paragraph 2) of GC8.3 NOTICE OF DISPUTE, or within such longer period as may have been agreed to by the parties, the Contractor may, by giving written notice to Canada, in accordance with GC2.3 NOTICES, within 10 working days from the end of such period, request that mediation be undertaken to assist the parties to reach agreement on the outstanding issues.

4) If the Contractor does not request mediation within the period permitted by paragraph 3) of GC8.4, the Contractor shall be deemed to have accepted the decision or direction of Canada under paragraph 1) of GC8.3 NOTICE OF DIPUTE and to have expressly waived and released Canada from any claim in respect of the particular matter dealt with in that decision or direction.

GC8.5 MEDIATION

1) If the Contractor has requested mediation in accordance with paragraph 3) of GC8.4 NEGOTIATION, mediation shall be conducted in accordance with GC8.8 RULES FOR MEDIATION OF DISPUTES.

2) If a Project Mediator has not previously been appointed for the purposes of the Contract, a Project Mediator shall be appointed in accordance with GC8.8 RULES FOR MEDIATION OF DISPUTES forthwith after delivery of a notice in accordance with paragraph 3) of GC8.4 NEGOTIATION, requesting mediation.

3) If the dispute has not been resolved within

   (a) Ten (10) working days following the appointment of a Project Mediator in accordance with paragraph 2) of GC8.5, if a Project Mediator was not previously appointed;

   (b) Ten (10) working days following receipt by Canada of a written notice in accordance with paragraph 3) of GC8.4 NEGOTIATION, if a Project Mediator was previously appointed; or

   (c) such other longer period as may have been agreed to by the parties;

   the Project Mediator shall terminate the mediation by giving written notice to the parties stating the effective date of termination.

GC8.6 CONFIDENTIALITY

1) All information exchanged during alternative dispute resolution procedures, by whatever means, shall be without prejudice and shall be treated as confidential by the parties and their representatives, unless otherwise required by law. However, evidence that is independently admissible or discoverable shall not be rendered inadmissible or non-discoverable by virtue of its use during an alternative dispute resolution process.

GC8.7 SETTLEMENT

1) Any agreement to settle all or any part of a dispute, by whatever means, shall be in writing and be signed by the parties or their authorized representatives.

GC8.8 RULES FOR MEDIATION OF DISPUTES

GC8.8.1 Interpretation

In these Rules

1) “Coordinator” means the person designated by Canada to act as the Dispute Resolution Coordinator.

GC8.8.2 Application

1) By mutual agreement, the parties may change or make additions to the Rules.

GC8.8.3 Communication

1) Written communications pursuant to these Rules shall be given in accordance with GC2.3 NOTICES.

GC8.8.4 Appointment of Project Mediator

1) The parties to the Contract may, by mutual consent, at any time after entry into the Contract, appoint a mediator (the "Project Mediator") to conduct mediation proceedings in accordance with these Rules for Mediation of Disputes, in regard to any dispute that may arise with regard to the interpretation, application or administration of the Contract. In this case, they shall jointly enter into a contract with the appointed Project Mediator, which contract shall be in a form drafted by the Coordinator and agreed to by the parties.

2) If the parties do not appoint a Project Mediator pursuant to paragraph 1) of GC8.8.4, the parties shall appoint a Project Mediator within 17 working days following receipt of a written notice from the Contractor, in accordance with GC2.3 NOTICES, requesting that mediated negotiations be undertaken in accordance with these Rules to assist the parties to reach agreement on any outstanding issues that may be in dispute. Any contract entered into with the appointed Project Mediator shall meet the requirements as set out for the contract described in paragraph 1) of GC8.8.4.

3) When mediation is requested by the Contractor pursuant to paragraph 3) of GC8.4 NEGOTIATION, if the parties have previously entered into a contract with a Project Mediator, the parties shall within 2 days send to both the Project Mediator and the Coordinator

   (a) a copy of the notice requesting negotiation under paragraph 2) of GC8.3 NOTICE OF DISPUTE;

   (b) a copy of Canada's written position in relation to the notice, the issues in contention and the relevant provisions of the contract; and

   (c) a copy of the Contractor's written request for mediation required under paragraph 3) of GC8.4 NEGOTIATION.

4) If the parties have not agreed on a Project Mediator, the parties shall forthwith provide the Coordinator with the written materials referred to in subparagraphs 3)(a), 3)(b) and 3)(c) of GC8.8.4 together with a request that the Coordinator assist in the appointment of a mutually acceptable Project Mediator in accordance with these Rules.

5) Within 5 working days following receipt of the request and materials referred to in paragraph 4) of GC8.8.4, the Coordinator shall provide the parties with a list of qualified private sector mediators obtained from an independent and impartial entity, together with instructions to each party to individually and confidentially select and rank their preferred and fully acceptable choices of mediator in descending order. Each mediator listed shall be impartial and independent of the parties, and shall be an experienced and skilled commercial mediator, preferably with knowledge of the subject matter of the dispute.

6) Within 10 working days of receipt of the list referred to in paragraph 5) of GC8.8.4 each party shall comply with the instructions accompanying the list(s) and shall deliver the completed listing to the Coordinator.

7) Within 2 working days following receipt of the completed listings, the Coordinator shall select the highest common ranked mediator to act as Project Mediator for the purposes of the contract.

8) In the event of a tie, the Coordinator shall consult both parties to re-evaluate their rankings in order to assist the Coordinator in selecting a Project Mediator acceptable to both parties. If the parties cannot agree upon a Project Mediator, the Coordinator shall forthwith provide the parties with a second list of mediators and the procedure shall be repeated.

9) If the parties have not previously entered into a contract with a mutually acceptable Project Mediator, the Coordinator shall use reasonable efforts to negotiate a contract with a mutually acceptable Project Mediator on behalf of the parties, which contract shall incorporate or otherwise comply with the provisions of these Rules. If negotiations are unsuccessful, or if for other reason the individual is unwilling or unable to enter into a contract to act as Project Mediator, the Coordinator shall repeat the process with the second-highest common ranked mediator.

10) The parties agree that, upon successful completion of the negotiations referred to in paragraph 9) of GC8.8.4, they shall jointly enter into a contract with the selected Project Mediator, which contract shall be in a form drafted by the Coordinator and agreed to by the parties.

11) Upon execution of the contract with the Project Mediator referred to in paragraph 10) of GC8.8.4 the Coordinator shall provide the Project Mediator with copies of the documents referred to in paragraph 3) of GC8.8.4.

GC8.8.5 Confidentiality

1) Subject to paragraph 2) of GC8.8.5, and unless otherwise agreed in writing by the parties, the Project Mediator, the parties and their counsel or representatives shall keep confidential all matters and documents disclosed during mediation proceedings except where the disclosure is necessary for any implementation of any agreement reached or is required by law.

2) Evidence that is independently admissible or discoverable in any arbitral or judicial proceeding shall not be rendered inadmissible or non-discoverable by virtue of its use in mediation proceedings.

3) Neither party shall make transcripts, minutes or other records of a mediation conference.

4) The personal notes and written opinions of the Project Mediator made in relation to mediation are in the Project Mediator's sole possession and control, are confidential, and may not be used in any subsequent proceeding between the parties or where they are opposed in interest without the express written permission of the parties.

5) All information exchanged during mediation procedures, by whatever means, shall be without prejudice and shall be treated as confidential by the parties and their representatives, unless otherwise required by law.

GC8.8.6 Time and Place of Mediation

1) The Project Mediator, in consultation with the parties shall set the date, time and place of any mediation conference as soon as possible, bearing in mind that, subject to agreement to

the contrary between the parties, only 10 working days are available within which to attempt to settle the dispute.

GC8.8.7 Representation

1) Representatives of the parties may be accompanied at the mediation conference by legal counsel or any other person.

2) If the Project Mediator is a lawyer, the Project Mediator shall not provide legal advice to a party during the course of the mediation conference, but may recommend that a party obtain independent legal advice before finalizing a settlement agreement.

GC8.8.8 Procedure

1) The parties agree to an exchange of all facts, information and documents upon which they intend to rely in any oral or written presentation during the mediation. This exchange shall be completed no later than 2 working days prior to the date set for a mediation conference.

2) The Project Mediator shall be free to meet with the parties individually during a mediation conference if the Project Mediator is of the opinion that this may improve the chances of a mediated settlement, and either party may request such an individual meeting at any time.

3) The parties may agree to extend the 10 working days available for settlement of the dispute through mediation, and the Project Mediator shall record that agreement in writing.

GC8.8.9 Settlement Agreement

1) The parties shall record in writing any settlement agreement reached, with sufficient detail to ensure a clear understanding of

   (a) the issues resolved;

   (b) any obligations assumed by each party including criteria to determine if and when these obligations have been met; and

   (c) the consequences of failure to comply with the agreement reached.

2) The parties agree to carry out the terms of a settlement agreement as soon as possible and, in any event, within any time periods specified in the agreement.

GC8.8.10 Termination of Mediation

1) Either party may withdraw from mediation at any time without reason and, in that event, the Project Mediator shall give each party a written notice terminating the mediation and establishing the effective date of termination.

2) If, in the opinion of the Project Mediator, either party fails to mediate in good faith or fails to comply with the terms of these Rules, or if the Project Mediator, at any time during mediation, is of the opinion that further negotiations will fail to resolve the issues outstanding, the Project Mediator may terminate the negotiations by providing the parties with a written notice of termination, stating therein the Project Mediator's reasons for the termination, and the effective date of termination.

3) If a dispute has not been resolved within 10 working days or such other longer period as may have been agreed to by the parties, the Project Mediator shall terminate the mediation by giving written notice to the parties stating the effective date of termination.

GC8.8.11 Costs

1) The parties agree that they will each be responsible for the costs of their own representatives and advisors and associated travel and living expenses. Fees and expenses of the Project Mediator and all administrative costs of mediation, such as the cost of the meeting room(s), if any, shall be borne equally by the parties.

GC8.8.12 Subsequent Proceedings

1) The parties shall not rely on or introduce as evidence in any arbitral or judicial proceeding, whether or not such proceeding relates to the subject matter of mediation,

   (a) any documents of other parties that are not otherwise producible in those proceedings;

   (b) any views expressed or suggestions made by any party in respect of a possible settlement of issues;

   (c) any admission made by any party in the course of mediation unless otherwise stipulated by the admitting party; and

   (d) the fact that any party has indicated a willingness to make or accept a proposal or recommendation for settlement.

2) The Project Mediator shall neither represent nor testify on behalf of either of the parties in any subsequent investigation, action or proceeding relating to the issues in mediation proceedings.

3) The Project Mediator shall not be subpoenaed to give evidence relating to

   (a) the Project Mediator's role in mediation; or

   (b) the matters or issues in mediation;

   in any subsequent investigation, action or proceeding and the parties agree to vigorously oppose any effort to have the Mediator so subpoenaed.

GC9 CONTRACT SECURITY

GC9.1 OBLIGATION TO PROVIDE CONTRACT SECURITY

1) The Contractor shall, at the Contractor's expense and within 14 days after the date that the Contractor receives notice that the Contractor's bid was accepted by Canada, obtain and deliver Contract Security to Canada in one of the forms prescribed in GC9.2 TYPES AND AMOUNTS OF CONTRACT SECURITY.

2) If the whole or a part of the Contract Security provided is in the form of a security deposit, it shall be held and disposed of in accordance with GC5.13 RETURN OF SECURITY DEPOSIT and GC7.4 SECURITY DEPOSIT - FORFEITURE OR RETURN.

3) If a part of the Contract Security provided is in the form of a labour and material payment bond, the Contractor shall post a copy of that bond at the site of the Work.

4) It is a condition precedent to the release of the first progress payment that the Contractor has provided the Contract Security as specified herein.

GC9.2 TYPES AND AMOUNTS OF CONTRACT SECURITY

1) The Contractor shall deliver to Canada either (a) or (b).

   (a) A performance bond and a labour and material payment bond each in an amount that is equal to not less than 50 percent of the Contract Amount.

   (b) A security deposit or an irrevocable standby letter of credit in an amount that is equal to not less than 20 percent of the Contract Amount.

2) A performance bond and a labour and material payment bond referred to in paragraph 1) of GC9.2 shall be in a form and be issued by a bonding or surety company that is approved by Canada.

   (a) The approved form for the performance bond is displayed at the following Website: http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=14494&section=text#appS

   (b) The approved form for the labour and material payment bond is displayed at the following website: http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=14494&section=text#appS ; and

   (c) The list of approved bonding or surety companies is displayed at the following Website: http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=14494&section=text#appL

3) A security deposit referred to in subparagraph 1)(b) of GC9.2 shall be in the form of

   (a) a bill of exchange, bank draft or money order made payable to the Receiver General for Canada and certified by an approved financial institution or drawn by an approved financial institution on itself; or

(b) bonds of, or unconditionally guaranteed as to principal and interest by, the Government of Canada.

4) For the purposes of subparagraph 3)(a) of GC9.2

(a) 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;

(b) if a bill of exchange, bank draft or money order is certified by or drawn on an institution or corporation other than a chartered bank, it must be accompanied by proof that the said institution or corporation meets at least one of the criteria described in subparagraph 4)(c) of GC9.2, either by letter or by a stamped certification on the bill of exchange, bank draft or money; and

(c) An approved financial institution is

(i) a corporation or institution that is a member of the Canadian Payments Association as defined in the *Canadian Payments Act*;

(ii) a corporation that accepts deposits that are insured, to the maximum permitted by law, by the Canada Deposit Insurance Corporation or the "Autorité des marchés financiers";

(iii) a corporation that accepts deposits from the public if repayment of the deposit is guaranteed by Her Majesty the Queen in right of a province;

(iv) a corporation, association or federation incorporated or organized as a credit union or co-operative credit society that conforms to the requirements of a credit union which are more particularly described in paragraph 137(6) of the *Income Tax Act*; or

(v) Canada Post Corporation.

5) Bonds referred to in subparagraph 3)(b) of GC9.2 shall be provided on the basis of their market value current at the date of the Contract, and shall be

(a) made payable to bearer; or

(b) 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

(c) 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.

6) An irrevocable standby letter of credit referred to in subparagraph 1)(b) of GC9.2 shall:

(a) be an arrangement, however named or described, whereby a financial institution (the “Issuer”) acting at the request and on the instructions of a customer (the “Applicant”) or on its own behalf,

(i) is to make a payment to, or to the order of, Canada as the beneficiary;

(ii) is to accept and pay bills of exchange drawn by Canada;

(iii) authorizes another financial institution to effect such payment or accept and pay such bills of exchange; or

(iv) authorizes another financial institution to negotiate against written demand(s) for payment provided that the terms and conditions of the letter of credit are complied with;

(b) state the face amount that may be drawn against it;

(c) state its expiry date;

(d) provide for sight payment to the Receiver General for Canada by way of the financial institution's draft against presentation of a written demand for payment signed by Canada;

(e) provide that more than one written demand for payment may be presented subject to the sum of those demands not exceeding the face value of the letter of credit;

(f) provide that it is subject to the International Chamber of Commerce (ICC) Uniform Customs and Practice (UCP) for Documentary Credits, 2007 Revision, ICC Publication No. 600. Pursuant to the ICC UCP, a credit is irrevocable even if there is no indication to that effect; and

(g) be issued or confirmed, in either official language in a format left to the discretion of the issuer or confirmer, by an approved financial institution on its letterhead.

GC10 INSURANCE

GC10.1 INSURANCE CONTRACTS

1) The contractor shall, at the contractor's expense, obtain and maintain insurance contracts in respect of the work and shall provide evidence thereof to Canada in accordance with the requirements of the INSURANCE TERMS.

2) The insurance contracts referred to in paragraph 1) of GC10.1 shall

   (a) be in a form, of the nature, in the amounts, for the periods and containing the terms and conditions specified in INSURANCE TERMS; and

   (b) provide for the payment of claims under such insurance contracts in accordance with GC10.2 INSURANCE PROCEEDS.

GC10.2 INSURANCE PROCEEDS

1) In the case of a claim payable under a Builders Risk/Installation (All Risks) insurance contract maintained by the contractor pursuant to GC10.1 INSURANCE CONTRACTS, the proceeds of the claim shall be paid directly to Canada, and

   (a) the monies so paid shall be held by Canada for the purposes of the contract, or

   (b) if Canada elects, shall be retained by Canada, in which event they vest in Canada absolutely.

2) In the case of a claim payable under a General Liability insurance contract maintained by the contractor pursuant to GC10.1 INSURANCE CONTRACTS, the proceeds of the claim shall be paid by the insurer directly to the claimant.

3) If an election is made pursuant to paragraph 1) of GC10.2, Canada may cause an audit to be made of the accounts of the contractor and of Canada in respect of the part of the work that was lost, damaged or destroyed for the purpose of establishing the difference, if any, between

   (a) the aggregate of the amount of the loss or damage suffered or sustained by Canada, including any costs 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 Canada under the contract, minus any monies retained pursuant to subparagraph 1)(b) of GC10.2; and

   (b) the aggregate of the amounts payable by Canada to the contractor pursuant to the contract up to the date of the loss or damage.

4) A difference that is established pursuant to paragraph 3) of GC10.2 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.

5) When payment of a deficiency has been made pursuant to paragraph 4) of GC10.2, all rights and obligations of Canada 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 paragraph 3) of GC10.2, be deemed to have been expended and discharged.

6) If an election is not made pursuant to subparagraph 1)(b) of GC10.2, the contractor shall, subject to paragraph 7) of GC10.2, clear and clean the work and its site and restore and replace the part of the work that was lost, damaged or destroyed at the contractor's expense as if that part of the work had not yet been performed.

7) When the contractor clears and cleans the work and its site and restores and replaces the work referred to in paragraph 6) of GC10.2, Canada shall pay the contractor out of the monies referred to in paragraph 1) of GC10.2 so far as they will thereunto extend.

8) Subject to paragraph 7) of GC10.2, payment by Canada pursuant to paragraph 7) of GC10.2 shall be made in accordance with the contract but the amount of each payment shall be 100 percent of the amount claimed notwithstanding subparagraphs 3)(a) and 3)(b) of GC5.4 PROGRESS PAYMENT.

Appendix "E"

TECHNICAL SPECIFICATIONS & PLANS

Project Tender Documents for the

AGR CANADA
VINELAND - DESIGN OF FUME HOOD INSTALLATION

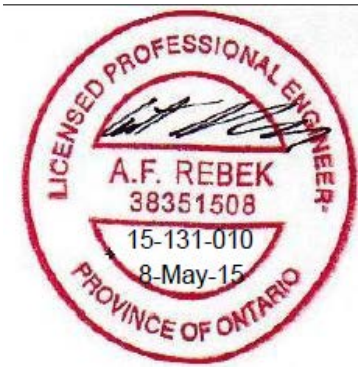
at

4890 Victoria Ave N,
Vineland Station, ON L0R 2E0

Project No.: 15-131-010

Date: May 8th, 2015

ARC Engineering Inc.
1100 South Service Road, Suite #417
Stoney Creek, ON L8E 0C5
Telephone: (905) 643-8530, Fax: (905) 643-8510



Only the specifications pertaining to design of the fume hood and associated appurtenances have been prepared under my direct supervision and the seal above applies only to that design.

1. GENERAL REQUIREMENTS

.1 SUMMARY OF WORK

.2 The work involves the provision of general contracting services for the installation of a Fume Hood and accessories as indicated on drawings and specifications.

.3 The construction will be carried out on schedule in order to achieve Substantial Completion of the Work on or before September 30, 2015. The Contractor will carry in their lump sum price all costs associated with time, labour and delivery of products and services.

.4 The work will be carried out on the premises of 4890 Victoria Ave N, Vineland Station, ON. The building will remain operational and occupied during construction. All work to be done during normal working hours unless arranged in advance with Vineland Research Inc. Noisy or disruptive (ex: odourous, space limiting, etc.) activities require planning and 1 week advance notice. Shut down of power or gas, etc. will also need 1 week advance notice. It will be the responsibility of the contractor to liaise and co-operate with the Owner and to provide reasonable notification of disruptive activities.

.5 The Owner has confirmed that no hazardous materials are present at the place of work.

.2 ALTERNATE PRICES

.1 There are no alternate prices required for this project.

2. PROJECT MANAGEMENT AND COORDINATION

.1 COORDINATION

.1 Coordinate the Work to ensure the Work proceeds safely and expeditiously.

.2 Ensure adequate communication among involved parties.

.3 Allocate mobilization areas at the Place of the Work; for field offices and storage, access, traffic, and parking facilities.

.4 Submit information required for preparation of coordination and interference drawings. Review and approve revised drawings for submission to Consultant.

.2 CONTINUANCE OF OWNER OPERATION

.1 Coordinate and schedule the Work to minimize any disruption of the normal functions of the existing buildings at the Place of Work.

.2 Changes to the traditional scheduling of construction may be required and certain portions of the Work may not be able to proceed in continuous sequence.

.3 Disruptive work may need to be completed after hours when the existing buildings is not occupied for work requiring shut down of services or beyond the limits of the construction area.

.4 Every reasonable effort will be made to cooperate with the construction process.

.5 The Owner may modify proposed scheduling where such changes are in the best interests regarding the operation of the facility.

.3 GENERAL REQUIREMENTS FOR MEETINGS

.1 Schedule and administer meetings in consultation with all parties involved, throughout the progress of the Work.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting 4 days in advance of meeting date to all parties involved.

.4 Make arrangements for site meetings held bi-weekly on site and/or by teleconference. Owner to pay for teleconferencing facilities.

.5 Preside at meetings.

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

.7 Submit draft copy of minutes to all parties involved within 2 Working Days after meeting.

.8 All parties involved are to review minutes and submit comments for any necessary revisions or additions within 3 Working Days.

.9 Update minutes to reflect comments from all parties involved.

.10 Reproduce and distribute copies of minutes within 2 Working Days after receipt of comments. Transmit minutes to meeting participants and all parties involved

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

.12 Schedule meetings at regular 14 day intervals, on a day that is determined as convenient by all parties involved.

.4 PRE-CONSTRUCTION MEETING

.1 Within 2 days after award of Contract, request a pre-construction meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Establish time and location of meeting

.3 Pre-construction Meeting Agenda: include the following:

.1 Appointment of official representative of participants in the Work;

.2 Schedule of Work, progress scheduling;

.3 Schedule of submissions of shop drawings, samples, colour chips;

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences;

.5 Delivery schedule of specified equipment;

.6 Site security;

.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements;

.8 Owner provided products.

.9 Record drawings;

.10 Maintenance manuals;

.11 Take-over procedures, acceptance, warranties;

.12 Monthly progress claims, administrative procedures, photographs, holdbacks;

.13 Appointment of inspection and testing agencies or firms;

.5 PROGRESS AND PROGRESS DRAW MEETINGS

.1 During course of Work and up to 2 weeks prior to project completion, schedule progress meetings biweekly.

.2 During course of Work, schedule progress draw meetings monthly. Progress draw meetings may coincide with progress meetings.

.3 Submit a copy of the application for payment not less than two Working Days before scheduled progress draw meeting. Changes to the application for payment may be required prior to progress draw meeting.

.4 Contractor, major Subcontractors involved in Work, Consultant, and Owner are to be in attendance.

.5 Notify parties minimum 4 days prior to meetings.

.6 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.

.7 Progress Meeting Agenda: include the following.

.1 Review, approval of minutes of previous meeting;

.2 Review of Work progress since previous meeting;

.3 Field observations, problems, conflicts;

.4 Problems impeding construction schedule;

.5 Review of delivery schedules;

.6 Corrective measuring and procedures to regain project schedule;

.7 Revision of construction schedule;

.8 Progress, schedule, during succeeding work period;

.9 Review submittal schedules, record drawings; expedite as required;

.10 Maintenance of quality standards;

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

.12 Other business

3. SCHEDULE

.1 SUBMISSION REQUIREMENTS

.1 Submit initial schedules within 2 days after award of Contract and resubmit updated schedule with each application for payment.

.2 CONSTRUCTION SCHEDULE – CRITICAL PATH METHOD

.1 Include complete sequence of construction activities.

.2 Include dates for commencement and completion of each major element of construction.

.3 Indicate progress of each activity to date of submission of the schedule.

.4 Update schedule monthly and resubmit with each application for progress payment. The Consultant will not review an application for payment that does not include an updated construction schedule.

.5 Show changes occurring since previous submission of schedule.

.1 Major changes in scope.

.2 Activities modified since previous submission.

.3 Revised projections of progress and completion.

.4 Other identifiable changes.

.6 If necessary, provide a narrative report to define:

.1 Problem areas, anticipated delays, and impact on schedule.

.2 Corrective action recommended and its effect.

.3 Effect of changes on schedules of other contractors.

4. SUBMITTAL PROCEDURES

.1 ADMINISTRATIVE

.1 Submit submittals listed for review. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work.

.2 Work affected by the submittal shall not proceed until review is complete.

.3 Review submittals prior to submission. Submittals not stamped, signed, dated and identified will not be reviewed by Consultant.

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

.5 Include with each submission a duplicate transmittal document indicating the following.

.1 Date of initial submission,

.2 Date of each resubmission, and

.3 Project title and Consultant's project number.

.6 Indicate on each submission, the following information:

.1 Name of Contractor,

.2 Name of Subcontractor,

.3 Name of supplier (as applicable),

.4 Name of manufacturer (as applicable),

.5 Name of person responsible for preparation of submission, and

.2 SUBMITTALS PRIOR TO START OF WORK

.1 Submit the following documents within the time stipulated, or, if not stipulated, prior to first application for payment:

.1 Insurance certificates,

.2 Workplace Safety and Insurance Board certificates,

.3 Construction schedule,

.4 Interference drawings,

.5 Shop drawing schedule,

.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Refer to SECTION 15010 – Mechanical General Provisions sub-section 2.1.

5. SPECIAL PROCEDURES

.1 CONSTRUCTION SAFETY AND PROTECTION

.1 Assume the role of "Constructor" as defined by applicable safety legislation.

.2 If requested, provide a copy of the registration filed with a Director under the provincial Occupational Health and Safety Act (Construction Projects); referred to as "Registration Forms of Construction and Employers of Workers".

.3 The Contractor shall provide temporary enclosures for all openings where the public or site staff may be at risk. The Contractor shall use proven dust control methods, isolate dust to the area of the work including dust transmission through ducts and other wall/ceiling penetrations. Contractor shall co-ordinate with Vineland Research Inc. to take proper measures to protect detection devices from dust.

.4 The Contractor shall provide and maintain all necessary fire protection during the construction period, using fire extinguishers and other such fire prevention measures as required by the authority having jurisdiction. Fire alarm system is to be activated at the end of each day, at no time is the premises to be left unprotected. Provide manned security after hours if the fire alarm system is not ready to be activated

.2 SPECIAL PROCEDURES FOR CONTRACTORS WORKING IN EXISTING BUILDINGS

.1 If and where it can be determined by any party to this contract or by the public, that the performance of the work in any way causes blockage of a required building egress route or endangers the Owner, occupants or the public, the Contractor shall stage his work to eliminate the risk to the Owner and the public by performing work during off hours as arranged in advance with Dept of Residences, or he shall provide an alternative egress route that meets the requirements of the authority having jurisdiction.

.3 HEALTH AND SAFETY REQUIREMENTS

.1 Prepare and initiate a Health and Safety Plan in accordance with appropriate regulatory agencies; requirements prior to commencing work activities involving the excavation, transport or handling of potentially contaminated material.

.2 Provide and maintain a safe working environment for on-site personnel and minimize the impact of construction activities on the general public and the surrounding environment.

.3 Supply workers, inspectors, and other site-visitors with appropriate personal protective equipment.

.4 Should any unforeseen, or site-peculiar safety related factor, hazard, or condition become evident during the performance of the work, notify the authority having jurisdiction and all parties involved immediately, and take prudent temporary action to establish and maintain safe working conditions until suitable permanent action can be implemented. Safeguard workers, the public and the surrounding area from contamination.

.5 In the event of injury to on-site personnel, contact the designated hospital and describe the injury prior to or during transport of injured personnel. Transport the injured personnel to the defined medical facility along a predefined route.

6. QUALITY REQUIREMENTS

.1 REGULATORY REQUIREMENTS

.1 Conform to the latest editions of the following regulatory requirements, hereinafter referred to as codes:

.1 The Ontario Building Code;

.2 The Ontario Fire Code;

.3 The Ontario Plumbing Code;

.4 The Canadian Electrical Code;

.5 The Construction Lien Act;

.6 The Occupational Health and Safety Act (Construction Projects);

.7 The Workplace Hazardous Materials Information System Regulation (WHMIS);

.8 Waste Audits and Waste Reduction Workplans; and

.9 Industrial, Commercial and Institutional Source Separation Programs.

.10 Conform to requirements of authorities having jurisdiction, including public utilities.

.2 Nothing contained in the Contract Documents shall be so construed as to be in conflict with any law, by-law, or regulation of the municipal, regional, provincial, or other Authorities Having Jurisdiction. Perform all work in conformity with all such regulatory requirements.

.2 PERMITS AND FEES

.1 Determine detailed requirements of authorities having jurisdiction.

.2 Pay construction damage deposits levied by municipality in connection with the issuance of a building permit. The owner will apply for and receive a building permit.

.3 REFERENCES

.1 Where edition date is not specified, consider that references to manufacturer's data, and published codes, standards and specifications are made to the latest edition or revision, approved by the issuing organization.

.2 Reference standards and specifications are quoted to establish minimum standards. Work which in quality exceeds the specified minimum will be considered to conform.

.3 The requirements of the Contract Documents govern over the requirements of reference standards and specifications.

.4 Standards, specifications, associations and regulatory agencies are generally referred to throughout the Contract Documents by their abbreviated designations, as listed below:

.1 AA – The Aluminum Association

.2 AAMA – Architectural Aluminum Manufacturer's Association

.3 ACI – American Concrete Institute

.4 AISI – American Iron and Steel Institute

.5 AMCA – Air Movement and Air Control Association

.6 ANSI – American National Standards Institute

.7 ARI – Air Conditioning and Refrigeration Institute

.8 ASME – American Society of Mechanical Engineering

.9 ASTM – American Society for Testing and Materials

.10 ASHRAE – American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc.

.11 AWMAC – Architectural Woodwork Manufacturers Association of Canada

.12 CGA – Canadian Gas Association

.13 CGSB – Canadian General Standards Board

.14 CISC – Canadian Institute of Steel Construction

.15 CRCA – Canadian Roofing Contractors' Association

.16 CSA – Canadian Standards Association

.17 CSC – Construction Specifications Canada

.18 CSSBI – Canadian Sheet Steel Building Institute

.19 CWC – Canadian Wood Council

.20 NFPA – National Fire Protection Association

.21 OPCA – Ontario Painting Contractors' Association

.22 SMACNA – Sheet Metal and Air Conditioning Contractors' National Association

.23 ULC – Underwriters Laboratories of Canada

.24 ULI - Underwriters Laboratories Incorporate

.25 WHI – Warnock-Hersey International

.4 QUALITY ASSURANCE

.1 Quality of work shall be the best quality, executed by the workers experienced and skilled in the respective duties for which they are employed.

.2 Maintain good order and discipline among workers engaged on the Project. Do not employ on the Work anyone not skilled in the tasks assigned.

.3 Immediately notify the parties involved if required Work is such as to make it impractical to produce required results.

.4 Decisions as to the quality or fitness of work in cases of dispute rest solely with the Consultant, whose decision is final.

.5 DEFECTIVE WORK

.1 Forward copy of inspection and test reports promptly to each affected Subcontractor.

.6 EQUIPMENT AND SYSTEMS

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

.2 Refer to facility services Sections for definitive requirements.

7. TEMPORARY FACLITIES AND CONTROLS

.1 TEMPORARY FACILITIES

.1 The Contractor shall provide and pay for:

.1 Temporary dust barriers;

.2 Temporary platforms and coverings to protect materials from the elements;

.3 Superintendent's hand-held telephone at the worksite (Cellular Phone)

.4 Mechanical space for contractor equipment will be designated by Vineland Research Inc.

.5 Site Office trailer: If being used, must be located in consultation with Vineland Research Inc.

8. EXAMINATION AND PREPARATION

.1 EXAMINATION AND ACCEPTANCE OF CONDITIONS

.1 Verify conditions are ready to receive installation.

.2 Ensure substrate surfaces are clean, dimensionally stable, cured and free of contaminants such as oil, sealers and curing compounds.

.3 Notify all parties involved in writing of unacceptable conditions.

.4 The Contractor shall examine the site and all conditions thereon. The Contractor shall take into consideration all such existing conditions as may affect the Work under the Contract prior to commencing work. Commencement of work shall constitute accepting of all visible conditions.

9. CUTTING AND PATCHING

.1 Refer to SECTION 15010 – Mechanical General Provisions sub-section 3.2.

