

**RETURN BIDS TO:**  
**RETOURNER LES SOUMISSIONS À:**  
**Public Works and Government Services Canada**  
**Telus Plaza North/Plaza Telus Nord**  
**10025 Jasper Ave./10025 ave. Jaspe**  
**5th floor/5e étage**  
**Edmonton**  
**Alberta**  
**T5J 1S6**  
**Bid Fax: (780) 497-3510**

**REQUEST FOR PROPOSAL**  
**DEMANDE DE PROPOSITION**

**Proposal To: Public Works and Government  
Services 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 goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

**Proposition aux: Travaux Publics et Services  
Gouvernementaux Canada**

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

**Comments - Commentaires**

<b>Title - Sujet</b> Consultant - Agronomy Bldg Repairs	
<b>Solicitation No. - N° de l'invitation</b> E0209-140619/A	<b>Date</b> 2013-09-23
<b>Client Reference No. - N° de référence du client</b> AAFC-E0209-140619	
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$PWU-909-9952	
<b>File No. - N° de dossier</b> PWU-3-36168 (909)	<b>CCC No./N° CCC - FMS No./N° VME</b>
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> <b>on - le 2013-11-04</b>	<b>Time Zone</b> <b>Fuseau horaire</b> Mountain Daylight Saving Time MDT
<b>F.O.B. - F.A.B.</b> <b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input checked="" type="checkbox"/> <b>Other-Autre:</b> <input type="checkbox"/>	
<b>Address Enquiries to: - Adresser toutes questions à:</b> Mayhew (RPC), Sylvia	<b>Buyer Id - Id de l'acheteur</b> pwu909
<b>Telephone No. - N° de téléphone</b> (780) 497-3645 ( )	<b>FAX No. - N° de FAX</b> (780) 497-3510
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b> PWGSC on behalf of Agriculture and Agri-Foods Canada, Lethbridge Research Center, Lethbridge, AB	

**Instructions: See Herein**

**Instructions: Voir aux présentes**

**Vendor/Firm Name and Address**  
**Raison sociale et adresse du**  
**fournisseur/de l'entrepreneur**

**Issuing Office - Bureau de distribution**  
Public Works and Government Services Canada  
Telus Plaza North/Plaza Telus Nord  
10025 Jasper Ave./10025 ave Jasper  
5th floor/5e étage  
Edmonton  
Alberta  
T5J 1S6

<b>Delivery Required - Livraison exigée</b> See Herein	<b>Delivery Offered - Livraison proposée</b>
<b>Vendor/Firm Name and Address</b> <b>Raison sociale et adresse du fournisseur/de l'entrepreneur</b>	
<b>Telephone No. - N° de téléphone</b> <b>Facsimile No. - N° de télécopieur</b>	
<b>Name and title of person authorized to sign on behalf of Vendor/Firm</b> <b>(type or print)</b> <b>Nom et titre de la personne autorisée à signer au nom du fournisseur/</b> <b>de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b>	
<b>Signature</b>	<b>Date</b>

## REQUEST FOR PROPOSAL (RFP)

### TABLE OF CONTENTS

The following is intended to clarify the general structure of the whole document.

Front Page

Supplementary Instructions to Proponents (SI)

- SI1 Introduction
- SI2 Proposal Documents
- SI3 Questions or request for clarifications
- SI4 Canada's Trade Agreements
- SI5 CODE OF CONDUCT AND CERTIFICATIONS - RELATED DOCUMENTATION**
- SI6 Workers Compensation
- SI7 Web Sites

Terms, Conditions and Clauses

Agreement

Supplementary Conditions (SC)

SC1 Employer/Prime Consultant:

Agreement Particulars

Team Identification Format (Appendix A)

Declaration/Certifications Form (Appendix B)

Price Proposal Form (Appendix C)

General Procedures & Standards (Appendix D)

Submission Requirements and Evaluation (SRE)

Terms of Reference

---

## SUPPLEMENTARY INSTRUCTIONS TO PROPONENTS (SI)

### SI1 INTRODUCTION

1. Public Works and Government Services Canada (PWGSC) intends to retain an individual consulting firm or joint venture to provide the professional services for the project as set out in this Request for Proposal (RFP).
2. This is a single phase selection process. The nature of the requirement and the anticipated limited number of response by the industry leads PWGSC to believe that this approach will not unduly force a large number of firms to expend an overall unreasonable amount of effort in response to PWGSC.
3. Proponents responding to this RFP are requested to submit a full and complete proposal. The proposal will cover not only the qualifications, experience and organization of the proposed Consultant Team, but also the detailed approach to the work, and the pricing and terms offered. A combination of the technical and price of services submissions will constitute the proposal.

### SI2 PROPOSAL DOCUMENTS

1. All instructions, general terms, conditions and clauses identified in the RFP by number, date and title, are hereby incorporated by reference into and form part of this solicitation and any resultant contract.

All instructions, general terms, conditions and clauses identified in the RFP by number, date and title, are set out in the Standard Acquisition Clauses and Conditions Manual ( <https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual> ) issued by Public Works and Government Services Canada.

2. The following are the proposal documents:
  - (a) Supplementary Instructions to Proponents (SI);  
R1410T (2013-06-27), General Instructions to Proponents (GI);  
Submission Requirements and Evaluation (SRE);
  - (b) the general terms, conditions and clauses, as amended, identified in the Agreement clause;
  - (c) Terms of Reference;
  - (d) the document entitled "General Procedures and Standards";

- (e) any amendment to the solicitation document issued prior to the date set for receipt of proposals; and
- (f) the proposal, Declaration/Certifications Form and Price Proposal Form.
3. Submission of a proposal constitutes acknowledgment that the Proponent has read and agrees to be bound by these documents.

### **SI3 QUESTIONS OR REQUEST FOR CLARIFICATION**

Questions or requests for clarification during the solicitation period must be submitted in writing to the Contracting Authority named on the RFP - Page 1 as early as possible. Enquiries should be received no later than 5 working days prior to the closing date identified on the front page of the Request for Proposal. Enquiries received after that date may not be answered prior to the closing date of the solicitation.

### **SI4 CANADA'S TRADE AGREEMENTS**

This procurement is subject to the provisions of the North American Free Trade Agreement (NAFTA).

### **SI5 CERTIFICATIONS**

#### **1. Code of Conduct and Certifications - Related Documentation**

By submitting a proposal, the Proponent certifies that the Proponent and its affiliates are in compliance with the provisions as stated in Section G11 Code of Conduct and Certifications - Proposal of R1410T (2013-06-27) General Instructions to Proponents (GI). The related documentation therein required will assist Canada in confirming that the certifications are true.

#### **2. Federal Contractors Program for Employment Equity - Proposal Certification**

By submitting a proposal, the Proponent certifies that the Proponent, and any of the Proponent's members if the Proponent is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "FCP Limited Eligibility to Bid" list (<http://hrsdc.gc.ca/eng/labour/index.shtml>) available from Human Resources and Skills Development Canada (HRSDC) -Labour's website.

---

Canada will have the right to declare a proposal non-responsive if the Proponent, or any member of the Proponent if the Proponent is a Joint Venture, appears on the "FCP Limited Eligibility to Bid" list at the time of contract award.

## **SI6 Workers Compensation**

1. The recommended Proponent shall provide to the Contracting Authority, prior to Contract award:
  - a) a Workers Compensation Board letter of good standing, also listing covered Directors, Principals, Proprietor(s) or Partners who will be or who are anticipated to be present on the work site(s).
2. The recommended Proponent shall deliver all of the above documents to the Contracting Authority on or before the date stated (usually 3-5 days after notification) by the Contracting Authority. Failure to comply with the request may result in the proposal being declared non-compliant.

## **SI7 - WEB SITES**

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

Employment Equity Act

<http://laws.justice.gc.ca/en/E-5.401/index.html>

Federal Contractors Program (FCP)

<http://www.hrsdc.gc.ca/eng/labour/equality/fcp/index.shtml>

Certificate of Commitment to Implement Employment Equity form LAB 1168

<http://www.servicecanada.gc.ca/cgi-bin/search/eforms/index.cgi?app=profile&form=lab1168&dept=sc&lang=e>

Code of Conduct for Procurement

<http://www.tpsgc-pwgsc.gc.ca/app-acq/cndt-cndct/contexte-context-eng.html>

**Consent to a Criminal Record Verification (PWGSC-TPSGC 229 form)**

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/formulaires-forms-eng.html>

Lobbying Act

<http://laws.justice.gc.ca/en/L-12.4/?noCookie>

Solicitation No. - N° de l'invitation

E0209-140619/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

pwu909

Client Ref. No. - N° de réf. du client

AAFC-E0209-140619

File No. - N° du dossier

PWU-3-36168

CCC No./N° CCC - FMS No/ N° VME

---

Contracts Canada

<https://buyandsell.gc.ca/>

Supplier Registration Information

<https://srisupplier.contractsCanada.gc.ca>

Consultant Performance Evaluation Report Form

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/2913-1.pdf>

Canadian economic sanctions

<http://www.international.gc.ca/sanctions/index.aspx?lang=eng>

National Joint Council (NJC) Travel Directive

<http://www.njc-cnm.gc.ca/directive/travel-voyage/index-eng.php>

## TERMS, CONDITIONS AND CLAUSES

### AGREEMENT

1. The Consultant understands and agrees that upon acceptance of the offer by Canada, a binding Agreement shall be formed between Canada and the Consultant and the documents forming the Agreement shall be the following:
  - (a) the Front Page and this Agreement clause;
  - (b) the General Terms, Conditions and Clauses, as amended, identified as:
    - R1210D (2013-06-27), General Condition (GC) 1 - General Provisions
    - R1215D (2011-05-16), General Condition (GC) 2 - Administration of the Contract
    - R1220D (2011-05-16), General Condition (GC) 3 - Consultant Services
    - R1225D (2012-07-16), General Condition (GC) 4 - Intellectual Property
    - R1230D (2012-07-16), General Condition (GC) 5 - Terms of Payment
    - R1235D (2011-05-16), General Condition (GC) 6 - Changes
    - R1240D (2011-05-16), General Condition (GC) 7 - Taking the Services Out of the Consultant's Hands, Suspension or Termination
    - R1245D (2012-07-16), General Condition (GC) 8 - Dispute Resolution
    - R1250D (2012-07-16), General Condition (GC) 9 - Indemnification and Insurance
    - Supplementary Conditions
    - Agreement Particulars
  - (c) Terms of Reference;
  - (d) the document entitled "General Procedures and Standards";
  - (e) any amendment to the solicitation document incorporated in the Agreement before the date of the Agreement;
  - (f) the proposal, the Declaration/Certifications Form and the Price Proposal Form.
  
2. The documents identified above by title, number and date are hereby incorporated by reference into and form part of this Agreement, as though expressly set out herein, subject to any other express terms and conditions herein contained.

The documents identified above by title, number and date are set out in the Standard Acquisition Clauses and Conditions (SACC) Manual, issued by Public Works and Government Services Canada (PWGSC). The SACC Manual is available on the PWGSC Web site:

<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>

3. If there is a discrepancy between the wording of any documents that appear on the following list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.
- (a) any amendment or variation in the Agreement that is made in accordance with the terms and conditions of the Agreement;
  - (b) any amendment to the solicitation document incorporated in the Agreement before the date of the Agreement;
  - (c) this Agreement clause;
  - (d) Supplementary Conditions;
  - (e) General Terms, Conditions and Clauses;
  - (f) Agreement Particulars;
  - (g) Terms of Reference;
  - (h) the document entitled "General Procedures and Standards";
  - (i) the proposal.

## **SUPPLEMENTARY CONDITIONS (SC)**

### **SC1 Employer/Prime Consultant:**

#### **1. During the Design Stage**

- a) The Consultant shall, where the Consultant is working on Federal property and is in control of the work site (no Federal presence or construction contractor), for the purposes of the applicable provincial or territorial Occupational Health & Safety Acts and Regulations, and for the duration of the Work of the Contract:
  - i) act as the Employer, where the Consultant is the only employer on the work site, in accordance with the Authority Having Jurisdiction;
  - ii) assume the role of Prime Consultant, where there are two or more employers (including sub-consultants) involved in work at the same time and space at the work site, in accordance with the Authority Having Jurisdiction; and

#### **2. During the Construction Stage**

- a) The Consultant shall, for the purposes of the Occupational Health & Safety Acts and Regulations, and for the duration of the Work of the Contract, agree to accept that the Construction Contractor is the Principal/Prime Contractor, and to conform to that Contractor's Site Specific Health and Safety Plan.

Solicitation No. - N° de l'invitation

E0209-140619/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

pwu909

Client Ref. No. - N° de réf. du client

AAFC-E0209-140619

File No. - N° du dossier

PWU-3-36168

CCC No./N° CCC - FMS No/ N° VME

---

## **AGREEMENT PARTICULARS**

The Agreement Particulars will be issued at time of award of contract and will identify the fee to be paid to the Consultant for the services determined in the Price Proposal Form.

Solicitation No. - N° de l'invitation

E0209-140619/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

pwu909

Client Ref. No. - N° de réf. du client

AAFC-E0209-140619

File No. - N° du dossier

PWU-3-36168

CCC No./N° CCC - FMS No/ N° VME

---

## **SUBMISSION REQUIREMENTS AND EVALUATION**

SRE 1 General Information

SRE 2 Proposal Requirements

SRE 3 Submission Requirements and Evaluation

SRE 4 Price of Services

SRE 5 Total Score

SRE 6 Submission Requirements - Checklist

## SUBMISSION REQUIREMENTS AND EVALUATION

### SRE 1 GENERAL INFORMATION

#### 1.1 Reference to the Selection Procedure

An 'Overview of the Selection Procedure' can be found in R1410T General Instructions to Proponents (GI3).

#### 1.2 Calculation of Total Score

For this project the Total Score will be established as follows:

Technical Rating x 90%	=	Technical Score (Points)
<u>Price Rating x 10%</u>	=	<u>Price Score (Points)</u>
Overall Total Evaluated Score	=	Max. 100 Points

### SRE 2 PROPOSAL REQUIREMENTS

#### 2.1 Requirement for Proposal Format

The following proposal format information should be implemented when preparing the proposal.

- Submit one (1) bound original plus three (3) bound copies of the proposal
- Paper size should be - 216mm x 279mm (8.5" x 11")
- Minimum font size - 11 point Times or equal
- Minimum margins - 12 mm left, right, top, and bottom
- Double-sided submissions are preferred
- One (1) 'page' means one side of a 216mm x 279mm (8.5" x 11") sheet of paper
- 279mm x 432 mm (11" x 17") fold-out sheets for spreadsheets, organization charts etc. will be counted as two pages.
- The order of the proposals should follow the order established in the Request for Proposal SRE section

---

## 2.2 Specific Requirements for Proposal Format

The maximum number of pages (including text and graphics) to be submitted for the Rated Requirements under SRE 3.2 is twenty (20) pages.

The following are not part of the page limitation mentioned above:

- Covering letter
- Consultant Team Identification (Appendix A)
- Declaration/Certifications Form (Appendix B)
- Code of Conduct Certifications
- Front page of the RFP
- Front page of revision(s) to the RFP
- Price Proposal Form (Appendix C)

***Consequence of non-compliance: any pages which extend beyond the above page limitation and any other attachments will be extracted from the proposal and will not be forwarded to the PWGSC Evaluation Board members for evaluation.***

## SRE 3 SUBMISSION REQUIREMENTS AND EVALUATION

### 3.1 MANDATORY REQUIREMENTS

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

#### 3.1.1 Licensing, Certification or Authorization

The proponent shall be a Architectural Engineer, licensed to provide the necessary professional services to the full extent that may be required by territorial law in the province of Alberta.

#### 3.1.2 Consultant Team Identification

The consultant team to be identified must include the following:

Proponent (prime consultant) - Architectural Engineer

Key Sub-consultants/Specialists - Civil Engineer, Structural Engineer, Mechanical Engineer, Electrical Engineer, Commissioning Specialist, Geotechnical Engineer, Schedule Management Specialist, Cost Consultant

---

Information required - name of firm, key personnel to be assigned to the project. For the prime consultant indicate current license and/or how you intend to meet the provincial or territorial licensing requirements. In the case of a joint venture identify the existing or proposed legal form of the joint venture (refer to R1410T General Instructions to Proponents, GI9 Limitation of Submissions).

An example of an acceptable format (typical) for submission of the team identification information is provided in Appendix A.

### **3.1.3 Declaration/Certifications Form**

Proponents must complete, sign and submit the following:

Appendix B, Declaration/Certifications Form as required.

### **3.1.4 Code of Conduct Certifications**

Proponents who are incorporated, including those bidding as a joint venture, must provide with their bid or promptly thereafter a complete list of names of all individuals who are currently directors of the Proponent. Proponents bidding as sole proprietorship, including those bidding as a joint venture, must provide the name of the owner with their bid or promptly thereafter. Proponents bidding as societies, firms, partnerships or associations of persons do not need to provide lists of names. If the required names have not been received by the time the evaluation of bids is completed, Canada will inform the Proponent of a time frame within which to provide the information. Failure to comply will render the bid non-responsive. Providing the required names is a mandatory requirement for contract award.

---

## 3.2 RATED REQUIREMENTS

### 3.2.1 Achievements of Proponent on Projects

Describe the Proponent's accomplishments, achievements and experience as prime consultant on projects.

Select a **maximum** of 3 projects undertaken within the last 10 years. Joint venture submissions are not to exceed the maximum number of projects. Only the first 3 projects listed in sequence will receive consideration and any others will receive none as though not included.

#### **Information that should be supplied:**

- clearly indicate how this project is comparable/relevant to the requested project.
- brief project description and intent. Narratives should include a discussion of design philosophy / approach to meet the intent, design challenges and resolutions.
- budget control and management - i.e. contract price & final construction cost - explain variation
- project schedule control and management - i.e. initial schedule and revised schedule - explain variation
- client references - name, address, phone and fax of client contact at working level - references may be checked
- names of key personnel responsible for project delivery
- awards received

The Proponent (as defined in R1410T General Instructions to Proponents, GI2 Definitions) must possess the knowledge on the above projects. Past project experience from entities other than the Proponent will not be considered in the evaluation unless these entities form part of a joint venture Proponent.

Please indicate those projects which were carried out in joint venture and the responsibilities of each of the involved entities in each project.

---

### 3.2.2 Achievements of Key Sub-consultants and Specialists on Projects

Describe the accomplishments, achievements and experience either as prime consultant or in a sub-consultant capacity on projects. If the Proponent proposes to provide multi-disciplinary services which might otherwise be performed by a sub-consultant, this should be reflected here.

Select a maximum of 3 projects undertaken within the last 10 years per key sub consultant or specialist. Only the first 3 projects listed in sequence (per key subconsultant or specialist) will receive consideration and any others will receive none as though not included.

#### **Information that should be supplied:**

- clearly indicate how this project is comparable/relevant to the requested project.
- brief project description and intent. Narratives should include a discussion of design philosophy / approach to meet the intent, design challenges and resolutions.
- budget control and management
- project schedule control and management
- client references - name, address, phone and fax of client contact at working level - references may be checked
- names of key personnel responsible for project delivery
- awards received

### 3.2.3 Achievements of Key Personnel on Projects

Describe the experience and performance of key personnel to be assigned to this project regardless of their past association with the current proponent firm. This is the opportunity to emphasize the strengths of the individuals on the team, to recognize their past responsibilities, commitments and achievements.