10. CLEANING AND WASTE MANAGEMENT

.1 PROGRESS CLEANING

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

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

.3 Remove waste material and debris from the Place of the Work in an approved manner at the end of each Working Day.

.4 Clean interior areas prior to installing finishing Products.

.5 Maintain areas free of dust and other contaminants during finishing operations.

.2 FINAL CLEANING

.1 Provide professional cleaning by a recognized, established cleaning company.

.2 Standards Meeting: Prior to final cleaning, hold a meeting on site to determine the acceptable standard of cleaning.

.3 Lock each room after completing final cleaning in that area.

.4 Restrict access to areas that have been final cleaned. Re-clean areas that have been accessed by workers prior to Owner occupancy.

.5 Remove stains, dirt and smudges from finished surfaces. Conform to respective manufacturers' recommendations.

.6 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, and plastic laminate.

.7 Replace broken, scratched or disfigured glass.

.8 Clean electrical and mechanical fixtures and other fittings of labels, wrappings, paper and other foreign material.

.9 Vacuum clean and dust building interiors located in work areas, including inside ducts, blowers and coils and behind grilles, louvres and screens.

.3 WASTE MANAGEMENT AND DISPOSAL

.1 Disposal of waste or volatile materials, such as kerosene, mineral spirits, oil or paint thinner into storm or sanitary sewers is prohibited. Collect such waste materials in appropriate containers and dispose of in accordance with the regulations and guidelines of the authority having jurisdiction.

.2 Provide on-site disposal service for rubbish accumulated by Subcontractors and Suppliers, in accordance with the requirements of the local municipality.

.3 Prevent extraneous materials from contaminating air beyond application areas by providing temporary enclosures as specified in Section 01 5000.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

.5 Deposit packaging materials in appropriate container at the Place of the Work for recycling or reuse.

.6 Avoid using landfill waste disposal procedures when recycling facilities are available.

11. PROTECTING INSTALLED CONSTRUCTION

.1 Refer to SECTION 15010 – Mechanical General Provisions sub-section 3.3.

12. CLOSEOUT PROCEDURES AND SUBMITTALS

.1 CLOSEOUT PROCEDURES

.1 Refer to SECTION 15010 – Mechanical General Provisions sub-section 3.5.

.2 OPERATING AND MAINTENANCE MANUALS

.1 Refer to SECTION 15010 – Mechanical General Provisions sub-section 2.3.

.3 AS-BUILT DOCUMENTS

.1 Promptly record architectural, structural, mechanical and electrical revisions, omissions and additions on a set of black line opaque drawings and in the Project Manual.

.2 As-built documents must be kept up to date at all times.

.3 Record information concurrently with construction progress.

.4 Do not conceal work until required information is recorded.

.5 As-built Specifications: legibly mark each item to record actual construction, including manufacturers name and catalogue number of each Product actually installed, particularly optional items and substitute items.

.6 Other Documents: maintain manufacturers' certifications, inspection certifications, hardware schedules, colour schedules and field test records as required by the individual specification Sections.

.7 Submit completed as-built documents to Consultant prior to Substantial Performance of the Work.

.4 SPARE PARTS AND EXTRA MATERIALS

.1 Two weeks prior to Substantial Performance of the Work, submit any special tools or equipment supplied for maintenance purposes.

.2 Spare parts and extra materials provided shall be new, not damaged or defective, and of same quality and manufacture as Products provided in the Work. If requested, furnish evidence as to type, source and quality of Products provided.

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

.4 Store spare parts and extra materials in a manner to prevent damage, or deterioration.

.5 Provide spare parts, special tools, maintenance and extra materials in quantities specified in individual specification Sections.

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

LIST OF DRAWINGS

MECHANICAL

M100 SCHEDULES AND LEGENDS
M101 CONTROLS
M200 GROUND FLOOR LABORATORY F23 PLUMBING DEMOLITION
M201 GROUND FLOOR LABORATORY F23 PLUMBING NEW CONSTRUCTION
M300 GROUND FLOOR LABORATORY F23 HVAC DEMOLITION
M301 GROUND FLOOR LABORATORY F23 HVAC NEW CONSTRUCTION
M302 PENTHOUSE MECHANICAL ROOM HVAC
M303 PENTHOUSE MECHANICAL ROOM DETAILS
M304 AIR BALANCING REFERENCE BASEMENT FLOOR
M305 AIR BALANCING REFERENCE GROUND FLOOR
M306 AIR BALANCING REFERENCE PENTHOUSE MECHANICAL ROOM

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply and install the fume hood countertop indicated on the Drawings and specified herein.

.3 Scope of work includes the provision of a new fume hood, countertop and base unit. Coordinate countertop with fume hood and base unit in sections 11610, and 12310.

1.2. RELATED SECTIONS:

.1 Section 11610, “Laboratory Fume Hoods”

.2 Section 12310, “Metal Casework”

1.3. REFERENCE STANDARDS

.1 SEFA 8: Laboratory Furniture – Casework, Shelving and Tables Guidelines Science Equipment and Furniture Association (SEFA).

.2 ISO 9001:2000 – Quality Management International Standards Organization (ISO)

1.4. SUBMITTAL DATA

.1 The laboratory casework manufacturer shall furnish shop drawings illustrating the layout and placement of all laboratory casework and fume hoods as well as any products included in this section.

PART 2 - PRODUCTS

2.1. CUPSINKS

.1 Polypropylene Resin Cupsinks: Flush mounted cupsinks shall be molded of polypropylene resin mixture. Cove inside corners and pitch bottom to integral 1-1/2” NPSM threaded outlet. Sink color shall be Black Onyx.

2.2. EPOXY FUME HOOD COUNTERTOP

.1 Provide solid epoxy resin laboratory fume hood base work surfaces.

.2 Product shall be designed to accommodate the plumbing and function of the fume hood with service slots, epoxy sinks and/or cupsinks located as required.

.3 MATERIALS

.1 Material shall be a monolithic, filled epoxy resin product and shall consist of a polymerized cast resin formulated to provide a work surface with high chemical resistance characteristics. The combination of epoxy resin and asbestos free inert materials shall be oven-cured in molds to obtain maximum chemical resistance, and then removed from the molds and oven tempered to achieve maximum physical strength and stability. Surfaces shall have a uniform low-sheen surface and the finished material shall be hard and resistant to scratches and abrasion.

.2 MATERIAL PROPERTIES

.1 Provide independent testing laboratory report certifying that the epoxy work surface meets or exceeds the following test criteria:

.2 Test Methods:

.1 Volatile chemicals (organic solvents): A cotton ball, saturated with the test chemical (reagent) is placed in a one-ounce bottle (10 x 75mm test tube or similar container) with a reservoir of liquid above the ball. The container is inverted on the test material for a period of 24 hours at a standard temperature of 23° plus or minus 2°C. (73° plus or minus 4°F).

.2 Non-Volatile Chemicals: Five drops (1/4cc) of the test chemical are placed on the test material surface. The chemical is covered with a watch glass (25mm) for a period of no less than 24 hours at a standard temperature of 23° plus or minus 2°C. (73° plus or minus 4°F).

.3 Evaluation Ratings:

.1 After 24 hour exposure, surfaces are washed with water, then a detergent solution, finally with naphtha, then rinsed with distilled water and dried with a cloth. Change in surface finish and function shall be described by the following (1-5) ratings:

.2 No Effect: No detectable change in the material surface.

.3 Excellent: Slight detectable change in color or gloss, but no change to the function or life of the work surface material.

.4 Good: Clearly discernible change in color or gloss, but no significant impairment of surface life or function.

.5 Fair: Objectionable change in appearance due to surface discoloration or etch, possibly resulting in deterioration of function over an extended period.

.6 Failure: Pitting, cratering or erosion of work surface material; obvious and significant deterioration.

.4 Minimum acceptable test results shall be equal to or better than the following rating:

Chemicals	Minimum Acceptable Results		Chemicals	Minimum Acceptable Results
Inorganic Acids – Corrosive			Organic Solvents	
Hydrochloric Acid 37%	1		Acetone	2
Nitric Acid 70%	1		Ethyl Acetate	1
Sulfuric Acid 60%	1		Toluene	1

Sulfuric Acid 96%	5		Alkaline Solutions – Corrosive	
Organic Acids – Corrosive			Ammonium Hydroxide 10%	1
Acetic Acid 5%	1		Sodium Hydroxide 60%	1
Acetic Acid, Glacial	1			

.5 Hardness (ASTM D785): Test method: hardness, Rockwell M “M” Scale; average of five readings. Minimum Acceptable Test Results: Average value of 100 over the five samples.

.6 Water Absorption: Test method: Specimens measuring 3” in length by 1” width by the thickness of the material should be used. At least three specimens should be tested. After weighing, specimens should be entirely immersed in distilled water maintained at a temperature of 230 plus or minus 10 C (73.40 plus or minus 1.80 F) for a period of 24 hours. The samples should then be removed, dried and weighed to the nearest 0.001g. The percentage of increase in weight calculated to the nearest 0.01% should then be calculated. Minimum Acceptable Test Results: 0.01%

.7 Flammability or Rate of Burning (ASTM D794): Test Method: Measure “Average Time of Burning (ATB)” as described in test. At least 5 samples (125mm +/- 5mm in length by 12.5mm +/- 0.2mm in width) should be tested. Minimum Acceptable Test Results: ATB should equal zero.

.8 Porcelain Crucible (Test A: Non-Standard Method): Test Method: A high-form porcelain crucible, size D, 15ml capacity, shall be heated over a Bunsen burner until the crucible bottom attains a incipient red heat. Immediately, the hot crucible shall be transferred to the top surface and allowed to cool to room temperature. Minimum Acceptable Test Results: Upon removal of the cooled crucible, there shall be no blisters or cracks. Slight dulling or color damage is acceptable.

.9 Heat Deflection @ 264 psi (ASTM 648): Minimum Acceptable Test Results: 1930 C (3800 F).

.10 Falling Ball Impact Resistance (ERF 23-69): Test Method: Careful attention to details of test procedure should be followed. A wooden supporting frame must be used with the test. Size samples: 12” x 12” by the thickness of the material. 2lb steel balls should be used. Three or more samples should be tested. Maximum height of 8’. Minimum Acceptable Test Result: No fracture to a height 7’.

.11 Thermal Shock Resistance (Non-Standard Test): Test Method: Two cubes (2” x 2” by thickness of material) are immersed in a dry ice/acetone bath maintained at minus 780 C. The cubes are allowed to remain in the bath for 15 minutes. Each cube is removed and immediately placed in container of boiling water at 1000 C. The procedure is repeated until fracture occurs (ie. Cracking, warpage, distortion) for a series of five repetitions. Minimum Acceptable Test Results: No visible changes should be observed.

.12 Flexural Strength and Modulus of Rupture (ASTM D790): Test Method: Test specimens should be prepared from 1" thick production material with a support span 16 times the depth (thickness) of the beam. The original surface of the sample should be unaltered. Recommended sample size is 19.5" x 1.0" x 1.0" (length, width, depth). A minimum of five samples are to be tested. Testing should be carried out to failure of the test sample. Modulus of rupture should be measured as described in the ASTM method. Minimum Acceptable Test Result: Flexural Strength-10,000 psi Modulus of Rupture: 1,000,000 psi.

.3 CONSTRUCTION

.1 Thickness: 1" thick.

.2 Edges and Corners: Exposed work surface edges and corners, except as indicated, shall be furnished with a 1/8" machined top edge with blended radius corners.

.3 Surface: Worksurfaces shall be furnished as flat with 1/4" raised marine edge only at epoxy sink and Fume hood top locations.

.4 Backsplashes: Supplied loose for field application in the same material and thickness as countertops. Curbs as installed shall be 4" high, unless otherwise indicted on drawings. Curbs will be bonded to the tops at the jobsite. Include top mounted end curb where worksurfaces abut walls, fume hoods, and locations detailed on drawings.

.5 Color: Black Onyx

.6 Warpage: Check work surface for warpage before fabrication. Measure in unrestrained condition. Work surface will be accepted for use if there is no gap exceeding 1/16" in a 36" (0.9m) span.

.7 Fabrication: Provide in longest practical lengths. All joints shall be bonded with a highly chemical and corrosion resistant epoxy grout. Provide 1/8" drip groove on underside of exposed edges set back 1/2" from edge at all sink areas and where shown on drawings. All exposed edges to be molded or finished.

.8 Thickness Tolerances: Each corner of top shall not deviate more than plus or minus 1/16" from nominal.

.9 Size Tolerances: Length, plus or minus 1/8". Width plus or minus 1/16".

.10 Squareness: Compare the diagonal corner-to-corner measurements across the width of each work surface. The diagonal measurements must be within 1/16".

.11 Penetrations: Location of cutouts and drillings: plus or minus 1/8". Sizes of cutout and drillings: plus or minus 1/16".

PART 3 - EXECUTION

3.1. INSTALLATION

.1 Install in accordance with manufacturer's instructions and approved Shop Drawings.

.2 Install tops plumb and level.

.3 Scribe to adjacent surfaces in accordance with manufacturer's recommendations.

.4 Fasten tops to supporting construction with adhesives appropriate for use with adjoining construction and as recommended by manufacturer.

.5 Form field joints using manufacturer's recommended adhesive. Form joints to be inconspicuous and nonporous.

.6 Install laboratory fume hood base work surfaces using fasteners and adhesive appropriate for use with adjoining construction and as recommended by manufacturer.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply and install the laboratory fume hood as indicated on the Drawings and specified herein.

.3 Scope of work includes the provision of a new fume hood, countertop and base unit. Coordinate fume hood with countertop and base unit in sections 06415, and 12310.

1.2. RELATED SECTIONS

.1 Section 06415, “Countertops”

.2 Section 12310, “Metal Casework”

1.3. REFERENCE STANDARDS

.1 SEFA 8: Laboratory Furniture – Casework, Shelving and Tables Guidelines Science Equipment and Furniture Association (SEFA).

.2 ANSI/AIHA Z9.5 - American National Standards for Laboratory Ventilation

.3 ASHRAE 110 - Method of Testing Performance of Laboratory Fume Hoods

.4 ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

.5 SEFA 1 – Recommended Practices For Laboratory Fume Hoods

.6 CAN/CSA C22.2 NO. 61010-2-081-04 (R2014) - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use

.7 ISO 9001:2000 – Quality Management International Standards Organization (ISO)

1.4. SUBMITTAL DATA

.1 Contractor shall furnish shop drawings illustrating the layout and placement of all laboratory casework and fume hoods as well as any products included in this section.

.2 Indicate the type and location of all service fittings.

1.5. PERFORMANCE REQUIREMENTS

.1 Design Data/Test Reports: Manufacturer shall submit test data and design criteria which are in compliance with the project specifications.

.2 Performance: Fume Hoods shall be designed to meet or exceed the American Standard for Laboratory Ventilation and the American Industrial Hygiene Association standard as described in ANSI/AIHA Z9.5. This standard of performance shall be verified through factory testing in accordance with the established protocol as set out by the ANSI/ASHRAE 110 standard. Factory test 1 hood of each size and model.

.3 Certificates: All certifications required in the specifications shall be submitted with the original submittal package under separate cover. Certificates must be provided with the signature of a qualified individual of the supplier.

.4 Manufacturers' Instructions: Provide manufacturer's instructions for installation and maintenance of all products provided and installed within this section.

PART 2 - PRODUCTS

2.1. FUME HOOD

.1 MATERIALS

.1 BASIC MATERIALS

.1 Fumehood width shall be 1500mm (5 feet).

.2 Exterior Panels Framing Members, and Furring Panels: Cold rolled and levelled mild steel and shall conform to ASTM A366, finished as in Para. 2.4.

.3 Screws: Interior fastening devices; stainless steel screws complete with corrosion resistant plastic caps.

.4 By-Pass Grilles: 18 Ga (1.2mm) thick mild steel directionally louvered upward, finished same as exterior panels.

.5 Upper panel: Laminated safety glass type 6mm (1/4") thick.

.6 Lower Foil: For hoods, form using 14 Ga (1.9mm) Type 316-4 stainless steel.

.7 Safety Glass: Laminated type 6mm (1/4") thick.

.8 Sash guides: Track shall be corrosion resistant polyvinyl chloride (PVC).

.9 Sash Chain: #35 hardened for Reduced Face Velocity and safeguard hoods.

.10 Sprocket system for Sash Chain: Hardened sprockets with one full width shaft per sash running in ball bearings.

.11 Sash Pull: Type 316, 18 Ga (1.2mm) thick stainless steel with an AISI #4 satin finish.

.12 Provide interior access panels on both sides, and secure using special moulded white vinyl gasket designed to be removed and reinstalled without use of special tools.

.13 Duct Stubs: Bell shaped Type 316, 18 Ga (1.2mm) stainless steel.

.14 Light Switches: Light switches shall be black in color, commercial spec grade or higher and shall be UL and CSA approved.

.15 Electrical receptacles: Electrical receptacles shall be black in color, commercial spec grade or higher and shall be UL and CSA approved.

.16 Cover Plates: Electrical cover plates shall be black in color, nylon and UL and CSA approved.

.17 Flourescent Fixture: Fixture shall be two tube rapid start or better. Energy saving cool white T8 lamps shall be provided. Ballast shall be sound rated to limit noise.

.2 FUME HOOD LINER

.1 FRP: Hood linings and baffles shall be fiberglass reinforced polyester thermoset resin of 3/16" (5mm) thickness. The fiberglass reinforced polyester panel shall have a minimum flexural strength of 15,000 psi (103,400 kPa), with a flame spread of 25 or less as per ASTM #E84. Final appearance shall be smooth and white in colour.

.3 FUME HOOD FURRING PANELS

.1 Where shown on drawings, provide matching furring panels to enclose the space between top edge of fume hoods and the finished ceiling.

.2 Provide furring panel with factory finished cut out for existing general exhaust ductwork. Contractor to field measure and order custom furring panel from manufacturer for a clean finished appearance.

.3 Panels shall be flanged, notched and reinforced where required to form a well-fitted enclosure, free from oilcanning. Secure panels using cadmium-plated, self-tapping screws; panels shall be removable for maintenance purposes.

.4 Finish shall match fume hood to which it is connected.

.4 PRE-PLUMBED

.1 Hood to be pre-plumbed to meet local codes.

.2 Services required: Domestic cold water and sanitary drain.

.3 Tubing for each service shall be routed to the upper rear corner of the fume hood for field connection separately on each side. Optionally, tubing may be routed down at the rear corner if needed.

.4 All plumbing shall be pressure tested before shipment to ensure no leaks are present before leaving the factory. Pressure testing shall be performed again on site after final connection mechanical contractor.

.2 BENCH FUME HOOD CONSTRUCTION

.1 Fume hood superstructure shall be double wall construction consisting of an outer shell of sheet steel and an inner hood liner. Double wall shall house and conceal steel framing members, attaching brackets and remote operating service fixture mechanisms. Overall double wall thickness; 4-3/4" (121mm) maximum.

.2 Front double-wall posts shall be pre-punched to accept up to 5 plumbing fittings per side, two electrical duplex outlets, light switch and optional monitor alarm where indicated on drawings. Electrical outlets and light switch shall be factory-wired and terminate at a junction box on roof of hood. All electrical components shall be UL listed/classified.

.3 Exterior panel members shall be fastened by means of concealed devices. Exposed screws are not acceptable.

.4 Provide access to remote-controlled fixture valves concealed between walls through removable panels on hood exterior and access panels on both inside liner walls. Assemble hood superstructure, fasten and connect inner and outer frame into a rigid self-supporting entity.

.5 Install fluorescent lighting fixture on exterior of roof. Provide a 6mm (1/4”) safety glass panel on hood "roof", sealed to isolate the lighting fixture from fume chamber. The 2-lamp fixture in each hood shall be largest possible for fume hood size. Average interior illumination levels within the fume chamber shall be 80 foot candles minimum. Finish fixture interior with white baked enamel.

.6 Fume hood sash(s) shall be full view type providing a clear and unobstructed side to side view of fume hood interior. Sash shall be laminated safety glass set into extruded polyvinyl chloride guide. Bottom and side sash rails shall be 18 Ga (1.2mm) stainless steel. Glass shall be set into rails with PVC glazing channel. Bottom rail shall be an integral, formed, full width, flush pull and shall be anchored on each side to sash cables at bottom. A single weight, pulley, cable, counter balance system shall be used for vertical operation of sash and prevent jamming to permit one finger operation at any point along full width sash pull and to maintain sash at any position without creep. Sash system shall be designed to prevent sash drop in the event of cable failure. Superstructure shall have a single sash and counter balance system. Sash shall open and close against rubber bumper stops.

.7 Micro-switches required to control the 2 speed fan will be installed on the sash at time of fabrication. Co-ordinate with trades required to wire and configure the 2-speed fan (fan by Section 15865).

.8 Constant volume hoods shall have a built in automatic compensating by-pass to maintain constant exhaust volume regardless of sash position. By-pass shall be positive in action, and controlled by louvered panel in the area immediately above the top portion of the sash when closed. As the sash is lowered, the by-pass design limits the increase in face velocity to a maximum of 4-1/2 times average face velocity as measured with the sash fully open.

.9 Three-piece main baffles shall provide controlled air vectors into and through the fume hood and be fabricated of the same material as the liner. Provide exhaust slots on the full perimeter of baffles, with top slot adjustable. A fixed, permanently-open, horizontal slot located at 31-1/2” (800mm) above the work surface shall be provided at the overlapping mid-point of the main baffles

.10 Manual-Control Baffle System:

.11 Baffle positions should only be set by qualified personal experienced with fume hood balancing.

.12 For safety, fume hood shall maintain essentially constant exhaust volume at any baffle position. Changes in average face velocity and exhaust volume as a result of baffle adjustment shall not exceed 5% for any baffle position at the specified face velocity.

.13 Design fume hoods to minimize static pressure loss with adequate slot area around the baffle and the bell shaped exhaust collar configuration. Measured average static pressure loss reading taken three diameters above the hood outlet from four points, 90o apart, shall not exceed the following values based on 60" (1524mm) wide hood:

Face Velocity		Measured Static Pressure Loss	
75 F.P.M.	(0.38 m/s)	0.15"	(45.8 Pa)
100 F.P.M.	(0.51 m/s)	0.20"	(87.1 Pa)
125 F.P.M.	(0.64 m/s)	0.25"	(136.9 Pa)

Face Velocity		Measured Static Pressure Loss	
60 F.P.M.	(0.3 m/s)	0.10"	(45.8 Pa)

.14 Airflow Requirements: Reduced Face Velocity fume hood is designed to function with the following exhaust volumes when operating at 60 feet per minute face velocity with a vertical sash opening of 29.5" (750mm)

Hood Size	Exhaust Volume Requirements (cubic Feet Per minute)
5 foot (1524mm)	621 cfm

.15 Electrical convenience duplex outlets shown mounted on the face of fume hoods shall be installed in front posts and pre-wired to a junction box mounted on top of fume hood superstructure. Electrical devices shall be UL/CSA classified/listed.

.3 FUME HOOD EXTERIOR FINISH

.1 Coating Performance data is available in Appendix 1.

.4 AIRFLOW MONITOR ALARM

.1 Audible and visual airflow alarm with digital air speed display shall be provided with fumehood.

.2 Airflow alarm to activate on high and low ventilation as based on face velocity and if sash height exceeds maximum height of 400mm.

.3 Airflow monitor alarm to have I/O terminal points to allow for connection to BAS to show alarms at the operators station and allow for alarm disable.

.4 Airflow monitor alarm to have constant power with battery back-up.

PART 3 - EXECUTION

3.1. INSTALLATION

.1 In addition to requirements of this Section, install fume hoods in positions shown, align and set level with levelling devices.

.2 Work in close cooperation with allied trades installing ductwork, wiring and other services.

.3 Apply small bead of sealant to junction of fume hood counter top and adjacent hood liner.

.4 Finish fumehood with resilient base between fume hood and floor to match existing including stainless steel corner protectors.

.5 Fumehood and alarms to be fully calibrated and adjusted for proper use according to manufacturer's instruction and user preferences where applicable.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply and install metal casework as indicated on the Drawings and specified herein.

.3 Scope of work includes the provision of a new base unit. Coordinate base unit with fume hood, and countertop in sections 06415, and 11610.

1.2. RELATED SECTIONS

.1 Section 06415, “Countertops”

.2 Section 11610, “Laboratory Fume Hoods”

1.3. REFERENCE STANDARDS

.1 SEFA 8: Laboratory Furniture – Casework, Shelving and Tables Guidelines Science Equipment and Furniture Association (SEFA).

.2 ISO 9001:2000 – Quality Management International Standards Organization (ISO)

.3 Fans shall be factory balanced, statically and dynamically to AMCA Standards.

1.4. SUBMITTAL DATA

.1 Contractor shall furnish shop drawings illustrating the layout and placement of all laboratory casework and fume hoods as well as any products included in this section.

.2 Indicate the type and location of all service fittings.

.3 Installation methods.

1.5. PERFORMANCE REQUIREMENTS

.1 Design Data/Test Reports: Manufacturer shall submit test data and design criteria which are in compliance with the project specifications.

.2 Certificates: All certifications required in the specifications shall be submitted with the original submittal package under separate cover. Certificates must be provided with the signature of a qualified individual of the supplier.

.3 Manufacturers’ Instructions: Provide manufacturer’s instructions for installation and maintenance of all products provided and installed within this section.

PART 2 - PRODUCTS

2.1. CASEWORK

.1 MATERIALS

.1 SHEET STEEL: Mild steel, cold rolled furniture grade to requirements of ASTM A366/A366M-91, Grade C or higher, with smooth surfaces to furniture quality.

.2 GALVANIZED SHEET STEEL: Commercial quality galvanized sheet steel to ASTM 653, Designation Z275.

.3 STAINLESS STEEL: ASTM A240, Type 316 alloy.

.4 GLASS: Clear Float, 6mm and 3mm thick, conforming to CAN2 12.3-M76, Glazing Quality. Laminated Glass: CAN/CGSB-12.1-M90, Type 1 with clear PVB interlayer. Total nominal thickness of laminated glass: 6 mm.

.5 SEALANT: One component, RTV silicone sealant. Color to suit application.

.2 CONSTRUCTION

.1 MATERIALS - Use the following minimum steel thicknesses for furniture manufacturing:

.1 3mm (11 Ga) leveling bolt gusset plates.

.2 1.9mm (14 Ga) drawer slides and side suspension channels.

.3 1.5mm (16 Ga) for tubular rails, legs for tables, gusset plates, cabinet top and intermediate horizontal rails.

.4 1.2mm (18 Ga) for door and drawer fronts, cabinet floor, cabinet sides, vertical front members, cabinet toe kick, service cover panels, table and kneehole frames, front rails, gable legs and dust caps, false panels, furring and filler panels.

.5 0.9mm (20 Ga) for drawer backs, door backs, vertical closure channel, removable back panels, shelves, drawer bodies, drawer dividers, bin bodies, and pull-out shelves.

.2 CABINET FRAME:

.1 Provide one-piece die-formed cabinet bottom construction with return side flanges turned down. Spot weld flanges to cabinet sides. Provide sink cabinets with galvanized bottom painted to match cabinet.

.2 Cabinet bottoms shall be turned down at front to form 32mm (1-1/4”) “U” channel to accept toe kick and turn down 133mm (5-1/4”) at back with 16mm (5/8”) return to form the back lower member of cabinet base. Provide punched 19mm (3/4”) dia. corner holes for access to levelers and to accept PVC press plugs.

.3 Provide additional vertical 75mm (3”) “HAT” shaped channels, spot-welded to or formed with the rear vertical corner. Channel shall be provided with pre-punched holes to receive shelf clips, and slotted

holes to receive drawer suspension tracks. Cabinets 762mm (30") wide and larger shall be provided with intermediate 117mm (4-5/8") "HAT" channels to brace cabinet and accept shelf clips and drawer tracks.

.4 Where applicable, the front corner posts shall be pre-punched and slotted to accept drawer suspension systems and suspension pull-out shelves. Front vertical posts shall form inboard flush front construction for doors acting as the cabinet main member side gable tying the cabinet bottom and horizontal member together to form a rigid case. Front post rear closure channels shall be "J" shaped 9mm (11/32") x 33mm (1-5/16") x 49mm (1-15/16"). Provide channel with pre-punched holes to receive shelf clips.

.5 Doors shall overlay top intermediates and floor horizontal members.

.6 Top horizontal front framing member shall form a "J" shaped section 75mm (3") wide, 10mm (3/8") return by 25mm (1") deep with 16mm (5/8") return.

.7 Intermediate horizontal framing members shall form a "U" 32mm (1-1/4") high with a 25mm (1") return on top and 16mm (5/8") return on bottom.

.8 Top rear horizontal framing member shall be 50mm (2") x 32mm (1-1/4") angle section welded to back corner lapped post and side gables with welded corner gusset plates acting as cabinet bracing and counter top material fixing member.

.9 Enclose cabinetry toe space shall be 75mm (3") deep x 100mm (4") high and shall act as a total enclosure to bottom of cabinet. Toe space section shall key up into "U" shaped front floor member and act as reinforcement. Toe space, front floor of cabinet and corner post sections shall be spot welded together forming one structural member.

.10 The toe space members, side gable returns, and back lower member shall form all welded structural corner to accept leveller gussets and 10mm (3/8") levelling bolts.

.11 Cabinet construction shall be electro spot-welded to form a strong well-fitted, one-piece unit.

.12 Exposed horizontal structural cabinet members between doors shall be unacceptable.

.3 CABINET HARDWARE

.1 Pulls: Provide 4" "D-pull" handles for hinged doors in 100mm (4") stainless steel wire.

.2 Door Hinges: Provide five knuckle-type barrel door hinges of 1.9mm (14 Ga) steel screwed into door and fastened to cabinet side stile with two counter sunk #8-32 zinc plated machine screws & captive

serrated tooth washer nuts. Chosen hinge finish shall be stainless steel.

.4 Base Cabinet Components:

.1 Provide removable back panels for cupboard base cabinets. Provide partial back panels 229mm (9") in height to accommodate plumbing at sink units. When requested, provide back panels and security panels on cabinets requiring locks.

.2 Shelving edges; turned down on all four sides 25mm (1"), and returned under on front and back 25mm (1"). Shelves 914mm (36") and longer shall be provided with "HAT' channel reinforcement at front edge.

.3 Doors:

.1 Fabricate doors of 2 telescoping metal panels, 19mm (3/4") thick, painted internally with a sound-deadening material extending continuously full-width, and top to bottom. Reinforce hinged side of door adequately with hinge machine screws to prevent sagging. Secure recessed hinges to cabinet posts with machine screws and concealed self-locking nuts. Provide nylon roller friction catches, mounted on horizontal top or intermediate members pull side of doors. Provide each hinged door with 2 rubber bumpers.

.2 Doors, and back panels shall be replaceable in the field without requiring special tools.

.3 All standard double door cabinets shall be designed without center stiles to maximize access to the cabinet.

.4 BASES Storage Cabinets (moulded liner)

.1 Construct in similar manner to standard steel base cabinets with the addition of a moulded polyethylene interior liner.

.2 The lining on the back of doors shall be fitted so that it overlays the flange on the front of the moulded cabinet liner to protect all metal areas of the cabinet from corrosive vapours.

.3 Base storage cabinets shall contain one full-width phenolic shelf. It shall be possible to locate shelf in four positions on 75mm (3") increments. Shelf supports shall be integrally moulded into cabinet liner.

.4 Provide one door with decal signifying "BASE" storage

.5 Molded liner shall incorporate a 25mm (1") high lip along bottom edge to contain spills.

.6 Provide one threaded connection fusion welded to the rear of the cabinet. Thread shall be 50mm (2") NPT for connection to exhaust source.

.7 Provide an entirely plastic door catch.

.5 Steel Furniture Finish

.1 Refer to Section 12310-A for paint performance requirements.

.6 Cabinet Ventilation

.1 Each cabinet should be interconnected with the fume hood exhaust plenum to provide ventilation for stored chemicals.

PART 3 - EXECUTION

3.1. INSTALLERS

.1 Installer Qualifications:

.1 Installer shall have a minimum of 5 years continued experience in installation or application of systems similar to those required for this project.

.2 Installer shall be authorized by either the distributor or manufacturer. Warranty will be void if unauthorized installer executes the installation.

3.2. INSTALLATION

.1 Casework Installation:

.1 Casework shall be set with components plumb, straight and square, securely anchored to building structure with no distortion. Concealed shims shall be used as required.

.2 Cabinets in continuous runs shall be fastened together with joints flush, uniform and tight with misalignment of adjacent units not to exceed 1/16 of an inch.

.3 Top edge surfaces shall be abutted in one true plane. Joints are to be flush and gap shall not exceed 1/8 of an inch between tops units.

.4 Casework and hardware shall be adjusted and aligned to allow for accurate connection of contact points and efficient operation of doors without any warping or binding.

.2 Countertop Installation:

.1 Countertops are to have been fabricated in lengths according to drawings, with ends abutting tightly and sealed with corrosion resistant sealant.

.2 Tops will be anchored to base casework in a single true plane with ends abutting at hairline joints with no raised edges at joints.

.3 Joints shall be factory prepared having no need for in-field processing of top and edge surfaces.

.4 Joints shall be dressed smoothly, surface scratches removed and entire surface cleaned thoroughly.

3.3. CLEANING

.1 Ensure all products are unsoiled and match factory finish. Remove or repair damaged or defective units.

.2 Clean all finished surfaces, including cabinet shelves, and touch up as necessary.

.3 Countertops shall be cleaned and free of grease or streaks.

3.4. PROTECTION:

.1 Counter tops and ledges shall be protected with 1/4 inch ribbed cardboard for the remainder of the construction process.

.2 Examine casework for damaged or soiled areas; replace, repair, and touch-up as required.

.3 Touch-up, repair or replace damaged products before Substantial Completion.

3.5. WARRANTY

.1 Furnish a written warranty that Work performed under this Section shall remain free from defects as to materials and workmanship for a period of two (2) years from date of shipment. Defects in materials and workmanship that may develop within this time are to be replaced without cost or expense to the Owner.

.2 Defects include, but are not limited to:

.1 Ruptured, cracked, or stained coating

.2 Discoloration or lack of finish integrity

.3 Cracking or peeling of finish

.4 Slippage, shift, or failure of attachment to wall, floor, or ceiling

.5 Weld or structural failure

.6 Warping or unloaded deflection of components

.7 Failure of hardware

END OF SECTION

PART 1 - STEEL FURNITURE FINISH

1.1. PREPARATION AND PAINTING

.1 Prepare all surfaces, make free of defects with welds ground smooth and indistinguishable from surrounding metal.

.2 Components shall be cleaned in a four-stage chemical spray process that produces an iron phosphate coating bonded to the steel surfaces. Components shall be thoroughly oven-dried before painting.

.3 Components shall be Electro-statically coated with an epoxy/urethane powder applied in a controlled environment then baked / cured in a temperature controlled oven to assure a smooth hard finish. Surface shall be a chemical resistant, high quality laboratory grade finish. The resulting paint coating shall provide a minimum film thickness of 1.2 mils on all exposed parts and an average film thickness of 1.0 ml on all other surfaces.

1.2. PHYSICAL PERFORMANCE OF COATINGS

.1 Paint Hardness on Steel

The paint hardness test is used to determine the resistance of the coatings to scratches.

.1 Test procedure:

.1 Pencils, regardless of their brand, are valued in this way: 8-H is the hardest, and next order of diminishing hardness are 7-H, 6-H, 5-H, 4-H, 3-H, 2-H, H, F, HB, B (soft), 2-B, 3-B, 4-B, 5-B (which are softest).

.2 The pencils shall be sharpened on emery paper to a wide sharp edge. Pencils of increasing hardness shall be pushed across the paint film in a chisel like manner until one is found that will cut or scratch the film. The pencil used before that one, that is the hardest pencil that will not rupture the film, is then used to express or designate the hardness.

.2 Acceptance Level:

.1 The paint shall have a hardness of 4-H minimum.

.2 Hot Water Test

The purpose of this test is to insure the coating is resistant to hot water.

.1 Test procedure:

.1 Hot water (190°F. to 205°F. [88°C to 96°C]) shall be allowed to trickle (with a steady stream and at a rate of not less than 6 ounces [177.44cc] per minute) on the finished surface, which shall be set at an angle of 45-degrees, for a period of five minutes.

.2 Acceptance Level:

.1 After cooling and wiping dry, the finish shall show no visible effect from the hot water.

.3 Impact Test

The purpose of this test is to evaluate the ductility of the coating.

.1 Test procedure:

.1 A one-pound ball (approximately 2" [50.8mm] in diameter) shall be dropped from a distance of 12" (304.8mm) onto a flat horizontal surface, coated to manufacturer's standard manufacturing method.

.2 Acceptance Level:

.1 There shall be no visual evidence to the naked eye of cracks or checks in the finish due to impact.

.4 Paint adhesion on Steel

The paint adhesion test is used to determine the bond of the coating to steel. This does not apply to non-steel products.

.1 Test procedure:

.1 This test is based on ASTM D2197-86 "Standard Method of Test for Adhesion of Organic Coating." Two sets of eleven parallel lines 1/16" (1.587mm) apart shall be cut with a razor blade to intersect at right angles thus forming a grid of 100 squares. The cuts shall be made just deep enough to go through the coating, but not into the substrate. They shall then be brushed lightly with a soft brush for one minute. Examine under 100-foot candles of illumination.

.2 Acceptance Level:

.1 Ninety or more of the squares shall show finish intact.

.5 Humidity Resistance

No visible effect after a 1000 hour exposure in saturated humidity at 38°C (100°F) per ASTM D2247-85.

.6 Salt Spray Resistance

No visible effect after a 250 hour salt spray test per ASTM B117-85.

1.3. CHEMICAL RESISTANCE PERFORMANCE

.1 Chemical Spot Test

The purpose of the chemical spot test is to evaluate the resistance a finish has to chemical spills.

Note: Many organic solvents are suspected carcinogens, toxic and/or flammable. Great care should be exercised to protect personnel and the environment from exposure to harmful levels of these materials.

.1 Test procedure:

.1 Obtain one sample panel measuring 14" x 24" (355.6mm x 609.6mm). The received sample to be tested for chemical resistance as described herein.

.2 Place panel on a flat surface, clean with soap and water and blot dry. Condition the panel for 48-hours at 73+ 3F (23(+ 2(C) and 50+ 5%

relative humidity. Test the panel for chemical resistance using forty-nine different chemical reagents by one of the following methods.

.3 Method A - Test volatile chemicals by placing a cotton ball saturated with reagent in the mouth of a 1-oz. (29.574cc) bottle and inverting the bottle on the surface of the panel.

.4 Method B – Test non-volatile chemicals by placing five drops of the reagent on the surface of the panel and covering with a 24mm watch glass, convex side down.

.5 For both of the above methods, leave the reagents on the panel for a period of one hour. Wash off the panel with water, clean with detergent and naptha, and rinse with deionized water. Dry with a towel and evaluate after 24-hours at 73± 3°F (23°± 2°C) and 50± 5% relative humidity using the following rating system:

Level 0 - No detectable change.
Level 1 - Slight change in colour or gloss.
Level 2 - Slight surface etching or severe staining.
Level 3 - Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

Test No.	Chemical Reagent	Test Method
1.	Acetate, Ethyl	A
2.	Acetic Acid, (98%)	B
3.	Acetone	A
4.	Ammonium Hydroxide, (28%)	B
5.	Ethyl Ether	A
6.	Hydrofluoric Acid, (48%)	B
7.	Sodium Hydroxide, (20%)	B
8.	Sodium Hydroxide, (40%)	B
9.	Sulfuric Acid (96%)	B
10.	Toluene	A

.2 Acceptance Level:

.1 Results will vary from manufacturer to manufacturer. Laboratory grade finishes should result in no more than four Level 3 conditions. Suitability for a given application is dependent upon the chemicals used in a given laboratory.

1.4. COLOURS

.1 Provide laboratory furniture paint finish in manufacturer's standard colours. A one colour scheme may be used.
.2 Match colour to existing fumehood assemblies.
.3 Final colour selection to be approved by owner.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Work included shall consist of the total content of Contract Documents.

.2 Coordinate work to maintain existing lab operation in accordance with owner's requirements.

.3 Install as much as the system external to the lab as possible to minimize shut down time of the lab.

.4 Work in penthouse can be completed as necessary.

.5 Coordinate lab shut down with the owner with minimum two (2) weeks' notice.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 These Specifications are an integral part of the Contract Documents. Tendering and Contract Requirements and Division 1, General Requirements apply to all Division 15 Specification Sections.

.2 Work in the Specifications is divided into descriptive Sections which are not intended to delegate functions or work to any specific Subcontractor or identify absolute contractual limits between Subcontractors or between the Contractor and his Subcontractor. The requirements of any one Section apply to all Sections. Refer to other Sections to ensure a complete operational product and fully coordinated standard of work.

.3 The direction to 'provide' equipment, materials, products, labour and services shall be interpreted to 'supply, install and test' the work indicated on the Drawings and specified.

.4 Provide mechanical components and normal system accessories not shown on the Drawings or stipulated in the Specifications, but required to ensure complete operational systems acceptable to the Consultant and all authorities having jurisdiction.

1.2. INTENT /PHASING

.1 Mention in the Specifications or Drawings, requires provision of the quality noted, the quantity required, and that systems be complete in every respect.

.2 Consider the Specifications as an integral part of the accompanying Drawings. Any item or subject omitted from one or the other, but which is either mentioned or reasonably implied, shall be considered as properly and sufficiently specified.

.3 Be completely responsible for the acceptable condition and operation of all systems, equipment and components forming part of the installation or directly associated with it. Promptly replace defective materials, equipment and parts of equipment and repair related damages.

.4 Phasing shall be scheduled with the Owner.

1.3. CONTRADICTION AND AMBIGUITY

.1 Where there is apparent contradiction or ambiguity in the documents, or where there are apparent discrepancies in or omissions from the documents, or if there is any doubt as to the intent of the documents, the bidder shall request and obtain written clarification(s) from the Consultant prior to submitting a tender.

.2 Consideration will not be granted for misunderstanding of the intent of the documents or the extent of the work to be performed.

1.4. REFERENCE STANDARDS

.1 Provide new materials and equipment of design and quality. Provide current models of equipment manufactured in North America, unless specified otherwise, with published ratings certified by recognized North American testing and standards agencies.

.2 Workmanship and installation methods shall conform to best practice. Employ tradesmen to perform work under the direct supervision of qualified personnel.

.3 Install equipment in accordance with manufacturer's recommendations.

.4 Meet the additional selection, sizing and performance criteria specified in this Specification.

1.5. DRAWINGS AND MEASUREMENTS

.1 Drawings show general design and arrangement of mechanical system installation, and are diagrammatic. Obtain further clarification of Drawings or Specifications from Consultant prior to installation.

.2 Drawings do not indicate exact Architectural, Structural or Electrical features. Examine Drawings prior to laying out.

.3 Do not scale Drawings. Take field measurements before ordering and fabricating materials.

.4 Obtain 'roughing-in' requirements of equipment which is not part of Division 15 work before proceeding.

.5 Leave areas clear as indicated for future equipment and maintenance.

.6 Give all necessary notices, obtain all permits and pay for fees, taxes and other costs in connection with the work. File all necessary forms, Contract Documents and prepare submissions and obtain approvals of regulatory bodies having jurisdiction.

1.6. CHANGES TO CONTRACT WORK

.1 Do not proceed with changes to Work without written authority from the Owner.

.2 Follow procedures outlined in Tendering and Contract Requirements for administration and execution of Contract revisions.

.1 For Labour Units - The most recent edition of the Mechanical Contractor's Association Labour Calculator and SMACNA published Labour Units, latest edition.

.2 For Labour Rates – Effective rate as defined by Union Contract, including the following:

.1 CAD Drawings

.2 Material Handling

.3 Warranty

.4 Testing and Commissioning

.5 As Built Drawings

.6 Reproduction for Owners use

.7 Scheduling

.8 Cleanup

.9 Other, per actual invoices

.3 Markup for overhead and profit shall be limited to and be calculated as follows;

.1 Work carried out by the Trade Contractor or Trade Subcontractor: 10% overhead and profit combined.

.2 Trade Contractor's overhead and profit on Trade Subcontractor's work: 5% overhead and profit combined.

.3 Credits to Owner's account: For changes involving deletions only, overhead and profit shall not be deducted.

.4 Trade Contractor and trade Subcontractor's overhead and profit shall be calculated on net additional work only.

.5 The cumulative total percentage for overhead and profit charged by the Trade Contractor, Trade Subcontractor and others shall not exceed 20% of the cumulative total value of such change in the work, net of overhead and profit.

.3 Where changes are extensive, or where requested by the Consultant, material and labour take-off shall be organized on a drawing-by-drawing basis or area-by-area basis to more readily facilitate verification of quantities and labour hours.

1.7. WARRANTY

.1 Meet the requirements of Tendering and Contract Requirements.

.2 Warrant all equipment, material and workmanship for not less than one year from date of Substantial Performance of the Work, or for longer periods when stated elsewhere in the Specifications.

.3 If any equipment or material does not match the manufacturer's published data or rating schedules during performance tests, replace without delay. . Bear all associated costs of replacement. Adjust all components to achieve the specified ratings.

.4 The Owner will give notice of observed defects promptly in writing.

.5 Promptly correct defects and deficiencies which originate during the warranty period. Pay for resulting damage.

PART 2 - SUBMITTALS

2.1. SHOP DRAWINGS

.1 Submit shop drawings via email in AutoCAD or pdf format only. Provide hard copy reproduction of all shop drawings for manuals, authorities having jurisdiction, the Owner and for coordination among other Trades. Identify Shop Drawing by Specification index reference and project name.

.2 Review all Shop Drawings prior to submittal and clearly certify as 'Correct for Review by Consultant'. Show company name, date and sign all Shop Drawings.

.3 Consultant review of Shop Drawings does not relieve the Contractor of full responsibility for errors, necessity to check Shop Drawings, furnish materials and equipment and perform work required by the Contract Documents.

.4 Clearly identify all components, accessories, including options to be supplied with each item.

.5 Submitted product data shall include sufficient detail to allow a reasonable assessment of the equipment being provided. The data shall include, but not be limited to:

.1 dimensions, including service clearance requirements

.2 shipping and operating weight including accessories and working fluids, together with point loadings

.3 performance specifications including fan curves/charts

.4 part load operational capabilities and limitations

.5 sound power levels

.6 materials of construction including exterior and internal finishes

.7 factory test standards rating conformance to recognized and applicable industry standards

.8 extended warranty coverage

.9 electrical requirements, including complete wiring diagrams clearly defining field, internal and factory wiring scope

.10 motor, power or control wiring requirements including rated voltage, phase and cycle, rated power draw, full load current, motor size and speed, motor frame size, type of enclosure and maximum rated temperature rise

.11 product installation, startup and operation manuals

.12 statement of compliance with the Model National Energy Code of Canada, as applicable.

.6 Incomplete submissions will be returned as unacceptable.

.7 Bind one set of reviewed Shop Drawings in each Operating and Maintenance Manual.

.8 Provide shop drawings for specified items as follows:

.1 Fume Hood assembly including but not limited to the fume hood, counter, base cabinets, audible/visual alarms, switches, and service connections.

.2 Fume hood exhaust fan including fused manual motor starter with indicator light.

.3 Supply air venturi valve.

.4 Exhaust air venturi valve.

.5 Flow measuring stations.

.6 Supply and exhaust diffusers/grilles.

.7 Extractor arm booster fan and audible/visual alarm.

.8 BAS control hardware.

2.2. RECORD DRAWINGS

.1 Suitably store and protect drawings on site and make available at all times for inspection.

.2 Show locations of access doors and panels and identify the equipment and components that they serve.

2.3. OPERATING AND MAINTENANCE MANUALS

.1 Submit two copies for review at least two weeks before instructions to Owner are commenced. One copy will be for Owner review, the other for Consultant review.

.2 Submit two copies of final manuals to the consultant.

.3 Ensure that the terminology used in various sections of the manual is consistent.

.4 Each manual shall contain the following information:

.1 description of each system with description of each major component of system

.2 complete sets of page size equipment Shop Drawings

.3 equipment manufacturer’s installation, startup and operation manuals

.4 equipment manufacturer’s recommended spare parts lists

.5 equipment wiring diagrams

.6 equipment identification list with serial numbers

.7 final balancing reports

.8 control drawings, sequences of operation

.9 commissioning report

.10 extended warranty documentation if applicable

PART 3 - EXECUTION

3.1. INSPECTION, TESTING AND CERTIFICATES

.1 Periodic inspections of the work in progress will be made to check general conformity of the work to the Contract Documents. Observed deficiencies will be reported. Correct deficiencies immediately.

.2 Meet the requirements of all laws, bylaws, codes, regulations and authorities having jurisdiction.

.3 Where the Contract Documents, instructions or the governing authorities require Division 15 work to be tested, inspected, or approved, give sufficient notice of its readiness for inspection and schedule the date and time for such inspection.

.4 Uncover Division 15 work that is covered up without consent, upon Consultant request, for examination and restore at no extra cost to the Owner.

.5 Furnish certificates and evidence that Division 15 work meets the requirements of authorities having jurisdiction.

.6 Correct deficiencies immediately upon notification.

3.2. CUTTING AND PATCHING

.1 Give notification in time to owner and consultant of openings required for Division 15 Work. Supply accurate details of location and size. When this requirement is not met, bear the cost of cutting and patching.

.2 In existing work, cutting, patching and restoration of finished work to original condition will be carried out by Other Contractors at the expense of Division 15.

.3 Cutting, patching and core drilling required shall be paid for by this contractor. Provide details of new opening through structural components for engineer's approval. Incur all costs related for structural approval.

.4 Obtain written Consultant approval before cutting openings through structure.

.5 Where new work connects with existing and where existing work is altered, cut, patch and restore to match existing work.

3.3. PROTECTION

.1 Protect all Division 15 work from damage. Keep all equipment dry and clean at all times.

.2 Cover openings in equipment, pipes and ducts, with caps or heavy gauge plastic sheeting until final connections are made.

.3 Repair any damage caused by improper storage, handling or installation of equipment and materials.

.4 Protect equipment, pipes and temporary services installed by Division 15 from weather damage.

3.4. TEMPORARY AND TRIAL USE

.1 Obtain written permission from Consultant to use and test permanent equipment and systems prior to Substantial Performance acceptance by Consultant.

.2 Consultant may use equipment and systems for test purposes prior to acceptance. Provide labour, fuel, material and instruments required for testing. Rectify incomplete work immediately to satisfaction of Consultant.

.3 Protect equipment and system openings from dirt, dust and other foreign materials during temporary usage. Whenever air handling systems are used for temporary services, in addition to other requirements specified, provide minimum {12 mm} [1/2"] thick glass fibre filter media in return air openings, transfer openings and other identified openings.

.4 Clean and renew equipment and systems used prior to acceptance.

.5 Warranty, including duration and commencement date, shall not to be affected by startup date of equipment.

3.5. COMPLETION

.1 Remove all debris from inside duct systems and equipment.

.2 Rectify deficiencies and complete work before submitting request for Substantial Performance inspection.

.3 Follow manufacturer's written instructions regarding bearing lubrication

.4 Check and align all drives to manufacturer's acceptable tolerances.

.5 Adjust belts for proper tension.

.6 Remove all temporary protection and covers.

.7 Remove oil and grease from equipment and bases.

.8 Clean all fixtures and equipment. Polish all plated surfaces.

.9 Vacuum clean the inside of all air handling systems, including fans, ducts, coils and terminal units to ensure that they are free from debris and dust.

.10 Leave in as new working order.

3.6. INSTRUCTIONS TO OWNER

.1 Submit check lists for each system or piece of equipment, indicating that all components have been checked and are complete prior to instruction period.

.2 Thoroughly instruct the Owner in the safe and efficient operation of the systems and equipment.

.3 Arrange and pay for the services of qualified manufacturer's representatives to instruct Owner on specialized portions of the installation, such as fume hoods, fans and automatic controls (including JCI controls technician).

.4 Submit a complete record of instructions given to the Owner. For each instruction period, supply the following data:

.1 Date

.2 Duration

.3 system or equipment involved

.4 names of persons giving instructions

.5 names of persons being instructed

.6 other persons present

.5 Submit receipted verification of completed training to Consultant prior to final release of retentions.

.6 Carry out instructional period during a period of 1 day scheduled at Owner's convenience.

3.7. INTERRUPTION OF EXISTING SERVICES

.1 Arrange, schedule and perform work with minimum disturbance to existing facilities and services.

.2 Submit a complete schedule of service interruptions and changeovers with approximate dates required, durations and times of day, for approval before proceeding.

.3 Notify Owner at least 72 hours in advance of planned interruption to existing services.

.4 Interruption of services must occur at the times and for the duration stipulated by the Owner.

.5 Keep service interruption duration to an absolute minimum. Carry out all preparatory work, measurements, prefabrication, etc., without interruption of existing services.

.6 If service interruptions are required by the Owner during the night or on weekends, etc., premium time shall be included in the Contract Price. No extra charges will be allowed at a later date for failure to include same.

3.8. REMOVAL AND REUSE OF EXISTING MATERIALS

.1 Carry out demolition work in accordance with the Occupational Health and Safety Code.

.2 Remove existing equipment, services and obstacles where required for refinishing or restoring existing surfaces. Replace same as work progresses.

.3 Turn over to the Owner existing material and equipment removed but not identified for reuse on site. Acceptance of removed material and equipment is at discretion of Owner. Remove such items from site when deemed unsuitable.

.4 Execute work with least possible interference or disturbance to Owner and to other work taking place over the same time period.

.5 Use only elevators assigned for Contractor use for moving men and material within buildings. Protect walls of elevators to satisfaction of Owner prior to use and accept liability for damage, safety of equipment and overloading of existing equipment.

3.9. PROTECTION OF OWNER'S PREMISES

.1 Adhere strictly to the Owner's requirements.

.2 Confer with the Owner concerning schedule, dust and noise control prior to commencing work in or adjacent to existing facilities where such work might affect either those facilities or their occupants.

.3 Execute work with least possible interference or disturbance to occupants, public and normal use of premises.

.4 Provide temporary means to maintain security when security has been reduced.

.5 Only elevators, assigned for Contractor's use may be used for moving men and material within building. Protect walls of passenger elevators, to approval of Owner prior to use. Accept liability for damage, safety of equipment and overloading of existing equipment.

.6 Provide temporary dust screens, barriers, warning signs in locations where renovations and alteration work is adjacent to areas which will be operative during work.

.7 Drawings indicate approximate locations of known existing underground and above ground facilities. Avoid damage to existing services. Bear cost of repairs and replacements.

.8 Immediately advise Consultant when unknown services are encountered and await instructions.

.9 Accept liability for costs incurred by the Owner in repairing and cleaning equipment, etc., resulting from failure to comply with the above requirements.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all services, materials and labour required to fully commission the mechanical systems in accordance with this Section of the Specification.

1.2. COORDINATION

.1 Meet the requirements of the General Instructions.

.2 Coordinate the work of this Section with all other Divisions to ensure complete and operational mechanical systems at completion of this work.

.3 Appoint a single person as Commissioning Coordinator who shall be responsible for progressing the commissioning activities of each Division 15 trade.

.4 Review the design intent of the project and the intended operation of systems with the Consultant before proceeding with commissioning.

1.3. QUALITY ASSURANCE

.1 The commissioning process shall meet the requirements of CAN/CSA Z31 series, the Code of Practice for Commissioning Mechanical Systems in Buildings. Meet ASHRAE Standard 1-1989 Guideline for Commissioning of HVAC Systems and ASHRAE Standard 110 Guide Specification for Laboratory Fume Hood Commissioning.

.2 This division may elect to source startup and handover by a specialist commissioning company. Supply to the Consultant, the following details regarding the proposed firm:

.1 Principle representative and qualifications

.2 Proposed personnel and relevant project experience

.3 Previous similar assignments and references

.4 Scope of work to be undertaken

.5 Company resources and equipment

.3 Use of a commissioning specialist shall not relieve Division 15 of the obligation to name one of his own employees as the person responsible for progressing commissioning, i.e. the Commissioning Coordinator.

.4 Supply the name, qualifications and experience of the proposed Commissioning Coordinator upon Construction Manager's request. Selection shall be subject to review and the approval of the Consultant. Supply alternative person(s) when requested by Consultant.

.5 The Consultant may, at his discretion, attend and advise in the commissioning process. Meet Consultant requirements.

PART 2 - PRODUCTS

2.1. SCHEDULES AND COMPLETION OF INSTALLATION OF SYSTEMS

.1 Submit to the Consultant, 30 days prior to the scheduled Substantial Performance, a detailed and comprehensive installation completion/startup/testing schedule, identifying all trades and suppliers to be involved. Update the schedule and resubmit for review, on a bi-weekly basis, during the course of commissioning. If found to be unacceptable, revise the schedule and the construction forces to suit the reviewed schedule. This schedule shall include, but is not limited to the following items:

.1 Air handling system ACS-1 & general exhaust system GE-1 impacted by system changes

.2 New fume hood

.3 New exhaust fan

.4 New booster fan

.5 New supply and exhaust terminal units

.6 Building Automation System addition and changes

.7 Overall BAS control sequences

.8 Test and Balance (TAB) Work

2.2. RECORD DOCUMENTATION

.1 Prepare record documentation for each equipment installation covering:

.1 Equipment identification and supplier

.2 Shop Drawing submittal, review, production release, and delivery dates

.3 Dates for completion of all work required to prepare for equipment installation

.4 Dates for equipment installation, supplier prestart checkout and system availability for startup

.5 Dates for equipment startup, performance testing, proposal for temporary use, acceptance testing, demonstration, turnover and warranty start/finish

.2 Submit proposed record sheets and procedures to Consultant for review, when requested by the Owner.

.3 List all specialist personnel and equipment required for the test and ensure that these are available by the test date.

.4 Provide documentation of the commissioning process for inclusion into the maintenance manuals. These are to include checkout sheets, equipment data sheets, startup certificates from suppliers involved in startup, documentation

concerning demonstration to the Owner. Include all records and result sheets from commissioning tests.

.5 Maintain a log of key operating parameters, problems encountered, solutions employed and verification of effectiveness of solutions. Include log in maintenance manuals.

2.3. STARTUP

.1 Coordinate and supervise the startup of the various pieces of equipment and systems. Utilize the startup services of the manufacturer's representative. Ensure that the equipment is operating in a satisfactory manner. Check the following items:

.1 Direction of rotation

.2 Grease and lubricants

.3 Noise, if deemed to be a problem

.4 Seals

.5 Alignment of pump and fan drives by a millwright

.6 Piping connections and safeties

.7 Electrical amp draw, starting inrush current and trip/heater settings

.2 Meet Section 15010 requirements for Temporary Services and Temporary and Trial Use.

2.4. TROUBLESHOOTING

.1 Where problems become apparent during the commissioning process, identify and resolve these problems. The basic functions in troubleshooting are:

.1 What - identification and definition of the problem

.2 Why - determination and evaluation of the causes

.3 When - determine the time available to resolve the problem

.4 Involve the designing authority in the review of the problem and proposed resolution

.5 Coordinate remedial action with the appropriate parties

.6 Evaluate the effectiveness of the remedial action

.7 Record the problem, cause, remedial action and result

2.5. OPERATION AND TESTING

.1 Test the operation of the individual components and systems. Go through each step of the sequence of operation and verify that each component operates correctly. Direct and ensure that all trades involved make the required changes and

adjustments to effect the proper operation of all components and systems. Meet commissioning test requirements.

.2 Document operation and testing.

2.6. DEMONSTRATION

.1 Demonstrate to the Owner the proper operation of all equipment and systems supplied under this Division. Demonstrations shall occur only after the operation and testing has been successfully completed. Ensure that Trade Contractor and equipment suppliers participate in the demonstration as required.

2.7. OPERATING AND MAINTENANCE MANUALS

.1 Meet Section 15010 requirements.

.2 Coordinate the manual provision with Consultant prepared Operation and Maintenance Manual, if available.

2.8. RECORD DRAWINGS

.1 Meet Section 15010 requirements.

2.9. COMPLETION

.1 Meet Section 15010 requirements.

2.10. SPARE PARTS

.1 Provide a list of spare parts, special tools, lubricants, etc. for each item of equipment which has been purchased as part of the Contract.

.2 Provide a listing of recommended spare parts for all equipment installed under Division 15, to cover a period from Substantial Completion to Warranty end.

.3 Provide at minimum, the following information for recommended spare parts:

.1 Manufacturer's name, address, phone and fax numbers

.2 Manufacturer's part name, part number, unit price, lead time, shelf life

.3 Quantity recommended for 1 year

.4 Alternative suppliers of compatible parts, including local supplier name, address, phone and fax numbers

.4 Submit preliminary list of spare parts and tools to Owner at least 30 days prior to intended system handover to Owner. The Owner reserves the right to add to, reduce or omit entirely, the recommendations contained on these lists.

PART 3 - EXECUTION

3.1. COMMISSIONING TESTS

.1 Verify readings, calibration and setup of sensors and equipment, including:

.1 Flow metering stations

.2 Status switches

.3 Alarm contacts at fumehood including readings at BAS

.4 Alarm contacts at extractor arms including readings at BAS

.5 Booster fans and extractor arms flow rates

.6 Temperature sensors

.2 Verify correct sensors are reporting accurately to the distributed field panels and operator workstation.

.3 Operate fume hood and corresponding exhaust fan. Verify and correct the following if required:

.1 Hi and Lo Speed using fume hood sash position.

.2 Verify calibrated operation of flow metering station.

.3 Test all alarms at fume hood and operator station.

.4 Start/stop exhaust fan from the operator terminal, fume hood, and motor starter.

.4 Verify operation of modulating supply venturi valve and support systems, including:

.1 Maximum Design Airflow (100%)

.2 Intermediate Airflow (66%)

.3 Minimum Design Airflow (33%)

.4 Verify calibrated operation of flow metering station.

.5 Verify operation of modulating exhaust venturi valve and support systems, including:

.1 Maximum Design Airflow (100%)

.2 Intermediate Airflow (66%)

.3 Minimum Design Airflow (33%)

.4 Verify calibrated operation of flow metering station.

.6 Verify operation of the operation of all equipment through Johnson's Control BAS, including:

.1 Equipment operation status

.2 Setpoint overrides

.3 Schedules changeover

.4 Graphics

.5 Alarms

.6 Operation of venture valve controllers.

.7 Trend logs operation indication.

.7 Verify duct cleaning, air balancing and air pattern adjustments.

.8 Verify the operation of all other equipment provided by Division 15.

.9 Verify that interfacing to the work of other Divisions results in complete and operational systems.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Provide all labour, materials, products, equipment and services to supply and install the basic mechanical materials indicated on the Drawings and specified in Division 15 of these Specifications.

1.2. IDENTIFICATION OF MECHANICAL SERVICES

.1 Identify all mechanical services.

.2 Use terminology consistent:

.1 with the Drawings and Specifications & owner's requirements.

.3 Mark valve and equipment identification on Record Drawings.

1.3. PIPE AND DUCTWORK IDENTIFICATION

.1 Provide SMS Wrap-Mark on all pipe coverings, using Wrap-Mark pipe markers with flow arrow and alternating wording. For outside diameters up to {150 mm} [6"], allow marker to completely wrap pipe. Secure markers on vertical piping and elsewhere where markers could be inadvertently moved.

.2 Use stencils and stencil paint on ductwork or ductwork insulation. Apply solid black capitalized lettering {50 mm} [2"] high and solid black flow arrows {150 mm} [6"] long x {50 mm} [2"] wide.

.3 Locate identification and flow arrows so they can be seen clearly from floor and service platforms

.1 at least once in each room

.2 at each piece of equipment

.3 at each branch close to connection point to main piping and ductwork

.4 at not greater than intervals of {15 metres} [50 ft] on straight runs of exposed piping and ductwork

.5 at entry and leaving point to pipe and duct chases, or other concealed spaces

.6 both sides where piping and ductwork passes through walls, partitions and floors

.7 on vertical pipes and ducts approximately {1800 mm} [6 ft] above floor

.8 behind each access door and panel

.9 at valves, identify piping upstream of valves and identify branch, equipment, building part or building serviced downstream of valve

1.4. VALVE TAGS

.1 Provide {40 mm} [1-1/2"] dia., {1 mm} [0.040"] thick brass tags with {10mm} [3/8"] high die-stamped black letters.

.2 Attach to valves with {100 mm} [4"] long brass chains.

.3 Tag all valves except for small valves isolating a single piece of equipment.

1.5. EQUIPMENT NAMEPLATES

.1 Identify equipment, starters, and, remote control devices in a manner consistent with the Drawings.

.2 Use solid black capitalized lettering {100 mm} [4"] high.

.3 Where equipment size does not permit stencil identification, use lamacoid labels, engraved white on black, mechanically fastened to the equipment. Minimum lettering size {10 mm} [3/8"].

1.6. CONTROLS IDENTIFICATION

.1 Meet Section 15955 and 15965 requirements.

PART 2 - PRODUCTS

2.1. INSERTS

.1 Use Phillips Red Head Multiset II Anchor system or equivalent Hilti System.