#### **Information that should be supplied for each key personnel:**

- professional accreditation
- accomplishments/achievements/awards
- relevant experience, expertise, number of years experience
- role, responsibility and degree of involvement of individual in past projects

---

### 3.2.4 Understanding of the Project:

The proponent should demonstrate understanding of the goals of the project, the functional/technical requirements, the constraints and the issues that will shape the end product.

#### **Information that should be supplied:**

- The functional and technical requirements
- Broader goals (federal image, sustainable development, sensitivities)
- The relationship between this commission and any earlier studies completed for PWGSC
- Significant issues, challenges and constraints
- Project schedule and cost. Review schedule and cost information and assess risk management elements that may affect the project
- The Client User's philosophies and values

### 3.2.5 Scope of Services:

The proponent should demonstrate capability to perform the services and meet project challenges and to provide a plan of action.

#### **Information that should be supplied:**

- Scope of Services - detailed list of services
- Work Plan - detailed breakdown of work tasks and deliverables
- Project schedule - proposed major milestone schedule
- Risk management strategy

---

### 3.2.6 Management of Services:

The Proponent should describe how he /she proposes to perform the services and meet the constraints; how the services will be managed to ensure continuing and consistent control as well as production and communication efficiency; how the team will be organized and how it will fit in the existing structure of the firms; to describe how the team will be managed. The proponent is also to identify sub-consultant disciplines and specialists required to complete the consultant team.

If the Proponent proposes to provide multi-disciplinary services which might otherwise be performed by a sub-consultant, this should be reflected here.

#### **Information that should be supplied:**

- Confirm the makeup of the full project team including the names of the consultant sub-consultants and specialists personnel and their role on the project.
- Organization chart with position titles and names (Consultant team). Joint Venture business plan, team structure and responsibilities, if applicable
- What back-up will be committed
- Profiles of the key positions (specific assignments and responsibilities)
- Outline of an action plan of the services with implementation strategies and sequence of main activities
- Reporting relationships
- Communication strategies
- Response time: demonstrate how the response time requirements will be met

### 3.2.7 Design Philosophy / Approach / Methodology

The proponent should elaborate on aspects of the project considered to be a major challenge which will illustrate design philosophy / approach / methodology. This is the opportunity for the Proponent to state the overall design philosophy of the team as well as their approach of resolving design issues and in particular to focus on the unique aspects of the current project.

#### **Information that should be supplied:**

- Design Philosophy / Approach / Methodology
- Describe the major challenges and how your team approach will be applied to those particular challenges.

### 3.3 EVALUATION AND RATING

In the first instance, price envelopes will remain sealed and only the technical components of the proposals which are responsive will be reviewed, evaluated and rated by a PWGSC Evaluation Board in accordance with the following to establish Technical Ratings:

<b>Criterion</b>	<b>Weight Factor</b>	<b>Rating</b>	<b>Weighted Rating</b>
Achievements of Proponent	2.0	0 - 10	0 - 20
Achievements of Key Sub-consultants/Specialists	1.0	0 - 10	0 - 10
Achievements of Key Personnel on Projects	2.0	0 - 10	0 - 20
Understanding Of Project	1.5	0 - 10	0 - 15
Scope of Services	1.0	0 - 10	0 - 10
Management of Services	1.0	0 - 10	0 - 10
Design Philosophy / Approach / Methodology	1.5	0 - 10	0 - 15
Technical Rating	10.0		0 - 100

## Generic Evaluation Table

PWGSC Evaluation Board members will evaluate the strengths and weaknesses of the Proponent's response to the evaluation criteria and will rate each criterion with even numbers (0, 2, 4, 6, 8 or 10) using the generic evaluation table below:

<b>NON RESPONSIVE</b>	<b>INADEQUATE</b>	<b>WEAK</b>	<b>ADEQUATE</b>	<b>FULLY SATISFACTORY</b>	<b>STRONG</b>
<b>0 point</b>	<b>2 points</b>	<b>4 points</b>	<b>6 points</b>	<b>8 points</b>	<b>10 points</b>
Did not submit information which could be evaluated	Lacks complete or almost complete understanding of the requirements.	Has some understanding of the requirements but lacks adequate understanding in some areas of the requirements.	Demonstrates a good understanding of the requirements.	Demonstrates a very good understanding of the requirements.	Demonstrates an excellent understanding of the requirements.
	Weaknesses cannot be corrected	Generally doubtful that weaknesses can be corrected	Weaknesses can be corrected	No significant weaknesses	No apparent weaknesses
	Proponent do not possess qualifications and experience	Proponent lacks qualifications and experience	Proponent has an acceptable level of qualifications and experience	Proponent is qualified and experienced	Proponent is highly qualified and experienced
	Team proposed is not likely able to meet requirements	Team does not cover all components or overall experience is weak	Team covers most components and will likely meet requirements	Team covers all components - some members have worked successfully together	Strong team - has worked successfully together on comparable projects
	Sample projects not related to this requirement	Sample projects generally not related to this requirement	Sample projects generally related to this requirement	Sample projects directly related to this requirement	Leads in sample projects directly related to this requirement
	Extremely poor, insufficient to meet performance requirements	Little capability to meet performance requirements	Acceptable capability, should ensure adequate results	Satisfactory capability, should ensure effective results	Superior capability, should ensure very effective results

To be considered further, proponents **must** achieve a minimum Technical Rating of fifty (50) points out of the hundred (100) points available as specified above.

**No further consideration will be given to proponents not achieving the pass mark of fifty (50) points.**

## SRE 4 PRICE OF SERVICES

All price proposal envelopes corresponding to responsive proposals which have achieved the pass mark of fifty (50) points will be opened upon completion of the technical evaluation. An average price is determined by adding all the price proposals together and dividing the total by the number of price proposals being opened.

All price proposals which are greater than twenty-five percent (25%) above the average price will be set aside and receive no further consideration.

The remaining price proposals are rated as follows:

The lowest price proposal receives a Price Rating of 100

The second, third, fourth and fifth lowest prices receive Price Ratings of 80, 60, 40, and 20 respectively. All other price proposals receive a Price Rating of 0.

On the rare occasions where two (or more) price proposals are identical, the matching price proposals receive the same rating and the corresponding number of following ratings are skipped.

The Price Rating is multiplied by the applicable percentage to establish the Price Score.

## SRE 5 TOTAL SCORE

Total Scores will be established in accordance with the following:

Rating	Possible Range	% of Total Score	Score (Points)
Technical Rating	0 - 100	90	0 - 90
Price Rating	0 - 100	10	0 - 10
Total Overall Score		100	0 - 100

The Proponent receiving the highest Total Overall Score is the first entity that the Evaluation Board will recommend for the provision of the required services. In the case of a tie, the proponent submitting the lower price for the services will be selected.

## **SRE 6 SUBMISSION REQUIREMENTS - CHECKLIST**

The following list of documents and forms is provided with the intention of assisting the Proponent in ensuring a complete submission. The Proponent is responsible for meeting all submission requirements.

Please follow detailed instructions in R1410T General Instructions to Proponents, G116 Submission of Proposal. Proponents may choose to introduce their submissions with a cover letter.

- Team Identification - see typical format in Appendix A
- Declaration/Certifications Form - completed and signed - form provided in Appendix B
- Code of Conduct Certifications - list of directors/owners
- Proposal - one (1) original plus 3 bound copies
- Front page of RFP
- Front page(s) of any solicitation amendment

In a separate envelope:

- Price Proposal form - one (1) completed and submitted in a separate envelope

## APPENDIX A - TEAM IDENTIFICATION FORMAT

For details on this format, please see SRE in the Request For Proposal.

The prime consultant and other members of the Consultant Team shall be, or eligible to be, licensed, certified or otherwise authorized to provide the necessary professional services to the full extent that may be required by provincial or territorial law.

### I. Prime Consultant (Proponent - Architectural Engineer):

Firm or Joint Venture Name: .....  
.....  
.....

Key Individuals and provincial professional licensing status and/or professional accreditation:

.....  
.....  
.....  
.....  
.....

### II. Key Sub Consultants / Specialists:

#### Civil Engineer

Firm Name: .....  
.....  
.....

Key Individuals and provincial professional licensing status and/or professional accreditation:

.....  
.....  
.....  
.....  
.....

Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

E0209-140619/A

pwu909

Client Ref. No. - N° de réf. du client

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

AAFC-E0209-140619

PWU-3-36168

**Structural Engineer**

Firm Name: .....  
.....  
.....

Key Individuals and provincial professional licensing status and/or professional accreditation:

.....  
.....  
.....  
.....  
.....

**Mechanical Engineer**

Firm Name: .....  
.....  
.....

Key Individuals and provincial professional licensing status and/or professional accreditation:

.....  
.....  
.....  
.....  
.....

**Electrical Engineer**

Firm Name: .....  
.....  
.....

Key Individuals and provincial professional licensing status and/or professional accreditation:

.....  
.....  
.....  
.....  
.....

Solicitation No. - N° de l'invitation

E0209-140619/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

pwu909

Client Ref. No. - N° de réf. du client

AAFC-E0209-140619

File No. - N° du dossier

PWU-3-36168

CCC No./N° CCC - FMS No/ N° VME

**Commissioning Specialist**

Firm Name: .....  
.....  
.....

Key Individuals and provincial professional licensing status and/or professional accreditation:

.....  
.....  
.....  
.....  
.....

**Geotechnical Engineer**

Firm Name: .....  
.....  
.....

Key Individuals and provincial professional licensing status and/or professional accreditation:

.....  
.....  
.....  
.....  
.....

**Schedule Management Specialist**

Firm Name: .....  
.....  
.....

Key Individuals and provincial professional licensing status and/or professional accreditation:

.....  
.....  
.....  
.....  
.....

Solicitation No. - N° de l'invitation

E0209-140619/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

pwu909

Client Ref. No. - N° de réf. du client

AAFC-E0209-140619

File No. - N° du dossier

PWU-3-36168

CCC No./N° CCC - FMS No/ N° VME

**Cost Consultant**

Firm Name: .....  
.....  
.....

Key Individuals and provincial professional licensing status and/or professional accreditation:

.....  
.....  
.....  
.....  
.....

Solicitation No. - N° de l'invitation

E0209-140619/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

pwu909

Client Ref. No. - N° de réf. du client

AAFC-E0209-140619

File No. - N° du dossier

PWU-3-36168

CCC No./N° CCC - FMS No/ N° VME

## APPENDIX B - DECLARATION/CERTIFICATIONS FORM

**Project Title:** AAFC Lethbridge - Agronomy Building Fire Repairs

**Name of Proponent:** \_\_\_\_\_

**Street Address:** \_\_\_\_\_  
\_\_\_\_\_

**Mailing Address:** \_\_\_\_\_  
\_\_\_\_\_

**Telephone Number:(    )** \_\_\_\_\_

**Fax Number: (    )** \_\_\_\_\_

**E-Mail:** \_\_\_\_\_

**Procurement Business Number:** \_\_\_\_\_

<p><b>Type of Organization:</b></p> <p>_____ Sole Proprietorship</p> <p>_____ Partnership</p> <p>_____ Corporation</p> <p>_____ Joint Venture</p>	<p><b>Size of Organization:</b></p> <p>Number of Employees _____</p> <p>Graduate Architects / Professional Engineers _____</p> <p>Other Professionals _____</p> <p>Technical Support _____</p> <p>Other _____</p>
---	---

---

## APPENDIX B - DECLARATION/CERTIFICATIONS FORM (CONT'D)

### Former Public Servant (FPS) - Certification

Contracts awarded to former public servants (FPS) in receipt of a pension or of a lump sum payment must bear the closest public scrutiny, and reflect fairness in the spending of public funds. In order to comply with Treasury Board policies and directives on contracts with FPS, proponents must provide the information required below before contract award.

#### Definitions

For the purposes of this clause,

"former public servant" is any former member of a department as defined in the *Financial Administration Act*, R.S., 1985, c. F-11, a former member of the Canadian Armed Forces or a former member of the Royal Canadian Mounted Police. A former public servant may be:

- (a) an individual;
- (b) an individual who has incorporated;
- (c) a partnership made of former public servants; or
- (d) a sole proprietorship or entity where the affected individual has a controlling or major interest in the entity.

"lump sum payment period" means the period measured in weeks of salary, for which payment has been made to facilitate the transition to retirement or to other employment as a result of the implementation of various programs to reduce the size of the Public Service. The lump sum payment period does not include the period of severance pay, which is measured in a like manner.

"pension" means a pension or annual allowance paid under the *Public Service Superannuation Act* (PSSA), R.S., 1985, c.P-36, and any increases paid pursuant to the *Supplementary Retirement Benefits Act*, R.S., 1985, c.S-24 as it affects the PSSA. It does not include pensions payable pursuant to the *Canadian Forces Superannuation Act*, R.S., 1985, c.C-17, the *Defence Services Pension Continuation Act*, 1970, c.D-3, the *Royal Canadian Mounted Police Pension Continuation Act*, 1970, c.R-10, and the *Royal Canadian Mounted Police Superannuation Act*, R.S., 1985, c.R-11, the *Members of Parliament Retiring Allowances Act*, R.S., 1985, c.M-5, and that portion of pension payable to the *Canada Pension Plan Act*, R.S., 1985, c.C-8.

## APPENDIX B - DECLARATION/CERTIFICATIONS FORM (CONT'D)

### Former Public Servant in Receipt of a Pension

As per the above definitions, is the Proponent a FPS in receipt of a pension?

YES ( ) NO ( )

If so, the Proponent must provide the following information, for all FPS in receipt of a pension, as applicable:

- (a) name of former public servant;
- (b) date of termination of employment or retirement from the Public Service.

By providing this information, proponents agree that the successful Proponent's status, with respect to being a former public servant in receipt of a pension, will be reported on departmental websites as part of the published proactive disclosure reports in accordance with Contracting Policy Notice: 2012-2 and the Guidelines on the Proactive Disclosure of Contracts.

### Work Force Adjustment Directive

Is the Proponent a FPS who received a lump sum payment pursuant to the terms of a work force reduction program? YES ( ) NO ( )

If so, the Proponent must provide the following information:

- (a) name of former public servant;
- (b) conditions of the lump sum payment incentive;
- (c) date of termination of employment;
- (d) amount of lump sum payment;
- (e) rate of pay on which lump sum payment is based;
- (f) period of lump sum payment including start date, end date and number of weeks;
- (g) number and amount (professional fees) of other contracts subject to the restrictions of a work force adjustment program.

For all contracts awarded during the lump sum payment period, the total amount of fees that may be paid to a FPS who received a lump sum payment is \$5,000, including Applicable Taxes.

Solicitation No. - N° de l'invitation  
E0209-140619/A

Amd. No. - N° de la modif.  
File No. - N° du dossier

Buyer ID - Id de l'acheteur  
pwu909

Client Ref. No. - N° de réf. du client  
AAFC-E0209-140619

File No. - N° du dossier  
PWU-3-36168

CCC No./N° CCC - FMS No/ N° VME

## APPENDIX B - DECLARATION/CERTIFICATIONS FORM (CONT'D)

**Name of Proponent:** \_\_\_\_\_

### DECLARATION:

I, the undersigned, being a principal of the proponent, hereby certify that the information given on this form and in the attached proposal is accurate to the best of my knowledge. If any proposal is submitted by a partnership or joint venture, then the following is required from each component entity.

..... name	..... signature
..... title	
I have authority to bind the Corporation / Partnership / Sole Proprietorship / Joint Venture	
..... name	..... signature
..... title	
I have authority to bind the Corporation / Partnership / Sole Proprietorship / Joint Venture	
..... name	..... signature
..... title	
I have authority to bind the Corporation / Partnership / Sole Proprietorship / Joint Venture	

During proposal evaluation period, PWGSC contact will be with the following person: \_\_\_\_\_ E-mail: \_\_\_\_\_  
Telephone Number: ( ) \_\_\_\_\_ Fax Number: ( ) \_\_\_\_\_

This Appendix "B" should be completed and submitted with the proposal, but may be submitted afterwards as follows: if Appendix "B" is not completed and submitted with the proposal, the Contracting Authority will so inform the Proponent and provide the Proponent with a time frame within which to meet the requirement. Failure to comply with the request of the Contracting Authority and meet the requirement within that time period will render the proposal non-responsive.

Solicitation No. - N° de l'invitation  
E0209-140619/A

Amd. No. - N° de la modif.  
File No. - N° du dossier

Buyer ID - Id de l'acheteur  
pwu909

Client Ref. No. - N° de réf. du client  
AAFC-E0209-140619

File No. - N° du dossier  
PWU-3-36168

CCC No./N° CCC - FMS No/ N° VME

---

## APPENDIX C - PRICE PROPOSAL FORM

INSTRUCTIONS: Complete this Price Proposal Form and submit in a **separate sealed envelope** with the Name of Proponent, Name of Project, PWGSC Solicitation Number, and the words "PRICE PROPOSAL FORM" typed on the outside of the envelope. Price Proposals are not to include GST/HST.

PROPOSERS SHALL NOT ALTER THIS FORM

**Project Title: AAFC Lethbridge - Agronomy Building Fire Repairs**

**Name of Proponent:** \_\_\_\_\_

**The following will form part of the evaluation process:**

---

### REQUIRED SERVICES

- ♦ **Fixed Fee** (R1230D (2012-07-16), GC 5 - Terms of Payment)

<b>SERVICES</b>	<b>FIXED FEE</b>
Provision of the services described in the Terms of Reference including fees and disbursements as follows:	
.1 Design Service; to provide construction documents for review at 50%, 99%, 100% completion stages:	\$.....
.2 Tender Services - to assist the Departmental Representative: Not in Contract (Future Phase)	\$.....
.3 Construction Support Service: Not in Contract (Future Phase)	\$.....
.4 Resident Construction Service: Not in Contract (Future Phase)	\$.....
.5 Post Construction Service: Not in Contract (Future Phase)	\$.....
<b>TOTAL MAXIMUM FIXED FEES</b>	<b>\$.....</b>
<b>(All applicable taxes extra)</b>	

Solicitation No. - N° de l'invitation  
E0209-140619/A

Amd. No. - N° de la modif.  
PWU-3-36168

Buyer ID - Id de l'acheteur  
pwu909

Client Ref. No. - N° de réf. du client  
AAFC-E0209-140619

File No. - N° du dossier  
PWU-3-36168

CCC No./N° CCC - FMS No/ N° VME

**The following will NOT form part of the evaluation process**

Canada may accept or reject any of the following fees, disbursements and/or hourly rates. Canada reserves the right to negotiate on these fees, disbursements and/or hourly rates.