2.2. PIPE HANGERS

.1 Provide pipe hangers and supports for all piping. Provide hangers in accordance with the following requirements. Provide steel supports in accordance with the subsequent article in this specification section. Provide galvanized steel hangers and supports with galvanized fittings and accessories where exposed to direct contact with water or to possible high humidity conditions where condensation can occur.

.2 Provide manufactured hangers, accessories and supports in accordance with ANSI B31.1 and MSS SP58, SP69, SP89 and SP90 similar to the Grinnell or Myatt figures numbers below.

.3 Select products to ensure adequate safety factors under anticipated loads.

.4 Provide upper attachments as follows:

.1 C clamp - Grinnell Fig 86 or Myatt Fig 586.

.2 Angle clip for light duty side mounting - Grinnell Fig 202 or Myatt Fig 542.

.5 For vertical adjustment of hanger rods, provide forged steel turnbuckle - Grinnell Fig 230 or Myatt Fig 475.

.6 Provide pipe attachments as follows:

.1 Clevis hanger for copper piping up to and including {100 mm} [4"] diameter - Grinnell Fig CT-65 plastic coated or Myatt Fig 56 epoxy coated.

.2 Swivel ring hanger for copper tubing up to and including {25 mm} [1"] diameter - Myatt Fig 43 epoxy coated.

.3 Standard duty clevis hanger for steel piping - Grinnell Fig 260 or Myatt Fig 124.

.4 Standard duty long clevis hanger for steel piping - Grinnell Fig 300 or Myatt Fig 124L.

.7 Provide vertical pipe supports as follows:

.1 Riser clamp for copper pipe - Grinnell Fig CT121C plastic coated or Myatt Fig 186 epoxy coated.

.2 Riser clamp for steel or cast iron pipe - Grinnell Fig 261 or Myatt Fig 182 or Fig 183.

.8 Provide supports for other piping types such as mechanically fused or packed joint pipe according to the pipe manufacturer's published recommendations. Support piping continuously where required to prevent sagging.

.9 Provide protection saddles where insulated piping is supported from below.

.1 For high temperature insulated pipe - Grinnell Fig 160 or Fig 165 or Myatt Fig 210 or Fig 240.

.2 For insulated pipe with vapour barrier for low temperature service, insulate pipe with calcium silicate at hangers and provide Grinnell Fig 167 or Myatt Fig 251.

2.3. SLEEVES, WALL AND FLOOR PLATES

.1 For pipe sleeves, use machine cut and reamed standard weight steel piping.

.2 Concealed perimeter risers and runouts may have sleeves of {1.31 mm} [18 gauge] galvanized steel set around section of insulation to provide freedom of movement of piping. Extend {50 mm} [2"] above finished floor level.

.3 Provide {1.31 mm} [18 gauge] galvanized steel duct sleeves. For fire rated floor and walls penetrations attain fire rated construction, in a manner acceptable to the governing authorities.

.4 Cover pipe sleeves in walls and ceilings of finished areas, other than Equipment Rooms, with satin finish stainless steel, or satin finish chrome or nickel plated brass escutcheons, with non-ferrous set screws. Do not use stamped steel split plates. Split cast plates with screw locks, however, may be used.

.5 Cover exposed duct sleeves in finished areas with {1.31 mm} [18 gauge] galvanized steel plates in the form of duct collars. Fix in position with non-ferrous metal screws.

2.4. PROVISION FOR PIPE EXPANSION, CONTRACTION AND BUILDING SHRINKAGE

.1 Allow for expansion and contraction utilizing offsets.

2.5. PIPE GUIDES AND ANCHORS

.1 Provide guides and anchors in vertical and horizontal piping and ductwork where anchors required to limit movement or guides to facilitate movement where required.

2.6. TEST PORT & INSTRUMENTATION ELEMENTS

.1 Install test port in the exhaust fan ductwork as indicated on the drawings.

.2 Install sensing elements where required and where required by the Automatic Controls Trade.

2.7. ACCESS DOORS AND PANELS

.1 Provide access for concealed mechanical equipment and devices that require access. Install systems and components to minimize number of access doors and panels. Install equipment and components to be readily accessible through doors and panels.

.2 Select access doors and panels to suit Architectural finishes and large enough to provide adequate access to equipment and components. Where personnel must pass through, provide minimum {600 mm x 450 mm} [24" x 18"] doors and panels. Otherwise, provide minimum {300 mm x 300 mm} [12" x 12"] doors and panels.

.3 Provide access doors and panels with a fire rating matching fire rating of the structure.

.4 For all other surfaces, provide {2.66 mm} [12 gauge] welded steel, flush type with concealed hinges, lock and anchor strap, and factory prime coat finish.

2.8. CURBS

.1 Provide concrete curbs around holes in Equipment Room floors, extending at least {150 mm} [6"] above finished floor. Make watertight connection between curb and floor.

2.9. CONCRETE

.1 Utilize existing {100 mm} [4"] concrete housekeeping pads under all floor mounted fan equipment and supports.

2.10. STEEL

.1 Provide steel for framing, lintels, supports etc.

.2 Provide steel of adequate strength to support equipment and materials during all operating and test conditions.

.3 Provide base supports for all pipe risers. Design to distribute operating and static loads.

.4 Fabricate steel supports in contact with water or humidity conditions from materials having approved corrosion resistance or galvanize after fabrication or brush welds clean and apply a prime coat of rust inhibiting paint.

2.11. FIRESTOPPING

.1 Provide ULC classified firestopping products by 3M or Hilti which have been tested in accordance with CAN4-S115.

2.12. WELDING AND BRAZING

.1 All welding and brazing shall conform to the following codes and standards:

.1 Building Services Piping Code ANSI/ASME B 31.9 (latest edition)

.2 All requirements of the Technical Standards and Safety Authority (TSSA)

.2 Welding shall conform to a welding procedure which must be in accordance with TSSA requirements and include materials, weld preparation, heat treatment and welding equipment to be used.

.3 Qualify welders according to ASME equivalent testing procedures. Do not use welders, on or off site work who are not qualified for the work. Maintain records for all qualification testing, and provide copies to the Consultant on request.

.4 Identify work in accordance with codes and standards. Welds shall be full penetration, continuous and without defects. After deposition, each layer of weld shall be cleaned to remove slag and scale by wire brushing or grinding, then chipped where necessary to prepare for proper deposition of the next layer. The weld reinforcement shall not be less than {1.6 mm} [1/16"] and not more than {3.2 mm} [1/8"] above the normal surface of the joined sections. The reinforcement shall be crowned at the centre and shall merge into the base material without excessive shoulder or undercut.

.5 Welding shall be made by machine or manual shielded metallic arc process. Direct current shall be used exclusively with the base material on the negative side of the line. Electrodes used shall be an approved all position rod type.

PART 3 - EXECUTION

3.1. PIPE, DUCT AND EQUIPMENT INSTALLATION

.1 Locate distribution systems, equipment and materials for maximum usable space, optimum service clearances and to accommodate current requirements and identified future expansion.

.2 Coordinate installation and relocate and lighting or other electrical or mechanical that interferes with new mechanical installation.

.3 Include all pipe and duct offsets required to eliminate interference.

.4 Install equipment and materials to present a neat appearance. Run piping, ducts and conduit parallel to or perpendicular to building planes. Conceal piping, ducts and conduit in finished areas. Install so as to require a minimum amount of furring.

.5 Install pipe, duct and conduit straight, parallel and close to walls and slab or deck underside, with specified pitch.

.6 Use standard fittings for all direction changes. Do not use drilled tees and other field fabricated fittings.

.7 Install eccentric reducers in horizontal piping to permit drainage and eliminate air pockets.

.8 Where pipe sizes differ from connection sizes of equipment, provide reducing fittings between inline components such as valves, strainers and fittings, and equipment. Reducing bushings are not permitted.

.9 Cap open ends of piping during installation.

.10 Lay copper tubing so that it is not in contact with dissimilar metal and will not kink or collapse.

.11 Use non-corrosive lubricant or teflon tape equal to Dow Corning and apply on male thread.

.12 Provide brass adaptors or dielectric couplings wherever dissimilar metals are joined.

.13 Ensure that pipe installation does not transmit vibration to the walls and floors through which they pass.

.14 Make provisions for neat insulation finish around equipment and materials. Do not mount equipment within insulation depth.

3.2. CONNECTIONS TO EQUIPMENT

.1 Provide unions or flanges at all connections to equipment. Ensure that piping adjacent to equipment is readily removable for servicing and/or removal of equipment without shutting down entire system.

.2 Install unions in piping up to and including {50 mm} [2"] pipe size. Install flanges in piping {65 mm} [2-1/2"] pipe size and larger.

.3 Prevent galvanic corrosion by isolating copper and steel. Use red brass adapters, or completely isolate flanges using full face gaskets with bolts installed through phenolic sleeves with insulating fibre washers. Where the Plumbing Code prohibits the use of red brass adapters, use insulating couplings. Where valves are required, solid brass isolating valves may be used in lieu of adapters or couplings.

.4 Provide metallic code rated continuity link between flanges or unions, where pipes carry flammable fluids or gases.

.5 Make all plumbing and sheet metal connections to equipment.

3.3. INSERTS

.1 Size and space for the loads to be supported.

.2 Place inserts only within main structure and not in any finishing materials.

.3 Do not use powder actuated tools.

3.4. HANGERS

.1 Suspend piping, ductwork and equipment with all necessary hangers and supports for a safe and neat installation. Ensure that pipes are free to expand and contract and are graded properly. Adjust each hanger to take its full share of the weight.

.2 Suspend hanger rods directly from the structure. Do not suspend pipes, ducts or equipment from other pipes, ducts, equipment, or ceilings.

.3 Provide auxiliary structural steel angles, channels and beams where ductwork, piping and equipment is suspended between joists or beams.

.4 Use galvanized rods, steel support angles, channels and beams where exposed to direct contact with water or to possible high humidity conditions where condensation can occur.

.5 Space hangers to ensure that structural steel members are not over stressed. Do not space hangers further apart than indicated in the tables. When requested, submit detailed drawings showing locations and magnitude of ductwork, piping and equipment loads on the structure. Provide calculations when requested by Consultant.

.6 Do not use trapeze type hangers for support of piping, without prior review by Consultant. Where permitted, fabricate from angle or channel frames, and space hangers to suit the smallest pipe size.

.7 Do not use hooks, chains or straps to support equipment and materials.

.8 Ensure that copper materials are completely isolated from ferrous materials. Use plastic or epoxy coated hangers and clamps. Use lead inserts between copper piping and other ferrous materials.

.9 Provide round steel threaded rods meeting ASTM A-36. Provide cadmium plated rod and accessories where exposed to direct contact with water or to possible high humidity conditions where condensation can occur.

.10 The following table establishes minimum standards of rod sizes and hanger spacing for steel and copper piping.

Maximum Horizontal Spacing of Supports			
Pipe Size {mm} [in]	**Rod Size {mm} [in]**	**Steel {m} [ft]**	**Copper {m} [ft]**
{12} [1/2]	{10} [3/8]	{1.5} [05]	{1.5} [05]
{20} [3/4]	{10} [3/8]	{1.8} [06]	{1.8} [06]
{25} [1]	{10} [3/8]	{1.8} [06]	{1.8} [06]
{32} [1-1/4]	{10} [3/8]	{2.4} [08]	{2.1} [07]
{40} [1-1/2]	{10} [3/8]	{2.7} [09]	{2.4} [08]
{50} [2]	{10} [3/8]	{2.7} [09]	{2.7} [09]

.11 In addition to these basic requirements, provide hangers in the following location:

.1 to eliminate vibration

.2 at points of vertical and horizontal change of direction of pipe

.3 at valves and strainers

.4 on mains at branch takeoffs

.5 to avoid stress on equipment connections

.12 Support horizontal cast iron soil pipe at each hub. Where groups of fittings occur, support at every three joints.

.13 Refer to applicable articles of the Specification regarding thermal insulation requirements. Unless shown specifically on Drawings, provide the following support methods.

.1 For insulated warm and hot water piping, for condensate piping and for steam piping up to {65 mm} [2-1/2"] diameter, support with hangers directly on piping.

.2 For chilled water and domestic cold water piping, hangers shall be large enough to fit over specified pipe covering. At each point of support, install specified saddles with sufficient length to prevent crushing of insulation.

.14 Generally, support ducts with {2.7 mm} [12 gauge] by {25 mm} [1"] wide galvanized hangers or with {12 mm} [½"] dia. rods and {40 mm} [1-1/2"] rolled angle saddles to meet SMACNA or ASHRAE Standards.

.15 Support vertical duct risers at each floor with rolled angle collars bearing on building structure.

3.5. SLEEVES, WALL PLATES, FLOOR PLATES

.1 Set sleeves for piping and ductwork as follows:

.1 Through interior walls, set sleeves flush with finished surfaces on both sides.

.2 Through exterior walls above grade, set sleeves flush with finished surfaces on inside and to suit flashing on outside.

.3 For floors in Mechanical Equipment Rooms, and similar areas where a water dam is required, set sleeves flush to underside of structure and extending {50 mm} [2"] above finished floor.

.4 For other floors, set sleeves flush to both finished surfaces

.2 Size sleeves to provide {25 mm} [1"] clearance around insulated piping and ductwork.

.3 Provide continuous insulation runs through fire separations. Ensure piping and ductwork does not touch sleeves or for warm and hot water piping and ductwork terminate insulation cover on each side of sleeve. For chilled water and domestic cold water piping, provide same thickness Manville Thermo-12 pipe insulation with all

purpose vapour barrier jacket through fire separation to a point {100 mm} [4"] on each side of fire separation.

Install leak tight seals to meet the manufacturer's requirements. Select inside diameter of wall sleeve opening to fit the pipe and seal leak tight.

.4 Additional sleeving requirements:

.1 Provide sleeves to accommodate piping and wiring conduits required for Division 15 work.

.2 Fill unused sleeves through fire separations with firestop material (see Firestopping article). Fill other unused sleeves with suitable noncombustible materials.

3.6. FIRESTOPPING

.1 Ensure that fire ratings of floors and walls are maintained.

.2 Fill spaces between openings, pipes and ducts passing through fire separations and install firestopping systems in accordance with the appropriate ULC system number for the products and type of penetration.

.3 Install firestopping systems using personnel trained or instructed by the product manufacturer.

3.7. PROVISION FOR PIPE EXPANSION, CONTRACTION AND BUILDING SHRINKAGE

.1 Make provision for pipe expansion, contraction and building shrinkage with suitable anchors, offsets or expansion loops.

.2 Install piping to allow freedom of movement in all planes without imposing undue stress on any section of main piping, branch piping, equipment or structure.

3.8. PIPE GUIDES AND ANCHORS

.1 Install pipe guides where required to maintain pipe alignment.

.2 Install manufactured or field fabricated alignment guides to allow movement in axial direction only.

.3 Install vertical risers properly anchored and guided to maintain accurate vertical position of piping. At time of startup, clean and lubricate guides, and adjust to allow free sliding at operating conditions.

.4 For piping up to and including {75 mm} [3"], guide pipes at every floor or every {3900 mm} [13 ft]. Guide larger pipes at every second floor or every {7500 mm} [25 ft].

.5 Fabricate anchors from structural steel channels, plates or angles. Submit detailed shop drawings of anchors

.6 Secure anchors to the structure. Avoid introduction of excessive reactive forces and operating weights into the structure and onto equipment and piping.

.7 Where guides are provided on cold piping, provide thermal break to prevent sweating.

.8 Where mains or branches connect to risers, the first point of support of the main or branch shall be a spring type hanger to allow movement of the riser.

3.9. PAINTING

.1 Paint all ferrous metal work except piping, galvanized and stainless steel ductwork, with one factory prime coat, or paint one prime coat on site.

.2 Clean and steel brush surfaces with welds. Then prime coat all steel supports and brackets.

.3 On uninsulated piping, steel brush and prime coat welds.

.4 Touchup or repaint surfaces damaged during shipment or installation and leave ready for finish painting.

.5 Prime coat material shall conform to Canadian General Standards Board Standard No. 1-GP-48.

.6 Provide finish painting to match existing.

3.10. ADDITION OF NEW CIRCUITS

.1 Before any new system is connected to an existing system, the new system shall be separately cleaned and treated to prevent contamination.

3.11. WELDING AND BRAZING INSPECTION

.1 Any welds found to be of poor or doubtful quality shall be cut out and replaced with satisfactory welds.

.2 One or more of the following defects shall be cause for rejection of a weld:

.1 failure to meet radiographic requirements or other code tests

.2 welding performed by unqualified personnel

.3 welds not reasonably uniform in appearance

.4 evidence of peeling

.5 cracks

.6 oxidation around welds

.7 lack of fusion

.8 the presence of porosity, slag inclusion or overlaps

.9 undercutting adjacent to completed welds or evidence of undercutting by grinding

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

1. Comply with Division 1, General Requirements and all documents referred to therein.

2. Provide all labour, materials, products, equipment and services to supply and install the motors, starters, and wiring indicated on the Drawings and specified in this Section of the Specification.

3. Scope of work includes the removal of an existing abandoned fume hood exhaust fan, provision of a new fume hood exhaust fan connected to the existing power supply, with a single phase starter, new booster fan, and any wiring required for BAS controls.

1.2. REFERENCE STANDARDS

.1 Provide all labour, materials, products, equipment and services, and perform all work in accordance with the current edition of

.1 The Canadian Electrical Code, (CSA C22).

.2 EEMAC and NEMA Standards.

.3 All other standards and regulations referenced by the authorities having jurisdiction.

PART 2 - PRODUCTS

2.1. MOTORS

.1 Provide, 60 cycle, 1750 rpm motors, except where noted, with the following characteristics:

.1 under {0.373 kW} [1/2 hp] - single phase, 120 V

.2 Motor nameplates shall list the full load motor efficiency.

.3 Select motors for quiet continuous operation to suit loads imposed by equipment. Recognize that motor horsepower specified and scheduled are minimum sizes. Include extra costs for larger motors, starters, power wiring and additional control wiring if larger motors are required for alternative equipment accepted as part of the Contract Price.

.4 Provide motor enclosures as follows:

.1 open drip-proof, 1.15 service factor for motors protected from the weather and moisture entrainment to operate satisfactorily at maximum temperature and moisture levels of surrounding air for motors located in air streams.

.2 totally enclosed fan cooled 1.15 service factor for motors in all other locations. .

.5 Provide single winding, variable torque (high and low speed) 2-speed motors where scheduled. Provide starter to suit motor requirements.

.6 Provide motors less than {0.75 kW} [1 hp] with sealed bearings. Provide larger motors with serviceable fill and drain plugs at each bearing. Provide bearings with B_{10} design life of at least 100,000 hours.

2.2. STARTERS AND MOTOR CONTROL

.1 Refer to Exhaust Fan Schedule on drawings.

.2 Provide 50,000 SCIA (Short Circuit Interrupting Ampacity) Symmetrical rating for all starters and disconnects.

.3 For single phase motors, provide manual starters with properly sized thermal overload protection and indicating pilot lights.

.4 Provide {141ºC} [285ºF] trip temperature relays. Provide fully ambient compensated relays where the difference between ambient of motor and ambient of starter may be more than 20ºC.

.5 Submit electrical field wiring diagrams of the complete motor and control system, with all relays and interlocks required for operation.

.6 Provide remote start/stop for fume hood exhaust operations from lab.

PART 3 - EXECUTION

3.1. INSTALLATION AND WIRING

.1 Provide motors, starters, disconnect switches and control devices for Division 15 work.

.2 Provide all power wiring from existing power provisions required for Division 15 work.

.3 Provide power wiring for controls where required.

.4 Provide control wiring for all equipment provided or supplied under Division 15.

.5 Provide all interlock connections and relays.

.6 Provide complete wiring diagrams of all controls and pilot circuits.

.7 Provide conduit and wiring materials and methods in strict accordance with base building requirements.

.8 Make connections to motors in flexible sealtight conduit, and with sufficient material to reduce vibration transmission and to allow full travel of motor for belt adjustment.

.9 Install wiring materials parallel to or perpendicular to building planes.

3.2. WARNING NOTICES

.1 Place warning notices at the motor starter under BAS control.

.2 Provide conspicuous notices with bold lettering and advising that the motor is under BAS control and may start at any time without warning.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply and install all fans indicated on the Drawings and specified herein.

1.2. REFERENCE STANDARDS

.1 Fans to be standard products, selected from published literature of manufacturer.

.2 Ratings to AMCA for sound and air delivery performance. Provide AMCA seal on each fan.

.3 Fans shall be factory balanced, statically and dynamically to AMCA Standards.

1.3. SUBMITTAL DATA

.1 Provide sound and air delivery performance ratings for fans where inlet vanes are provided. Include sound and power data at 100%, 66% and 33% capacity.

1.4. PERFORMANCE REQUIREMENTS

.1 Refer to Fan Schedule and Drawings for fan sizes, arrangements and capacities.

1.5. GENERAL REQUIREMENTS

.1 Provide V-belt drives, unless noted otherwise, selected for 200% service factor, based on motor nameplate data. Provide variable pitch motor pulley for motors up to {3.7 kW} [5 HP].

PART 2 - PRODUCTS

2.1. CENTRIFUGAL FANS

.1 Provide centrifugal fans, complete with motors, drives, belt guards and accessories required for the specified fans. Centrifugal fans shall be single inlet.

.2 Provide belt guards with tachometer openings for all belt driven equipment.

.3 Factory clean air handling apparatus and coat with red oxide primer prior to shipment.

.4 Provide re-greasable cast iron pillow block bearings are selected for L10-200,000 hrs, complete with lube-line kits to the exterior of the fan housing.

.5 Equip fan housing with drain holes.

.6 Deviations from overall dimensions of specified air handling apparatus will not be accepted without written permission. Confirm before ordering, that equipment can be accommodated within space provided, indicating allowance for required service clearances.

.7 Submit certified performance curves for all air handling fans through complete operating ranges of equipment for review with Shop Drawings.

.8 Furnish adjustable motor bases.

2.2. FUME HOOD EXHAUST FANS

.1 Provide ventilators constructed of Stainless Steel 316 (SS316).

.2 Fans housing to be manufactured of heavy gauge, continuously welded stainless steel construction. The housings to be smooth on both exterior for aesthetic appearance and interior for unrestricted airflow.

.3 Impeller to be manufactured of stainless steel construction.

.4 Accessories include: Bolted access door, punched flanged outlet, belt guard, and shaft seal.

.5 Provide belt drives with adjustable pitch V-belt drives. Units shall be selected for quiet operation.

.6 Motors shall be two-speed two-winding motors suitable for 115V AC operation.

.7 Refer to schedules for models, sizes and capacities.

2.3. BOOSTER FANS

.1 Provide inline booster fan for extractor arm assembly.

.2 Fan housing to be manufactured of corrosion resistant galvanized steel with black baked enamel coating and supplied with a mounting bracket.

.3 New and existing fan to be hardwired to electrical service.

.4 Warranty period of five (5) years for materials and workmanship.

PART 3 - EXECUTION

2.4. INSTALLATION

.1 Locate units to enable servicing to all sides in compliance with manufacturer's recommendations.

.2 Meet W.H.I.M.S. standards for motor drives, bases and belt guards required for each fan.

.3 Supply one extra set of matched V-belts for each fan, properly tagged with the equipment designation.

2.5. STARTUP AND TESTING

.1 Have manufacturers check out installed equipment for proper alignment and lubrication at time of startup.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply and install the sheet metal and ductwork systems as indicated on the Drawings and specified in this Section of the Specifications.

1.2. REFERENCE STANDARDS

.1 Meet Standards described in the latest Edition of HVAC Duct Construction Standards handbook from Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

.2 Fire dampers shall be ULC listed and labelled, and meet requirements of Ontario Fire Marshall and NFPA-90A.

PART 2 - PRODUCTS

2.1. DUCTWORK

.1 Fabricate supply and general exhaust ductwork from galvanized sheet metal with a minimum coating of {1.83 grams/m^2} [0.60 oz/sq.ft.] (G60coating). Duct installation shall conform to the following:

.1 Ductwork shall be smooth on the inside and free of obstructions, vibration and rattle.

.2 Fabricate ductwork, except as described in the next item, according to the following classifications:

.1 Class 1: All ducting subject to positive or negative static pressure of {250 Pa} [1 in w.g.] or less with maximum velocities of {13 m/s} [2500 fpm] shall be constructed in accordance with SMACNA construction standards for {250 Pa} [1 in w.g.] duct.

.2 Class 2: All ducting subject to positive or negative static pressure of more than {250 Pa} [1 in w.g.] up to {500 Pa} [2 in w.g.] with maximum velocity of {13 m/s} [2500 fpm] shall be constructed in accordance with SMACNA construction standards for {500 Pa} [2 in w.g.] duct.

.3 Provide Class 2 pressure duct construction for:

.1 Ductwork between variable volume air handling units and airflow Venturi Supply Valves.

.2 Ductwork between airflow Venturi Supply Valves and supply grilles.

.4 Provide duct transformation with expansion fittings having slopes not exceeding 1 to 7 and contraction fittings having slopes not exceeding 1 to 4.

.5 Provide full radius tees, bends, and elbows for changes in direction.

.6 Seal all joints in low, medium and high pressure ductwork with Transcontinental MP for low and medium pressure or DuroDyne S2 duct sealer for high pressure. Joints shall be sealed to conform to SMACNA standards as follows:

Seal Class	Sealing Required	Static Pressure Construction Class
A	All transverse joints, longitudinal seams and duct wall penetrations.	{1000 Pa} [4" w.g. and up]
B	All transverse joints and longitudinal seams.	{500-750 Pa} [2" - 3" w.g.]
C	Transverse joints	Up to {500 Pa} [2" w.g.]

.2 Fabricate fumehood exhaust ductwork from stainless steel using Type 316L sheet stainless steel of {1.52 mm} [22 gauge] minimum thickness.

.1 Ductwork shall be smooth on the inside and free of obstructions, vibration and rattle.

.2 Fabricate ductwork, according to the following classifications:

.3 Class 1: All ducting subject to positive or negative static pressure of {250 Pa} [1 in w.g.] or less with maximum velocities of {13 m/s} [2500 fpm] shall be constructed in accordance with SMACNA construction standards for {250 Pa} [1 in w.g.] duct.

.4 All positively and negatively pressurized ductwork to be welded.

.5 Provide duct transformation with expansion fittings having slopes not exceeding 1 to 7 and contraction fittings having slopes not exceeding 1 to 4.

.6 Provide full radius tees, bends, and elbows for changes in direction.

.7 Seal joints in exhaust ducting in accordance with seal Class B.

PART 3 - EXECUTION

3.1. SHEET METAL INSTALLATION

.1 Provide final duct connections to all fume hoods and other individual canopies or hoods provided by Division 11, as designated on the drawings.

.2 Provide frames in ductwork for airflow stations.

.3 Provide DuroDyne IP-1 or IP-2 test openings in all ducts entering and leaving air exhaust fans. Install test openings at 90 degree intervals around circular ducts. In insulated surfaces, provide extension to suit insulation thickness. Provide additional Model IP-4 test ports in ductwork where required for air balancing. Submit drawings to indicate proposed locations.

.4 Slope ductwork down to exhaust hoods and other equipment connections. Provide drains at low points and pipe to nearest floor or funnel drain.

3.2. TESTING

.1 Pressure test all ductwork in accordance with the outlines and classification described in the SMACNA, HVAC Duct Leakage Test manual.

.2 The leakage amount shall not exceed the allotted amount for the pressure class. The test pressures shall be based on the static pressure for each fan.

Duct Construction Class	Leakage Class
up to {500 Pa} [2" w.g.]	12

.3 Repair duct and retest where air leakage exceeds the specified limits.

.4 Make good all audible leakage, whether test is within limit specified or not.

.5 Provide calibrated tester, connection hoses, temporary plugs, etc., as required.

3.3. CLEAN UP

.1 Vacuum clean the inside of ducts, and terminal units to ensure that they are free from debris and dust.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply, install and test the air terminal control units with controls indicated on the Drawings and specified in this Section of the Specification.

.3 Provide sizes and capacities shown in the Schedules and on the Drawings.

PART 2 - PRODUCTS

2.1. VARIABLE VOLUME AIR TERMINAL CONTROL UNITS – EXHAUST VENTURI VALVE

.1 The airflow control device shall be a venturi valve.

.2 The valve assembly manufacturer’s Quality Management System shall be registered to ISO 9001:2000.

.3 The airflow control device shall be pressure independent over its specified differential static pressure operating range. An integral pressure-independent assembly shall respond and maintain specific airflow within one second of a change in duct static pressure regardless of the magnitude of pressure (from 0.3 in WC to 3.0 in WC) (74.7 Pa to 747 Pa) and/or flow change or quantity of airflow controllers on a manifolded system.

.4 The airflow control system shall maintain specific airflow (±5% of signal) with a minimum 11 to 1 airflow turndown to ensure accurate pressurization at low airflow and assure maximum energy efficiency.

.5 In the event of a power failure, airflow control devices shall fail to the last position and continue to maintain flow control within ±5% of signal within one second of a change in duct static pressure.

.6 No minimum entrance or exit straight length of duct shall be required to ensure accuracy and/or pressure independence.

.7 The airflow control device shall be constructed of the following type:

.1 Class A - The airflow control device for non-corrosive airstreams, such as supply and general exhaust, shall be constructed of 16-gauge aluminum. The device's shaft and shaft support brackets shall be made of 316 stainless steel. The pivot arm and internal mounting link shall be made of aluminum. The pressure-independent springs shall be a spring-grade stainless steel. All shaft-bearing surfaces shall be made of a Teflon®, polyester or PPS (polyphenylene sulfide) composite.

.8 A low-speed electric actuator shall be used to modulate the airflow over the range of the specific valve size. The maximum time to modulate from minimum to maximum flow shall be less than 90 seconds. A UL or CSA listed electronic actuator shall be factory mounted to the valve. The actuator shall have sufficient torque to modulate the airflow against the maximum duct static pressure (within product specifications). Loss of main power shall cause the valve to maintain its last airflow position. This position shall be maintained until power is restored.

.9 CONTROLS

.1 The airflow valve controller device shall be supplied for the exhaust airflow control device and the corresponding exhaust air control device in a standalone application and does not require pair tracking ability.

.2 The airflow valve controller device shall be BACnet compatible.

.3 The airflow valve controller device shall integrate seamlessly with the existing Johnson's Control System.

.10 SOUND LEVELS

.1 Unless otherwise specified, the airflow control device shall not exceed the sound power levels in Table below.

	Exhaust Sound Power Level in dB (re: 10^{-12} watts)					
Octave Band Number	2	3	4	5	6	7
Center Frequency in Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
1000-50 CFM Device						
800 CFM @ 0.6" WC	63	55	52	54	50	49
200 CFM @ 0.6" WC	46	42	38	37	32	25
800 CFM @ 3.0" WC	73	70	64	66	65	60
200 CFM @ 3.0" WC	51	52	51	50	52	51

.2 If the airflow control device cannot meet the sound power level specification, a properly sized silencer or sound attenuator must be used. All silencers must be of a packless design with a maximum pressure drop at the device's maximum rated flow rate not to exceed 0.20 inches of water.

.3 All proposed airflow control devices shall include exhaust sound power level performance.

.11 Each airflow control device shall be marked with the room number, tag number, serial number, and, model number. All information shall be stored by the manufacturer for use with as-built documentation.

2.2. VARIABLE VOLUME AIR TERMINAL CONTROL UNITS – SUPPLY VENTURI VALVE

.1 The airflow control device shall be a venturi valve.

.2 The valve assembly manufacturer's Quality Management System shall be registered to ISO 9001:2000.

.3 The airflow control device shall be pressure independent over its specified differential static pressure operating range. An integral pressure-independent assembly shall respond and maintain specific airflow within one second of a change in duct static pressure regardless of the magnitude of pressure (from 0.6 in WC to 3.0 in WC) (149.4 Pa to 747 Pa) and/or flow change or quantity of airflow controllers on a manifolded system.

.4 The airflow control system shall maintain specific airflow (±5% of signal) with a minimum 16 to 1 airflow turndown to ensure accurate pressurization at low airflow and assure maximum energy efficiency.

.5 In the event of a power failure, airflow control devices shall fail to the last position and continue to maintain flow control within ±5% of signal within one second of a change in duct static pressure.

.6 No minimum entrance or exit straight length of duct shall be required to ensure accuracy and/or pressure independence.

.7 The airflow control device shall be constructed of the following type:

.1 Class A - The airflow control device for non-corrosive airstreams, such as supply and general exhaust, shall be constructed of 16-gauge aluminum. The device's shaft and shaft support brackets shall be made of 316 stainless steel. The pivot arm and internal mounting link shall be made of aluminum. The pressure-independent springs shall be a spring-grade stainless steel. All shaft-bearing surfaces shall be made of a Teflon®, polyester or PPS (polyphenylene sulfide) composite.

.8 A low-speed electric actuator shall be used to modulate the airflow over the range of the specific valve size. The maximum time to modulate from minimum to maximum flow shall be less than 90 seconds. A UL or CSA listed electronic actuator shall be factory mounted to the valve. The actuator shall have sufficient torque to modulate the airflow against the maximum duct static pressure (within product specifications). Loss of main power shall cause the valve to maintain its last airflow position. This position shall be maintained until power is restored.

.9 CONTROLS

.1 The airflow valve controller device shall be supplied for the supply airflow control device and the corresponding supply air control device in a standalone application and does not require pair tracking ability.

.2 The airflow valve controller device shall be BACnet compatible.

.3 The airflow valve controller device shall integrate seamlessly with the existing Johnson’s Control System.

.10 SOUND LEVELS

.1 Unless otherwise specified, the airflow control device shall not exceed the sound power levels in Tables below.

	Discharge Sound Power Level in dB (re: 10^{-12} watts)					
Octave Band Number	2	3	4	5	6	7
Center Frequency in Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
1500-100 CFM Device						
1200 CFM @ 0.6" WC	63	59	55	60	54	53
400 CFM @ 0.6" WC	53	49	44	49	45	39
1200 CFM @ 3.0" WC	72	73	69	77	72	68
400 CFM @ 3.0" WC	58	63	61	63	60	57

	Radiated Sound Power Level in dB (re: 10^{-12} watts)					
Octave Band Number	2	3	4	5	6	7
Center Frequency in Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
1500-100 CFM Device						
1200 CFM @ 0.6" WC	47	53	40	42	38	36
400 CFM @ 0.6" WC	35	39	31	34	33	26
1200 CFM @ 3.0" WC	52	60	54	60	59	53
400 CFM @ 3.0" WC	42	44	43	46	46	42

.2 If the airflow control device cannot meet the sound power level specification, a properly sized silencer or sound attenuator must be used. All silencers must be of a packless design with a maximum pressure drop at the device's maximum rated flow rate not to exceed 0.20 inches of water.

.3 All proposed airflow control devices shall include supply discharge and radiated sound power level performance.

.11 Each airflow control device shall be marked with the room number, tag number, serial number, and, model number. All information shall be stored by the manufacturer for use with as-built documentation.

2.3. SUPPLY AND EXHAUST AIRFLOW MEASURING DEVICES

.1 Provide airflow measuring devices, capable of continuously monitoring the airflow volume of the duct served and electronically transmitting a signal linear to the airflow volume, shall be provided where indicated. Airflow measuring devices shall be of the insertion type, or built into airflow control valves, as required, with the capability of measuring velocity over the full range of 400 to 7000 FPM. Devices shall consist of multiple velocity sensors, supported on insertion probe bars.

.2 Individual airflow sensors shall be of rugged construction, and shall not require special handling during installation. Sensors shall be mounted on support bars, as required to achieve an equal area traverse. For corrosive air streams, sensors and support bars shall be manufactured of corrosion resistant CPVC and ABS. Furnish all mounting hardware required.

.3 Individual velocity sensors shall not be affected by dust, temperature, pressure, or humidity. The sensors shall be passive in nature, with no active parts within the air stream. The output from individual sensors shall be linear with respect to airflow velocity and shall be capable of sensing airflow in one direction only. The velocity sensors shall not require calibration.

.4 Velocity measurements from individual sensors shall be summed in the integrally connected airflow transmitter. The measurement shall be input and conditioned digitally to eliminate Analog-to-Digital conversion input error. The transmitter shall provide a scalable output over the full range of control of the unit, via on-board adjustments. The output signal of the transmitter shall be industry standard electronic signals, selectable on-board via jumpers or switches, for 4-20ma, 1-5vdc or 2-10vdc. Power requirement for the transmitter shall be 24VAC or DC.

PART 3 - EXECUTION

3.1. COORDINATION

.1 Install terminal units clear of light fixtures and ceiling components to enable full maintenance access, removal of light fixtures.

.2 Coordinate the supply of DDC controller package and actuator by controls contractor to the air terminal manufacturer.

3.2. INSTALLATION

.1 Provide minimum of four diameters of straight circular duct at inlet of air terminal units.

3.3. FACTORY TESTS

.1 Conduct laboratory tests designed to support performance data in accordance with the latest version of ARI 880.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to provide air terminals as indicated on the Drawings and specified in this Section of the Specifications.

1.2. REFERENCE STANDARDS

.1 Provide equipment performance rated in accordance with ADC (Air Diffusion Council) Equipment Test Code 1062GRD 84, 1S0 Standard 5135 and 1S0 Standard 5219.

.2 Meet the noise criteria levels of NC35 in the laboratory.

1.3. SHOP DRAWINGS

.1 Provide air terminal shop drawing submittals.

1.4. SAMPLES

.1 Submit air terminal samples when requested by Consultant.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

.1 Unless otherwise specified, provide all grilles, registers and diffusers from one manufacturer.

2.2. GRILLES, REGISTERS & DIFFUSERS

.1 Refer to the air terminal device schedules for descriptions of terminal types, sizes, materials of construction and finishes.

.2 Equip each supply air terminal with a volume control damper and an equalizing grid.

PART 3 - EXECUTION

3.1. INSTALLATION

.1 Provide air terminals in strict accordance with manufacturer's recommendations.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

.1 All work of this Division shall be coordinated and provided by the single Electronic Control and Monitoring System (ECMS) Contractor or the Building Automation System (BAS). The terms ECMS and BAS are considered synonymous.

.2 The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other trades. Reference other Division 15 Sections and drawings for details.

.3 The work of this Division shall be as required by the Specifications, and Drawings.

.4 If the ECMS Contractor believes there are conflicts or missing information in the project documents, the Contractor shall promptly request clarification and instruction from the design team.

1.2 DEFINITIONS

.1 Analog: A continuously variable system or value not having discrete levels. Typically exists within a defined range of limiting values.

.2 Binary: A two-state system where an “ON” condition is represented by one discrete signal level and an “OFF” condition is represented by a second discrete signal level.

.3 Electronic Control and Monitoring System (ECMS): The total integrated system of fully operational and functional elements, including equipment, software, programming, and associated materials, to be provided by this Division ECMS Contractor and to be interfaced to the associated work of other related trades.

.4 ECMS Contractor: The single Contractor to provide the work of this Division. This Contractor shall be the primary manufacturer, installer, commissioner and ongoing service provider for the ECMS work.

.5 Control Sequence: A ECMS pre-programmed arrangement of software algorithms, logical computation, target values and limits as required to attain the defined operational control objectives.

.6 Direct Digital Control: The digital algorithms and pre-defined arrangements included in the ECMS software to provide direct closed-loop control for the designated equipment and controlled variables. Inclusive of Proportional, Derivative and Integral control algorithms together with target values, limits, logical functions, arithmetic functions, constant values, timing considerations and the like.

.7 ECMS Network: The total digital on-line real-time interconnected configuration of ECMS digital processing units, workstations, panels, sub-panels, controllers, devices and associated elements individually known as network nodes. May exist as one or more fully interfaced and integrated sub-networks, LAN, WAN or the like.

.8 Node: A digitally programmable entity existing on the ECMS network.

.9 ECMS Integration: The complete functional and operational interconnection and interfacing of all ECMS work elements and nodes in compliance with all applicable codes, standards and ordinances so as to provide a single coherent ECMS as required by this Division.

.10 Provide: The term “Provide” and its derivatives when used in this Division shall mean to furnish, install in place, connect, calibrate, test, commission, warrant, document and supply the associated required services ready for operation.

.11 PC: Personal Computer from a recognized major manufacturer

.12 Furnish: The term “Furnish” and its derivatives when used in this Division shall mean supply at the ECMS Contractor’s cost to the designated third party trade contractor for installation. ECMS Contractor shall connect furnished items to the ECMS, calibrate, test, commission, warrant and document.

.13 Wiring: The term “Wiring” and its derivatives when used in this Division shall mean provide the ECMS wiring and terminations.

.14 Install: The term “Install” and its derivatives when used in this Division shall mean receive at the jobsite and mount.

.15 Protocol: The term “protocol” and its derivatives when used in this Division shall mean a defined set of rules and standards governing the on-line exchange of data between ECMS network nodes.

.16 Software: The term “software” and its derivatives when used in this Division shall mean all of programmed digital processor software, preprogrammed firmware and project specific digital process programming and database entries and definitions as generally understood in the ECMS industry for real-time, on-line, integrated ECMS configurations.

.17 The use of words in the singular in these Division documents shall not be considered as limiting when other indications in these documents denote that more than one such item is being referenced.

.18 Headings, paragraph numbers, titles, shading, bolding, underscores, clouds and other symbolic interpretation aids included in the Division documents are for general information only and are to assist in the reading and interpretation of these Documents.

.19 The following abbreviations and acronyms may be used in describing the work of this Division:

ADC	-	Analog to Digital Converter
AHJ	-	Authority Having Jurisdiction
AI	-	Analog Input
AN	-	Application Node
ANSI	-	American National Standards Institute
AO	-	Analog Output
ASCII	-	American Standard Code for Information Interchange
ASHRAE		American Society of Heating, Refrigeration and Air Conditioning Engineers
AWG	-	American Wire Gauge
CPU	-	Central Processing Unit
CRT	-	Cathode Ray Tube
DAC	-	Digital to Analog Converter
DDC	-	Direct Digital Control
DI	-	Digital Input
DO	-	Digital Output
EEPROM	-	Electronically Erasable Programmable Read Only Memory

EMI	-	Electromagnetic Interference
FAS	-	Fire Alarm Detection and Annunciation System
GUI	-	Graphical User Interface
HOA	-	Hand-Off-Auto
ID	-	Identification
IEEE	-	Institute of Electrical and Electronics Engineers
I/O	-	Input/Output
IT	-	Information Technology
LAN	-	Local Area Network
LCD	-	Liquid Crystal Display
LED	-	Light Emitting Diode
MCC	-	Motor Control Center
NC	-	Normally Closed
NIC	-	Not In Contract
NO	-	Normally Open
OWS	-	Operator Workstation
OAT	-	Outdoor Air Temperature
PC	-	Personal Computer
RAM	-	Random Access Memory
RF	-	Radio Frequency
RFI	-	Radio Frequency Interference
RH	-	Relative Humidity
ROM	-	Read Only Memory
RTD	-	Resistance Temperature Device
SPDT	-	Single Pole Double Throw
SPST	-	Single Pole Single Throw
XVGA	-	Extended Video Graphics Adapter
TBA	-	To Be Advised
TCP/IP	-	Transmission Control Protocol/Internet Protocol
TTD	-	Thermistor Temperature Device
UPS	-	Uninterruptible Power Supply
VAC	-	Volts, Alternating Current
VAV	-	Variable Air Volume
VDC	-	Volts, Direct Current
WAN	-	Wide Area Network

1.3 WORK INCLUDED

.1 These specifications are an integral part of the Contract Documents, Tendering and Contract Requirements and Division 1. General Requirements apply to all Division 15 Specification Sections.

.2 Provide all labour, materials, equipment, and service necessary to fully integrate the new equipment and monitoring devices into the existing Electric/Electronic Control and Monitoring (ECMS) Direct Digital Control System. The system shall be an extension and upgrade of the Existing JCI Building Technologies ECMS.

.3 This Section shall have the responsibility to install, program and commission the control requirements as per specifications, drawings, and sequences of operation. This system may also be referenced elsewhere in the specifications or on the drawings as the Electronic Control and Monitoring System (ECMS) or the Building Automation System (BAS).

.4 The ECMS will provide access to all system data both locally and over a secure Intranet within the building and by remote access by a standard Web Browser over

the Internet. This shall include HVAC monitoring and control as well as remote diagnostic and programming ability by the vendor and all trending, reporting and maintenance management functions related to normal building operations all as indicated on the drawings or elsewhere in this specification. Interface to existing maintenance management system.

.5 This section shall have the responsibility to upgrade, integrate, supply, install, test existing components, test and commission whole system after upgrade, program and commission the complete integrated electronic control and monitoring system (ECMS) as specified, described, shown on drawings and conceived from site conditions.

.6 The work shall include (but not limited to):

1. Replace and/or add control points as indicated in control diagrams.
2. Test and recalibrate all existing control points within Laboratory F23 such as temperature sensors, actuators, relays, transducers etc., and report to the owner any defective component.
3. Prepare Control shop drawings.
4. Provide control components as shown in drawings and/or specifications.
5. Utilize existing network of BACnet based, direct digital control panels.
6. Reprogram the sequence of operation as revised under these specs and drawings.
7. Test and Balance upgraded/revised HVAC systems including all control sequences required for the ECMS control system in Lab F23 and associated areas in the building including penthouse area.
8. Provide ECMS commissioning services as specified.
9. Provide maintenance manuals, and as-built drawings.
10. Provide training of Owner’s Operators with a qualified representative for the supplier of the ECMS system.
11. Provide one year warranty on all components and control system.

.7 All materials and equipment used shall be standard components, regularly manufactured for this and/or other systems and not custom designed specifically for this project. All systems and components shall have been thoroughly tested and proven in actual use.

.8 The control system shall be Direct Digital Control with electronic sensors and electronic or pneumatic actuation of valve and damper actuators.

.9 All wiring dedicated to the installation of the building automation system shall be done in accordance with all local and national codes.

.10 All labour, material, equipment, and commissioning labour not specifically referred to herein or on the plans, that is required to meet the functional intent of this specification, shall be provided without additional cost to the Owner. Ensure all

schedules and energy management routines are pre-programmed for complete year round operational functionality.

.11 The direction to provide equipment, material, products, labour and services shall be interpreted to supply, install, test and commission the Division 15 work indicated on the Drawings and specified in the Specifications.

.12 Provide and include in the Contract Price, Division 15 work including Control components and normal system accessories not shown on the Drawings or stipulated in the specifications, and required to ensure completed operational systems and a fully coordinated standard of Work acceptable to the Consultant and all authorities having jurisdiction.

.13 Consider the specifications as an integral part of the accompanying drawings. Any item or subject omitted from one or the other, but which is either mentioned or reasonably implied, shall be considered as properly and sufficiently specified.

.14 Be completely responsible for the acceptable condition and operation of all systems, equipment and components forming part of the installation or directly associated with it. Promptly replace defective materials, equipment and parts of equipment and repair related damages.

1.4 QUALITY ASSURANCE

.1 General

1. ECMS work shall be performed by one firm specializing in the manufacture and installation of control systems for building environmental control.

2. Products referenced under this Section establish the minimum acceptable standards of product quality, features and performance

3. The equipment provided by the supplier shall be the latest version currently in manufacture. No custom products shall be allowed. All products shall be supported for a minimum of 10 years, including spare parts, board repairs and software revisions. There shall be no yearly or other licensing fees required of the Owner for software upgrade during this period. The installer shall have an in-place support and training facility within 100 KM of the project job site with technical staff, spare parts inventory and all necessary training test and diagnostic equipment and, be capable of supplying all necessary support services including hardware and software support, configuration services system installation and commissioning and ongoing support.

4. Supplied equipment is to be backwards compatible with the existing controls system currently in place.

1.5 WORKPLACE SAFETY AND HAZARDOUS MATERIALS

1. Provide a safety program in compliance with the Contract Documents.

2. The ECMS Contractor shall have a corporately certified comprehensive Safety Certification Manual and a designated Safety Supervisor for the Project.

3. The Contractor and its employees and subtrades shall comply with federal, state and local safety regulations.

4. The Contractor shall ensure that all subcontractors and employees have written safety programs in place that covers their scope of work, and that their employees receive the training required by the OSHA rules that have jurisdiction for at least each topic listed in the Safety Certification Manual.

5. Hazards created by the Contractor or its subcontractors shall be eliminated before any further work proceeds.

1.6 QUALITY MANAGEMENT PROGRAM

1. Designate a competent and experienced employee to provide ECMS Project Management. The designated Project Manager shall be empowered to make technical, scheduling and related decisions on behalf of the ECMS Contractor. At minimum, the Project Manager shall:

   a. Manage the scheduling of the work to ensure that adequate materials, labor and other resources are available as needed.
   b. Manage the financial aspects of the ECMS Contract.
   c. Coordinate as necessary with other trades.
   d. Be responsible for the work and actions of the ECMS workforce on site.

1.7 REFERENCES

.1 All work shall conform to the following Codes and Standards, as applicable:

1. National Fire Protection Association (NFPA) Standards.

2. National Electric Code (NEC) and applicable local Electric Code.

3. Underwriters Laboratories (UL) listing and labels.

4. UL 268 Smoke Detectors.

5. UL 916 Energy Management

6. NFPA 70 - National Electrical Code.

7. NFPA 90A - Standard For The Installation Of Air Conditioning And Ventilating Systems.

8. Factory Mutual (FM).

9. American National Standards Institute (ANSI).

10. National Electric Manufacturer’s Association (NEMA).

11. American Society of Mechanical Engineers (ASME).

12. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).

13. Air Movement and Control Association (AMCA).

14. Institute of Electrical and Electronic Engineers (IEEE).

15. American Standard Code for Information Interchange (ASCII).

16. Electronics Industries Association (EIA).

17. Occupational Safety and Health Administration (OSHA).

18. American Society for Testing and Materials (ASTM).

19. Federal Communications Commission (FCC) including Part 15, Radio Frequency Devices.

20. ANSI/ASHRAE Standard 195-2008 (BACnet)

.2 In the case of conflicts or discrepancies, the more stringent regulation shall apply.

.3 All work shall meet the approval of the Authorities Having Jurisdiction at the project site.

1.8 SUBMITTALS

.1 Shop Drawings, Product Data, and Samples

1. The ECMS contractor shall submit a list of all shop drawings with submittals dates within 30 days of contract award.

2. Submittals shall be in defined packages. Each package shall be complete and shall only reference itself and previously submitted packages. The packages shall be as approved by the Engineer for Contract compliance.

3. Allow 5 working days for the review of ECMS package by the Engineer and Owner in the scheduling of the total ECMS work.

4. Equipment and systems requiring approval of local authorities must comply with such regulations and be approved. Filing shall be at the expense of the ECMS Contractor where filing is necessary. Provide a copy of all related correspondence and permits to the Owner.

5. Prepare an index of all submittals and shop drawings for the installation. Index shall include a shop drawing identification number, Contract Documents reference and item description.

6. The ECMS Contractor shall correct any errors or omissions noted in the first review.

7. At a minimum, submit the following:

   a. ECMS network architecture reference diagrams including all additional and revised nodes and interconnections.
   b. Systems schematics, sequences and flow diagrams.
   c. Points schedule for each point in the ECMS, including: Point Type, Object Name, Expanded ID, Display Units, Controller type, and Address.
   d. Samples of Graphic Display screen types and associated menus.
   e. Detailed Bill of Material list for each system or application, identifying quantities, part numbers, descriptions, and optional features.

f. Details of all ECMS interfaces and connections to the work of other trades.
g. Product data sheets or marked catalog pages including part number, photo and description for all product.

1.9 RECORD DOCUMENTATION

.1 Operation and Maintenance Manuals

1. Two (2) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation and Maintenance Manual shall be furnished on USB/CD media, and include the following for the ECMS provided:

a. Table of contents.
b. As-built system record drawings. Computer Aided Drawings (CAD) record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.
c. Manufacturer’s product data sheets or catalog pages for all products including software.
d. System Operator’s manuals.
e. Archive copy of all site-specific databases and sequences.
f. ECMS network diagrams.
g. Interfaces to all third-party products and work by other trades.
h. The Operation and Maintenance Manual CD shall be self-contained, and include all necessary software required to access the product data sheets. A logically organized table of contents shall provide dynamic links to view and print all product data sheets. Viewer software shall provide the ability to display, zoom, and search all documents.

1.10 WARRANTY

.1 Standard Material and Labor Warranty:

1. Provide a one-year labor and material warranty on the ECMS.

2. If within twelve (12) months from the date of acceptance of product, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the ECMS Contractor at the cost of the ECMS Contractor.

1.11 SYSTEM ACCESS

.1 The Owner and the Owner’s nominated representative will be given full and complete access to the ECMS, including all engineering software required to completely program and configure the system.

1.12 LICENSING FEE

.1 The Owner will not be liable for any yearly licensing fees.

1.13 TECHNOLOGY GUARANTEE

.1 The contractor will provide a written guarantee from the manufacturer that the technology being provided will be supported for a minimum of ten (10) years following completion of the project.

PART 2 – PRODUCTS

2.1 GENERAL DESCRIPTION

.1 The products used shall interface with the existing Electronic Control and Monitoring System (ECMS).

.2 The new controls shall include, but are not limited to, the following systems:

1. Existing Fume Hoods
2. New Fume Hood
3. New Fume Hood Exhaust Fan
4. New Supply Air Venturi Valve and Controller
5. New Exhaust Air Venturi Valve and Controller
6. New Flow Measuring Stations
7. Existing Extractor Arm Booster Fan
8. Existing Extractor Arm Booster Fan
9. BAS Control Hardware
10. All components required for a complete and working ECMS.

.3 Acceptable Manufacturers

1. Johnson Controls (JCI)

2.2 SCHEDULES

a. A graphical display for time-of-day scheduling and override scheduling of building operations shall be provided. At a minimum, the following functions shall be provided:

- Weekly schedules
- Exception Schedules
- Monthly calendars

b. Weekly schedules shall be provided for each group of equipment with a specific time use schedule.

c. It shall be possible to define one or more exception schedules for each schedule including references to calendars

d. Monthly calendars shall be provided that allow for simplified scheduling of holidays and special days for a minimum of five years in advance. Holidays and special days shall be user-selected with the pointing device or keyboard, and shall automatically reschedule equipment operation as previously defined on the exception schedules.

e. Changes to schedules made from the User Interface shall directly modify the Network Automation Engine schedule database.

f. Schedules and Calendars shall comply with ASHRAE SP135/2008 BACnet Standard.

g. Selection of a single menu item or tool bar button shall print any displayed schedule on the system printer for use as a building management and diagnostics tool.
h. Software shall be provided to configure and implement optimal start and stop programming based on existing indoor and outdoor environmental conditions as well as equipment operating history

2.3 INPUT DEVICES

.1 General Requirements

1. Installation, testing, and calibration of all sensors, transmitters, and other input devices shall be provided to meet the system requirements.

2. The following sensors and transmitters may or may not be included in the project. Refer to control diagrams and sequences for sensor and transmitters requirements.

.2 Temperature Sensors

1. Relocate and calibrate existing space temperature sensor as indicated on the drawings. If the temperature accuracy is not within the range specified below for a new sensor, replace sensor.

2. General Requirements:

a. Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations.
b. The temperature sensor shall be of the resistance type, and shall be either two-wire 1000 ohm nickel RTD, or two-wire 1000 ohm platinum RTD.
c. The following point types (and the accuracy of each) are required, and their associated accuracy values include errors associated with the sensor, lead wire, and A to D conversion:

Point Type	Accuracy
Room Temp	$\pm$ .5°F.

3. Room Temperature Sensors

a. Room sensors shall be constructed for either surface mounting.
b. Room sensors shall have the following options when specified:

- Setpoint reset slide switch providing a $\pm$3 degree (adjustable) range.
- Individual heating/cooling setpoint slide switches.
- A momentary override request push button for activation of after-hours operation.
- Analog thermometer.

4. Acceptable Manufacturers: Johnson Controls or approved alternative.

.3 Flow Monitoring

1. Air Flow Monitoring

a. Air Flow Measuring Sensor

- The airflow-measuring sensor shall be duct mounted with an adjustable sensor insertion length to suit ductwork sizes shown on drawings. Refer to section 15932 for details.

.4 Status and Safety Switches

1. General Requirements

a. Switches shall be provided to monitor equipment status, safety conditions, and generate alarms at the ECMS when a failure or abnormal condition occurs. Safety switches shall be provided with two sets of contacts and shall be interlock wired to shut down respective equipment.

2. Current Sensing Switches

a. The current sensing switch shall be self-powered with solid-state circuitry and a dry contact output. It shall consist of a current transformer, a solid state current sensing circuit, adjustable trip point, solid state switch, SPDT relay, and an LED indicating the on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip point range.
b. Current sensing switches shall be used for run status for fans, and other miscellaneous motor loads.
c. Current sensing switches shall be calibrated to show a positive run status only when the motor is operating under load. A motor running with a broken belt or coupling shall indicate a negative run status.
d. Acceptable manufacturers: Johnson Controls, Veris Industries or other equal alternative.

3. Air Flow Switches

a. Differential pressure flow switches shall be bellows actuated mercury switches or snap acting micro-switches with appropriate scale range and differential adjustment for intended service.
b. Acceptable manufacturers: Johnson Controls, Cleveland Controls, or equal alternative.

2.4 OUTPUT DEVICES

.1 Actuators

1. General Requirements

a. Damper and valve actuators shall be electronic and/or pneumatic, as specified in the System Description section.

b. It is anticipated that the existing control valves and dampers will be reused. Testing is required to confirm operation. Pneumatic-to-current transducers are to be replaced. Provide a separate break-out price for replacement of valves and dampers if required.

2. Electronic Valve Actuators

a. Electronic valve actuators shall be manufactured by the valve manufacturer.

b. Each actuator shall have current limiting circuitry incorporated in its design to prevent damage to the actuator.
c. Modulating Actuators shall accept 24 VAC or VDC and 120 VAC power supply and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal, and may be used to parallel other actuators and provide true position indication. The feedback signal of each valve actuator (except terminal valves) shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
d. Acceptable manufacturers: Johnson Controls or approved alternative.

.2 Control Relays

1. Control Pilot Relays

a. Control pilot relays shall be of a modular plug-in design with retaining springs or clips.
b. Mounting Bases shall be snap-mount.
c. DPDT, 3PDT, or 4PDT relays shall be provided, as appropriate for application.
d. Contacts shall be rated for 10 amps at 120VAC.
e. Relays shall have an integral indicator light and check button.
f. Acceptable manufacturers: Johnson Controls, Lectro, or approved alternative.

2. Lighting Control Relays

a. Lighting control relays shall be latching with integral status contacts.
b. Contacts shall be rated for 20 amps at 277 VAC.
c. The coil shall be a split low-voltage coil that moves the line voltage contact armature to the ON or OFF latched position.
d. Lighting control relays shall be controlled by:

- Pulsed Tri-state Output – Preferred method.
- Pulsed Paired Binary Outputs.
- A Binary Input to the Facility Management System shall monitor integral status contacts on the lighting control relay. Relay status contacts shall be of the “dry-contact” type.

e. The relay shall be designed so that power outages do not result in a change-of-state, and so that multiple same state commands will simply maintain the commanded state. Example: Multiple OFF command pulses shall simply keep the contacts in the OFF position.

.3 Electronic Signal Isolation Transducers

1. A signal isolation transducer shall be provided whenever an analog output signal from the ECMS is to be connected to an external control system as an input, or is to receive as an input signal from a remote system.

2. The signal isolation transducer shall provide ground plane isolation between systems.

3. Signals shall provide optical isolation between systems.

4. Acceptable manufacturers: Johnson Controls, or Advanced Control Technologies or equal alternative.

PART 3 – PERFORMANCE / EXECUTION

3.1 INSTALLATION PRACTICES

.1 ECMS Wiring

1. All conduit, wiring, accessories and wiring connections required for the installation of the Electronic Control and Monitoring System, as herein specified, shall be provided by the ECMS Contractor. All wiring shall comply with the requirements of applicable portions of base building standards and all local and national electric codes, unless specified otherwise in this section.

2. All ECMS wiring materials and installation methods shall comply with ECMS manufacturer recommendations.

3. The sizing, type and provision of cables, and conduits, shall be the design responsibility of the ECMS Contractor. If complications arise, however, due to the incorrect selection of cable, and/or conduit by the ECMS Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.

4. Class 2 Wiring

   a. All Class 2 (24VAC or less) wiring shall be installed in conduit unless otherwise specified.
   b. Conduit is not required for Class 2 wiring in concealed accessible locations. Class 2 wiring not installed in conduit shall be supported every 5’ from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines. All wiring shall be installed in accordance with local code requirements.

5. Class 2 signal wiring and 24VAC power can be run in the same conduit. Power wiring 120VAC and greater cannot share the same conduit with Class 2 signal wiring.

6. Provide for complete grounding of all applicable signal and communications cables, panels and equipment so as to ensure system integrity of operation. Ground cabling and conduit at the panel terminations. Avoid grounding loops.

.2 ECMS Line Voltage Power Source

1. 120-volt AC circuits used for the Electronic Control and Monitoring System shall be taken from existing panel boards and circuit breakers.

2. Circuits used for the ECMS shall be dedicated to the ECMS and shall not be used for any other purposes.

3. DDC terminal unit controllers may use AC power from motor power circuits.

.3 Penetrations

1. Provide fire stopping for all penetrations used by dedicated ECMS conduits and raceways.

2. All openings in fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.

3. All wiring passing through penetrations, including walls shall be in conduit or enclosed raceway.

4. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.

.4 ECMS Identification Standards

.5 IDENTIFICATION

1. Provide all pieces of supplied equipment with a minimum 25 mm x 75 mm [1 in x 3 in] black and white lamacoid nameplate with, at minimum, 6 mm high bold lettering and affix to control device or on panel front. Identify in accordance with the shop drawing descriptions. Except where specifically noted otherwise, permanently attach using self-tapping screws or bead chain.

2. Within each field panel provide a complete listing of points connected, system schematic diagrams, calculated point codes and other information useful to assist an operator using a PT for diagnostic purposes. Fasten information to inside of front door using adhesive backed paper, or mount information in sealed plastic covers and secure to field cabinet.

3. Identify all field wiring terminations with labels corresponding to Shop Drawing identifications.

.6 ECMS Panel Installation

1. The ECMS panels and cabinets shall be located as indicated on the drawings. Each cabinet shall be anchored per the manufacturer's recommendations.

2. The ECMS contractor shall be responsible for coordinating panel locations.

.7 Input Devices

1. All Input devices shall be installed per the manufacturer recommendation

2. Locate components of the ECMS in accessible local control panels wherever possible.

.8 HVAC Input Devices – General

1. All Input devices shall be installed per the manufacturer recommendation

2. Locate components of the ECMS in accessible local control panels wherever possible.

3. The mechanical contractor shall install all in-line devices such as airflow stations, etc.

4. Input Flow Measuring Devices shall be installed in strict compliance with ASME guidelines affecting non-standard approach conditions.

5. Space Sensors:

   a. Shall be mounted per ADA requirements.

.9 HVAC Output Devices

1. All output devices shall be installed per the manufacturer's recommendation. The mechanical contractor shall install all in-line devices such as air valves, fume hoods, airflow stations, etc.

2. Actuators (where deemed required): All control actuators shall be sized capable of closing against the maximum system shut-off pressure. The actuator shall modulate in a smooth fashion through the entire stroke. When any pneumatic actuator is sequenced with another device, pilot positioners shall be installed to allow for proper sequencing.

3.2 POWER

.1 Provide class II 24VAC transformers where required.

.2 Under normal conditions, no single power supply shall be operated at more than 75% of its rated maximum continuous load.

3.3 TRAINING

.1 The ECMS contractor shall provide the following training services:

1. One half day of on-site orientation by a technician representative from the supplier who is fully knowledgeable of the specific installation details of the project. This orientation shall, at a minimum, consist of a review of the project as-built drawings, the ECMS software layout and naming conventions, and a walk through of the facility to identify panel and device locations.

3.4 COMMISSIONING

.1 Fully commission all aspects of the Electronic Control and Monitoring System work.

.2 Acceptance Check Sheet

1. Prepare a check sheet that includes all points for all functions of the ECMS as indicated on the point list included in this specification.

2. Submit the check sheet to the Engineer for approval

3. The Engineer will use the check sheet as the basis for acceptance with the ECMS Contractor.

.3 Promptly rectify all listed deficiencies and submit to the Engineer that this has been done.

3.5 SEQUENCES

.1 Refer to Drawings

PART 1 - GENERAL

1.1. CASH ALLOWANCES

.1 Include in the bid price, a cash allowance equal to 1% of the mechanical bid to cover the balance and check out of all air, water and control systems in accordance with this Section.

.2 Following Contract award, upon request by Consultant, issue this Section of the Contract Documents, together with an agreed upon bid form to prequalified balancing companies.

.3 The Owner reserves the right to reject any or all bids without explanation, and the lowest bid will not necessarily be accepted.

1.2. QUALIFICATIONS

.1 The TAB Agency shall be a current member in good standing with either the Associated Air Balance Council or National Environmental Balancing Bureau.