**THE FOLLOWING DAILY RATES MAY BE USED FOR FUTURE CONTRACT AMENDMENTS**

1. Daily travel rate including disbursements \$ \_\_\_\_\_ per day

**THE FOLLOWING HOURLY RATES MAY BE USED FOR FUTURE CONTRACT AMENDMENTS**

**Principals**

<b>Name</b>	<b>\$ per hour</b>
Senior Architect	\$.....
Senior Electrical Engineer	\$.....
Senior Mechanical Engineer	\$.....
Senior Structural Engineer	\$.....
Junior Architect	\$.....
Junior Electrical Engineer	\$.....
Junior Mechanical Engineer	\$.....
Junior Structural Engineer	\$.....
Draftsman	\$.....
Office Clerk	\$.....

**Staff**

<b>Name / Position</b>	<b>\$ per hour</b>
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

**END OF PRICE PROPOSAL FORM**

Solicitation No. - N° de l'invitation

E0209-140619/A

Amd. No. - N° de la modif.

File No. - N° du dossier

PWU-3-36168

Buyer ID - Id de l'acheteur

pwu909

CCC No./N° CCC - FMS No/ N° VME

AAFC-E0209-140619

---

## **General Procedures & Standards (Appendix D)**

**See PDF document attached**



# Architectural & Engineering Services

## TERMS OF REFERENCE

### Agronomy Building Fire Repairs

For:

Agriculture and Agri-Food Canada  
Lethbridge Research Center  
Lethbridge, Alberta

September, 2013



## Table of Contents:

<b>1</b>	<b>PROJECT DESCRIPTION</b>	<b>3</b>
1.1	GENERAL	3
1.2	BACKGROUND INFORMATION	3
1.3	SUMMARY OF DESIGN WORK	5
1.4	OBJECTIVES	5
1.5	SUMMARY OF SERVICES AND QUALIFICATIONS	6
1.6	SCHEDULE	7
1.7	COST	7
1.8	EXISTING DOCUMENTATION	7
1.9	CODES, ACTS, STANDARDS, REGULATIONS	8
<b>2</b>	<b>REQUIRED SERVICES</b>	<b>9</b>
2.1	GENERAL REQUIREMENTS	9
2.2	PROJECT REVIEW AND APPROVAL	9
2.3	DESIGN SERVICES	10
2.4	TENDER SERVICES: NOT IN CONTRACT (FUTURE PHASE)	12
2.5	CONSTRUCTION SUPPORT SERVICE: NOT IN CONTRACT (FUTURE PHASE)	13
2.6	COMMISSIONING SERVICE: NOT IN CONTRACT (FUTURE PHASE)	15
2.7	POST CONSTRUCTION SERVICE: NOT IN CONTRACT (FUTURE PHASE)	15
<b>3</b>	<b>PROJECT ADMINISTRATION</b>	<b>17</b>
3.1	GENERAL REQUIREMENTS	17
	<b>APPENDIX A</b>	<b>18</b>
	LETHBRIDGE RESEARCH CENTRE, AGRONOMY SERVICE BUILDING, FIRE DAMAGES REPORT	18



# 1 PROJECT DESCRIPTION

## 1.1 GENERAL

### 1.1.1 PURPOSE

.1 Public Works & Government Services Canada (PWGSC) requires the services of an architectural firm, acting as prime consultant together with a multi-disciplinary team of sub-consultants for the provision of service required for this project.

### 1.1.2 THE PWGSC GENERAL PROCEDURES AND STANDARDS DOCUMENT (GP&S)

- .1 The TOR document must be used in conjunction with the GP&S, as the two documents are complimentary.
- .2 The TOR describes project-specific requirements, services and deliverables while the GP&S document outlines with minimum standards and procedures common to all projects.
- .3 In the case of a conflict between the two documents, the requirements of the TOR override the GP&S Document.

### 1.1.3 PROJECT INFORMATION

Project Information	
Project Title:	Agronomy Building Fire Repairs
Project Address:	Lethbridge Research Center
Solicitation Number:	To be determined
PWGSC Project Number:	R.061700.001
PWGSC Contracting Officer:	Sylvia Mayhew
PWGSC Project Manager (Departmental Representative):	TBA

## 1.2 BACKGROUND INFORMATION

### 1.2.1 NEED & GOALS

- 1. Agriculture and Agri-Food Canada has identified a need to repair and redevelop the fire-damaged Agronomy Building.
- 2. The work is to be based on the “Fire Damages Report” dated March 2013 and prepared by Robert Elsworthy Architecture. See Appendix A.
- 3. The design will be for repairing and redeveloping the existing building, following the recommended modifications as identified in the “Fire Damages Report”.

### 1.2.2 USER DEPARTMENT

.1 The User Department referred to throughout the TOR is Agriculture and Agri-Food Canada.



### 1.2.3 EXISTING CONDITIONS

- .1 The main characteristics of the site are that a fire broke out during the week of November 6, 2012 and created extensive damage to one room in an existing structural steel frame building used for agriculture research projects and equipment / material storage. Smoke and heat damage occurred to adjacent rooms and connecting parts of the building.
- .2 AAFC statement of work is:
  - .1 Agronomy building is to contain a drying room, with mechanical drying equipment.
  - .2 Drying room is to be equipped with a fan, burner, distribution duct to cart and control, alarm system.
  - .3 Type of material being dried in drying room includes different types of wheat seed, beans and biomass.
  - .4 Drying temperature required is 35 degrees C. Seeds are damaged at higher temperature.
  - .5 An alarm is needed if drying temperature exceeds 40 degrees C, which would stop heating but keeping ventilation on.
  - .6 Drying room is to contain products for  $\pm$  one (1) week.
  - .7 Products are monitored and removed from drying room when dry.
  - .8 No product remains in drying room once dried during drying season.
  - .9 Drying room may contain up to 18 carts at a time on each side for a total of 36 carts per dryer
  - .10 Drying equipment is to be constructed from non-combustible material.

### 1.2.4 CONSTRAINTS AND CHALLENGES

- .1 The Consultant will be required to become familiar with the project site and obtain local information as required.
- .2 Agronomy Building is to be in service for the 2014 drying season.
- .3 Drying season is from June to November
- .4 All site visits must be arranged through the Departmental Representative.
- .5 Environmental conditions must be kept under control during all phases of the work.
- .6 The project scope must be tailored to meet the User Department's budget. Diligent cost estimating and cost control is required.
- .7 Consultant's key personnel must be available to respond to emergencies within 4 hours.

### 1.2.5 HAZARDOUS MATERIALS

- .1 Hazardous materials have been identified at this site through various audits of this building: See Fire Damages Report for list of existing hazardous materials.



- .2 The Prime Consultant is responsible for hiring a hazmat consultant as required to prepare a hazmat scope of work and specifications, which should be integrated into the Prime Consultant's construction documents. The Prime Consultant's hazmat consultant should also assist in the future tendering of the project and should carry-out site inspections and air quality monitoring during the hazmat abatement stage of the future demolition and construction phase.

#### **1.2.6 PROJECT DELIVERY APPROACH**

- .1 This project will use a traditional design-bid-build approach.
- .2 It is anticipated that one tender package will be required for this project:
- .3 The Consultant shall prepare the tender package and ensure full co-ordination of the work of all disciplines.

### **1.3 SUMMARY OF DESIGN WORK**

#### **1.3.1 DEMOLITION AND NEW CONSTRUCTION WORK**

- .1 The project requires design work to repair and redevelop the existing Agronomy Building, in its same function prior to fire damages.

### **1.4 OBJECTIVES**

#### **1.4.1 GENERAL GOALS**

- .1 Ensure the design is efficient and cost effective considering both initial cost and operation & maintenance costs over a life cycle of 25 years.

#### **1.4.2 FUNCTIONAL REQUIREMENTS**

- .1 The Functional Program accompanying this TOR defines User Department's functional requirements.

#### **1.4.3 DESIGN PERFORMANCE**

- .1 Provide a building that meets the functional needs of the User Department, as indicated in the functional program in the RFP.
  - .1 Responds to the operational and functional needs of the User Department.
  - .2 Meets or exceeds the requirements of the National Building Code.
  - .3 Will endure and remain serviceable for its unique purpose by:
    - .1 Incorporating suitable high quality materials into the design that are of quality, durable and are constructed with the best workmanship possible;
    - .2 Employing advanced systems and technologies to support contemporary operating requirements with capacity for growth and change;
    - .3 Fully integrating all components and systems, including architectural, structural, mechanical, electrical, IT, multimedia, and security design; and
    - .4 Welcomes access by visitors while respecting security requirements.
- .2 The building must:



- .1 Provide a healthy and safe working environment that meets or exceeds all codes for fire, health, and life safety, including the Canada Labour Code, that fully supports optimum work productivity;
- .2 Provide efficient and productive accommodations with planning configurations and workspaces that are flexible, functional, responsive and efficient in keeping with current PWGSC, Treasury Board, Health Canada and User Department Standards;
- .3 Fully integrate and optimize the performance of components and systems;
- .4 Embody contemporary sustainable design and application principles and is implemented in an environmentally responsible manner;
- .5 Be designed for ease of maintenance, with systems that can be accessed and easily repaired and / or replaced during the building's life cycle;
- .6 Provide physical security for occupants;
- .7 Allow capacity for growth and change, as indicated in the federal office standards;
- .8 Provide integration with User systems for security and information IT/MM services.

#### **1.4.4 PROJECT DELIVERY**

- .1 Deliver the project within the construction budget.
- .2 Deliver the project within the key milestones and according to the detailed project schedule.
- .3 Ensure that each Consultant team member understands the project requirements, for seamless delivery of the required services.
- .4 Ensure co-ordination of services with other consultants hired by PWGSC.

### **1.5 SUMMARY OF SERVICES AND QUALIFICATIONS**

#### **1.5.1 GENERAL SERVICES**

- .1 The prime consultant will provide a full consulting team including the following consultant services and specialties as required:
  - .1 Professional Architectural Services;
  - .2 Professional Engineering Services
    - .1 Civil Engineering;
    - .2 Structural Engineering;
    - .3 Mechanical Engineering;
    - .4 Electrical Engineering;
  - .3 Hazmat Consultant;
  - .4 Commissioning Specialist;
  - .5 Geotechnical Engineer;



- .6 Schedule Management Specialist;
- .7 Cost Estimating Specialist;

## 1.6 SCHEDULE

### 1.6.1 GENERAL

- .1 Deliver the project to be ready for occupancy in accordance with the project milestone listing identified below.
- .2 Completion dates shown are relative to an assumed start date of November 14, 2013.
- .3 Prepare a Project Schedule, in accordance with the milestone list.

### 1.6.2 ANTICIPATED MILESTONE DATES

Project Phase	Milestone Completion Date
Consultant Contract Award	November 14, 2013
Design Development	January 13, 2014
Construction Documents	March 12, 2014
Final Construction Documents	March 26, 2014
Construction Start (Future Phase)	To Be Determined
Substantial Completion of Construction (Future Phase)	To Be Determined
Commissioning, Final Inspection & Acceptance (Future Phase)	To Be Determined
Post Construction Warranty Evaluation (Future Phase)	To Be Determined

## 1.7 COST

### 1.7.1 CONSTRUCTION BUDGET

- .1 The construction estimate does not include Project Management fees, administration costs, Consultant fees, Risk Allowance, Escalation or GST and is in 'Budget-Year (Current)' dollars.

### 1.7.2 ESTIMATED CONSTRUCTION COST

- .1 The estimated construction cost (excluding GST), is anticipated at this time to be as follows:

Estimated Construction Cost	Budget-Year \$
Construction Cost (Maximum)	\$ See Appendix A
Construction Contingency (Maximum)	\$ See Appendix A
Construction Budget at time of tender	\$ See Appendix A

## 1.8 EXISTING DOCUMENTATION



### 1.8.1 AVAILABLE FOR THE CONSULTANT

- .1 Limited as-built drawings and Operation & Maintenance Manuals will be available on the project site and the Consultant will be responsible for verifying the accuracy of the information incorporated into the design.
- .2 The Consultant will be provided with AutoCAD scaled floor plans of the building if available.
  - .1 The drawings will require modifications by the Consultant.

### 1.8.2 DISCLAIMER

- .1 Reference information will be available in the language in which it is written.
- .2 The documentation may be unreliable and is offered, “as is” for the information of the Consultant.

## 1.9 CODES, ACTS, STANDARDS, REGULATIONS

### 1.9.1 GENERAL

- .1 A listing of Codes, Acts, Standards and Guidelines potentially applicable to this project are contained in the GP&S Document.
- .2 The Authorities Having Jurisdiction (AHJ) on this project are:
  - .1 The local AHJs;
  - .2 The Fire Protection Engineer of Labour Canada;
  - .3 Treasury Board of Canada.
- .3 The Consultant must identify, analyze and design the project in accordance with the requirements of all AHJs and all applicable Codes, Acts, Standards and Guidelines and Legislation.
  - .1 The applicability of various Codes, Acts, Standards and Guidelines listed in the GP&S document arise out of direct and indirect references in documents which apply to Federal buildings, such as the Canada Labour Code.
  - .2 The consultant team must be fully versed with the legislation and requirements that are unique to Federal Government buildings in Canada.
  - .3 The consultant team must be fully versed with the legislation and requirements that are unique to Federal Government projects tendered through Public Works & Government Services Canada.



## 2 REQUIRED SERVICES

### 2.1 GENERAL REQUIREMENTS

#### 2.1.1 SERVICES

- .1 Design Service; to provide construction documents for review at 50%, 99%, 100% completion stages:
- .2 Tender Services – to assist the Departmental Representative: Not in Contract (Future Phase)
- .3 Construction Support Service: Not in Contract (Future Phase)
- .4 Resident Construction Service: Not in Contract (Future Phase)
- .5 Post Construction Service: Not in Contract (Future Phase)

### 2.2 PROJECT REVIEW AND APPROVAL

#### 2.2.1 GENERAL

- .1 Comply with all applicable laws and regulatory requirements as required by the General Conditions of the Contract.

#### 2.2.2 FEDERAL GOVERNMENT

- .1 The federal authorities having jurisdiction over this project are:
  - .1 HRSDC for fire prevention engineering services and life safety;
    - .1 The purpose of this review is fire protection, health and life safety,
    - .2 Submission documents shall be in the following format: drawings and specifications,
    - .3 Submission will be reviewed at construction document stages, 50% and 99% completion,
    - .4 Expected turnaround time is 2 weeks, and
    - .5 For each review, provide one submission plus any follow-up submission.
  - .2 User Department for functional design;

#### 2.2.3 PWGSC REVIEWS, APPROVALS AND PRESENTATIONS

- .1 Project delivery team approval
  - .1 This includes both the PWGSC Professional & Technical Team reviews and User approval.
    - .1 The purpose of this review is technical quality assurance.
    - .2 Submissions will be reviewed at construction documents phase 50%, and 99%.
    - .3 Expected turnaround time is 2 weeks.
    - .4 For each review, provide one submission plus any follow-up submissions.

#### 2.2.4 PROVINCIAL, TERRITORIAL AND MUNICIPAL AUTHORITIES



- .1 The federal government generally defers to provincial and municipal authorities for specific regulations, standards and inspections but in areas of conflict, the more stringent authority prevails.
- .2 Municipal authority review
  - .1 The purpose of this review is information and awareness;
  - .2 Submission documents shall be in the following format: drawings and specifications;
  - .3 Submission will be reviewed at construction documents at 99% completion;
  - .4 Expected turnaround time is 2 weeks.
  - .5 For each review, provide one submissions plus any follow-up submission.

## **2.3 DESIGN SERVICES**

### **2.3.1 GENERAL**

- .1 The objective of this stage is to translate the Fire Damages Report findings into a design and construction drawings and specifications for the purpose of tendering.
- .2 The Consultant must obtain written authorization from the Departmental Representative before proceeding with Construction Documents.
- .3 Prepare one tender package; co-ordinate with all disciplines.

### **2.3.2 SCOPE AND ACTIVITIES**

- .1 Create construction documents in accordance with the General P&S Document,
  - .1 Design according to the budget and schedule,
    - .1 Non-compliances will require revisions to the contract documents.
  - .2 Update the cost estimates
    - .1 Provide a cost breakdown by unit rate and/or trade for review of bids and comparison with the successful Contractor's cost breakdown.
  - .3 Update the project schedule
  - .4 Establish a quality control process for the construction and contract administration stage
- .2 The Consultant shall:
  - .1 Coordinate the work of various disciplines, including scope changes required to remain within budget;
  - .2 In consultation with Departmental Representative, approve construction materials, processes and specifications considering sustainability and commissioning;
  - .3 Apply a process of continuing cost control, with increasing level of detail during production of contract/construction documents;
    - .1 At each review, prepare an up-to-date estimate demonstrating compliance with the Construction Cost Plan,
    - .2 Non-compliances will require revisions to the contract documents,



- .4 Prepare a Class A cost estimate at the pre-tender phase, using 100% measured quantities;
  - .1 Provide a cost breakdown by trade for review of bids and comparison with the successful Contractor's cost breakdown.
- .5 Advise Departmental Representative and resolve issues FHBRO, NCC or other governmental authority officials raise, and adjust Construction Documents as required;
- .6 Provide written response to PWGSC comments at 50%, 99% and 100% completion review stages and integrate comments into final construction documents;
- .7 Participate in the risk management process;
- .8 Update Project Log tracking approved major decisions;
- .9 Update the schedule;
- .10 Establish quality control process for construction and contract administration phase;
- .11 Provide commissioning specifications, PI/PV forms, training plans and integrated systems testing; include PI/PV forms within applicable sub-sections of the specifications.

### 2.3.3 DELIVERABLES

- .1 50% complete Construction Documents.
  - .1 A Class "B" Estimate
  - .2 An updated project schedule
  - .3 Construction Drawings
    - .1 Drawings should reflect 50% completeness with all Plan, Elevation, Details, and Sections shown.
  - .4 Specifications
    - .1 Index to specifications
    - .2 Draft Division 1 including draft Commissioning Sections.
- .2 99% complete Construction Documents, fully coordinated as if ready for tender.
  - .1 This submission incorporates all revisions required by the review of the previous submission.
  - .2 The Consultant shall submit documents to the PWGSC Departmental Representative.
  - .3 The submittal shall include:
    - .1 A Class "A" Estimate
    - .2 An updated project schedule
    - .3 Construction Drawings



- .1 Drawings should reflect 99% completeness with a complete design without any unfinished details.
- .4 Complete Specifications.
  - .1 Specifications should be complete with all sections and thoroughly coordinated with the Drawings.
  - .5 Response to PWGSC written comments of previous submittal.
- .3 Final (100%) Construction Documents ready for tendering.
  - .1 This submission incorporates all revisions required by the review of the previous submission.
  - .2 The Consultant shall submit documents to the Departmental Representative, HRSDC, local municipality, or any other Authority having jurisdiction:
  - .3 The submittal shall include:
    - .1 Signed and sealed documents.
    - .2 An updated Class 'A' cost estimate.
    - .3 An updated project schedule
    - .4 Construction Drawings & Specifications
      - .1 As per the General P&S Document..
    - .5 Response to PWGSC written comments of previous submittal
    - .6 Advise the Departmental Representative of all issues raised by other officials and all Consultants' responses.
  - .4 The Consultant must confirm in writing that:
    - .1 The documents are ready to be issued for tender;
    - .2 The checklist in the GP&S Document has been reviewed in concert with the requirements of the Consultant Agreement; and
    - .3 A full review and coordination of the Contract Documents are complete and in accordance with professional standard of care.

## **2.4 TENDER SERVICES: NOT IN CONTRACT (FUTURE PHASE)**

### **2.4.1 GENERAL**

- .1 The object of this phase is to support the Departmental Representative with the tender.
- .2 The Contract Authority for this project is the Real Property Contracting branch (RPC) of PWGSC.

### **2.4.2 SCOPE AND ACTIVITIES**

- .1 When requested, the Consultant will be required to;
  - .1 Provide the Departmental Representative with information required by bidders to interpret construction documents.



- .2 Prepare addenda, in response to all questions within two (2) business days during the bidding period and submit to Departmental Representative,
- .3 Attend pre-tender site visits,
- .4 If PWGSC decides to re-tender the project, or any specific tender package, provide full services to the Departmental Representative,
- .5 During Bid Review and Analysis, assist the Departmental Representative, as required, by analyzing and reconciling any differences between pre-tender estimates and submitted bids.

## **2.5 CONSTRUCTION SUPPORT SERVICE: NOT IN CONTRACT (FUTURE PHASE)**

### **2.5.1 GENERAL**

- .1 The object of this phase is to support the Departmental Representative with the construction phase and ensure the quality, budget and schedule of the project.

### **2.5.2 SCOPE AND ACTIVITIES**

- .1 The Consultant shall:
  - .1 Share all project information with PWGSC.
    - .1 All material specifications, mixes and test results shall be turned over to the Departmental Representative for future maintenance by PWGSC and others
    - .2 This service is required for each construction package developed.
  - .2 For General Services
    - .1 Provide one (1) copy of reviewed shop drawings.
    - .2 Prepare record drawings and specifications based on Contractor's as-builts;
    - .3 Update Project Log tracking approved major decisions, including those impacting project scope, budget and schedule,
    - .4 Prepare and issue a communications protocol and a shop drawing review protocol in consultation with the Departmental Representative
  - .3 For Site Visits
    - .1 Provide bi-weekly field reviews and as required to fulfil the Consultant's professional obligations to monitor the construction activities throughout the construction period and keep Departmental Representative informed of work progress,
      - .1 Reject unsatisfactory work,
      - .2 Provide written reports.
  - .4 For Construction & contract administration
    - .1 Provide Time Management Report, based on Contractor's submissions and on-site performance
    - .2 Provide additional drawings to clarify, interpret or supplement Construction Documents,



- .3 Interpret contract documents as required,
- .4 Assist the Departmental Representative to prepare Certificate of Substantial Completion and provide sign-off,
- .5 Arrange construction meetings, update Master Schedule, obtain detailed cost breakdown from the contractor, ensure compliance with labour laws and bylaws, , provide construction inspection services, provide clarifications, measure work, provide detail drawings and examine shop drawings, monitor training,
- .6 Review work at regular intervals to determine conformity with the contract documents and keep Departmental Representative informed of work progress,
- .7 Review and comment on various documents such as Contractor's Progress Claims and updated schedules,
- .8 Monitor performance of the Contractor,
- .9 Offer timely technical advice time on all disputes and claims between PWGSC and the Contractor,
- .10 Conduct inspections and reject unsatisfactory work,
- .11 Authorize special tests, inspections and minor works that do not impact project cost and schedule,
- .12 Furnish supplemental instructions to the Contractor with reasonable promptness or in accordance with a schedule for such instructions agreed to by PWGSC and the Contractor,
- .13 Determine the amounts owing to the Contractor based on work progress, and certify payments to the Contractor and
- .14 Provide Post-Construction Evaluation report.
- .5 Permits
  - .1 Assist the Contractor and provide required documentation in order to obtain the building permit.
- .6 For cost services:
  - .1 Assist the Construction team with cost management advice, if requested;
  - .2 Evaluate change orders; claims, work completed and cash flow.
  - .3 After issue of contract provide details for evaluating the project's cost performance and
- .7 For Scheduling Services:
  - .1 Report Review contractor's monthly schedule report; report findings and recommendations to the PWGSC for further discussion with the Contractor.
- .8 For Changes to the work:
  - .1 Assist the Departmental Representative to prepare CCN's and COs, to be issued by the Departmental Representative.



- .9 Assist the Departmental Representative to prepare Certificate of Final Completion and provide sign-off.

## **2.6 COMMISSIONING SERVICE: NOT IN CONTRACT (FUTURE PHASE)**

### **2.6.1 GENERAL**

- .1 The purpose of the Commissioning Service is to ensure that a fully functioning project is delivered to the Client.

### **2.6.2 SCOPE AND SERVICES**

- .1 Integrated and comprehensive commissioning for the project in accordance with the requirements in the P&S document,
- .2 The project will be accepted and the Certificate of Substantial Completion will be issued only after:
  - .1 Successful completion of integrated systems tests, life safety support systems tests and after meeting all requirements of the authority having jurisdiction
  - .2 All test certificates, commissioning reports and commissioning documentation have been approved by the Departmental Representative
- .3 During the Construction Phase:
  - .1 Monitor and report on contract commissioning activities,
  - .2 Review and certify verification sheets as they are completed by the contractor, and
  - .3 Review commissioning schedule
  - .4 Witness all component, system and integrated systems tests,
  - .5 Review and comment on commissioning test results,
  - .6 Provide advice and recommendations for fine tuning,
  - .7 Finalize the Design Intent Report and Client / Users O&M Manual to reflect as-commissioned operation and maintenance of each system,

### **2.6.3 DELIVERABLES**

- .1 Commissioning Plan,
- .2 Commissioning Specifications in Div 01,
- .3 CV Sheets to be executed by the Contractor,
- .4 PVT Sheets to be executed by the Contractor,
- .5 Reviewed and Accepted Commissioning (Evaluation) Report.

## **2.7 POST CONSTRUCTION SERVICE: NOT IN CONTRACT (FUTURE PHASE)**

### **2.7.1 GENERAL**

- .1 The purpose of this phase is to support the Departmental Representative in obtaining all final documents required for project close out.

### **2.7.2 SCOPE AND ACTIVITIES**



- .1 Project Close-out Services
  - .1 Revise documentation to reflect all changes, revisions and adjustments after completion of commissioning
  - .2 Prepare record drawings and specifications based on Contractor's as-builts;
  - .3 Prepare and submit Final Certificate of Completion and final records.
  - .4 Review the Operations and Maintenance Manual.
  - .5 Review the integrated Commissioning Manual.
  - .6 Participate in Lessons Learned workshops if requested
- .2 Warranty Services
  - .1 Monitor and certify rectification of deficiencies before expiry of warranties
  - .2 Monitor environmental and life safety system checks to be carried out by Contractor/O&M staff before expiration of warranties
  - .3 Sign off on the Final Completion of the construction contract,
  - .4 Participate in warranty inspections with *Departmental Representative* and Contractor
  - .5 Provide warranty deficiency list,
  - .6 Provide Final Warranty Review report.

### 2.7.3 DELIVERABLES

- .1 Warranty Deficiency List
- .2 Final Certificate
- .3 As-Built and Record Drawings and As-Built Specifications.
- .4 Comments to O&M Manual
- .5 Signed final Commissioning Manual
- .6 Sign-off on Warranty



## **3 PROJECT ADMINISTRATION**

### **3.1 GENERAL REQUIREMENTS**

#### **3.1.1 PWGSC PROCEDURES AND STANDARDS**

.1 In addition to adhering to the general project administration requirements contained in section 2 of the GP&S document, the Consultant shall comply with the project specific requirements in this section.

#### **3.1.2 LANGUAGE**

.1 [No variation]

#### **3.1.3 MEDIA**

.1 [No variation]

#### **3.1.4 PROJECT MANAGEMENT**

.1 [No variation]

#### **3.1.5 LINES OF COMMUNICATION**

.1 [No variation]

#### **3.1.6 MEETINGS**

.1 [Define frequency and location and type of meetings]

#### **3.1.7 CONSULTANT RESPONSIBILITIES**

.1 [No variation]

#### **3.1.8 PWGSC RESPONSIBILITIES**

.1 [No variation]

#### **3.1.9 USER DEPARTMENT RESPONSIBILITIES**

.1 [No variation]

#### **3.1.10 REVIEW AND APPROVAL BY PROVINCIAL AND MUNICIPAL AUTHORITIES**

.1 [No variation]

#### **3.1.11 BUILDING PERMITS AND OCCUPANCY PERMITS**

.1 [No variation]

#### **3.1.12 TECHNICAL AND FUNCTIONAL REVIEWS**

.1 [No variation]



## APPENDIX A

### LETHBRIDGE RESEARCH CENTRE, AGRONOMY SERVICE BUILDING, FIRE DAMAGES REPORT



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

# Lethbridge Research Centre Agronomy Service Building Fire Damages Report



Prepared for  
Public Works and Government Services Canada  
April 2013  
PWGSC No. PWU-2-35374



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

## **TABLE OF CONTENTS**

### ***1.0 EXECUTIVE SUMMARY***

### ***2.0 INTRODUCTION***

Objectives  
Site and Building Description  
Terms of Reference  
Building Code Analysis  
Interior Finishes  
Cost Estimate

### ***3.0 INVESTIGATIVE METHODOLOGY***

### ***4.0 CONCLUSION***

### ***5.0 APPENDIXES***

Appendix A: Ballast Environmental Consulting Ltd. Environmental report  
Appendix B: MPE Engineering Ltd. Mechanical and Electrical report  
Appendix C: KTA Structural Engineers Ltd. Structural report  
Appendix D: Swan Roofing Consultants (Southern) Ltd. Roofing report  
Appendix E: Letter to Authority Having Jurisdiction  
Appendix F: Building Plans  
Appendix G: KBK Cost Consulting Inc. "D" Cost Estimate  
Appendix H: Project Photographs  
Appendix I: Project Schedule



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

## **1.0 EXECUTIVE SUMMARY**

In the early morning hours of November 6<sup>th</sup>, 2012 a fire broke out in the Agronomy Building at the Lethbridge Research Centre. The fire triggered the fire alarm in the building and was relayed directly to the local fire department. This enabled a rapid response that helped to confine the extent of the fire and damage mostly to the north wing. The fire started in the dryer room and this room suffered the greatest heat and as a result, suffered the greatest damage as structural elements were compromised. This room itself is located in the northern wing of the Agronomy Building which is a steel pre-engineering building constructed in the 1990's.

In February of 2013 Robert Elsworthy Architecture (REA) was retained by Public Works and Government Services Canada as prime consultant to lead a formal assessment of the fire damage and to evaluate options for repair. The assessment team includes Ballast Environmental Consulting Ltd. for hazardous materials assessment, KTA Structural Engineering for structural assessment, MPE Engineering for mechanical and electrical assessments, KBK Cost Consultant for costing and Swan Roofing for the roofing inspection.

The hazardous material assessment as undertaken by Ballast Environmental did not find any extensive hazardous material. They did find localized asbestos in rooms 102, 105 and 107 plus minor amounts of other hazardous material. These must be handled in a proper manner as described in the Environmental report. Specifically, an asbestos management plan be implemented.

After several site visits and in-depth review of the damages, it is the conclusion of the assessment team that the fire damages can be addressed through a partial demolition and reconstruction of the building. The majority of the fire damage is located within the Drying Room in the southeast corner of the north wing of the Agronomy Building, abutting the one storey refrigerated seed storage in the central wing. The mechanical and electrical systems throughout the north wing were extensively damaged. The entire system from heaters, fans, controls, dusting etc. must be replaced. The structural beams, purlins and steel cladding of the south wall will require complete replacement.

The concrete block wall that separated the drying room from the rest of the northern wing has suffered extensive smoke damage and some damage to the concrete block could be observed. Since these concrete block walls are not load bearing, it may not be necessary to demolish and replace these concrete block walls based on structural assessment by KTA. However, given that the entire structural bay needs to be rebuilt, it may be easier to rebuild all the effected structural elements by demolishing and then rebuilding the interior concrete block walls after the new structural elements are in place.

No visible damage to the existing concrete slab floor in the drying room was observed.

The heat from the fire has also caused damage to the roofing system of the one storey, refrigerated seed storage in the central wing just to the south of the drying room. The roof assembly of the seed storage area must be removed and rebuilt to ensure the integrity of the storage room.

The structural portion of the north wing in the fire room will require replacement as laid out in the structural report. (Appendix C) The entire mechanical and electrical system must also be replaced as they were damaged beyond repair.

Also included in this report is a preliminary Class "D" cost estimate of the demolition and repair work based on the assessment done to date as per request of Public Works and Government Services Canada.

This report has been prepared for the sole benefit Public Works and Government Services Canada and may not be relied upon by any other party or person without the written consent of Robert Elsworthy Architecture. Any use by a third party of this report, or reliance or decisions based upon this report is the responsibility of such third party. Robert Elsworthy Architecture accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made, or actions taken, based upon this report.



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA  
1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

## 2.0 INTRODUCTION

Robert Elsworthy Architecture was retained by Public Works and Government Services Canada to undertake a review of the fire and the subsequent damage that it caused in the Agronomy Building located on the Lethbridge Research Centre campus. The fire occurred on November 6, 2012. The subject building, The Agronomy Building, is located in the Lethbridge Research Centre adjacent to highway #3 at 5403 1st Avenue S in the Country of Lethbridge

We obtained the services of the following other consultants to assist in this study and assessment.

1. Mechanical and Electrical: MPE Engineering Ltd
2. Structural: KTA Structural Engineers Ltd.
3. Environmental: Ballast Environmental Consulting Ltd
4. Roof inspection: Swan Roofing Consultants (southern) Inc.
5. Costing: KBK Cost Consulting Inc.

### OBJECTIVES

The purpose of the study is to identify any significant problems that could have an impact on the building as a result of the fire. We looked at the damage from the Structural, Mechanical, Electrical Architectural and Environmental viewpoints.

### Site and Building Description

The site is the Lethbridge Research Centre and the building is the Agronomy Building which is located to the northeast of the main administration Building. The Agronomy building consists of three distinct parts; the centre portion, the main wing is of non-combustible construction of concrete block and precast portion and is a two story facility. The main axis of this central portion is running in an east west direction with the main entry on the west face towards the existing LRC service building. There are two wings; a north wing and a south wing. Both of these wings are of non-combustible construction and are constructed as a pre-engineered building of steel columns, steel girds and steel wall and roof panels. The fire occurred in the north wing in the southeast corner right adjacent to the concrete block wall of the seed storage room of the main wing.

### Terms of Reference

Robert Elsworthy Architecture undertook a building condition assessment of the Agronomy Building and the portion of the building as damaged by the fire. We looked at the fire damage and the implications of correcting same on the building as whole and the parts of the building specifically affected by the fire. The fire started in the pre-engineered north wing of the facility in the dryer room located in the southeast room of that wing. The fire was contained to that portion, but extensive damage was inflicted the rest of that pre-engineered north wing addition. The majority of the Mechanical and Electrical systems were damaged and made inoperative. The structure of the pre-engineered north wing was damaged especially at the south portion of the fire room. The room immediately adjacent to the fire room to the south; the seed storage room had damage to the roofing system and damage to the concrete block separating it from the fire room. Some of the concrete blocks may require replacement as well as a new roof system for the seed storage room.

P L A N N I N G • D E S I G N • P R O G R A M M I N G

## BUILDING CODE ANALYSIS

The building houses offices and laboratories and thus classified as both “D” *Business and personal services occupancies* and “F-2” *Medium-hazardous industrial occupancies*.

The building has the following characteristics and properties:

AREA	1557.69SM
STORIES	TWO
STREETS	THREE
CONSTRUCTION	NON-COMBUSTIBLE
SPRINKLERED	NON SPRINKLERED
OCCUPANCY	“D” & “F-2”

The 2006 Alberta Building Code is the code in effect at the time of this analysis and will be used as the authority for this review. The ABC requires that if any portion of the building is upgraded, then the Authority Having Jurisdiction may require that the entire building be upgraded to the latest edition of the Building Code in effect at that time. The results of the Building Code Analysis are as follows:

### Group “D” occupancy (Business services)

Based upon the above, the building falls under article 3.2.2.53

This clause allows the building to be of combustible or non-combustible construction with floors and roof with a 45 minutes Fire Rating if of combustible construction.

### Group “F-2” occupancy (Industrial)

Based upon the above, the building falls under article 3.2.2.69

Maximum building area allowed is 1500 SM

This article requires that the entire building be sprinklered to be compliant. It could also require resolution of the other outstanding code related items with the building. They could include resolution of the existing dead-end corridor, resolution of the interconnected floor space, non-fire rated exit stairs and other items.

### Options to resolve the Building Code concerns

- A. Sprinkler and upgrade the existing building to meet the latest edition of the Alberta Building Code.

To make the entire building compliant with the ABC, the total building must be sprinklered. This will most likely require a new larger water service (minimum 6”) plus a possible fire pump room and a complete new fire alarm system. The existing dead end corridor on the second floor must also be resolved. We would recommend that a new entry stair be located at the east end of the second floor providing an exit through the south wing to the exterior. The hoistway must be separated from the adjacent occupancies by fire rated walls and fire rated doors. The estimated cost of this option is outlined in the cost report.

- B. Install a Firewall to separate the north wing (fire damaged wing) from the remainder of the building.

We are recommending that a fire wall solution be pursued as a possible solution to resolve this problem. The south portion of the building, the seed storage room, the two story office and the south pre-engineered addition is to become one building. The wing wherein the fire occurred, the north addition, is to become another building. This is to be accomplished by constructing two 2-hour firewalls. The north wall of the seed storage room is to have the north wall (concrete block) extended up past the

roof of the north building to form a 2-hour fire wall with a 150 mm parapet as required by article 3.1.10.4. We are also proposing that the south wall of the north wing be rebuilt as per the structural recommendation and it be treated with a fire rated spray-on system, similar to ULC assembly ULC W800, W801, W802, or W803 to achieve a 2-hour fire rated wall assembly. Thus we are providing two 2-hour fire rated walls as per article 3.1.10.1. Both of these walls will be designed to be independent of each other such that the collapse of one wall assembly in either building will not cause the collapse of the other.

We have met with the Authority Having Jurisdiction and they concur with the two options presented above. Refer to the letter to same as found in appendix "E"

**Interior finishes**

The fire, heat and smoke have damaged the entire north wing and will require all surfaces to be cleaned and refinished.

The existing concrete slab is in fairly good condition and requires only cleaning and a good wash.

The walls and the ceiling will require extensive cleaning to remove all smoke damage and soot. The cleaned walls and ceiling should be painted to provide a good level of finish for ongoing maintenance to enhance the new lighting system that must be installed.

**Cost Estimate**

As part of our mandate, we have undertaken an estimate of the construction cost for the work to restore this facility to its pre-fire operating condition and to meet the requirements of the 2006 ABC.

Option A	
Sprinkler the entire building and upgrade to meet 2006 ABC	\$850,000.00
Option B	
Develop 2 2-hour rated fire walls to create 2 separate buildings	\$405,000.00

We have not included any process equipment replacement in the cost estimate.