1.3. SUBMITTAL REQUIREMENTS

.1 Submit the following information with the Bid Form:

.1 List of proposed equipment to be used for this project.

.2 Proof of membership in the Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB).

.3 The names and qualifications of all personnel who will be assigned to this project. Use of other personnel will be grounds for contract termination.

.4 A listing of references including project names, Consultant, Contractor and Owner references with telephone numbers.

1.4. WORK INCLUDED

.1 Comply with Division 1 - General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to test, adjust and balance all air and hydronic systems to verify conformance to specified quantities and to the design intent of the mechanical system.

.3 The following systems and/or equipment are included in the Scope of Work:

.1 Air Systems:

.1 Supply fan ACS-1

.2 Supply venturi valve

.3 General Exhaust GE-1

.4 Exhaust venturi valve

.5 New exhaust fan F-23 attached to new fume hood C

.6 Existing exhaust fan F-23E and F23-W to existing fume hoods A and B

.7 Diffusers, Registers and Grilles

.4 Refer to Specification Section 15890 for test openings in duct system. Provide additional openings to fulfill the work of this section.

1.5. REFERENCE STANDARDS:

.1 All work shall be in accordance with the latest edition of the AABC or NEBB National Standards. If these contract documents set forth more stringent requirements than the Reference Standards, these contract documents shall prevail.

1.6. REFERENCE DOCUMENTS:

.1 Obtain and pay for, a complete set of reviewed Shop Drawings of pumps, fans and control systems.

.2 Obtain and pay for, a complete set of Mechanical Drawings and Specifications.

PART 2 - PRODUCTS

2.1. TEST EQUIPMENT

.1 When requested by the Consultant, provide current calibration certificates for test equipment.

PART 3 - EXECUTION

3.1. GENERAL

.1 The specified systems shall be reviewed and inspected for conformance to design documents. Testing, adjusting and balancing on each identified system shall be performed. The accuracy of measurements shall be in accordance with AABC or NEBB Standards or "5%, which ever is more stringent.

.2 Any deficiencies in the installation or performance of a system or component shall be reported in writing to the Contractor and Consultant.

.3 Equipment settings, including manual damper quadrant positions, manual valve indicators, fan speed control levers, and similar controls and devices shall be physically marked to show final settings.

3.2. JOB SITE INSPECTION

.1 Inspect the installation of the systems to be tested at least twice during the construction period. Ensure specified devices and components required for testing and balancing functions have been installed according to the manufacturer’s recommendations.

.2 Ensure all required balancing dampers are installed, functional, and accessible for use in testing and balancing procedures.

.3 Provide a written report of inspection to the Contractor and Consultant identifying specific concerns and deficiencies affecting the testing and balancing procedures.

3.3. FANS AND AIR HANDLING SYSTEMS

.1 Verify that all ductwork, dampers, grilles, registers and diffusers have been installed per design.

.2 Test and adjust fan RPM to achieve design flow.

.3 Test and record motor voltage and amperage. Compare data with nameplate limits.

.4 Perform pitot tube traverse at all main and branch ducts. Compare traverse total with measured outlet total to determine actual duct leakage.

.5 Test and record system static pressure profile of each air handling system at minimum outdoor air volume.

.6 Test and record settings of motor thermal overload devices. Adjust settings where required.

3.4. AIR DISTRIBUTION AND TERMINALS

.1 Adjust duct distribution to obtain specified air quantities. At least one zone balancing damper shall be completely open. Multi diffuser/grille branch ducts shall have at least one volume damper completely open.

.2 Test and adjust each air terminal to obtain specified flow. Adjust deflectors and pattern controllers to eliminate drafts.

3.5. VARIABLE AIR VOLUME SYSTEMS

.1 Set air terminal control units to maximum and minimum flow. Test and record amplified velocity pressure signal and inlet static pressure.

.2 Cooperate with the Automatic Controls Trade in testing and recording:

.1 Accurate supply and return fan tracking by total air flow measurements at 33%, 66% and 100% of maximum flow.

.2 Establish required system static pressure reference for satisfactory operation of system.

3.6. EXHAUST FUME HOODS

.1 Test exhaust fume hoods in accordance with ASHRAE 110 – Fume Hood Testing including:

.1 Flow visualization

.2 Face velocity Measurements

.3 Tracer Gas Containment

3.7. LAB ROOM

.1 Test and adjust air flow under all operating parameters. Testing must be performed under final automatic control. Do not position air flow devices manually.

.2 Confirm, by smoke pencil test, positive/negative/neutral air conditions are obtained with doors in closed position.

.3 Report shall include verification of room pressure balance with description of the test procedure employed.

3.8. PRELIMINARY TESTING

.1 In the event preliminary testing reveals a deficiency in the system which cannot be corrected through the balancing process, advise the Contractor and Consultant in writing describing the conditions and suggested corrective action.

3.9. REPORTS

.1 Provide four (4) copies of the TAB report for Consultant review.

.2 Summarize all testing into logical sections, tabulated and summarized.

.3 Identify system terminals and distribution on legible plan or schematic drawings depicting actual system arrangement. Label pitot tube traverse locations, terminal identification and equipment identification in a manner consistent with the contract documents.

3.10. REPORT VERIFICATION

.1 Cooperate with the Consultant in field verification of the final reported valves.

.2 Specific and random verifications will be performed using the same procedures used in preparation of the reports.

.3 Sufficient verifications will be performed to satisfy the Consultant that the reports accurately represent the actual system conditions.

3.11. GUARANTEE

.1 Provide AABC National Project Performance Guaranty or NEBB Performance Bond for the work.

.2 Include a copy of the guarantee in each copy of the Testing and Balancing Report.

END OF SECTION

LEGEND – GENERAL

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	GATE VALVE		PIPE UP
	GLOBE VALVE		PIPE DOWN
	LOCKABLE FLOW CONTROL VALVE		CAPPED PIPE
	BALL VALVE		DIRECTION OF FLOW
	CHECK VALVE		PIPE SLEEVE
	FLOAT VALVE		CONTINUOUS PIPE
	HOSE-END DRAIN VALVE	M	METER
	VALVED AND CAPPED PROVISION		UNION
	GATE VALVE AND FLOW SWITCH		STRAINER
	SHUT-OFF VALVE AND ACCESS PANEL	BFP	BACKFLOW PREVENTER
	BUTTERFLY VALVE	WFA	WATER FEEDER ASSEMBLY
	LOCKSHIELD VALVE		FLEXIBLE PIPE CONNECTION
	PLUG VALVE		PUMP
	PRESSURE REDUCING VALVE		PRESSURE GAUGE WITH COCK
	FLOW SWITCH		THERMOMETER
	FLOW METER, VENTURI		STARTER
	SOLENOID VALVE	$	FAN SPEED CONTROLLER
	CIRCUIT BALANCING VALVE	STB	SLEEVE THROUGH BEAM
	BALANCING VALVE (PLUG)	STW	SLEEVE THROUGH WALL
	NEEDLE VALVE	DTF	DOWN THROUGH FLOOR
	PRESSURE DIFFERENTIAL VALVE	CTE	CONNECT TO EXISTING
	SAFETY RELIEF VALVE	AP	ACCESS PANEL
		AD	ACCESS DOOR
	AUTOMATIC CONTROL VALVE		
	3 WAY BUTTERFLY CONTROL VALVE		
	MOTORIZED BUTTERFLY VALVE		
	VALVE IN RISER		
	BACKWATER VALVE INLINE		
	BACKWATER VALVE WITH ACCESS		

LEGEND – HVAC

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
HWS	HEATED WATER SUPPLY		SINGLE LINE RIGID DUCT
HWR	HEATED WATER RETURN		SINGLE LINE DUCT WITH ACOUSTIC LINING
RWS	RADIATION WATER SUPPLY		SINGLE LINE FLEXIBLE DUCT
RWR	RADIATION WATER RETURN		DOUBLE LINE FLEXIBLE DUCT
CHWS	CHILLED WATER SUPPLY		SUPPLY AIR DIFFUSER
CHWR	CHILLED WATER RETURN		RETURN AIR GRILLE
CWS	CONDENSER WATER SUPPLY	2-150ø / S1-100	NUMBER/DIFF NECK SIZE / DIFF TYPE/SUPPLY AIR L/S
CWR	CONDENSER WATER RETURN	FD	FIRE DAMPER
S	STEAM MAIN (PRESSURE AS INDICATED)	SD	SMOKE DAMPER
C	CONDENSATE RETURN	MD	MOTORIZED DAMPER
RL	REFRIGERANT LIQUID	BD	MANUAL BALANCING DAMPER
RD	REFRIGERANT DISCHARGE	BDD	BACK DRAFT DAMPER
RS	REFRIGERANT SUCTION	FS	MOTORIZED COMBINATION FIRE AND SMOKE DAMPER
GS	GLYCOL SUPPLY		FIRE DAMPER (IN RISER)
GR	GLYCOL RETURN		SMOKE & FIRE DAMPER (IN RISER)
	SUPPLY OR OUTSIDE AIR DUCT		BALANCING DAMPER IN (IN RISER)
	RETURN OR EXHAUST DUCT		MOTORIZED DAMPER (IN RISER)
	SUPPLY DUCT DOWN	T	THERMOSTAT
	RETURN DUCT DOWN	H	HUMIDISTAT
	ROUND DUCT UP	UC	DOOR UNDERCUT
	ROUND DUCT DOWN	DG	DOOR GRILLE
	DUCT WITH ACOUSTIC LINING	OA	OUTDOOR AIR
	DOUBLE LINE DUCT	RA	RETURN AIR
	SOUND ATTENUATOR	RF	RELIEF AIR
		SA	SUPPLY AIR

IMPERIAL TO METRIC SIZING CONVERSION

1/8"	3mm	1"	25mm
1/4"	6mm	1 1/4"	30mm
3/8"	10mm	1 1/2"	40mm
1/2"	15mm	2"	50mm
3/4"	20mm	2 1/2"	65mm

AIR VALVE SCHEDULE

TAG	SYSTEM	LOCATION	TYPE	CAPACITY MAXIMUM		CAPACITY MINIMUM		ESP		REMARKS
				L/S	CFM	L/S	CFM	Pa	in.w.c	
EV-8	GENERAL EXHAUST AIR	LABORATORY F23	VENTURI	472	1000	142	300	750	3	-
SV-12	SUPPLY AIR	LABORATORY F23	VENTURI	708	1500	94	200	750	3	-

NOTES:
1. COMPLETE WITH AIR FLOW MEASURING STATION.

BOOSTER FAN SCHEDULE

TAG	SYSTEM	LOCATION	TYPE	CAPACITY HI-SPEED		ESP		VOLTAGE	MOTOR			REMARKS
				L/S	CFM	Pa	in.w.c		KW	HP	BHP	
BF-A	EXTRACTOR ARMS	LABORATORY F23	INLINE	35	75	250	1.00	120/1/60	0.09	0.12	-	-

NOTES:
1. BOOSTER FAN TO MATCH EXISTING IN BALANCE ROOM.

DIFFUSER/GRILLE SCHEDULE

TAG	TYPE	REMARKS
S1	LOUVERED FACE SUPPLY GRILLE	STEEL CONSTRUCTION C/W STEEL DAMPER
R1	LOUVERED FACE RETURN GRILLE	STEEL CONSTRUCTION C/W STEEL DAMPER

NOTES:
1. DIMENSIONS AND FLOW RATES ON LAYOUT.

EXHAUST FAN SCHEDULE

TAG	SYSTEM	LOCATION	TYPE	CAPACITY HI-SPEED		CAPACITY LO-SPEED		ESP		VOLTAGE	MOTOR			ESTIMATED WEIGHT		REMARKS
				L/S	CFM	L/S	CFM	Pa	in.w.c		KW	HP	BHP	KG	LBS	
EF-23	FUME HOOD	PENTHOUSE	CENTRIFUGAL	260	550	173	367	75	0.30	120/1/60	0.25	0.33	0.06	45	100	-

NOTES:
1. STAINLESS STEEL SS316 HOUSING AND COMPONENTS.
2. TWO-SPEED TWO WINDING MOTOR.
3. COMPLETE WITH AIR FLOW MEASURING STATION.

FUME HOOD SCHEDULE

TAG	SYSTEM	LOCATION	TYPE	CAPACITY		ESP		VOLTAGE	APPROXIMATE DIMENSIONS						ESTIMATED WEIGHT		REMARKS
				L/S	CFM	Pa	in.w.c		W (MM)	W (IN)	D (MM)	D (IN)	H (MM)	H (IN)	KG	LBS	
FH-C	5FT FUME HOOD	LABORATORY F23	2-SPEED	260	550	13	0.05	120/1/60	1520	60	810	32	3000	118	450	1000	

NOTES:
1. COMPLETE WITH SERVICE CONNECTIONS, ALARMS, VENTILATED BASE CABINETS, COUNTERTOP, AND CUSTOM FURRING WITH FRONT SNAP OFF PANEL.

DRAWING SCHEDULE

DWG NO	DRAWING TITLE
M-100	SCHEDULES AND LEGENDS
M-101	CONTROLS
M-200	GROUND FLOOR LABORATORY F23 PLUMBING DEMOLITION
M-201	GROUND FLOOR LABORATORY F23 PLUMBING NEW CONSTRUCTION
M-300	GROUND FLOOR LABORATORY F23 HVAC DEMOLITION
M-301	GROUND FLOOR LABORATORY F23 HVAC NEW CONSTRUCTION
M-302	PENTHOUSE MECHANICAL ROOM HVAC
M-303	PENTHOUSE MECHANICAL ROOM DETAILS
M-304	AIR BALANCING REFERENCE BASEMENT FLOOR
M-305	AIR BALANCING REFERENCE GROUND FLOOR
M-306	AIR BALANCING REFERENCE PENTHOUSE MECHANICAL ROOM

GENERAL NOTES

No.	DESCRIPTION	DATE	BY
C	ISSUED FOR TENDER	MAY 8,2015	A.R.
B	ISSUED FOR FINAL REVIEW	APR 28,2015	A.R.
A	ISSUED FOR 50% REVIEW	MAR 13,2015	A.R.

REVISIONS

LICENSED PROFESSIONAL ENGINEER
A.F. REBEK
38351508
15-131-010
08-MAY-15
PROVINCE OF ONTARIO

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PROJECT:

AGRICULTURE CANADA
VINELAND - DESIGN OF
FUME HOOD INSTALLATION

4890 VICTORIA AVE N
VINELAND STATION, ON L0R 2E0

START DATE:	DRAWN BY:	DESIGNED BY:
2015/03/13	P.B.	A.R.

DRAWING TITLE:

SCHEDULES
AND LEGENDS

SCALE:	DRAWING No.:
N.T.S.	M-100
PROJECT: 15-131-010	

PLOT DATE: May 8, 2015

ORIGINAL SHEET SIZE: ARCH D

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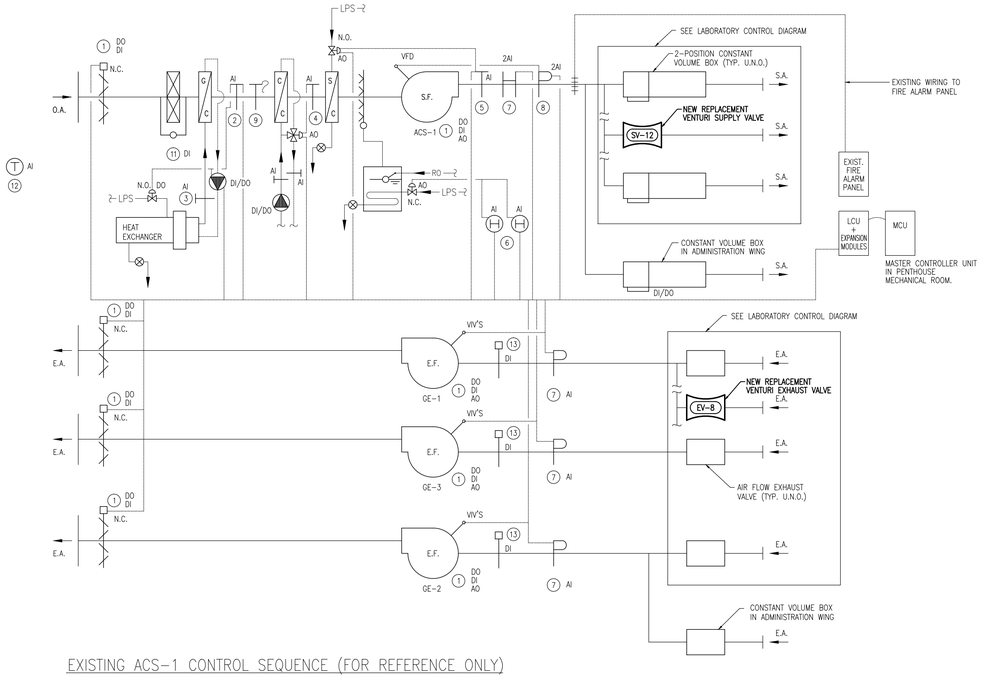
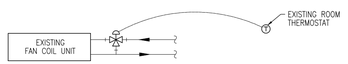


EXISTING ACS-1 CONTROL SEQUENCE (FOR REFERENCE ONLY)

1. OUTSIDE AIR DAMPER AND EXHAUST AIR DAMPERS WILL BE OPENED WHEN SYSTEM STARTS UP. SUPPLY AIR FAN ACS-1, EXHAUST AIR FANS GE-1, GE-2 AND GE-3 WILL BE ENERGIZED. VARIABLE INLET VANES ON ACS-1, GE-1, GE-2 & GE-3 WILL START TO MODULATE AND THE SYSTEM WILL BE UNDER AUTOMATIC CONTROLS. PROVIDE HARD WIRE INTERLOCK OF FANS WITH THEIR RESPECTIVE DAMPERS.
2. PRE-HEAT TEMPERATURE SENSOR CONTROLS STEAM CONTROL VALVE FOR STEAM-GLYCOL HEAT EXCHANGER TO MAINTAIN SETTING. (7.2°C ADJUSTABLE)
3. HIGH LIMIT SAFETY THERMOSTAT TO ENSURE WATER TEMPERATURE DOES NOT RISE ABOVE SET POINT.
4. DISCHARGE AIR TEMPERATURE SENSOR MODULATES 3-WAY CHILLED WATER CONTROL VALVE TO MAINTAIN SETTING. (15.6°C ADJUSTABLE
5. FAN DISCHARGE AIR TEMPERATURE SENSOR MODULATES STEAM CONTROL VALVE FOR STEAM COIL TO MAINTAIN SETTING (23.9°C SUMMER, 22.2°C WINTER).
6. ROOM HUMIDITY SENSORS LOCATED IN CORRIDOR BL3 AND CORRIDOR F39 SHALL MODULATE 2-WAY STEAM VALVE FOR HUMIDIFIER TO MAINTAIN SETTING (30 % ADJUSTABLE).
7. DUCT MOUNTED HIGH LIMIT HUMIDITY SENSORS (LOCATED ON FIRST FLOOR MAIN BRANCH-2 REQUIRED) SHALL OVERRIDE (6) WHEN HUMIDITY EXCEED 60% R.H. AND CLOSE 2-WAY STEAM VALVE ON HUMIDIFIER.
8. DUCT MOUNTED PRESSURE SENSORS (2 REQUIRED IN BRANCH SUPPLY AIR DUCTS) SHALL MODULATE CORRESPONDING FANS' VIV TO MAIN SETTING.
9. FREEZESTAT SHALL ALARM, DE-ENERGIZED ALL FANS, CLOSED OUTSIDE AIR AND EXHAUST AIR DAMPERS WHEN TEMPERATURE DROP BELOW 4.4°C.

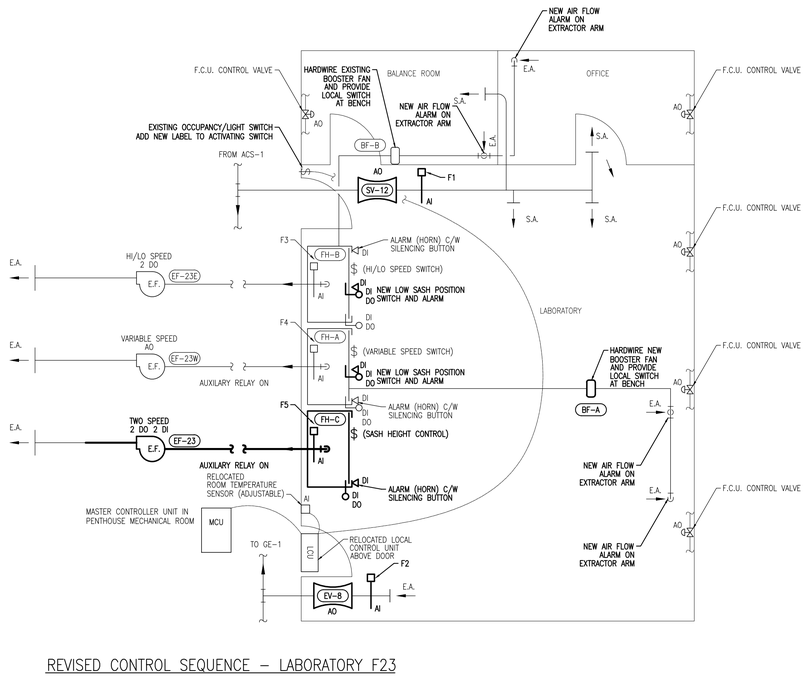
11. DIFFERENTIAL PRESSURE SWITCH FOR MAIN FILTERS TO ALARM WHEN PRESSURE ACROSS MAIN FILTERS EXCEED 300 Pa.
12. OUTDOOR TEMPERATURE SENSOR.
13. DUCT TYPE SMOKE DETECTOR IN EXHAUST AIR DUCT SHALL SHUT EXHAUST AIR UNIT "ACS-1" AND EXH. FANS GE-1, GE-2, GE-3.
14. CONNECT SMOKE DETECTOR TO EXISTING WIRING TO EXISTING FIRE ALARM CONTROL PANEL TO SHUT DOWN "ACS-1" ON SIGNAL FROM FIRE ALARM PANEL.
15. ON SIGNAL FROM BUILDING'S FIRE ALARM SYSTEM, SUPPLY AIR FAN ACS-1 WILL BE DE-ENERGIZED AND OUTSIDE AIR DAMPER SHALL BE CLOSED. EXHAUST FANS GE-1, 2 AND 3 TO CONTINUE TO RUN. DUCT TYPE SMOKE DETECTOR FOR GE-1 & 3 TO ALARM AT OWS VIA FIRE ALARM PANEL.

1 / M-101 CONTROL DIAGRAM FOR SUPPLY AIR SYSTEM "ACS-1" (FOR REFERENCE ONLY)
SCALE: NTS



(1) EXISTING THERMOSTAT (T) TO MODULATE CONTROL VALVE ON FAN COIL UNIT TO MAINTAIN SETTING.

3 / M-101 CONTROL DIAGRAM FOR EXISTING STANDALONE FAN COIL UNITS
SCALE: NTS



REVISED CONTROL SEQUENCE – LABORATORY F23

1. BAS CONTROL FOR LAB 23 () INCLUDES TWO ADJACENT SPACES; BALANCE ROOM (F22), AND OFFICE (F21). A LOCAL CONTROL PANEL IN CONTAINS CONTROLLERS AND INTERFACE TO THE BUILDING BAS. **RELOCATE CONTROL PANEL TO LOCATION ABOVE DOOR.**
2. **OCCUPANCY MODE IS DETERMINED BY TIME OF DAY SCHEDULE (ADJUSTABLE).** THE LIGHT SWITCH POSITION CAN OVERRIDE THE UNOCCUPIED MODE.
3. EXHAUST AIR IS PROVIDED BY THREE FUME HOODS (FH-A & FH-B **& FH-C**) AND ROOM EXHAUST, **NEW VARIABLE VOLUME EXHAUST VALVE (EV-8).** LAB F23 IS REQUIRED TO MAINTAIN A NET REQUIRED EXHAUST AIRFLOW (NRE) AT ALL TIMES (47 L/S IN OCCUPIED MODE AND 28 L/S IN UNOCCUPIED MODE).
4. FH-A IS SERVED BY EXHAUST FAN (EF-23W) AND IS CONTROLLED BY A MANUALLY POSITIONED VARIABLE SPEED SWITCH (VSS). THE LAB TECHNICIAN SETS THE VSS AT A HIGH SPEED OR LOW SPEED POSITION THAT CORRESPONDS TO APPROXIMATELY 259 L/S AT HIGH SPEED & 130 L/S AT LOW SPEED. EF-23W IS INTENDED TO OPERATE AT HIGH SPEED IN THE OCCUPIED MODE AND LOW SPEED IN THE UNOCCUPIED MODE.
5. FH-A AIRFLOW IS MONITORED VIA FLOW MEASURING STATION (F4). A LOCAL AUDIBLE AND BAS ALARM IS INITIATED FOR A ZERO FLOW CONDITION.
6. FH-A MAXIMUM SASH POSITION IS MONITORED. A LOCAL AUDIBLE AND BAS ALARM IS INITIATED IF THE SASH IS OPENED HIGHER THAN 400MM.
7. LAB BENCH EXHAUST ARM (LBE-A) IS LOCATED IN F23 AND CONNECTS TO THE EXHAUST PLENUM OF FH-A. LBE-A HAS A MANUALLY OPERATED SHUTOFF VALVE. **PROVIDE PERMANENTLY POWERED WIRING TO NEW IN-LINE BOOSTER FAN (BF-A) AND PROVIDE LOCAL ON-OFF SWITCH AT THE LAB BENCH LEVEL TO ENERGIZE/DE-ENERGIZE BF-A. PROVIDE AIRFLOW ALARM AT EACH EXTRACTOR ARM FOR LOCAL AUDIBLE ALARM.**
8. **PROVIDE A LOW SASH POSITION SWITCH AND PROVIDE A BAS AND LOCAL AUDIBLE ALARM IF THE BF-A IS ENERGIZED AND THE FH-A SASH IS NOT IN THE CLOSED POSITION.**
9. FH-B IS SERVED BY EXHAUST FAN (EF-23E), AND IS CONTROLLED BY A TWO-POSITION SPEED SWITCH (2P-SS). THE LAB TECHNICIAN SETS THE 2P-SS AT A HIGH SPEED OR LOW SPEED POSITION THAT CORRESPONDS TO APPROXIMATELY 259 L/S AT HIGH SPEED & 173 L/S AT LOW SPEED. EF-23E IS INTENDED TO OPERATE AT HIGH SPEED IN THE OCCUPIED MODE AND LOW SPEED IN THE UNOCCUPIED MODE.
10. FH-B AIRFLOW IS MONITORED VIA FLOW MEASURING STATION (F3). A LOCAL AUDIBLE AND BAS ALARM IS INITIATED FOR A ZERO FLOW CONDITION.
11. FH-B MAXIMUM SASH POSITION IS MONITORED. A LOCAL AUDIBLE AND BAS ALARM IS INITIATED IF THE SASH IS OPENED HIGHER THAN 400MM.
12. LAB BENCH EXHAUST ARM (LBE-B) IS LOCATED IN BALANCE ROOM-F23 AND CONNECTS TO THE EXHAUST PLENUM OF FH-B. LBE-B HAS A MANUALLY OPERATED SHUTOFF VALVE. AN IN-LINE BOOSTER FAN (BF-B) IS USED FOR THIS SYSTEM. **PROVIDE PERMANENTLY POWERED WIRING TO BF-B AND PROVIDE LOCAL ON-OFF SWITCH AT THE LAB BENCH LEVEL TO ENERGIZE/DE-ENERGIZE BF-B. PROVIDE AIRFLOW ALARM AT EACH EXTRACTOR ARM FOR AUDIBLE ALARM.**
13. **PROVIDE A LOW SASH POSITION SWITCH AND PROVIDE A BAS AND LOCAL AUDIBLE ALARM IF THE BF-B IS ENERGIZED AND THE FH-B SASH IS NOT IN THE CLOSED POSITION.**
14. **FH-C IS SERVED BY EXHAUST FAN (EF-23), AND IS CONTROLLED BY SASH HEIGHT POSITION. WHEN SASH IS OPENED, OPERATE THE FAN AT A HIGH SPEED AND REDUCE TO LOW SPEED WHEN THE SASH IS CLOSED. AIRFLOW CORRESPONDS TO APPROXIMATELY 259 L/S AT HIGH SPEED & 173 L/S AT LOW SPEED. EF-23 IS INTENDED TO OPERATE AT HIGH SPEED IN THE OCCUPIED MODE AND LOW SPEED IN THE UNOCCUPIED MODE.**
15. **FH-C AIRFLOW IS MONITORED VIA FLOW MEASURING STATION (F5). A LOCAL AUDIBLE AND BAS ALARM IS INITIATED FOR A LOW FLOW CONDITION (ADJUSTABLE).**
16. **FH-C MAXIMUM SASH POSITION IS MONITORED. A LOCAL AUDIBLE AND BAS ALARM IS INITIATED IF THE SASH IS OPENED HIGHER THAN 400MM.**
17. **ROOM VENTILATION SUPPLY AIR IS PROVIDED BY A NEW VARIABLE VOLUME SUPPLY AIR VALVE (SV-12). NEW FLOW MEASURING STATION (F1) IS USED TO CONTROL SV-12 TO MAINTAIN THE MINIMUM OCCUPIED/UNOCCUPIED VENTILATION MODE AIR FLOW SETTINGS. (MINIMUM 472 L/S OCCUPIED & MINIMUM 278 L/S UNOCCUPIED).**
18. **SUPPLEMENTARY EXHAUST AIR IS PROVIDED BY NEW VARIABLE VOLUME EXHAUST VALVE (EV-8). NEW FLOW MEASURING STATION (F2) IS USED TO MODULATE EV-8 TO MAINTAIN THE NET ROOM EXHAUST AIRFLOW (NRE) (47 L/S IN OCCUPIED MODE AND 28 L/S IN UNOCCUPIED MODE) AT TIMES WHEN SV-12 IS AT MINIMUM VENTILATION SUPPLY AIRFLOW.**
19. **BAS TO SUM SUPPLY AIRFLOW F1 AND EXHAUST FLOWS F-3, F-4, AND F-5 [FOR FH-A/B/C RESPECTIVELY]. MAINTAIN A NRE OF 47 L/S IN OCCUPIED MODE AND 28 L/S IN UNOCCUPIED MODE AS FOLLOWS:**

    –IN NORMAL OPERATION WHEN ADDITIONAL MAKEUP AIR IS REQUIRED; THE SUM OF SUPPLY AIR FLOW F-1 AND EXHAUST AIR FLOWS F-3, F-4, AND F-5 EXCEED THE NRE. RESET SV-12 TO MAINTAIN REQUIRED NRE.

    –IN ABNORMAL CONDITIONS (SUCH AS REDUCTION/LOSS OF FUMEHOOD(S) AIRFLOW), AND THE NRE IS BELOW REQUIRED AIRFLOW SETPOINT, MODULATE EV-8 OPEN TO MAINTAIN NRE.
20. ROOM TEMPERATURE IS MAINTAINED BY 3 FAN COIL UNITS (FCU) IN F23, AND 1 FCU IN BALANCE ROOM– F23, AND 1 FCU IN OFFICE– F23. THE FCU'S ARE 2-PIPE HYDRONIC AND ARE ON A CHANGE-OVER SYSTEM WITH CHILLED WATER (CHW) DURING THE COOLING SEASON AND HOT WATER (HW) SUPPLY DURING THE HEATING SEASON.
21. A RELOCATED TEMPERATURE SENSOR LOCATED AT PROPER HEIGHT IN F23 IS USED TO MODULATE 2-WAY CONTROL VALVES ON THE FIVE FCU'S TO MAINTAIN ROOM F23 SETPOINT (ADJUSTABLE). EACH FCU HAS A 3-POSITION MANUAL CONTROL SWITCH (OFF-LOW-HIGH) TO CONTROL FAN SPEED.
22. A TEMPERATURE SENSOR LOCATED ON THE F23 BAS CONTROL PANEL IS USED TO MODULATE 2-WAY CONTROL VALVES ON THE FIVE FCU'S TO MAINTAIN ROOM F23 SETPOINT (ADJUSTABLE). EACH FCU HAS A 3-POSITION MANUAL CONTROL SWITCH (OFF-LOW-HIGH) TO CONTROL FAN SPEED.

2 / M-101 CONTROL DIAGRAM FOR F23 LABORATORY SYSTEM (THREE FUMEHOODS)
SCALE: NTS

GENERAL NOTES

No.	DESCRIPTION	DATE	BY
C	ISSUED FOR TENDER	MAY 8,2015	A.R.
B	ISSUED FOR FINAL REVIEW	APR 28,2015	A.R.
A	ISSUED FOR 50% REVIEW	MAR 13,2015	A.R.