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

### **3.0 INVESTIGATIVE METHODOLOGY**

Two main investigative methods were used to assess the fire damages in the drying room and surrounding area. The first is sampling and laboratory testing of the various component of the existing Agronomy Building by Ballast Environmental for hazardous materials such as asbestos, PCBs and mercury.

The second method used is a detailed visual inspection of the damaged area both in person and through high resolution photo images captured during the various site visits. Because structural steel loses its load bearing capacity at the same time it bends and deforms due to heat stress, it was determined that the initial architectural and structural assessment will be based primarily on visual inspections.

Further destructive laboratory testing of the structural elements will be used if there are any concerns regarding the bearing capacity any critical structural elements that cannot be resolved visually. This is done both to expedite the assessment process and to ensure the cost of the assessment process is within the budget allotted by Public Works and Government Services Canada.

Several independent site visits were taken by REA and the Consultants to assess the fire damages in February and March of 2013. The architectural, structural, mechanical/electrical, and environmental assessments were all done independent of each other in order to ensure integrity of the assessments. It is only at the compilation of the final report were all the individual assessments brought together for final comparison and analysis.

The original independent reports by all the consultants can be found in the appendixes at the end of this report.

In the end it was determined that no destructive testing of structural elements was required as the deformation of the structural elements or the lack of deformation were clearly visible to the naked eye.

Architectural and structural assessments were done under both under the natural daylight and with the aid of high powered artificial lights before and after the interior wall finishes were partially removed to reveal the structural elements within the wall and roof assembly.



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA  
1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

#### **4.0 CONCLUSION**

The fire of early November 2012 caused extensive damage to the north wing of the Agronomy building.

The environmental assessment did not find any extensive amounts of asbestos or other materials in the north and only minor concerns in the south part of the building.

The fire also caused extensive damage to all of the mechanical and electrical components and equipment such that none of it is salvageable. The entire mechanical and electrical components must be replaced.

The structural elements on the south wall, the adjacent roofing support purlins and the beams and girds on the east wall and the roof over the fire room will require replacement.

The fire also damaged the roof of the seed storage room immediately south of the fire room. This roof must be replaced.

We, as part of our mandate, identified the life safety concerns that the existing building does present. We have presented 2 options to rectify the life safety concerns and have confirmed both solutions are acceptable with the Authority Having Jurisdiction.

It is our recommendation that Option B: Install a Firewall to separate the north wing (fire damaged wing) from the remainder of the building, to rectify the life safety concerns.



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

# ***APPENDIXES***



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

## ***APPENDIX A***

# Ballast Environmental Consulting Ltd. Environmental Report

**HAZARDOUS MATERIALS ASSESSMENT  
LETHBRIDGE RESEARCH CENTRE'S AGRONOMY BUILDING**



Prepared for:  
**Robert Elsworthy Architecture**  
1427 Ranchlands Road NW  
Calgary, AB T3G 1N2  
Tel: (403) 714-2097



Prepared by:  
Ballast Environmental Consulting Ltd.  
212 Initiative Avenue SE  
Calgary, AB T3S 0B7  
Tel: 403-452-3110  
Fax: 403-452-3133  
[www.ballastenvironmental.com](http://www.ballastenvironmental.com)  
March 6, 2013  
File No. 13240

## TABLE OF CONTENTS

TABLE OF CONTENTS .....	i
EXECUTIVE SUMMARY .....	iii
1.0 INTRODUCTION .....	1
1.1 STUDY OBJECTIVES .....	1
1.2 SCOPE OF WORK .....	1
1.3 SITE DESCRIPTION .....	1
2.0 METHODOLOGY .....	2
2.1 HEALTH AND SAFETY .....	2
2.2 ASBESTOS-CONTAINING MATERIALS (ACM) .....	2
2.3 LEAD PRODUCTS .....	3
2.4 POLYCHLORINATED BIPHENYLS (PCB) .....	4
2.5 MERCURY .....	4
2.6 OZONE-DEPLETING SUBSTANCES (ODS) .....	4
2.7 RADIOACTIVE MATERIALS .....	4
2.8 MISCELLANEOUS CHEMICALS .....	4
2.9 MOULD .....	4
2.10 OTHER .....	4
3.0 SAMPLING SITE: AGRONOMY BUILDING .....	5
3.1 SCOPE OF WORK .....	5
3.2 SITE DESCRIPTION .....	5
4.0 RESULTS .....	5
4.1 ASBESTOS-CONTAINING MATERIALS (ACM) .....	5
4.2 LEAD PRODUCTS .....	7
4.3 POLYCHLORINATED BIPHENYLS (PCBs) .....	8
4.4 MERCURY .....	9
4.5 OZONE-DEPLETING SUBSTANCES (ODS) .....	9
4.6 RADIOACTIVE MATERIALS .....	10
4.7 MISCELLANEOUS CHEMICALS .....	10
4.8 MOULD .....	10
4.9 OTHER .....	10
4.10 SUMMARY OF RESULTS FOR THE AGRONOMY BUILDING .....	11
4.11 ASSESSING RISK EXPOSURE FOR ASBESTOS .....	11
4.12 CONCLUSIONS .....	14
4.13 RECOMMENDATIONS .....	15
5.0 LIMITATIONS .....	18



## LIST OF TABLES

Table 1: Summary of ACM Findings for the Agronomy Building	iii
Table 2: Asbestos Analysis Results Summary for the Agronomy Building	6
Table 3: Lead in Paint Analysis Results Summary for the Agronomy Building	8
Table 4: Location of Fluorescent Bulb Fixtures	9
Table 5: ODS Results Summary for the Agronomy Building	9
Table 6: Miscellaneous Chemicals Summary for the Agronomy Building	10
Table 7: Hazardous Materials Summary for the Agronomy Building	11
Table 8: ACM Risk of Exposure and Control Required	14
Table 9: Extent of ACM and Recommendations for the Agronomy Building	15

## APPENDICES

### Appendix 1:

- 1a. Vicinity Map
- 1b. Site Map
- 1c. Detailed Room List of Construction Materials
- 1d. Site Sampling Diagram
- 1e. Photographic Log
- 1f. Laboratory Results

### Appendix 2: Reference Material

### Appendix 3: QA/QC Procedures

### Appendix 4: Acronym and Unit List



## EXECUTIVE SUMMARY

Ballast Environmental Consulting Ltd. (Ballast Environmental) was contracted by Robert Elsworthy Architecture to conduct a Hazardous Building Material Assessment at the Agriculture and Agri-Food Canada's Lethbridge Research Centre (LRC) Agronomy Building (Building 22) (Appendix 1b). The LRC is located adjacent Highway 3 at 5403 1 Ave S in Lethbridge, AB (Appendix 1a). The assessment was conducted February 19, 2013. The information obtained will be used for renovation and management purposes.

The hazardous materials assessment includes:

- Assessment and sampling of suspect materials which may contain asbestos and lead-based paint;
- Assessment of polychlorinated biphenyls (PCB), mercury, ozone-depleting substances (ODS), radioactive materials, mould; and
- Analysis and reporting of findings with recommendations.

### ASBESTOS

Table 1 details the asbestos containing material found (ACM) in the Agronomy Building.

Table 1: Summary of ACM Findings for the Agronomy Building

ACM	EXTENT	RECOMMENDATION*
Low Risk Abatement	Moderate Risk Abatement	High Risk Abatement
ACM Floor Tiles -red & brown 9" x 9" -light brown 12" x 12"	Estimated: 600 m <sup>2</sup>	Implement an Asbestos Management Plan

\*NOTE: any ACM materials must only be handled/abated by trained and experienced personnel.

Asbestos abatement must be carried out by qualified personnel who are experienced and trained in asbestos removal. Air monitoring and inspections must be completed during the abatement to ensure the safety of the abatement personnel and any unprotected persons in the area.

Maintenance staff, contractors and anyone working or entering the premises should be made aware of ACMs.

### PCBs

While all ballasts were retrofitted in 2004, all fluorescent light ballasts should be checked for PCBs at the time of removal using the most current version of Environment Canada publication: Identification of Lamp Ballasts Containing PCBs. Those that do contain PCBs must be handled, packaged and disposed of by the current regulations and personnel must be equipped with proper PPE.

### MERCURY

Fluorescent light tubes in the fluorescent light fixtures may contain varying amounts of mercury vapor, even newly purchased tubes/bulbs. There are many fluorescent tubes in the building. All fluorescent lights should be stored to protect from breakage and recycled accordingly.

Any mercury items should be recycled and disposed of according to current regulations.

### **OZONE-DEPLETING SUBSTANCES**

There were several ODS located throughout the building. Upon decommissioning or maintenance, the ODS units should be recovered/recycled by a qualified and experienced worker according to Ozone Depleting Substances and Halocarbons Regulations.

### **RADIOACTIVE MATERIALS**

There was no evidence of radioactive materials in the Agronomy Building.

### **MISCELLANEOUS CHEMICALS**

All miscellaneous chemicals need to be stored and disposed of according to current regulations and manufacturers recommendations.

### **MOULD**

Water damage and visible mould was observed on the north wall of room 107. Since the building is occupied, the mould-contaminated materials should be removed and/or cleaned.

### **OTHER**

Batteries were found in the Agronomy Building, and are located in emergency lights on the main floor. Also, two car batteries were found in room 123C. The batteries and electronic equipment should be collected and recycled at a proper facility as per the Recycling Council of Alberta at the time of decommissioning.

There were numerous appliances located throughout the building that should be collected and recycled at a proper facility as per the Recycling Council of Alberta at the time of decommissioning.

Two fume hoods were found in the lab on the main floor. The hoods may contain hazardous materials in, for example, the filter, where hazardous materials can be trapped. Location of the hoods was noted but no sampling was conducted. The filters in the fume hood should be treated as hazardous at the time of decommissioning.

**If any other suspect materials become exposed during renovation, the suspect materials should be tested.**

Procedures for hazardous materials identified in this report should be developed and communicated to anyone who may come in contact with these materials. Also, anyone who may come in contact with hazardous materials should be informed on how to identify where the hazards may be present and how to proceed if they observe any suspect materials.



## **1.0 INTRODUCTION**

Ballast Environmental Consulting Ltd. (Ballast Environmental) was contracted by Robert Elsworthy Architecture to conduct a Hazardous Building Material Assessment at the Agriculture and Agri-Food Canada's Lethbridge Research Centre (LRC) Agronomy Building (Building 22). The LRC is located adjacent Highway 3 at 5403 1 Ave South in Lethbridge, AB. The assessment was conducted February 19, 2013. The information obtained will be used for renovation and management purposes.

### **1.1 STUDY OBJECTIVES**

The study objective includes providing a Hazardous Materials Report as per the Terms of Reference with the following information included in the report:

- Site investigation, sample collection/location and laboratory analysis
- Assessing the degree of risk/health hazard to workers
- Estimating types, quantities and locations of hazardous materials and preparing a report in tabular format
- Specifying QA/QC procedures and laboratory investigation methodologies

### **1.2 SCOPE OF WORK**

The hazardous materials assessment includes:

- Assessment and sampling of suspect materials which may contain asbestos and Lead-based paint;
- Assessment of polychlorinated biphenyls (PCB), mercury, ozone-depleting substances (ODS), radioactive materials, mould; and
- Analysis and reporting of findings with recommendations.

The building assessed for this report was the Agronomy Building (Building 22).

### **1.3 SITE DESCRIPTION**

The subject site is located adjacent Highway 3 at 5403 1 Ave South in Lethbridge, AB. The site consists of one building, with three additions. This site was subject to a fire that occurred on February 19, 2013 in one room of a single story steel frame addition, which caused heat and smoke damage to adjacent rooms and the connecting building. The building and additions are addressed in this report. Refer to Appendix 1b for a site plan.

## 2.0 METHODOLOGY

A room-by-room inspection was completed in all accessible rooms. Samples were taken of materials suspected to contain asbestos and of paint suspected to contain lead. Sampling of asbestos materials follows the recommendations set out in the Alberta Asbestos Abatement Manual (October 2012), for bulk sampling. A visual survey was completed for polychlorinated biphenyls (PCB), mercury, ozone-depleting substances (ODS), radioactive materials and mould and/or water damage. Observations and sampling locations were documented and diagrams are provided in the appendices.

### 2.1 HEALTH AND SAFETY

All work carried out was consistent with a site-specific health and safety plan. A hazard assessment and a job task analysis was completed before the commencement of work and hazard controls were identified.

### 2.2 ASBESTOS-CONTAINING MATERIALS (ACM)

A room-by-room (where accessible) and systematic visual survey was conducted in order to identify materials which may contain asbestos. Suspect materials were sampled and the location, type, estimated amount and condition were documented. Homogenous materials such as drywall compound or ceiling tile were sampled in various locations within a building and composites were made from each sampling location because of the variable nature of asbestos in these substances. The asbestos testing was completed by International Asbestos Testing Laboratory (IATL) in Mt. Laurel, New Jersey using polarized light microscopy US Environmental Protection Agency (EPA) method 600/R-93/116, Method for the Determination of Asbestos in Bulk Building Materials (1993) for bulk samples.

Some samples were not repeated on a room-by-room basis if it was obvious that the subject material was the same. For example: drywall putty was tested several times in the Agronomy Building. The results from these samples apply to all areas with drywall. This type of extrapolation is site-dependent and is dependent on the material, amount, suspected date of installation, renovations, etc.

For homogenous material, bulk samples were collected based on the guidelines set out in the Alberta Asbestos Abatement Manual (October 2012). Generally, samples were collected as follows:

<90 m <sup>2</sup>	= 3 samples
90 – 450 m <sup>2</sup>	= 5 samples
>450 m <sup>2</sup>	= 7 samples

If anomalous results are encountered, a step-out procedure would be used to re-sample the material. This involved taking three additional samples, arranged in a triangle, around the area where the original sample was taken.

The following procedures were adhered to during sampling:

- The sampling was performed by a competent person
- Only the person sampling was in the area being sampled
- The material sampled was sprayed lightly with amended water
- Samples were collected carefully, trying not to disturb more material than necessary
- Any protective coverings that were disturbed were repaired/replaced/covered immediately
- Representative samples of all suspect materials were sampled, penetrating the entire depth of the material, and sampling was done at random locations (where accessible)
- Materials with different appearances were sampled separately
- Collected samples were placed into sealed, impervious containers and they were labeled as a laboratory sample and had a Workplace Hazardous Materials Information System (WHMIS) label on them
- The WHMIS label contained the following information:
  - Product identifier
  - The sample may contain asbestos
  - The statement "hazardous laboratory sample, for hazardous information and in an emergency call..." and provided an emergency telephone number
- Where appropriate, plastic drop cloths were used to collect any debris from sampling and any debris was vacuumed up using a vacuum equipped with a HEPA filtered exhaust or by wet wiping
- The sampler wore the appropriate half-mask respirator with P100 filters, disposable, impermeable coveralls, rubber boots, safety glasses and disposable nitrile gloves
- The gloves were changed for each sample
- All waste, including gloves, was placed in an appropriate bag labeled "Asbestos Waste"
- All tools and sampling equipment were decontaminated between samples and at the end of the day

## 2.3 LEAD PRODUCTS

Paint samples were taken from various locations and from various substrates. Every effort was made to remove the paint without removing the underlying substrate. Disposable, impermeable coveralls, rubber boots, disposable nitrile gloves and half-mask respirators with P100 filters were worn by the samplers. A razor scraper was used to scrape the paint from the substrate which was then placed in a plastic, re-sealable, labeled bag. The samples were shipped to the laboratory via courier as soon as possible. No preservation or refrigeration is required for the paint samples.

IATL tested for lead content using the ASTM D3335-85A Standard Method to Test for Low Concentrations of Lead in Paint by Atomic Absorption Spectrophotometry (2009). If any lead samples which contained greater than 0.5% lead by weight were found, they were submitted to ALS Environmental (Calgary) for toxicity characteristic leaching procedure (TCLP) as per landfill requirements.

Visual observations were made for other materials containing lead, such as emergency backup batteries.

## **2.4 POLYCHLORINATED BIPHENYLS (PCB)**

Generally, fluorescent light ballasts were noted. No ballasts were sampled or inspected.

## **2.5 MERCURY**

A visual survey was completed to identify and document the locations of any possible mercury-containing items such as fluorescent light tubes, thermostats, gauges etc.

## **2.6 OZONE-DEPLETING SUBSTANCES (ODS)**

Generally, a visual survey was completed and compressors, refrigerators, water coolers and air conditioning units were checked for labels, if present, specifying the refrigerant type used. The type and location of ozone-depleting substances or any unlabeled suspected ODS-containing items were noted.

## **2.7 RADIOACTIVE MATERIALS**

A visual survey was completed for radioactive material in smoke detectors and other potential sources.

## **2.8 MISCELLANEOUS CHEMICALS**

In general, a visual survey was completed and any miscellaneous chemicals, along with the location and estimated amount, were noted.

## **2.9 MOULD**

A visual survey was completed for mould and conditions which promote mould growth, such as water damage. If mould and/or water damage was encountered, the location, amount and potential source were noted.

## **2.10 OTHER**

A visual survey was completed and any possible sources of hazardous materials, along with the location and estimated amount, were noted.

### **3.0 SAMPLING SITE: AGRONOMY BUILDING**

The following are the results of the investigation at the Agronomy Building. Please refer to Appendix 1 for detailed room descriptions, vicinity and site maps, sampling diagrams, a photographic log and copies of the laboratory reports.

#### **3.1 SCOPE OF WORK**

The hazardous materials assessment includes:

- Assessment and sampling of suspect materials which may contain asbestos and lead-based paint;
- Assessment of polychlorinated biphenyls (PCB), mercury, ozone-depleting substances (ODS), radioactive materials and mould; and
- Analysis and reporting of findings with recommendations.

#### **3.2 SITE DESCRIPTION**

The Agronomy Building consists of the original building, constructed in the 1950's, and three additions were erected, the first being the east Seed Storage room in the 1960's, the second – the location of the fire - being in the 1980's, and the third in the 1990's. The original building has two floors (Main, and 2<sup>nd</sup>), containing offices, labs, lunch rooms, "middle room", washrooms and showers, a walk-in fridge for seed storage, a hoist lift connecting the first and second floor, and maintenance/mechanical rooms. The first extension, on the east side of the original building, contains the Seed Storage room. The second extension, on the north side of the original building, contains the initial fire location room, a sampling room, a garage and storage area, and several equipment storage rooms. The third extension, on the south side of the original building, contains a lab, a seed drying room, and a large seed storage area.

The exterior walls of the original Agronomy Building, east and south extensions consist of cinderblock and concrete, while the exterior of the north is made of galvanized metal, and concrete. The roof of the original building is tar while the extensions have galvanized metal roofs, and the interior ceilings are a galvanized metal/fiberglass, wood panels, drywall, concrete, and ceiling tile. Floors are primarily concrete, tile, plywood, or occasionally hardwood.

For a detailed list of the rooms and construction materials, refer to Appendix 1c.

### **4.0 RESULTS**

#### **4.1 ASBESTOS-CONTAINING MATERIALS (ACM)**

Twenty two samples (including two duplicates) of suspected ACM were collected and sent for analysis. Six of the samples were found to contain chrysotile asbestos. The results are contained in Appendix 1c and are summarized in the table below (Table 2).

Table 2: Asbestos Analysis Results Summary for the Agronomy Building

SAMPLE	COLOUR	DESCRIPTION	LOCATION (ROOM NUMBER/NAME, SAMPLING LOCATION)	CONDITION	RESULT* (ASBESTOS TYPE)
<b>A1</b>	<b>Marble brown</b>	<b>9"x9" floor tile</b>	<b>107, floor</b>	<b>Fair</b>	<b>1.1% (Chrysotile)</b>
<b>Dup 3 (A1)</b>	<b>Marble brown</b>	<b>9"x9" floor tile</b>	<b>107, floor</b>	<b>Fair</b>	<b>1.1% (Chrysotile)</b>
<b>A2</b>	<b>Marble red</b>	<b>9"x9" floor tile</b>	<b>107, floor</b>	<b>Fair</b>	<b>1.1% (Chrysotile)</b>
A3	White	Window glazing	107, window storage	Poor	None detected
<b>A4</b>	<b>Brown streak</b>	<b>12"x12" floor tile</b>	<b>105, floor</b>	<b>Good</b>	<b>10% (Chrysotile)</b>
A5	Marble white	12"x12" floor tile	103a, floor	Poor	None detected
A6	Marble white	12"x12" floor tile	103b, floor	Poor	None detected
A7	Black	Insulation	101, boiler	Good	None detected
<b>A8</b>	<b>Marble brown</b>	<b>9"x9" floor tile</b>	<b>102, floor</b>	<b>Fair</b>	<b>1.1% (Chrysotile)</b>
<b>Dup 2 (A8)</b>	<b>Marble brown</b>	<b>9"x9" floor tile</b>	<b>102, floor</b>	<b>Fair</b>	<b>1.1% (Chrysotile)</b>
A9	Marble red	9"x9" floor tile	102, floor	Fair	0.25% (Chrysotile)
A10	Brown speckle	12"x12" floor tile	Front foyer, floor	Good	None detected
A11	Brown speckle	12"x12" floor tile	Back entrance, floor	Fair	None detected
A12	Cream	Drywall mud	Back entrance, wall	Good	None detected
A13	Brown	Sheet linoleum	Hoist 2, floor	Good	None detected
A14	Cream	Drywall mud	2 <sup>nd</sup> floor back entrance, wall	Good	None detected
A15	Brown	Squares linoleum	201, floor	Good	None detected
A16	White	Drywall mud	201, wall	Good	None detected
A17	Grey	External mortar	Original building, north exterior	Good	None detected
A18	Grey	External mortar	Original building, south exterior	Good	None detected
A19	Grey	External mortar	Original building, east exterior	Good	None detected
A20	Grey	External mortar	Original building, east exterior	Good	None detected

**BOLD – over criteria\***

\* Criteria: ≥1% asbestos: asbestos-containing material as defined by the Alberta Asbestos Abatement Manual, Chapter 3, Updated October 2012. Vermiculite is positive for asbestos when asbestos is present in any amount.

Due to the size and amount of ACM possibly present on this site, representative sampling was conducted. It was not practical or necessary to sample every item which may be an ACM. If the representative samples test positive for asbestos, it is assumed that identical materials, which were not tested, are also positive. For example, the tile marble brown tile floor tested positive, therefore all marble brown tile floor are assumed to be positive for asbestos.

Below is a list of the types of materials sampled and the results for asbestos (# samples positive and/or # samples negative) in brackets.

Agronomy Building (22 asbestos samples):

- Marble brown floor tile, including 2 duplicates (4 positive)
- Marble red floor tile (1 positive, 1 negative)
- Brown streak floor tile (1 positive)
- White window glazing (1 negative)
- Marble white floor tile (2 negative)
- Black boiler insulation (1 negative)
- Brown speckle floor tile (2 negative)
- Cream drywall mud (2 negative)
- Brown sheet linoleum (1 negative)
- Brown squares linoleum (1 negative)
- White drywall mud (1 negative)
- Grey external mortar (4 negative)

The following is considered to be ACM (refer to Appendix 1 for room details, diagrams showing the sample locations, and a photographic log):

- The marble brown and marble red floor tile in rooms 102 and 107 contained up to 1.1% chrysotile asbestos.
- The brown streak floor tile in room 105 contained up to 10% chrysotile asbestos.

#### **4.2 LEAD PRODUCTS**

Eight (including two duplicates) representative samples were collected and placed into sealable containers for lead content analysis. Please refer to Appendices 1c, 1d, and 1f for a detailed description, a sampling diagram and copies of the laboratory reports. None of the samples tested contained 0.5% or greater lead by weight, therefore none are considered to be lead-based paints (Table 3).

Table 3: Lead in Paint Analysis Results Summary for the Agronomy Building

SAMPLE	COLOUR	LOCATION (ROOM NUMBER/NAME, SAMPLING LOCATION)	CONDITION	RESULTS (% LEAD BY WEIGHT)*
P1	Cream	Fire room, wall	Poor	0.12
P2	Gray	123E, floor	Fair	0.14
P3	Off white	Middle room, wall	Poor	0.21
P4	Cream/light green	Middle room, wall	Fair	0.033**
P5	Cream	107, wall	Poor	0.014
P6	White	Exterior seed room, wall	Fair	<0.0063
Dup 1 (P6)	White	Exterior seed room, wall	Fair	<0.0053
P7	Gray	Exterior seed room, wall	Fair	<0.0064

**BOLD – over criteria**

\* lead >0.5% by weight is considered to be lead-containing paint (Federal Hazardous Products Act)

\*\*Matrix/substrate interference possible. Sample results are not corrected for contamination by field or analytical blanks

\*\*\*Insufficient sample provided to perform QC re-analysis

Below is a list of the colours of paints sampled and the results (# samples negative for lead-based paint) in brackets.

Agronomy Building (8 paint samples):

- Cream, fire room (1 negative)
- Gray, 123E (1 negative)
- Off white, middle room (1 negative)
- Cream/light green, middle room (1 negative)
- Cream, room 107 (1 negative)
- White, exterior (1 negative)
- White, exterior duplication (1 negative)
- Gray, exterior (1 negative)

#### 4.3 POLYCHLORINATED BIPHENYLS (PCBS)

There were fluorescent light fixtures found throughout the entire building (Table 4). Fluorescent light ballasts may contain PCBs, but all were retrofitted in 2004 and thus PCB-free, so no ballasts were inspected.

Table 4: Location of Fluorescent Bulb Fixtures

(FLOOR/ROOM NUMBER OR NAME)	NUMBER OF FLUORESCENT BULB FIXTURES
Main/Front entrance	1
Main/Hall	6
Main/103a	1
Main/103b	1
Main/104	6
2 <sup>nd</sup> /Electrical room 2	2
2 <sup>nd</sup> /Hall	9
2 <sup>nd</sup> /202	6
2 <sup>nd</sup> /203	5
2 <sup>nd</sup> /204	2
2 <sup>nd</sup> /205	2
2 <sup>nd</sup> /207,209	4
2 <sup>nd</sup> /211	1

Hoist grease may also contain PCBs; however, it was not accessible for sampling.

#### 4.4 MERCURY

Fluorescent light tubes may contain varying amounts of mercury vapor, even newly purchased tubes/bulbs. Fluorescent tubes were ubiquitous throughout the Agronomy Building.

Thermostats suspected to contain mercury were not found in the Agronomy Building.

#### 4.5 OZONE-DEPLETING SUBSTANCES (ODS)

Several ODS were still present in the building. Table 5 outlines the ODS of concern.

Table 5: ODS Results Summary for the Agronomy Building

LOCATION (FLOOR/ROOM NUMBER OR NAME)	DESCRIPTION OF THE SYSTEM	TYPE OF ODS	ESTIMATED QUANTITY
Main/Seed storage	Refrigerator	R-404A <sup>^</sup>	14 kg
Main/Hoist room	Refrigeration/cooler	R-134A <sup>^</sup>	0.4 kg
2 <sup>nd</sup> /202	Refrigerator	R-48	4.9 oz
2 <sup>nd</sup> /203	Air conditioner	*	*
2 <sup>nd</sup> /204	Air conditioner	*	*
2 <sup>nd</sup> /206	Air conditioner	*	*
2 <sup>nd</sup> /210	Refrigerator	R-12	4.25 oz
2 <sup>nd</sup> /210a	Cooler	R-134A <sup>^</sup>	25 g

\* Unable to verify type and/or quantity

<sup>^</sup> Insignificant ozone depletion potential

The following is a summary of the ozone-depleting substances confirmed at the time of the assessment:

- There was 1 refrigerator which contained R-12.
- There was 1 refrigerator which contained R-48.
- There were three air conditioners in which access to the label was restricted.
- There were three refrigerator/coolers which contained R-134A and R-404A, but these refrigerants have insignificant ozone depletion potential.

#### 4.6 RADIOACTIVE MATERIALS

No objects suspected to contain radioactive materials were observed on the subject site.

#### 4.7 MISCELLANEOUS CHEMICALS

Miscellaneous chemicals were observed at the following locations (Table 6):

Table 6: Miscellaneous Chemicals Summary for the Agronomy Building

LOCATION (FLOOR/ROOM NUMBER OR NAME)	DESCRIPTION	ESTIMATED QUANTITY
Main/101	Miscellaneous chemicals	-
Main/110	Miscellaneous chemicals	-
Main/Hoist room	Miscellaneous chemicals	-
Main/Seed storage	Miscellaneous chemicals	-

#### 4.8 MOULD

Water damage and visible mould was observed on an area of cinder block (< 1 m<sup>2</sup>) on the north wall of room 107.

#### 4.9 OTHER

##### BATTERIES

Emergency lights on the main floor in the garage, seed storage, and sampling room. Car/lawnmower batteries (2) found on the main floor in room 123C.

##### ELECTRONICS

Various appliances (washer/dryers, microwaves, coffeemakers, vacuums, and televisions) and office equipment (photocopiers, computers, printers, and monitors) were observed throughout the building.

##### FIBERGLASS

Fiberglass insulation was found on the main floor in rooms 101 (pipe insulation), 107 (poking through crack between cinderblocks), 123C (roof), and in the second floor storage mezzanine above the main floor seed drying room and lab (pipe insulation).

## FUME HOODS

Two fume hoods were found in the lab on the main floor. The hoods may contain hazardous materials in, for example, the filter, where hazardous materials can be trapped. Location of the hoods was noted but no sampling was conducted.

## 4.10 SUMMARY OF RESULTS FOR THE AGRONOMY BUILDING

Table 7 is a summary of the hazardous materials identified in the Agronomy Building. Refer to Appendix 1d for the sampling location diagram and to Appendix 1e for photographs.

Table 7: Hazardous Materials Summary for the Agronomy Building

HAZARDOUS MATERIAL	ROOMS	ESTIMATED QUANTITY
ACM – floor tile	102, 105, 107	300 m <sup>2</sup>
Mercury - fluorescent light tubes	Throughout the building	-
ODS	Seed storage, hoist room, 206, 210, 210a, 202, 203, 204	-
Miscellaneous chemicals	Hoist room, Seed room, 101, 110	-
Mould	107	1 m <sup>2</sup>
Batteries	Main/Garage, Main/Sampling room, 123C	4
Electronics	Throughout the building	-
Fume hood filters	1 <sup>st</sup> floor lab	2

## 4.11 ASSESSING RISK EXPOSURE FOR ASBESTOS

There are eight major factors which assist in evaluating the condition of a particular asbestos installation.

The eight factors include:

1. Condition of Material
2. Water Damage
3. Exposed Surface Area
4. Accessibility
5. Activity and Movement
6. Air Plenum or Direct Air Stream
7. Friability
8. Asbestos Content

These factors have been put together in Figure 1 to allow for assessment to determine the degree of risk associated with existing asbestos. The parameters in Figure 1 and the associated Asbestos Risk Decision Tree Legend are applied to the ACM to derive a risk rating. These risk ratings are then compared to Table 8 to determine what type of action is required. The risk assessment method described in the Alberta Asbestos Abatement Manual (2012) is an acceptable risk assessment method as per the Alberta Occupational Health and Safety Act.

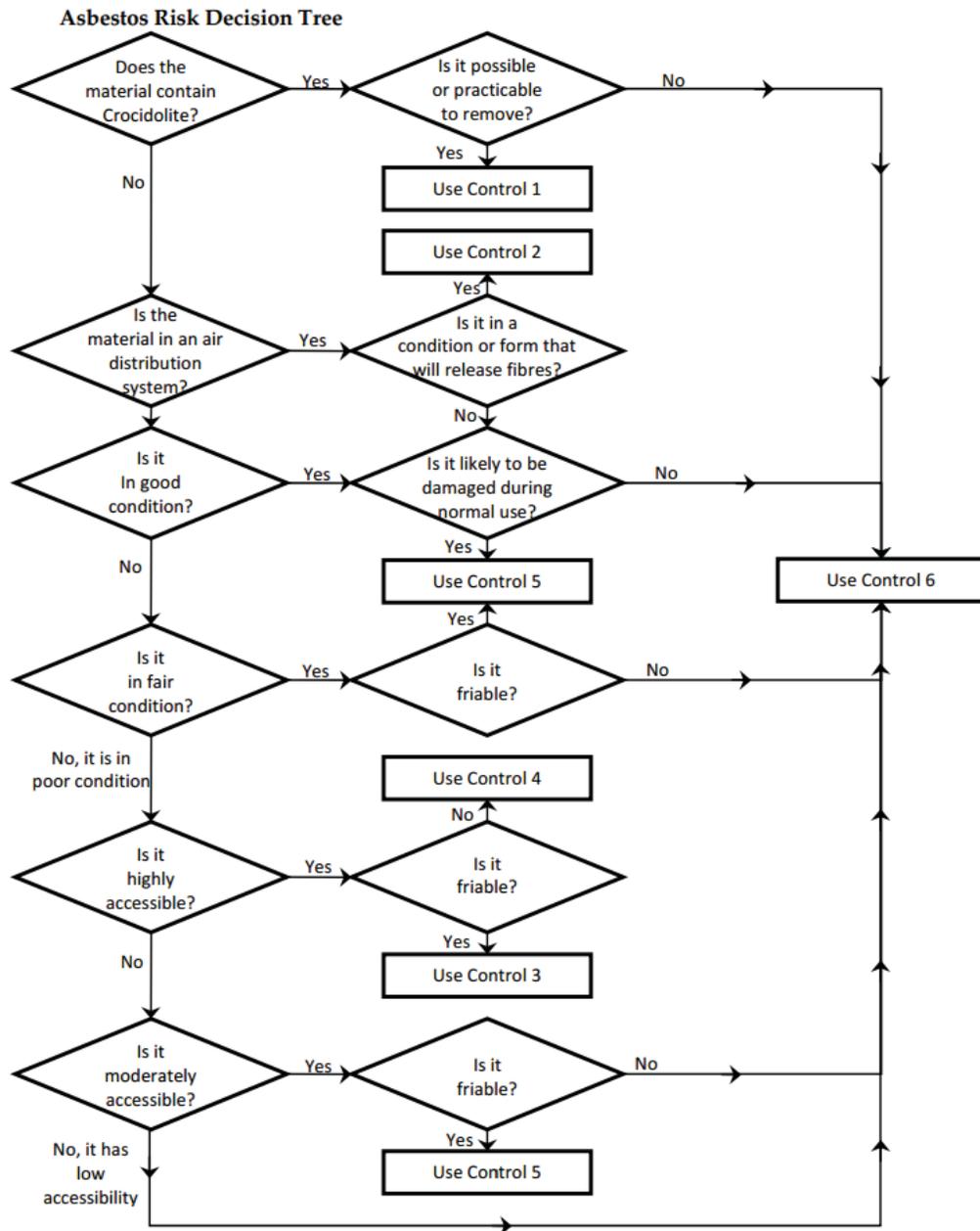


Figure 1: Asbestos Risk Decision Tree. From *Alberta Asbestos Abatement Manual*. Government of Alberta, October 2012.

## **ASBESTOS RISK DECISION TREE LEGEND**

### GOOD CONDITION

- No significant signs of damage, deterioration or delamination

### FAIR CONDITION

- Mild to moderate damage deterioration or delamination.

### POOR CONDITION

- Severely damaged, deteriorated or delaminated

### HIGH ACCESSIBILITY

- Can be touched or contacted through activities (routine or accidental) by all building users.

### MODERATE ACCESSIBILITY

- Accessible in low activity areas or beyond the reach of most occupants (with the exception of maintenance staff).

### LOW ACCESSIBILITY

- Enclosed or concealed; requires the removal of a building component, including lay in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc.

### CONTROL 1

- Immediate removal of material is required as per Section 32 of the OHS Code.

### CONTROL 2

- Immediately prevent the asbestos fibres from entering the air distribution system through changes to the system, removal, clean up and/or repair as per Section 33 of the OHS Code, and if not ultimately removed, implement an Asbestos Management Plan (Control 6).

### CONTROL 3

- Immediately restrict access to the area and prevent air movement. Remove or clean up and/or repair. If not ultimately removed, implement an Asbestos Management Plan (Control 6).

### CONTROL 4

- Immediately restrict access to the area. Remove or clean up and/or repair. If not ultimately removed, implement an Asbestos Management Plan (Control 6).

### CONTROL 5

- Schedule removal or clean up and/or repair in a reasonable time frame and if not ultimately removed, implement an Asbestos Management Plan (Control 6).

### CONTROL 6

- Implement an Asbestos Management Plan. The Plan should be in writing and include the following:
  - (a) inventory of asbestos-containing materials in the building;
  - (b) inspection frequency and procedures;
  - (c) training requirements for maintenance staff and others who may come into contact with the materials or work in proximity to the materials;
  - (d) procedures to follow in the event of damage or other emergency situations;

- (e) procedures to follow should the condition of the materials change or work routines be altered;
- (f) notification procedures for occupants and others in the building;
- (g) labeling of asbestos-containing materials; and
- (h) a plan for ultimate removal of asbestos.

Table 8: ACM Risk of Exposure and Control Required

SAMPLE	DESCRIPTION	LOCATION	CONDITION	RESULT	ACCESSIBILITY	CONTROL REQUIRED
A1	Marble brown floor tile	107, floor	Fair	1.1% (Chrysotile)	High	Control 6
A2	Marble red floor tile	107, floor	Fair	1.1% (Chrysotile)	High	Control 6
A4	Brown streak floor tile	105, floor	Good	10% (Chrysotile)	High	Control 6
A8	Marble brown floor tile	102, floor	Fair	1.1% (Chrysotile)	High	Control 6

According to the above risk assessment, an Asbestos Management Plan (Control 6) should be implemented for the ACM containing marble brown, and red, floor tile and brown streak floor tile.

## 4.12 CONCLUSIONS

### ASBESTOS

Of the 20 samples collected, three tested positive for chrysotile. Marble brown tile in rooms 102 and 107, and marble red tiles in room 107, contained up to 1.1% chrysotile asbestos, and the brown streak floor tile in room 105 contained up to 10% chrysotile asbestos. It is assumed that all floor tiles in these rooms contain asbestos.