REVISIONS

LICENSED PROFESSIONAL ENGINEER
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38351508
15-131-010
08-MAY-15
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PROJECT:
AGRICULTURE CANADA
VINELAND - DESIGN OF FUME HOOD INSTALLATION
4890 VICTORIA AVE N
VINELAND STATION, ON L0R 2E0

START DATE:	DRAWN BY:	DESIGNED BY:
2015/03/13	P.B.	A.R.

DRAWING TITLE:
CONTROLS

SCALE: N.T.S.
PROJECT: 15-131-010
DRAWING No.: **M-101**

PLOT DATE: May 8, 2015
ORIGINAL SHEET SIZE: ARCH D
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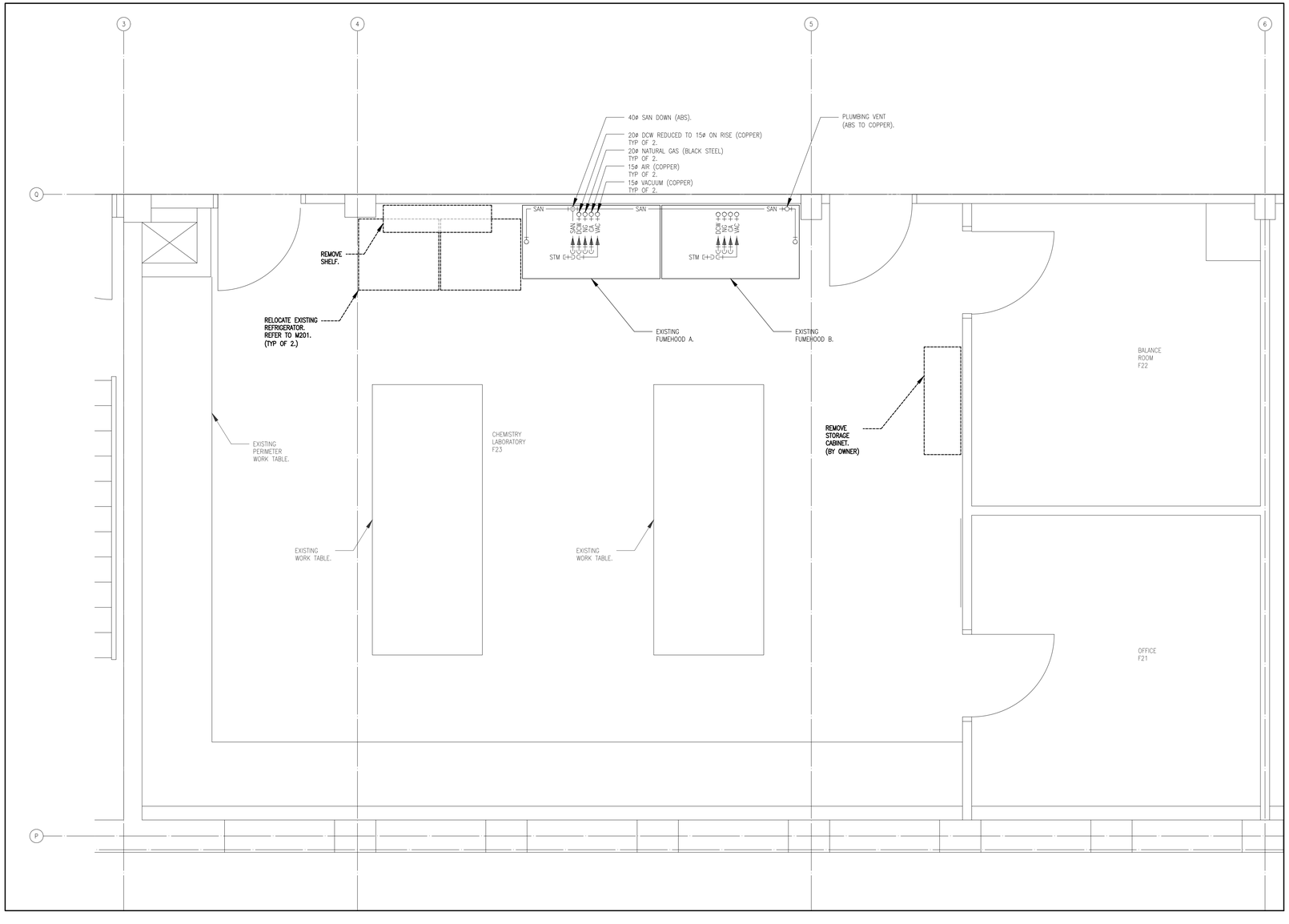

GENERAL NOTES

No.	DESCRIPTION	DATE	BY
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VINELAND - DESIGN OF
FUME HOOD INSTALLATION

4890 VICTORIA AVE N
VINELAND STATION, ON L0R 2E0

START DATE:	DRAWN BY:	DESIGNED BY:
2015/03/13	P.B.	A.R.

DRAWING TITLE:

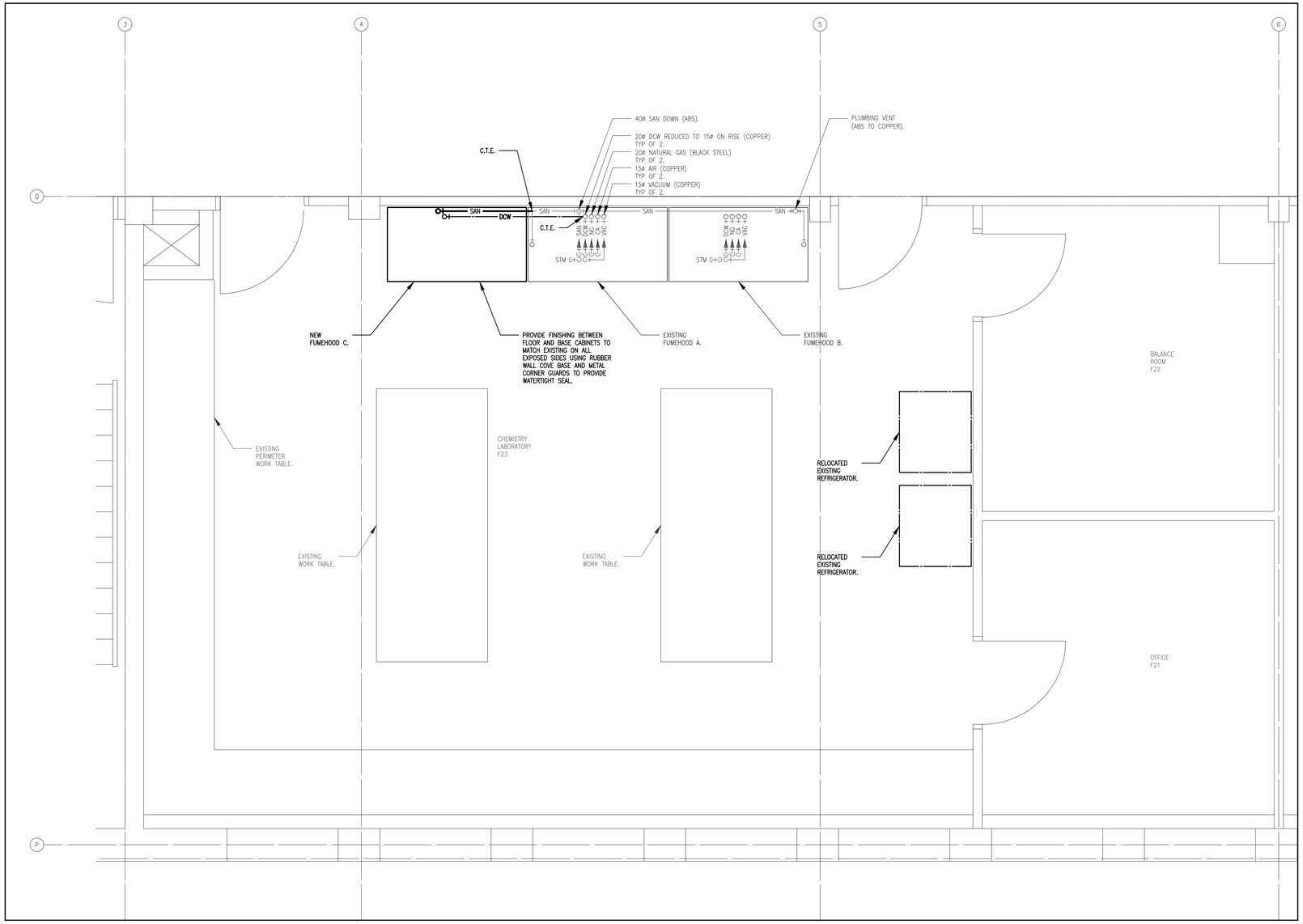
GROUND FLOOR
LABORATORY F23
PLUMBING DEMOLITION

SCALE:	DRAWING No.:
1:25	**M-200**
PROJECT: 15-131-010	

PLOT DATE: May 8, 2015

ORIGINAL SHEET SIZE: ARCH D

30cm 20cm 10cm 0



GENERAL NOTES

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VINELAND - DESIGN OF
FUME HOOD INSTALLATION

4890 VICTORIA AVE N
VINELAND STATION, ON L0R 2E0

START DATE:	DRAWN BY:	DESIGNED BY:
2015/03/13	P.B.	A.R.

DRAWING TITLE:

GROUND FLOOR
LABORATORY F23
PLUMBING NEW CONSTRUCTION

SCALE:	DRAWING No.:
1:25	**M-201**
PROJECT: 15-131-010	

PLOT DATE: May 8, 2015

ORIGINAL SHEET SIZE: ARCH D

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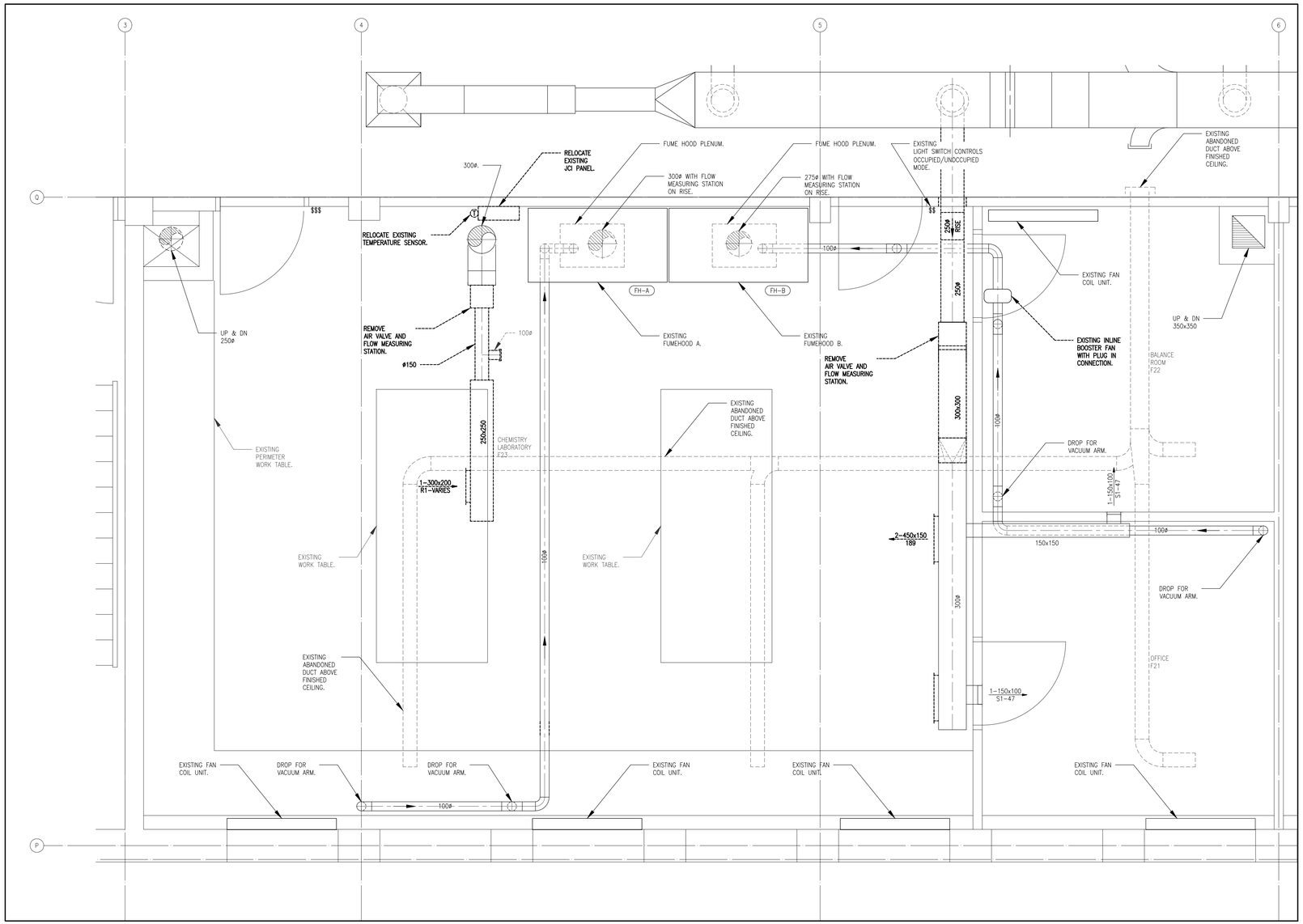

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VINELAND - DESIGN OF
FUME HOOD INSTALLATION

4890 VICTORIA AVE N
VINELAND STATION, ON L0R 2E0

START DATE:	DRAWN BY:	DESIGNED BY:
2015/03/13	P.B.	A.R.

DRAWING TITLE:

GROUND FLOOR
LABORATORY F23
HVAC DEMOLITION

SCALE:	DRAWING No.:
1:25	M-300
PROJECT: 15-131-010	

PLOT DATE: May 8, 2015

ORIGINAL SHEET SIZE: ARCH D

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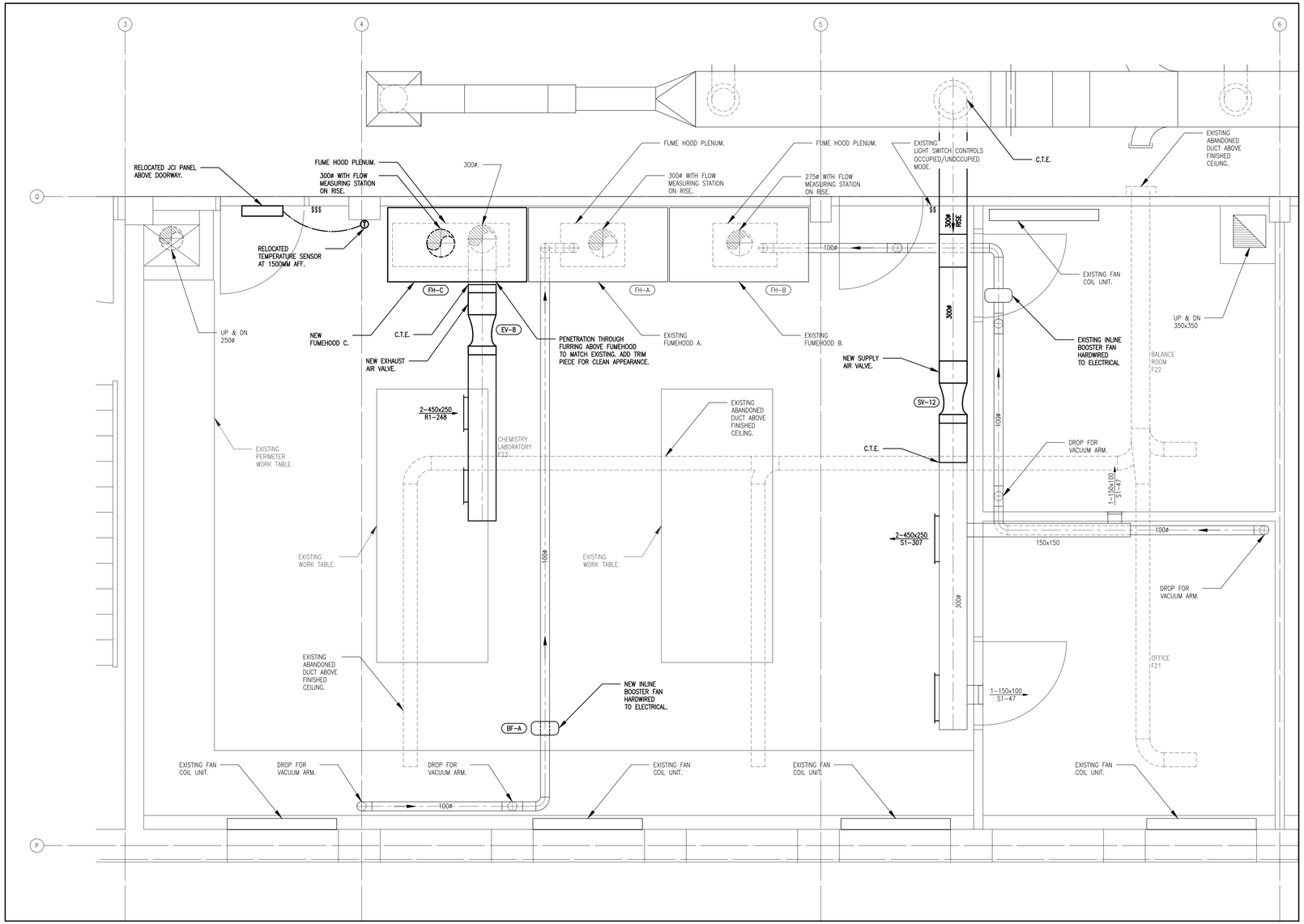

GENERAL NOTES

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VINELAND - DESIGN OF
FUME HOOD INSTALLATION

4890 VICTORIA AVE N
VINELAND STATION, ON L0R 2E0

START DATE:	DRAWN BY:	DESIGNED BY:
2015/03/13	P.B.	A.R.

DRAWING TITLE:

GROUND FLOOR
LABORATORY F23
HVAC NEW CONTSTRUCTION

SCALE: 1:25

PROJECT: 15-131-010

DRAWING No.: **M-301**

PLOT DATE: May 8, 2015

ORIGINAL SHEET SIZE: ARCH D

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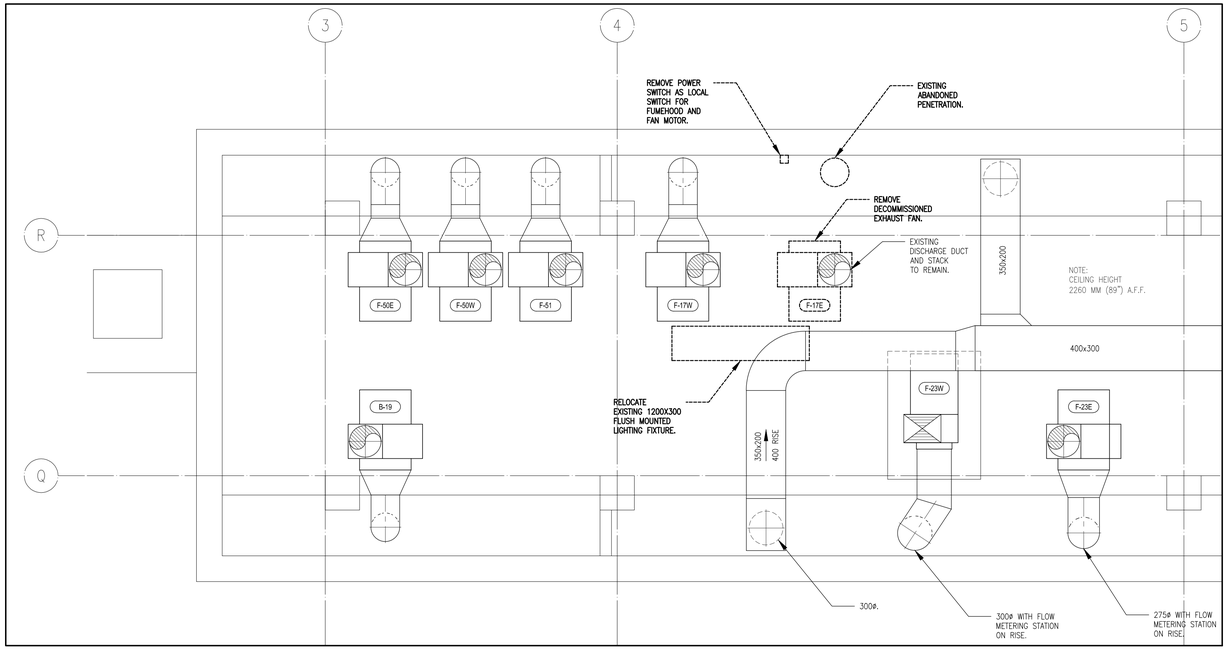
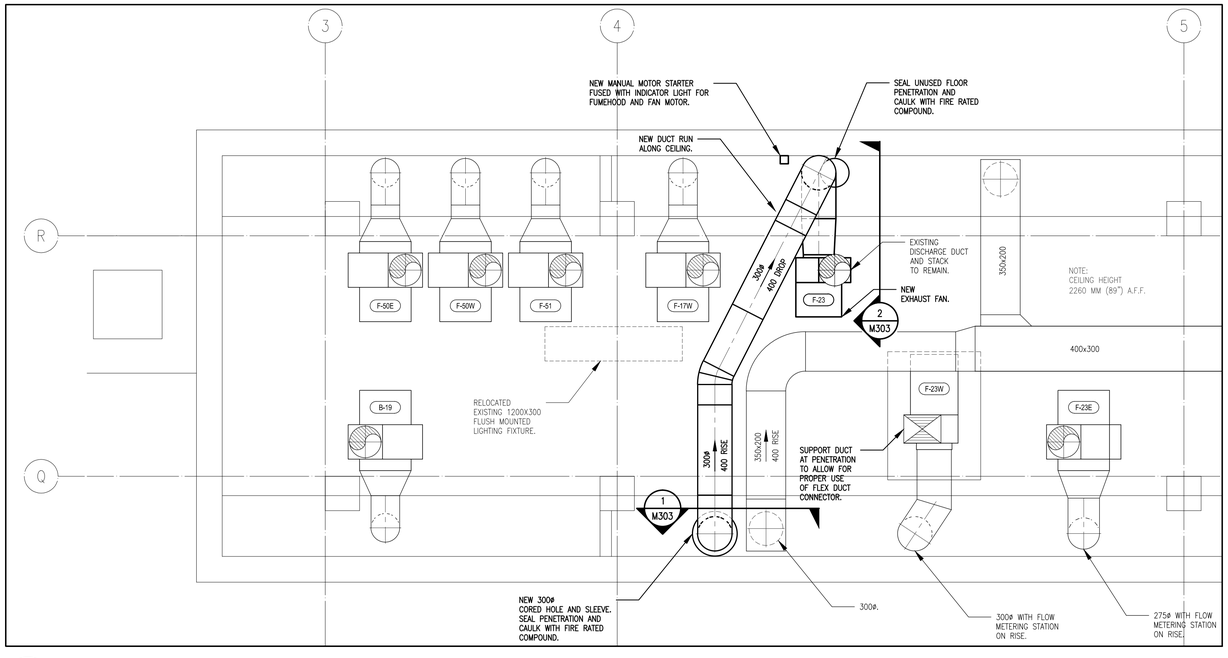


1 / M-302 PENTHOUSE MECHANICAL ROOM HVAC DEMOLITION

SCALE: 1:25



2 / M-302 PENTHOUSE MECHANICAL ROOM HVAC NEW CONSTRUCTION

SCALE: 1:25

PLOT DATE: May 8, 2015

ORIGINAL SHEET SIZE: ARCH D

30cm 20cm 10cm 0

GENERAL NOTES

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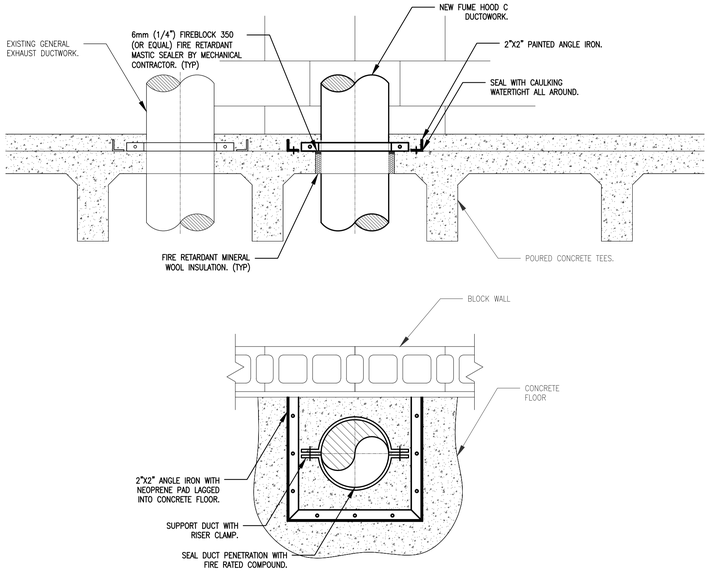
2015/03/13	P.B.	A.R.

DRAWING TITLE:

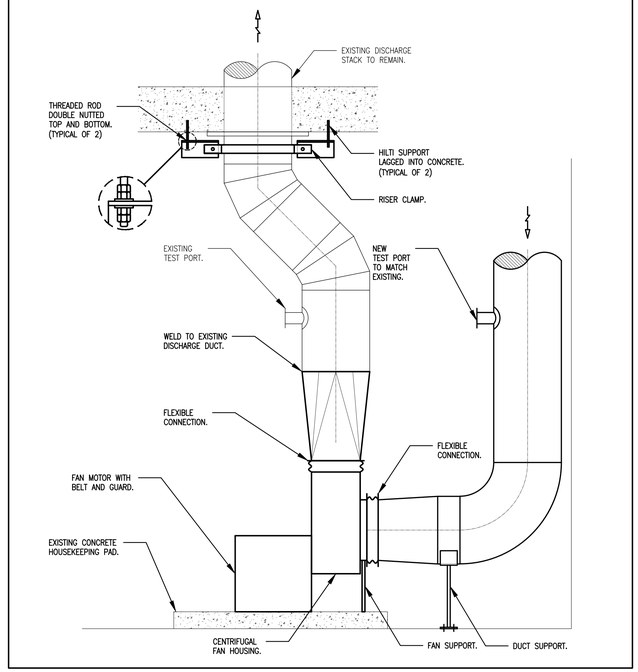
PENTHOUSE
MECHANICAL ROOM
HVAC

SCALE:	DRAWING No.:
1:25	**M-302**
PROJECT: 15-131-010	



1 M-303 DUCT PENETRATION SUPPORT DETAIL

SCALE: NTS



2 M-303 EXHAUST FAN DUCT CONNECTION DETAIL

SCALE: NTS

GENERAL NOTES

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START DATE:	DRAWN BY:	DESIGNED BY:
2015/03/13	P.B.	A.R.

DRAWING TITLE:

PENTHOUSE
MECHANICAL ROOM
DETAILS

SCALE:	DRAWING No.:
N.T.S.	**M-303**
PROJECT: 15-131-010	

PLOT DATE: May 8, 2015

ORIGINAL SHEET SIZE: ARCH D

30cm 20cm 10cm 0

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START DATE:	DRAWN BY:	DESIGNED BY:
2015/03/13	P.B.	A.R.

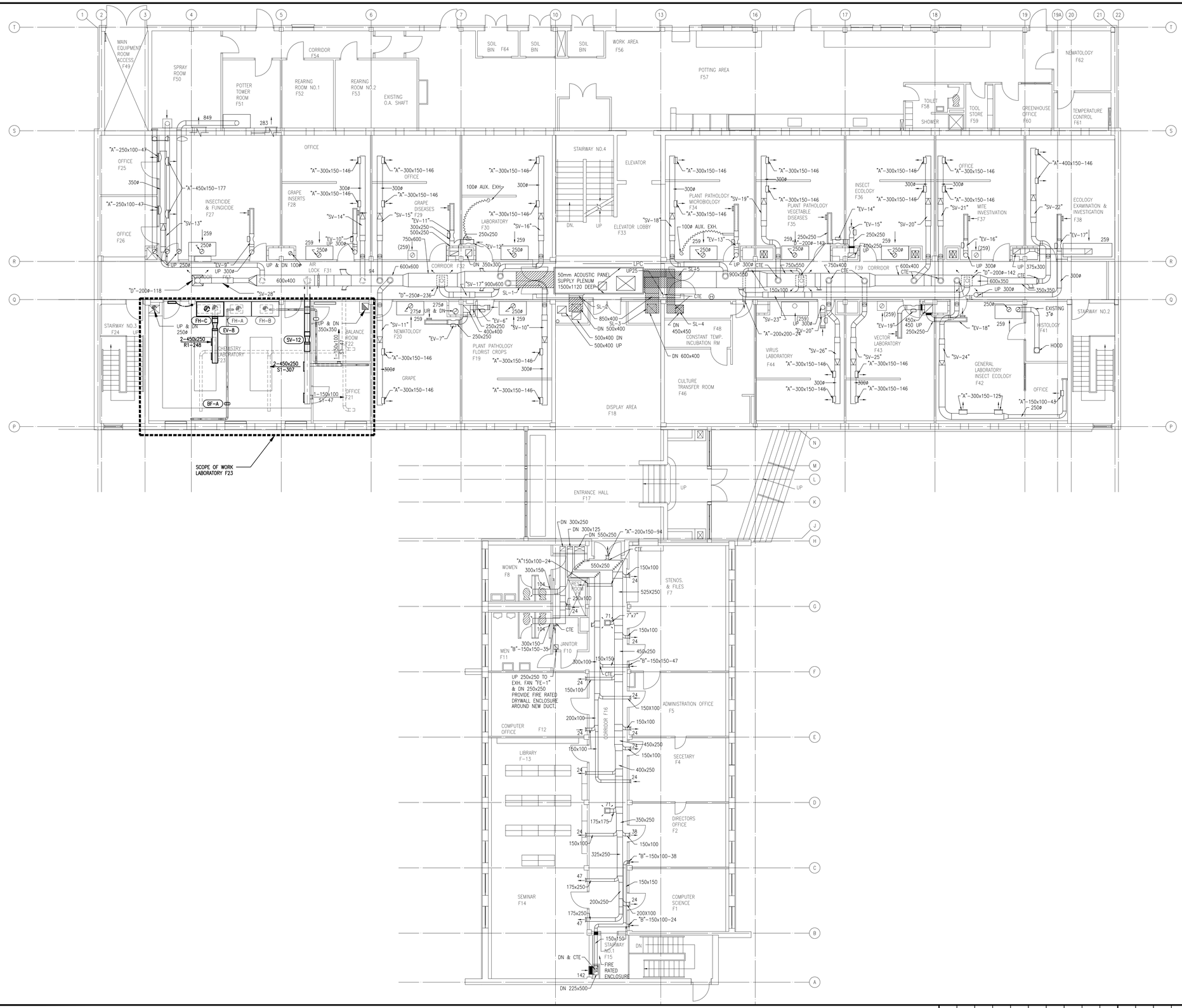
DRAWING TITLE:

AIR BALANCING REFERENCE
BASEMENT FLOOR

SCALE: 1:100

DRAWING No.: **M-304**

PROJECT: 15-131-010



GENERAL NOTES

No.	DESCRIPTION	DATE	BY
C	ISSUED FOR TENDER	MAY 8,2015	A.R.
B	ISSUED FOR FINAL REVIEW	APR 28,2015	A.R.
A	ISSUED FOR 50% REVIEW	MAR 13,2015	A.R.

REVISIONS

LICENSED PROFESSIONAL ENGINEER
A.F. REBEK
38351508
15-131-010
08-MAY-15
PROVINCE OF ONTARIO

ARC Engineering Inc.
Creating Solutions Through Engineering Excellence
1100 South Service Rd., #417
Stoney Creek ON L8E 0C5
T ● (905) 643-8530
F ● (905) 643-8510
www.arcengineering.ca
contact@arcengineering.ca

PROJECT:

AGRICULTURE CANADA
VINELAND - DESIGN OF
FUME HOOD INSTALLATION

4890 VICTORIA AVE N
VINELAND STATION, ON L0R 2E0

START DATE:	DRAWN BY:	DESIGNED BY:
2015/03/13	P.B.	A.R.