The Agronomy Building is currently occupied; but the ACM does not pose an immediate risk, so an Asbestos Management Plan should be implemented.

### LEAD

None of the paint samples tested in the Agronomy Building rooms was considered lead-containing.

### PCBs

Fluorescent light fixtures were found throughout the building and were noted but not inspected. Fluorescent light ballasts may contain PCBs, but all were retrofitted in 2004 and thus PCB-free, so no ballasts were inspected.

### MERCURY

Fluorescent light tubes in the fluorescent light fixtures may contain varying amounts of mercury vapor, even newly purchased tubes/bulbs. There are tens of tubes throughout the building.

### **OZONE-DEPLETING SUBSTANCES**

Several rooms contained refrigerators/coolers, with two units containing R-134A, one unit containing R-404, one unit containing R-48, and one unit containing R-12. Three air conditioners were found on the 2<sup>nd</sup> floor but the refrigerant used could not be determined and are assumed to be ODS.

### **RADIOACTIVE MATERIALS**

No objects suspected to contain radioactive materials were observed on the subject site.

### **MISCELLANEOUS CHEMICALS**

Miscellaneous chemicals were found in the Hoist room, Seed room, and rooms 101 and 110.

### **MOULD**

Water damage and visible mould was observed on the north wall of room 107.

### **OTHER**

Batteries were found in the Agronomy Building, and are located in emergency lights on the main floor. Also, two car batteries were found in room 123C.

There were numerous appliances located throughout the building.

Fiberglass insulation was found as pipe insulation in rooms 101 and the storage mezzanine, and both poking through cracks between cinder blocks and on the roof of rooms 107 and 123C, respectively.

Two fume hoods were found in the lab on the main floor. The hoods may contain hazardous materials in, for example, the filter, where hazardous materials can be trapped. Location of the hoods was noted but no sampling was conducted.

## **4.13 RECOMMENDATIONS**

### **ASBESTOS**

Table 9 summarizes the extent of ACM and the risk level associated with abatement.

Table 9: Extent of ACM and Recommendations for the Agronomy Building

<b>ACM</b>	<b>EXTENT</b>	<b>RECOMMENDATION*</b>
Low Risk Abatement	Moderate Risk Abatement	High Risk Abatement
ACM Floor Tiles	Estimated: 600 m <sup>2</sup>	Implement an Asbestos Management Plan

\*NOTE: any ACM materials must only be handled/abated by trained and experienced personnel.

Asbestos abatement must be carried out by qualified personnel who are experienced and trained in asbestos removal. Air monitoring and inspections must be completed during the abatement to ensure the safety of the abatement personnel and any unprotected persons in the area.

Maintenance staff, contractors and anyone working or entering the premises should be made aware of ACM.

### **PCBs**

All fluorescent light ballasts should be checked for PCBs at the time of removal using the most current version of Environment Canada publication: Identification of Lamp Ballasts Containing PCBs. Those that do contain PCBs must be handled, packaged and disposed of by the current regulations and personnel must be equipped with proper PPE.

### **MERCURY**

Fluorescent light tubes in the fluorescent light fixtures may contain varying amounts of mercury vapor, even newly purchased tubes/bulbs. There are many fluorescent tubes throughout the buildings. All fluorescent lights should be stored to protect from breakage and recycled accordingly.

Any mercury items should be recycled and disposed of according to current regulations.

### **OZONE-DEPLETING SUBSTANCES**

There were several ODS located throughout the building. Upon decommissioning or maintenance, the ODS units should be recovered/recycled by a qualified and experienced worker according to Ozone Depleting Substances and Halocarbons Regulations.

### **RADIOACTIVE MATERIALS**

There was no evidence of radioactive materials in the Agronomy Building.

### **MISCELLANEOUS CHEMICALS**

All miscellaneous chemicals need to be stored and disposed of according to current regulations and manufacturers recommendations.

### **MOULD**

Water damage and visible mould was observed on an area of cinder block (< 1 m<sup>2</sup>) on the north wall of room 107. Since the building is occupied, the mould-contaminated materials should be removed. According to the Best Practices Mould at the Work Site (July 2009) guidelines, the mould should be remediated as follows:

1. Wet-vacuum the material. In porous material, some mould spores/fragments will remain but will not grow if material is completely dried. Use a high-efficiency particulate air (HEPA) vacuum once the material has been thoroughly dried. Dispose of HEPA-vacuum contents in well-sealed plastic bags.
2. Use professional judgment to determine personal protective equipment (PPE) for each situation. Be prepared to raise PPE requirements if contamination is more extensive than expected. The minimum requirement for this remediation should include gloves, a N-95 respirator, and goggles/eye protection.
3. No containment is required.

## **OTHER**

The batteries and electronic equipment should be collected and recycled at a proper facility as per the Recycling Council of Alberta at the time of decommissioning.

Two fume hoods were found in the lab on the main floor. The hoods may contain hazardous materials in, for example, the filter, where hazardous materials can be trapped. Fume hood maintenance should be completed by professionals.

## **EXPOSURE AND MANAGEMENT PLAN**

Procedures for hazardous materials identified in this report should be developed and communicated to anyone who may come in contact with these materials. Also, anyone who may come in contact with hazardous materials should be informed on how to identify where the hazards may be present and how to proceed if they observe any suspect materials.

A management and monitoring plan should be developed and implemented to address the hazardous materials identified in this report and any possible future hazardous materials which may be encountered. According to the Alberta Asbestos Abatement Manual (2012), the management plan must:

- Include a current inventory of the hazardous materials identified,
- Ensure that all ACM is clearly identified,
- Include a risk assessment, completed by a qualified person, of the potential for exposure,
- Include safe work procedures, developed by a qualified person, for work conducted near hazardous materials,
- Include instruction in all aspects of the management plan for all workers who could be exposed,
- Ensure that manufacturer's manuals and instructions are available to workers,
- Include site-specific written work procedures and ensure that they are available to all workers required to follow the procedures,
- Ensure that work is carried out under the supervision of experienced and qualified supervisors, and
- Include accurate and complete records pertaining to hazardous materials management.

## 5.0 LIMITATIONS

Sampling of most gaskets in the mechanical rooms would have required dismantling equipment; therefore most gaskets could not be sampled.

There were areas which were not accessible and/or not visible due to building dimensions and walls, for example, high ceilings or wall cavities. These areas were not sampled.

The diagrams provided and used in this report did not always correlate with the room layout observed at the time of the sampling. Every effort was made to correct discrepancies at the time of sampling, however, there may be discrepancies or/and omissions. If there are discrepancies, the location should be verified on site.

This report is for the exclusive use of the client. Any third party use of this report and subsequent reliance or decisions based on this report is made at the sole risk of the third party. Ballast Environmental Consulting Ltd. has no obligation to any third party and will accept no responsibility for any damages suffered by third party use.

This assessment and subsequent conclusions and recommendations have been conducted with a reasonable level of care and skill and in accordance with current environmental assessment standards and practices for this geographic location at the time of the assessment. The final assessment of the risk level for abatement work may need to be modified based on additional assessment by the abatement company and/or the condition of materials at the time of abatement.

This assessment is limited to the scope as previously defined under 1.2 Scope of Work. The data and findings are limited to the date of investigation. This assessment is not and should not be considered an opinion concerning past or present compliance of any past or present owner with any municipal, provincial or federal regulations. No warranty or guarantee is expressed or implied.

Should you have any questions or comments, feel free to contact the undersigned at [info@ballastenvironmental.com](mailto:info@ballastenvironmental.com) or 403.452.3110.

Sincerely,

Ballast Environmental Consulting Ltd.



Reed Davis, M.Sc.



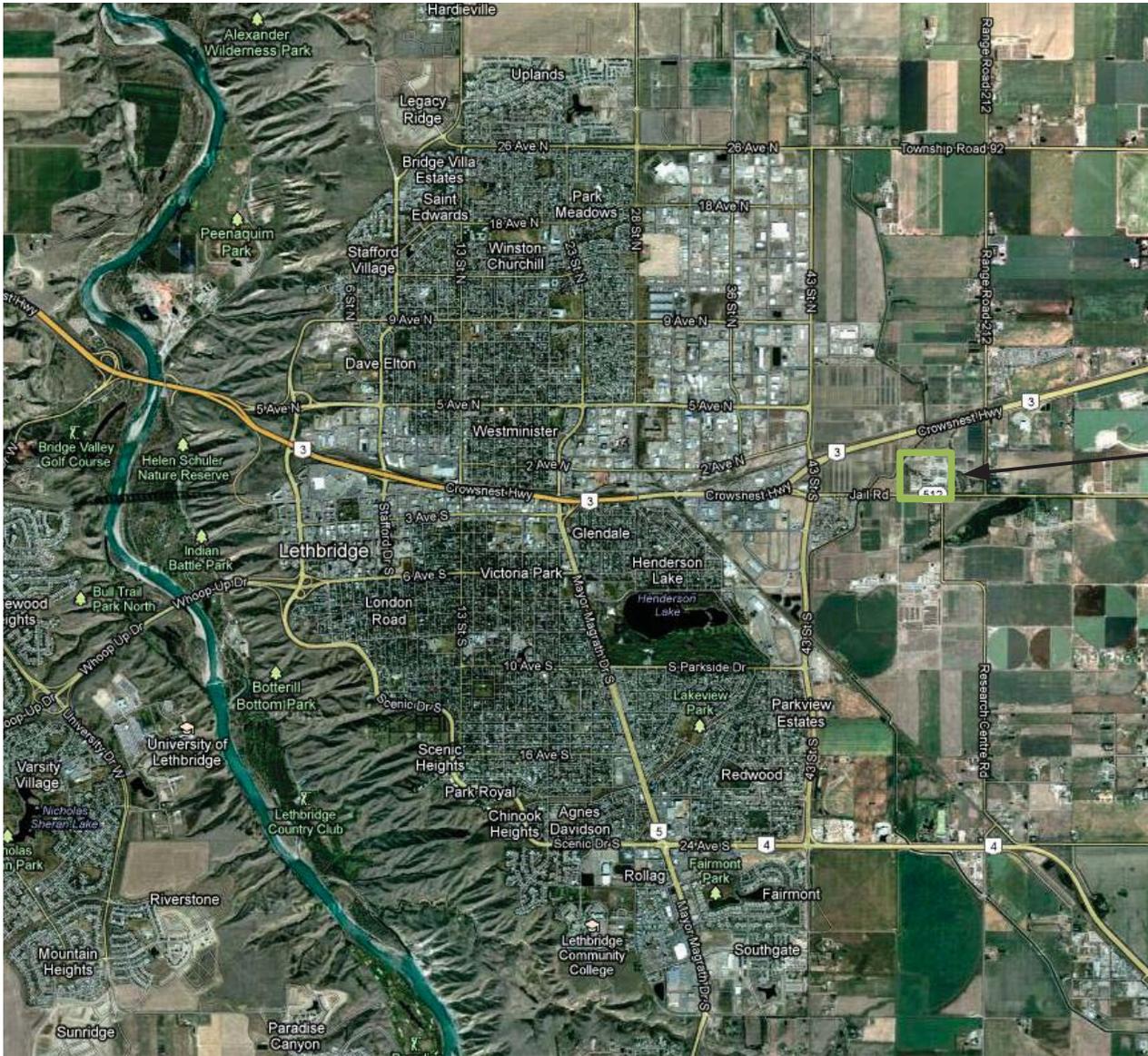
Elvie Reinson, B.Sc., RPBio, EP



## **APPENDIX 1**

Vicinity Map  
Site Map  
Detailed List of Construction Materials  
Site Sampling Design  
Photographic Log  
Laboratory Results





Subject Site



1 km

## VICINITY MAP

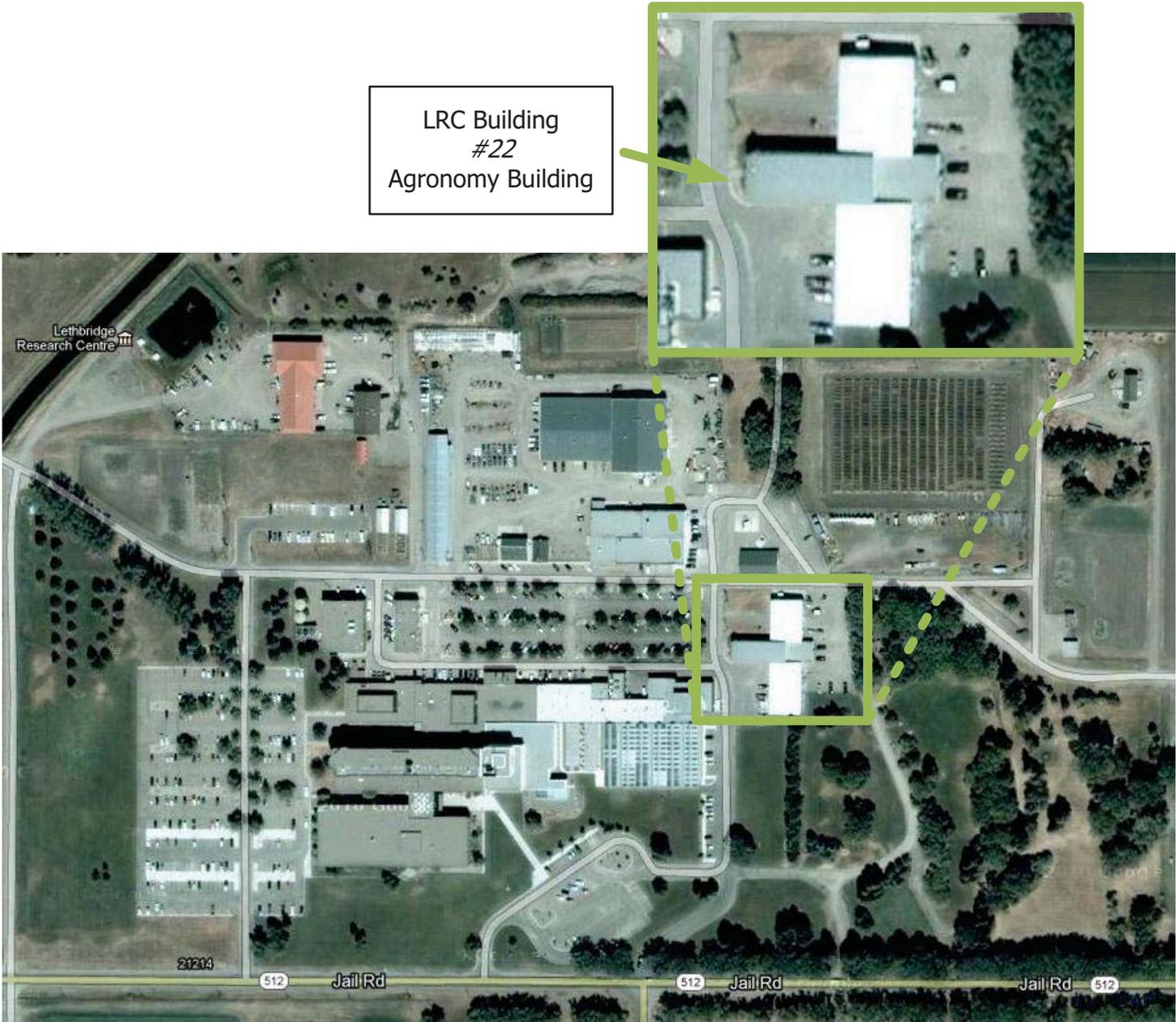


Dwg: RD Date: 01-Mar-2013  
 Edited: RD Date: 06-Mar-2013  
 Approved: ER Date: 06-Mar-2013

File No.: 13240  
 Revision: 0  
 Source: Google Maps

Location: 5403 – 1<sup>st</sup> Avenue South,  
 Lethbridge, AB  
 Client: Robert Elsworth Architecture  
 Site: Lethbridge Research  
 Centre's Agronomy Building

Appendix  
 1a



LRC Building  
#22  
Agronomy Building



50 m

**SITE MAP**



Dwg: RD      Date: 01-Mar-2013  
 Edited: RD    Date: 06-Mar-2013  
 Approved: ER   Date: 06-Mar-2013

File No.: 13240  
 Revision: 0  
 Source: Google Maps

Location: 5403 – 1<sup>st</sup> Avenue South,  
 Lethbridge, AB  
 Client: Robert Elsworth Architecture  
 Site: Lethbridge Research  
 Centre's Agronomy Building

Appendix:  
**1b**

Floor	Room	Description	Estimated Size (m)	Ceiling	Walls	Floor	Misc.	Ceiling Color	Wall Color	Floor Color/Pattern	Ceiling Tile Size	Asbestos Sample	Sample ID	Location	Paint Sample	Sample ID	Location	Result
main	back entrance	access	5x2	wood panel	drywall/cinderblock	brown speckles/concrete	rubber stairs (not tile)	cream	cream	brown speckled	-	brown speckles 12"x12" floor tile	A11	floor	-	-	-	negative
main	drying room	seed storage	6x11	drywall	drywall	concrete	6 flour, lights, 2 old windows	white	white	bare	-	drywall mud	A12	wall	-	-	-	negative
main	exterior	building exterior	-	-	-	-	-	-	-	-	-	gray external mortar	A17	N exterior of original building	-	-	-	negative
												gray external mortar	A18	S exterior of original building	-	-	-	negative
												gray external mortar	A19	E exterior of original building	-	-	-	negative
												gray external mortar	A20	E exterior of original building	-	-	-	negative
main	fire room	storage	9x9	metal/fiber glass	metal panel	concrete	-	black (fire)	metal - galvanized black and cream on cinderblock	bare	-	-	-	-	white	P6	exterior seed room	negative
main	front entrance/foyer	access	5x2	wood panel	cinderblock/drywall	tile 12"x12"/concrete	1 fluorescent light	cream/cinderblock	cream	brown speckled	-	brown speckles 12"x12" floor tile	A10	floor	-	-	-	negative
main	garage	storage	13x16	metal/fiber glass	metal panel	concrete	8 flour, lights, emergency battery on S wall	galvanized metal	galvanized metal	bare	-	-	-	-	-	-	-	-
main	hall	access	12x2	wood panel	cinderblock/drywall	tile 12"x12"/concrete	6 flour, light	cream/cinderblock	cream	brown speckled	-	-	-	-	-	-	-	-
main	hoist room	hoist/access to	3x3	wood panel	cinderblock	concrete	pipes with fiberglass, refrigerator cooler, R134A; 0.4 kg	off white	off white	gray	-	-	-	-	-	-	-	-