DRAWING TITLE:

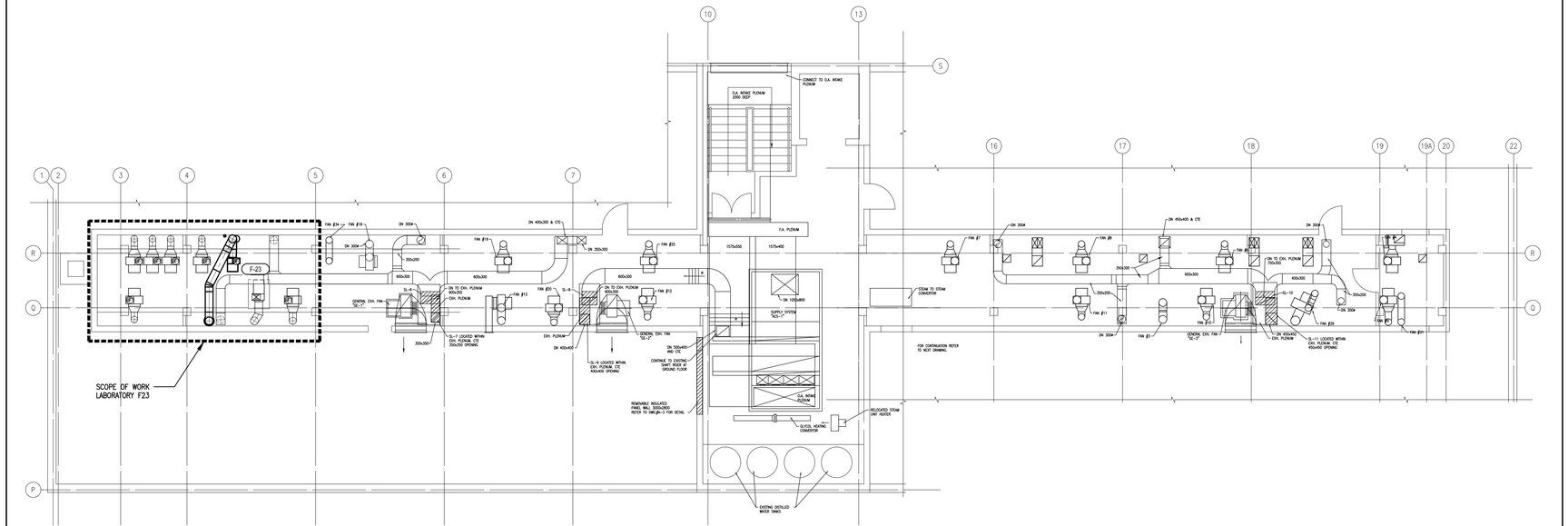
AIR BALANCING REFERENCE
GROUND FLOOR

SCALE:	DRAWING No.:
1:100	**M-305**
PROJECT: 15-131-010	

PLOT DATE: May 8, 2015

ORIGINAL SHEET SIZE: ARCH D

30cm 20cm 10cm 0



PLOT DATE: May 8, 2015

ORIGINAL SHEET SIZE: ARCH D

GENERAL NOTES

No.	DESCRIPTION	DATE	BY
C	ISSUED FOR TENDER	MAY 8,2015	A.R.
B	ISSUED FOR FINAL REVIEW	APR 28,2015	A.R.
A	ISSUED FOR 50% REVIEW	MAR 13,2015	A.R.

REVISIONS

PROFESSIONAL ENGINEER
A.F. REBEK
38351508
15-131-010
08-MAY-15
PROVINCE OF ONTARIO

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www.arcengineering.ca
contact@arcengineering.ca

PROJECT:

AGRICULTURE CANADA
VINELAND - DESIGN OF
FUME HOOD INSTALLATION

4890 VICTORIA AVE N
VINELAND STATION, ON L0R 2E0

START DATE:	DRAWN BY:	DESIGNED BY:
2015/03/13	P.B.	A.R.

DRAWING TITLE:

AIR BALANCING REFERENCE
PENTHOUSE MECHANICAL ROOM

SCALE: 1:100

DRAWING No.: **M-306**

PROJECT: 15-131-010

30cm 20cm 10cm 0

Appendix "F"

INSURANCE TERMS

INSURANCE TERMS

IN1 GENERAL

IN1.1 Worker's Compensation

1) The Contractor shall provide and maintain Worker's Compensation Insurance in accordance with the legal requirements of the Province or Territory where the work is being carried out.

IN1.2 Indemnification

1) The insurance required by the provisions of these Insurance Terms shall in no way limit the Contractor's responsibility under the Indemnification clause of the General Conditions of the contract. Any additional coverage the Contractor may deem necessary to fulfill his obligations under the aforesaid clause shall be at his own discretion and expense.

IN1.3 Proof of Insurance

1) Before commencement of the Work, and within thirty (30) days after acceptance of its bid, the Contactor shall deposit with Canada a CERTIFICATE OF INSURANCE (form AAFC / AAC5314) available upon request.

2) Upon request by Canada, the Contractor shall provide originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the provisions contained herein.

IN1.4 Insured

1) Each policy shall insure the Contractor and shall include Her Majesty the Queen in right of Canada, represented by the Minister of Agriculture & Agri-Food Canada as an additional Insured, with respect to liability arising out of the operations of the contractor with regard to the work.

IN1.5 Payment of Deductible

1) The payment of monies up to the deductible amount made in satisfaction of a claim shall be borne by the Contractor.

IN2 COMMERCIAL GENERAL LIABILITY

IN2.1 Scope of Policy

1) The insurance coverage provided shall not be less than that provided by IBC Form 2100, as amended from time to time, and shall have:

   (a) an Each Occurrence Limit of not less than $5,000,000.00 ;

   (b) a Products/Completed Operations Aggregate Limit of not less than $5,000,000.00 ; and

   (c) a General Aggregate Limit of not less than $10,000,000.00 per policy year, if the policy is subject to such a limit.

2) The policy shall either include or be endorsed to include coverage for the following exposures or hazards if the Work is subject thereto:

   (a) Blasting.

   (b) Pile driving and caisson work.

   (c) Underpinning.

   (d) Removal or weakening of support of any building or land whether such support be natural or otherwise if the work is performed by the insured contractor.

   (e) Asbestos.

   (f) Non-owed Automobile Policy.

IN2.2 Period of Insurance

1) Unless otherwise directed in writing by Canada, or, otherwise stipulated elsewhere herein, the policy required herein shall be in force and be maintained from the date of contract award until the day of issue of the Certificate of Completion except that the coverage for Completed Operations Liability shall, in any event, be maintained for a period of at least six (6) years beyond the date of the CERTIFICATE OF SUBSTANTIAL PERFORMANCE.

IN3 AUTOMOBILE INSURANCE

IN3.1 Scope of Policy

1) Automobile Liability Insurance in respect of licensed vehicles shall have limits of not less than one million dollars inclusive per occurrence for bodily injury, death, and damage to property.

IN4 BUILDER'S RISK / INSTALLATION FLOATER

IN4.1 Scope of Policy

1) The insurance coverage provided by a Builder's Risk policy or an Installation Floater policy shall not be less than that provided by IBC Forms 4042 and 4047, as amended from time to time.

2) The policy shall permit use and occupancy of the project, or any part thereof, where such use and occupancy is for the purposes for which the project is intended upon completion.

3) The policy may exclude or be endorsed to exclude coverage for loss or damage caused by any of the following:

   (a) Asbestos.

   (b) Fungi or spores.

   (c) Cyber.

   (d) Terrorism.

IN4.2 Amount of Insurance

1) 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 Canada at the site of the project to be incorporated into and form part of the finished Work. If the value of the Work is changed, the policy shall be changed to reflect the revised contract value.

IN4.3 Period of Insurance

1) Unless otherwise directed in writing by Canada, or, stipulated elsewhere herein, the policy required herein shall be in force and be maintained from prior to the commencement of work until the day of issue of the CERTIFICATE OF SUBSTANTIAL PERFORMANCE.

IN4.4 Insurance Proceeds

1) The policy shall provide that the proceeds thereof are payable to Her Majesty or as Canada may direct in accordance with GC 10.2 Insurance Proceeds.

2) The Contractor shall, without delay, do such things and execute such documents as are necessary to effect payment of the proceeds.

Appendix "G"

CONTRACT DOCUMENTS

MAJOR WORKS - CONTRACT DOCUMENTS

SC01 CONTRACT DOCUMENTS

1) The following are the contract documents:

   (a) Contract page when signed by Canada;

   (b) Duly completed Bid and Acceptance Form and any Appendices attached thereto;

   (c) Drawings and Specifications;

   (d) AAFC General Conditions form AAFC / AAC5321-E:

(i)	GC1	General Provisions
(ii)	GC2	Administration of the Contract
(iii)	GC3	Execution and Control of the Work
(iv)	GC4	Protective Measures
(v)	GC5	Terms of Payment
(vi)	GC6	Delays and Changes in the Work
(vii)	GC7	Default, Suspension or Termination of Contract
(viii)	GC8	Dispute Resolution
(ix)	GC9	Contract Security
(x)	GC10	Insurance

   (e) Supplementary Conditions, if any;

   (f) Insurance Terms form AAFC / AAC5315-E;

   (g) Any amendment issued or any allowable bid revision received before the date and time set for solicitation closing;

   (h) Any amendment incorporated by mutual agreement between Canada and the Contractor before acceptance of the bid; and

   (i) Any amendment or variation of the contract documents that is made in accordance with the General Conditions.

2) The language of the contract documents shall be the language of the Bid and Acceptance Form submitted.

SC02 ACCEPTANCE AND CONTRACT

1) Upon acceptance of the Contractor's offer by Canada, a binding Contract shall be formed between Canada and the Contractor. The documents forming the Contract shall be the contract documents referred to in SC01 CONTRACT DOCUMENTS.

Appendix "H"

CONTRACT

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

CONTRACT

PURCHASING OFFICE

Agriculture and Agri-Food Canada
Eastern Service Centre
Tender Receiving Unit
2001 University Street., Suite 671-TEN
Montréal, Quebec
H3A 3N2

Your tender is accepted to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the construction listed herein and on any attached sheets at the price or prices set out therefor.

Comments

Vendor / Firm Name and Address

Title

Solicitation / Contract No. | Date

Client Reference No.

File No.

Financial Code(s)

GST HST
QST

F.O.B
Destination

Applicable Taxes
Included

Destination

Invoices - Original and two copies to be sent to :

Address Enquiries to:

Telephone No. Ext. | Fax No.

Total Estimated Cost | Currency Type
CAD

For the Minister

Signature Date

Canada

FORMS

- Bid Bond
- Certificate of Insurance
- Labour and Material Payment Bond
- Performance Bond
- Personnel Screening, Consent and Authorization Form
- T4-A Certification

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

BID BOND

BOND NUMBER: _____ **AMOUNT:** _____

KNOW ALL PERSONS BY THESE PRESENTS, that _____ as Principal,

hereinafter called the Principal, and _____ as Surety,

hereinafter called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto Her Majesty the Queen in right of Canada as represented by the Minister of Agriculture and Agri-Food, as Obligee, hereinafter called the Crown, in the amount of

_____

dollars ($ _____), lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

SIGNED AND SEALED this _____ day of _____, 20__.

WHEREAS, the Principal has submitted a written tender to the Crown, dated the _____ day of _____, 20__,

for _____

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are such that if:

(a) the Principal, should his tender be accepted within the period specified by the Crown, or, if no period be specified, within sixty (60) days after closing date of the tender, does execute within a period specified by the Crown, or, if no period be specified therein, within fourteen (14) days after the prescribed forms are presented to him for signature, execute such further contractual documents, if any, as may be required by the terms of the tender as accepted, and does furnish a Performance Bond and a Labour and Material Payment Bond, each in the amount of 50% of the Contract price and satisfactory to the Crown, or other security acceptable to the Crown, or

(b) the Principal does pay to the Crown the difference between the amount of the Principal's tender and the amount of the Contract entered into by the Crown for the work, supplies and services which were specified in the said tender, if the latter amount be in excess of the former,

then this obligation shall be void; otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, that the Surety and the Principal shall not be liable to the Crown for an amount greater than the amount specified in this bond.

PROVIDED FURTHER that the Surety shall not be subject to any suit or action unless such suit or action is instituted and process therefore served upon the Surety at its Head Office in Canada, within twelve (12) months from the date of this bond.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority, the day and year first above written.

SIGNED, SEALED AND DELIVERED in the presence of:

_____
Principal

_____
Witness

_____
Surety

Note: Affix Corporate seal if applicable.

Canada

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

CERTIFICATE OF INSURANCE

To be completed by the Insurer

CONTRACT

Description and location of work	Contract No.
	Project No.

INSURER			**BROKER**		
Company name			Company name		
Unit/Suite/Apt.	Street number	Number suffix	Unit/Suite/Apt.	Street number	Number suffix
Street name			Street name		
Street type	Street direction	PO Box or Route Number	Street type	Street direction	PO Box or Route Number
Municipality (City, Town, etc.)			Municipality (City, Town, etc.)		
Province/State	Postal/ZIP code		Province/State	Postal/ZIP code	

INSURED			**ADDITIONAL INSURED**
Contractor name			
Unit/Suite/Apt.	Street number	Number suffix	Her Majesty the Queen in right of Canada as represented by the Minister of Agriculture and Agri-Food Canada.
Street name			
Street type	Street direction	PO Box or Route Number	
Municipality (City, Town, etc.)			
Province/State	Postal/ZIP code		

This insurer certifies that the following policies of insurance are at present in force covering all operations of the Insured, in connection with the contract made between the named insured and Her Majesty the Queen in right of Canada, represented by the Minister of Agriculture and Agri-Food Canada.

POLICY

Type	Number	Inception date	Expiry date	Limit of liability ($)
Commercial General Liability				
Builder's Risk "All Risks"				
Installation Floater "All Risks"				
Other (list)				

Each of these policies includes the coverages and provisions as specified in Insurance Terms and each policy has been endorsed to cover Her Majesty as an Additional Insured. The Insurer agrees to notify Her Majesty and the Named insured in writing thirty (30) days prior to any material change in, or cancellation of any policy or coverage.

Name of Insurer's Officer or Authorized Employee | Telephone number | Ext.

Signature | Date

Canada

LABOUR AND MATERIAL PAYMENT BOND

BOND NUMBER: _____ **AMOUNT:** _____

KNOW ALL PERSONS BY THESE PRESENTS, that _____ as Principal,

hereinafter called the Principal, and _____ as Surety,

hereinafter called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto Her Majesty the Queen in right of Canada as represented by the Minister of Agriculture and Agri-Food, as Obligee, hereinafter called the Crown, in the amount of

_____

dollars ($ _____), lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

SIGNED AND SEALED this _____ day of _____, 20__

WHEREAS, the Principal has entered into a Contract with the Crown dated the _____ day of _____ , 20__,

for _____

which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are such that, if payment is promptly made to all Claimants who have performed labour or services or supplied material in connection with the Contract and any and all duly authorized modifications and extensions of the Contract that may hereafter be made, notice of which modifications and extensions to the Surety being hereby waived, then this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. For the purpose of this bond, a Claimant is defined as one having a direct contract with the Principal or any Sub-Contractor of the Principal for labour, material or both, used or reasonably required for use in the performance of the Contract, labour and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone services or rental of equipment (but excluding rental of equipment where the rent pursuant to an agreement is to be applied towards the purchase price thereof) directly applicable to the Contract.

2. For the purpose of this Bond, no payment is required to be made in respect of a claim for payment for labour or services performed or material supplied in connection with the Contract that represents a capital expenditure, overhead or general administration costs incurred by the Principal during the currency or in respect of the Contract.

3. The Principal and the Surety hereby jointly and severally agree with the Crown that if any Claimant has not been paid as provided for under the terms of his contract with the Principal or a Sub-Contractor of the Principal before the expiration of a period of ninety (90) days after the date on which the last of such Claimant's labour or service was done or performed or materials were supplied by such Claimant, the Crown may sue on this bond, have the right to prosecute the suit to final judgment for such sum or sums as may be due and have execution thereon; and such right of the Crown is assigned by virtue of Part VIII of the *Financial Administration Ac*t to such Claimant.

4. For the purpose of this bond the liability of the Surety and the Principal to make payment to any claimant not having a contract directly with the Principal shall be limited to that amount which the Principal would have been obliged to pay to such claimant had the provisions of the applicable provincial or territorial legislation on lien or privileges been applicable to the work. A claimant need not comply with provisions of such legislation setting out steps by way of notice, registration or otherwise as might have been necessary to preserve or perfect any claim for lien or privilege which the claimant might have had. Any such claimant shall be entitled to pursue a claim and to recover judgment hereunder subject to the terms and notification provisions of the Bond.

5. Any material change in the Contract between the Principal and the Crown shall not prejudice the rights or interest of any Claimant under this Bond who is not instrumental in bringing about or has not caused such change.

6. No suit or action shall be commenced hereunder by any Claimant:

   (a) Unless such Claimant shall have given written notice within the time limits hereinafter set forth to the Principal and the Surety above named, stating with substantial accuracy the amount claimed. Such notice shall be served by mailing the same by registered mail to the Principal and the Surety at any place where an office is regularly maintained for the transaction of business by such persons or served in any manner in which legal process may be served in the Province or other part of Canada in which the subject matter of the Contract is located. Such notice shall be given

      (i) in respect of any claim for the amount or any portion thereof required to be held back from the Claimant by the Principal or by the Sub-Contractor of the Principal under either the terms of the Claimant's Contract with the Principal or the Claimant's Contract with the Sub-Contractor of the Principal within one hundred and twenty (120) days after such Claimant should have been paid in full under this Contract;

      (ii) in respect of any claim other than for the holdback or portion thereof referred to above within one hundred and twenty (120) days after the date upon which such Claimant did or performed the last of the service, work or labour or furnished the last of the materials for which such claim is made under the Claimant's Contract with the Principal or a Sub-Contractor of the Principal;

   (b) After the expiration of one (1) year following the date on which the Principal ceased work on the said Contract, including work performed under the guarantees provided in the Contract;

   (c) Other than in a court of competent jurisdiction in the province or district of Canada in which the subject matter of the Contract or any part thereof is situated and not elsewhere, and the parties hereto hereby agree to submit to the jurisdiction of such court.

7. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder.

8. The Surety shall not be entitled to claim any moneys relating to the Contract and the liability of the Surety under this Bond shall remain unchanged and, without restricting the generality of the foregoing, the Surety shall pay all valid claims of Claimants under this Bond before any moneys relating to the Contract held by the Crown are paid to the Surety by the Crown.

9. The Surety shall not be liable for a greater sum that the amount specified in this bond.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority, the day and year first above written.

SIGNED, SEALED AND DELIVERED in the presence of:

_____
Principal

_____
Witness

_____
Surety

Note: Affix Corporate seal if applicable.

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

PERFORMANCE BOND

BOND NUMBER: _____ **AMOUNT:** _____

KNOW ALL PERSONS BY THESE PRESENTS, that _____ as Principal,

hereinafter called the Principal, and _____ as Surety,

hereinafter called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto Her Majesty the Queen in right of Canada as represented by the Minister of Agriculture and Agri-Food, as Obligee, hereinafter called the Crown, in the amount of

_____

dollars ($ _____), lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

SIGNED AND SEALED this _____ day of _____, 20__.

WHEREAS, the Principal entered into a Contract with the Crown dated the _____ day of _____, 20__,

for _____

which Contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are such that, if the Principal shall well and faithfully observe and perform all the obligations on the part of the Principal to be observed and performed in connection with the Contract, then this obligation shall be void, otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. Whenever the Principal shall be, and declared by the Crown to be, in default under the Contract, the Surety shall:
   (a) if the work is not taken out of the Principal's hands, remedy the default of the Principal,
   (b) if the work is taken out of the Principal's hands and the Crown directs the Surety to undertake the completion of the work, complete the work in accordance with the Contract provided that if a contract is entered into for the completion of the work,
      (i) it shall be between the Surety and the completing contractor, and
      (ii) the selection of such completing contractor shall be subject to the approval of the Crown,
   (c) if the work is taken out of the Principal's hands and the Crown, after reasonable notice to the Surety, does not direct the Surety to undertake the completion of the work, assume the financial responsibility for the cost of completion in excess of the moneys available to the Crown under the Contract,
   (d) be liable for and pay all the excess costs of completion of the Contract, and
   (e) not be entitled to any Contract moneys earned by the Principal, up to the date of his default on the Contract and any holdbacks relating to such earned Contract moneys held by the Crown, and the liability of the Surety under this Bond shall remain unchanged provided, however, and without restricting the generality of the foregoing, upon the completion of the Contract to the satisfaction of the Crown, any Contract moneys earned by the Principal or holdbacks related thereto held by the Crown may be paid to the Surety by the Crown.
2. The Surety shall not be liable for a greater sum than the amount specified in this Bond.
3. No suit or action shall be instituted by the Crown herein against the Surety pursuant to these presents after the expiration of two (2) years from the date on which final payment under the Contract is payable.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority, the day and year first above written.

SIGNED, SEALED AND DELIVERED in the presence of:

Note: Affix Corporate seal if applicable.

_____
Principal

_____
Witness

_____
Surety

Canada

Government of Canada / Gouvernement du Canada

PROTECTED (when completed)

PERSONNEL SCREENING, CONSENT AND AUTHORIZATION FORM

OFFICE USE ONLY		
Reference number	Department/Organization number	File number

NOTE: For *Privacy Act* Statement refer to Section C of this form and for completion instructions refer to attached instructions.
Please typewrite or print in block letters.

A ADMINISTRATIVE INFORMATION (To be completed by the Authorized Departmental/Agency/Organizational Official)

☐ **New** ☐ **Update** ☐ **Upgrade** ☐ **Transfer** ☐ **Supplemental** ☐ **Re-activation**

The requested level of reliability/security check(s)

☐ Reliability Status ☐ Level I (CONFIDENTIAL) ☐ Level II (SECRET) ☐ Level III (TOP SECRET)

☐ Other _____

PARTICULARS OF APPOINTMENT/ASSIGNMENT/CONTRACT

☐ Indeterminate ☐ Term ☐ Contract ☐ Industry ☐ Other (specify secondment, assignment, etc.) _____

Justification for security screening requirement

Position/Competition/Contract number	Title		Group/Level (Rank if applicable)
Employee ID number/PRI/Rank and Service number (if applicable)	If term or contract, indicate duration period ▶	From	To
Name and address of department / organization / agency	Name of official	Telephone number ( )	Facsimile number ( )

B BIOGRAPHICAL INFORMATION (To be completed by the applicant)

Surname (Last name)	Full given names (no initials) underline or circle usual name used	Family name at birth
All other names used (i.e. Nickname)	Sex ☐ Male ☐ Female	Date of birth Y M D	Country of birth	Date of entry into Canada if born outside Canada Y M D
RESIDENCE (provide addresses for the last five years, starting with the most current) Home address	Daytime telephone number ( )	E-mail address

	Apartment number	Street number	Street name	Civic number (if applicable)	From Y M	To present
1	City	Province or state	Postal code	Country	Telephone number ( )	
2	Apartment number	Street number	Street name	Civic number (if applicable)	From Y M	To Y M
	City	Province or state	Postal code	Country	Telephone number ( )	

Have you previously completed a Government of Canada security screening form? ☐ Yes ☐ No

If yes, give name of employer, level and year of screening. Y

CRIMINAL CONVICTIONS IN AND OUTSIDE OF CANADA (see instructions)

Have you ever been convicted of a criminal offence for which you have not been granted a pardon? ☐ Yes ☐ No

If yes, give details. (charge(s), name of police force, city, province/state, country and date of conviction) ■

Charge(s)	Name of police force	City
Province/State	Country	Date of conviction ▶ Y M D

Canada

Government of Canada / Gouvernement du Canada

PROTECTED (when completed)

PERSONNEL SCREENING, CONSENT AND AUTHORIZATION FORM

Surname and full given names	Date of birth (Y M D)

C CONSENT AND VERIFICATION (To be completed by the applicant and authorized Departmental/Agency/Organizational Official)

Checks Required (See Instructions)	Applicant's initials	Name of official (print)	Official's initials	Official's Telephone number
1. ☐ Date of birth, address, education, professional qualifications, employment history, personal character references				( )
2. ☐ Criminal record check				( )
3. ☐ Credit check (financial assessment, including credit records check)				( )
4. ☐ Loyalty (security assessment only)				
5. ☐ Other (specify, see instructions)				( )

The Privacy Act Statement

The information on this form is required for the purpose of providing a security screening assessment. It is collected under the authority of subsection 7(1) of the *Financial Administration Act* and the Government Security Policy (GSP) of the Government of Canada, and is protected by the provisions of the *Privacy Act* in institutions that are covered by the *Privacy Act*. Its collection is mandatory. A refusal to provide information will lead to a review of whether the person is eligible to hold the position or perform the contract that is associated with this Personnel Screening Request. Depending on the level of security screening required, the information collected by the government institution may be disclosed to the Royal Canadian Mounted Police (RCMP) and the Canadian Security Intelligence Service (CSIS), which conduct the requisite checks and/or investigation in accordance with the GSP and to entities outside the federal government (e.g. credit bureaus). It is used to support decisions on individuals working or applying to work through appointment, assignment or contract, transfers or promotions. It may also be used in the context of updating, or reviewing for cause, the reliability status, security clearance or site access, all of which may lead to a re-assessment of the applicable type of security screening. Information collected by the government institution, and information gathered from the requisite checks and/or investigation, may be used to support decisions, which may lead to discipline and/or termination of employment or contractual agreements. The personal information collected is described in Standard PIB PSU 917 (Personnel Security Screening) which is used by all government agencies, except the Department of National Defence PIB DND/PPE 834 (Personnel Security Investigation File), RCMP PIB CMP PPU 065 (Security/Reliability Screening Records), CSIS PIB SIS PPE 815 (Employee Security), and PWGSC PIB PWGSC PPU 015 (Personnel Clearance and Reliability Records) used for Canadian Industry Personnel. Personal information related to security assessments is also described in the CSIS PIB SIS PPU 005 (Security Assessments/Advice).

I, the undersigned, do consent to the disclosure of the preceding information including my photograph for its subsequent verification and/or use in an investigation for the purpose of providing a security screening assessment. By consenting to the above, I acknowledge that the verification and/or use in an investigation of the preceding information may also occur when the reliability status, security clearance or site access are updated or otherwise reviewed for cause under the Government Security Policy. My consent will remain valid until I no longer require a reliability status, a security clearance or a site access clearance, my employment or contract is terminated, or until I otherwise revoke my consent, in writing, to the authorized security official.

Signature _____ Date (Y/M/D) _____

D REVIEW (To be completed by the authorized Departmental/Agency/Organizational Official responsible for ensuring the completion of sections A, B and C)

Name and title	Telephone number
Address	Facsimile number

E APPROVAL (To be completed by authorized Departmental/Agency/Organizational Security Official only)

I, the undersigned, as the authorized security official, do hereby approve the following level of screening.

Reliability Status

☐ Approved Reliability Status ☐ Not approved

Name and title _____

Signature _____ Date (Y/M/D) _____

Security Clearance (if applicable)

☐ Level I ☐ Level II ☐ Level III ☐ Not recommended

Name and title _____

Signature _____ Date (Y/M/D) _____

Comments

PHOTO (for Level III T.S., and/or upon request - see instructions)

Government of Canada / Gouvernement du Canada

INSTRUCTIONS FOR PERSONNEL SCREENING CONSENT AND AUTHORIZATION FORM TBS/SCT 330-23E (Rev. 2002/02)
Once completed, this form shall be safeguarded and handled at the level of Protected A.

General:
If space allotted in any portion is insufficient please use separate sheet using same format.

1. Section A (Administrative Information) Authorized Departmental/Agency/Organizational Official
The Official, based on instructions issued by the Departmental Security Officer, may be responsible for determining, based on five year background history, what constitutes sufficient verification of personal data, educational and professional qualifications, and employment history. References are to be limited to those provided on the application for employment or equivalent forms.

SUPPLEMENTAL INFORMATION REQUIREMENTS
Persons who presently hold a SECURITY CLEARANCE and subsequently marry, remarry or commence a common-law partnership, in addition to having to update sections of the *Security Clearance Form (TBS/SCT 330-60)*, are required to submit an original *Personnel Screening, Consent and Authorization Form*, with the following parts completed:

Part A - As set forth in each question
Part B - As set forth in each question, excluding CRIMINAL CONVICTIONS IN AND OUTSIDE OF CANADA.
Part C - Applicant's signature and date only are required

"Other". This should be used to identify if the security screening is for Site Access, NATO, SIGINT etc.

2. Section B (Biographical Information)
To be completed by the ***applicant***. If more space is required use a separate sheet of paper. Each sheet must be signed.

Country of Birth - For "NEW" requests, if born abroad of Canadian parents, please provide a copy of your Certificate of Registration of Birth Abroad. If you arrived in Canada less than five years ago, provide a copy of the Immigration Visa, Record of Landing document or a copy of passport.

- List only criminal convictions for which a pardon has NOT been granted. Include on a separate attached sheet of paper, if more than one conviction. Applicant must include those convictions outside Canada.
- Offences under the *National Defence Act* are to be included as well as convictions by courts-martial are to be recorded.

3. Section C (Consent and Verification)
A copy of Section "C" may be released to institutions to provide acknowledgement of consent.

Criminal record checks (fingerprints may be required) and credit checks are to be arranged through the Departmental Security Office or the delegated Officer.

Consent: may be given only by an applicant who has reached the age of majority, otherwise, the signature of a parent or guardian is mandatory.

The age of majority is:
19 years in NFLD., N.S., N.B., B.C., Yukon, Norhwest Territories and Nunavut;
18 years in P.E.I., Que., Ont., Man., Sask. and Alta.

The applicant will provide initials in the " applicant's initials box".

The official who carried out the verification of the information will print their name, insert their initials and telephone number in the required space.
- Reliability Screening (for all types of screening identified within Section A): complete numbers 1 and 2 and 3 if applicable.
- Security Clearance (for all types of screening identified within Section A): complete numbers 1 to 4 and 5 where applicable.
- Other: number 5 is used only where prior Treasury Board of Canada Secretariat approval has been obtained.

4. Section D (Review)
To be completed by authorized Departmental/Agency/Organizational Official who is responsible for ensuring the completion of sections A to C as requested.

5. Section E (Approval)
Authorized Departmental/Agency/Organizational Security Official refers to the individuals as determined by departments, agencies, and organizations that may verify reliability information and/or approve/not approve reliability status and/or security clearances. Approved Reliability Status and Level I, II and III, as well as the signature of the authorized security official or manager are added for Government of Canada use only. Applicants are to be briefed, acknowledge, and be provided with a copy of the "Security Screening Certificate and Briefing Form (TBS/SCT 330-47)".
Note: Private sector organizations do not have the authority to approve any level of security screening.

Photographs: Departments/Agencies/Organizations are responsible for ensuring that three colour photographs of passport size are attached to the form for the investigating agency. Maximum dimensions are 50mm x 70mm and minimum are 43mm x 54mm. The face length from chin to crown of head must be between 25mm x 35mm. The photographs must be signed by the applicant and an authorized security official. The photographs must have been taken within the last six months. It is required for new or upgrade Level III security clearances for identification of the applicant during the security screening investigation by the investigating agency. The investigating agency may in specific incidents request a photograph for a Level I or II clearances when an investigation is required.

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

T4-A CERTIFICATION

The Contractor shall complete and submit this T4-A Certification within fourteen (14) calendar days of Notification of Contract award and within fourteen (14) calendar days immediately following any change to the information already provided under the Contract. Failure to provide this information or failure to provide the correct information shall result in a fundamental breach of the Contract.

1. **The Contractor shall enter a [x] in one of the boxes below opposite the description that best describes its status.**

[ ] A business incorporated either federally or provincially;
[ ] An unincorporated business, either as a sole proprietor or a partnership; or
[ ] An individual.

Note: The information provided in Section 2 must correspond with that provided in Section 1.

Corporate or unincorporated business or individual's name: _____

Street Name or Box #: _____

City, Town or Village: _____

Province: _____

Postal Code: _____

2. Contractor shall complete Section 2(a) or 2(b) or 2(c), whichever is applicable to its situation.

(a) If incorporated:

Business Number (BN): _____, or
GST / HST Number: _____, or
T2 Corporation Tax Number (T2N): _____, whichever is applicable

(b) If unincorporated:

Social Insurance Number (SIN): _____, and
Business Number (BN): _____, or
GST / HST Number: _____, whichever is applicable

Note: The Unincorporated Business Name must be the same as the name associated with the Revenue Canada Business Number or the GST Number.

(c) If individual:

Social Insurance Number (SIN): _____, and
Business Number (BN): _____, or
GST / HST Number: _____, whichever is applicable

Note: The Individual's Name must be the same as the name associated with the Social Insurance Number.

3. WE HEREBY CERTIFY that I/We have examined the information provided above, including the legal name, address and Revenue Canada identifier (SIN, BN, GST / HST No., T2N), as applicable, and that it is correct and complete, and fully discloses my/our identification.

_____	_____	_____
Contractor's signature	Title of Signatory	Date