\* no access \*\* limited visibility of area \*\*\*Sample not analyzed

Floor	Room	Description	Estimated Size (m)	Ceiling	Walls	Floor	Misc.	Ceiling Color	Wall Color	Floor Color/Pattern	Ceiling Tile Size	Asbestos Sample	Sample ID	Location	Paint Sample	Sample ID	Location	Result
main	lab	lab	7x7	drywall	drywall, metal	concrete	7 flour. lights, 2 fumehoods	white	white	bare	-	-	-	-	-	-	-	-
main	middle room	seed storage	12x8	wood panel	cinderblock	concrete	8 flour. lights	cream	off white/cream	gray	-	-	p3	N wall	off white	-	-	negative
main	seed room	seed storage	31x18	metal - galvanized	metal - galvanized	concrete	25 (6 set) flour. lights, chemical storage	light gray	light gray	bare	-	-	-	-	-	-	-	-
main	seed storage	seed storage	12x6	concrete	cinderblock	concrete	R404A, 14 kg	white	white	bare	-	-	-	-	-	-	-	-
main	100e	storage	2x3	wood panel	cinder/drywall	concrete	-	cream/ch derblock bare	cream	gray	-	-	-	-	-	-	-	-
main	101	utility room	4x3	drywall	cinderblock	concrete	misc. cleaning chemicals, fiberglass pipe insulation, old boiler	no paint	cream	gray	-	black insulation	A7	boiler	-	-	-	negative
main	102	office	5x3	wood panel	cinderblock/wood/drywall	tile/concrete	-	cream	cream	red/brown tile	-	marble brown 9"x9" floor tile	A8	floor	-	-	-	positive
main	103a	men's washroom	3x5	ceiling tile	cinderblock	tile/concrete	1 fluorescent light	cream	cream	marble white	-	marble red 9"x9" floor tile	A9	floor	-	-	-	negative
main	103b	women's washroom	2x2	ceiling tile	cinderblock	tile/concrete	1 fluorescent light	cream	cream	marble white	-	marble white 12"x12" floor tile	A5	floor	-	-	-	negative
main	104	lab/under renovation	11x6	wood panel	drywall/cinderblock	concrete	under renovation/6 flour. lights	cream	cream/light green	-	-	-	-	-	-	-	-	-
main	105	lab	8x5	wood panel	cinderblock	tile/concrete	new windows	cream	cream	brown streak	-	brown streak 12"x12" floor tile	A4	floor	-	-	-	positive
main	106	electrical room	2x4	wood panel	cinderblock/drywall (W)	concrete	-	cream	cream	gray	-	-	-	-	-	-	-	-

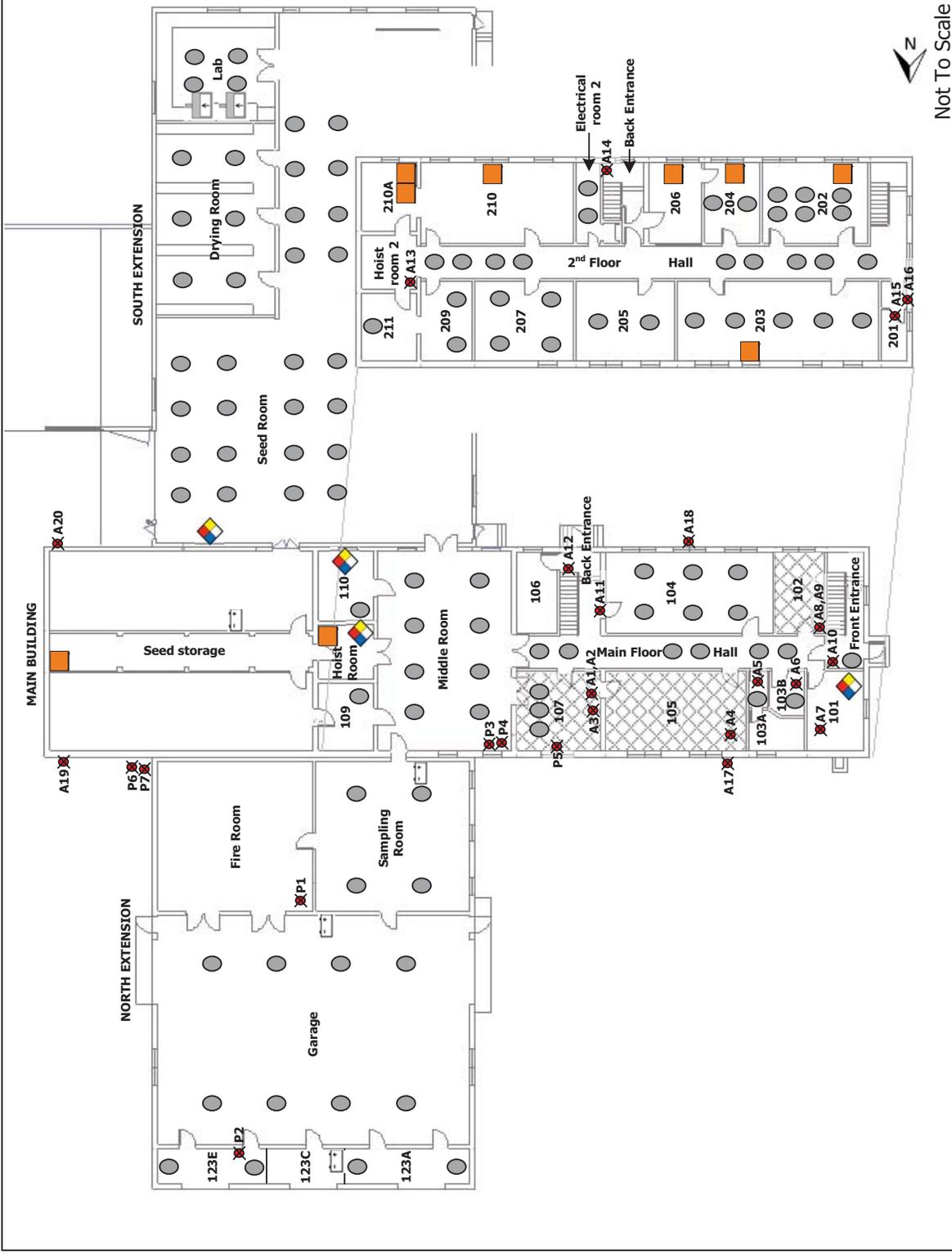
\* no access \*\* limited visibility of area \*\*\*Sample not analyzed

Floor	Room	Description	Estimated Size (m)	Ceiling	Walls	Floor	Misc.	Ceiling Color	Wall Color	Floor Color/Pattern	Ceiling Tile Size	Asbestos Sample	Sample ID	Location	Paint Sample	Sample ID	Location	Result
main	107	storage	5x5	wood panel	cinderblock	tile/ concrete	3 flour. lights, fiberglass insulation	cream	cream	red/brown tile	-	marble brown 9"x9" floor tile	A1	floor	-	P5	main; N wall	negative
main	109	tool room 1	3x3	wood panel	cinderblock	concrete	1 fluorescent light	off white	off white	gray	-	white window glazing	A3	2 window storage	-	-	-	negative
main	110	tool room 2	3x3	wood panel	cinderblock	concrete	1 fluorescent light	off white	off white	gray	-	marble red 9"x9" floor tile	A2	floor	-	-	-	negative
main	123a	equipment storage	8x2	drywall	N: metal, S: cinder, E: plywood, W: metal	concrete	2 flour. lights	cream	cream	gray	-	-	-	-	-	-	-	-
main	123c	storage	3x2	drywall	N: metal, S: cinderblock, E+W: plywood	concrete	fiberglass insulation in roof, 2 car batteries	cream	cream	gray	-	-	-	-	-	-	-	-
main	123e	storage	8x2	drywall	N: metal, S: cinder block, E: metal, W: plywood	wood	2 flour. lights	cream	cream	gray	-	-	-	-	gray	P2	floor	negative
2	back entrance	back entrance/stairs; access to second floor	5x2	wood panel	drywall, cinderblock	brown speckles/ concrete	stairs; rubber, not tile	cream	cream	brown speckled	-	drywall mud	A14	wall	-	-	-	negative
2	electrical room 2	electrical panels	4x2	wood panel	wood panel	hardwood	2 flour. lights, hole in cinderblock, no insulation	cream	cream	-	-	-	-	-	-	-	-	-
2	hall	access	28x2	wood panel	wood panel	hardwood	9 flour. lights	cream	cream	-	-	-	-	-	-	-	-	-
2	hoist 2	hoist room 2	3x3	wood panel	cinderblock	wood	-	cream	cream	brown sheet linoleum	-	brown sheet linoleum	A13	floor	-	-	-	negative

\* no access \*\* limited visibility of area \*\*\*Sample not analyzed

Floor	Room	Description	Estimated Size (m)	Ceiling	Walls	Floor	Misc.	Ceiling Color	Wall Color	Floor Color/Pattern	Ceiling Tile Size	Asbestos Sample	Sample ID	Location	Paint Sample	Sample ID	Location	Result
2	mezzanine	storage	18x6	metal	metal/railing	plywood/wood	3 flour. lights, furnace, hotwater tank, air compressor	white	white metal	bare	-	brown squares linoleum	A15	floor	-	-	-	negative
2	201a	washroom; 2 showers	5x3	drywall	drywall	linoleum/hardwood	looks new	cream	cream	squares	-	-	-	-	-	-	-	-
2	202	lunch room	5x6	tiles; holes	cinderblock	linoleum	6 flour. lights, fridge; R48; 4.9 oz	cream	cream	-	white tile with holes 12"x12"	-	-	-	-	-	-	-
2	203	office	5x11	wood panel	cinderblock	hardwood	5 flour. lights, old air conditioner	cream	cream	-	-	-	-	-	-	-	-	-
2	204	office	5x6	tiles; holes	cinderblock	painting wood	2 flour. lights, air conditioner (old)	gray	gray	painting	-	-	-	-	-	-	-	-
2	205	lunch room	6x5	wood panel	cinderblock	hardwood	2 flour. lights	cream	cream	-	-	-	-	-	-	-	-	-
2	206	office	3x4	tile	cinderblock	painting wood	air conditioner; R401A; 12.9 oz	gray (newer)	gray	gray	white tile 12"x12"	-	-	-	-	-	-	-
2	207/209	office	8x5	wood panel	cinderblock	hardwood	4 flour. lights	cream	cream	-	-	-	-	-	-	-	-	-
2	210;210a	office	11x5	wood panel	wood panel	hardwood	air conditioner; old fridge; r12; 425 oz. cooler; R134a; 28 g	cream	cream	-	-	-	-	-	-	-	-	-
2	211	storage	4x3	wood panel	cinderblock	hardwood	1 fluorescent light	cream	cream	-	-	-	-	-	-	-	-	-

\* no access \*\* limited visibility of area \*\*\*Sample not analyzed



**Legend**

- Sample ID
- A = asbestos sample
- P = paint sample
- Sampling Location
- Floor Covering containing Asbestos
- Ozone Depleting Substance (ODS)
- Battery Location
- Radioactive Items
- Chemical Storage
- Mercury
- Fume Hood

# SITE SAMPLING DIAGRAM

Appendix  
1d

Location: 5403 – 1<sup>st</sup> Avenue South, Lethbridge  
 Client: Robert Eisworthy Architecture  
 Site: Lethbridge Research Centre's Agronomy Building

File No.: 13240  
 Revision: 0  
 Drawn by: Provided by Robert Eisworthy Architecture

Dwg: RD      Date: 01-Mar-2013  
 Edited: RD      Date: 06-Mar-2013  
 Approved: ER      Date: 06-Mar-2013





Asbestos containing materials in marble brown, and red, floor tiles in room 107



Asbestos containing materials in brown streak floor tiles in room 105



Asbestos containing materials in marble brown floor tiles in room 102



Miscellaneous chemicals on the main floor in rooms 101 (not shown), 110 (not shown), Hoist room (left), and Seed storage (right)

## PHOTOGRAPHIC LOG



Source: RD Date: 20-Feb-2013  
 Edited: RD Date: 06-Mar-2013  
 Approved: ER Date: 06-Mar-2013

File: 13240  
 Revision: 0  
 Source: RD

Location: 5403 – 1<sup>st</sup> Avenue South,  
 Lethbridge, AB  
 Client: Robert Elsworth Architecture  
 Site: Lethbridge Research  
 Centre's Agronomy Building

Appendix  
 1e



9000 Commerce Parkway, Ste B  
 Mount Laurel, NJ 08054  
 Toll Free 877-428-4285  
 Local: 856-231-9449  
 Fax: 856-231-9818

# CERTIFICATE OF ANALYSIS

<b>Client:</b>	Ballast Enviro. Conslt'g Ltd.	<b>Report Date:</b>	2/26/2013
	PO Box87073 RPO DouglasSq.	<b>Report No.:</b>	297669
	Calgary AB T2Z 3V7	<b>Project:</b>	Hazmat
		<b>Project No.:</b>	13240

## BULK SAMPLE ANALYSIS SUMMARY

<b>Lab No.:</b>	4926173	<b>Description / Location:</b>	Brown Floor Tile; 9x9	
<b>Client No.:</b>	A1		Rm 107	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
PC 1.1	Chrysotile	None Detected	None Detected	PC 98.9

<b>Lab No.:</b>	4926174	<b>Description / Location:</b>	Red Floor Tile; 9x9	
<b>Client No.:</b>	A2		Rm 107	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
PC 1.1	Chrysotile	None Detected	None Detected	PC 98.9

<b>Lab No.:</b>	4926174	<b>Description / Location:</b>	Tan Mastic	<b>Layer No.:</b> 2
<b>Client No.:</b>	A2		Rm 107	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	Trace	Synthetic	100

<b>Lab No.:</b>	4926175	<b>Description / Location:</b>	Tan Glazing	
<b>Client No.:</b>	A3		Rm 107; 2 Window Storage	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

**Accreditation**      **NIST-NVLAP No. 101165-0**      **NY-DOH No. 11021**      **AIHA-LAP, LLC No. 100188**

*This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government  
 This report shall not be reproduced except in full, without written approval of the laboratory.*

**Analytical Method:**      EPA 600/R-93/116, by Polarized Light Microscopy

**Comments:**      Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

**Analysis Performed By:**      S. Clay

**Approved By:**      

**Date:**      2/26/2013

Frank E. Ehrenfeld, III  
 Laboratory Director



9000 Commerce Parkway, Ste B  
 Mount Laurel, NJ 08054  
 Toll Free 877-428-4285  
 Local: 856-231-9449  
 Fax: 856-231-9818

# CERTIFICATE OF ANALYSIS

<b>Client:</b>	Ballast Enviro. Consl'tg Ltd.	<b>Report Date:</b>	2/26/2013
	PO Box87073 RPO DouglasSq.	<b>Report No.:</b>	297669
	Calgary AB T2Z 3V7	<b>Project:</b>	Hazmat
		<b>Project No.:</b>	13240

## BULK SAMPLE ANALYSIS SUMMARY

<b>Lab No.:</b>	4926176	<b>Description / Location:</b>	Tan Floor Tile	
<b>Client No.:</b>	A4		Rm 105	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
10	Chrysotile	None Detected	None Detected	90

<b>Lab No.:</b>	4926177	<b>Description / Location:</b>	Lt Tan Floor Tile; 12x12	
<b>Client No.:</b>	A5		Rm 103a	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

<b>Lab No.:</b>	4926177	<b>Description / Location:</b>	Brown Mastic	<b>Layer No.:</b> 2
<b>Client No.:</b>	A5		Rm 103a	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	Trace	Cellulose	100

Accreditation **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

*This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government  
 This report shall not be reproduced except in full, without written approval of the laboratory.*

**Analytical Method:** EPA 600/R-93/116, by Polarized Light Microscopy

**Comments:** Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

**Analysis Performed By:** S. Clay

**Date:** 2/26/2013



9000 Commerce Parkway, Ste B  
 Mount Laurel, NJ 08054  
 Toll Free 877-428-4285  
 Local: 856-231-9449  
 Fax: 856-231-9818

# CERTIFICATE OF ANALYSIS

<b>Client:</b>	Ballast Enviro. Conslt'g Ltd.	<b>Report Date:</b>	2/26/2013
	PO Box87073 RPO DouglasSq.	<b>Report No.:</b>	297669
	Calgary AB T2Z 3V7	<b>Project:</b>	Hazmat
		<b>Project No.:</b>	13240

## BULK SAMPLE ANALYSIS SUMMARY

<b>Lab No.:</b>	4926178	<b>Description / Location:</b>	Off-White Floor Tile; 12x12	
<b>Client No.:</b>	A6		Rm 103b	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

<b>Lab No.:</b>	4926178	<b>Description / Location:</b>	Black Mastic	<b>Layer No.:</b>	2
<b>Client No.:</b>	A6		Rm 103b		
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>	
None Detected	None Detected	Trace	Cellulose	100	

---

<b>Lab No.:</b>	4926179	<b>Description / Location:</b>	Brown Insulation	
<b>Client No.:</b>	A7		Rm 101; Boiler	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	1	Cellulose	9
		90	Fibrous Glass	

---

<b>Lab No.:</b>	4926180	<b>Description / Location:</b>	Brown Floor Tile; 9x9	
<b>Client No.:</b>	A8		Rm 102	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
PC 1.1	Chrysotile	None Detected	None Detected	PC 98.9

**Accreditation**      **NIST-NVLAP No. 101165-0**      **NY-DOH No. 11021**      **AIHA-LAP, LLC No. 100188**

*This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government  
 This report shall not be reproduced except in full, without written approval of the laboratory.*

**Analytical Method:**      EPA 600/R-93/116, by Polarized Light Microscopy

**Comments:**      Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

**Analysis Performed By:**      S. Clay

**Date:**      2/26/2013



9000 Commerce Parkway, Ste B  
 Mount Laurel, NJ 08054  
 Toll Free 877-428-4285  
 Local: 856-231-9449  
 Fax: 856-231-9818

# CERTIFICATE OF ANALYSIS

<b>Client:</b>	Ballast Enviro. Consl'tg Ltd.	<b>Report Date:</b>	2/26/2013
	PO Box87073 RPO DouglasSq.	<b>Report No.:</b>	297669
	Calgary AB T2Z 3V7	<b>Project:</b>	Hazmat
		<b>Project No.:</b>	13240

## BULK SAMPLE ANALYSIS SUMMARY

<b>Lab No.:</b>	4926181	<b>Description / Location:</b>	Red Floor Tile; 9x9 Rm 102	
<b>Client No.:</b>	A9			
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
PC 0.25	Chrysotile	None Detected	None Detected	PC 99.75

<b>Lab No.:</b>	4926182	<b>Description / Location:</b>	Lt Tan Floor Tile; 12x12 Front Foyer	
<b>Client No.:</b>	A10			
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

<b>Lab No.:</b>	4926183	<b>Description / Location:</b>	Lt Tan Floor Tile; 12x12 Back Entrance	
<b>Client No.:</b>	A11			
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

<b>Lab No.:</b>	4926183	<b>Description / Location:</b>	Black Mastic	<b>Layer No.:</b> 2
<b>Client No.:</b>	A11		Back Entrance	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

<b>Accreditation</b>	<b>NIST-NVLAP No. 101165-0</b>	<b>NY-DOH No. 11021</b>	<b>AIHA-LAP, LLC No. 100188</b>
----------------------	--------------------------------	-------------------------	---------------------------------

*This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government  
 This report shall not be reproduced except in full, without written approval of the laboratory.*

**Analytical Method:** EPA 600/R-93/116, by Polarized Light Microscopy

**Comments:** Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

**Analysis Performed By:** S. Clay

**Date:** 2/26/2013



9000 Commerce Parkway, Ste B  
 Mount Laurel, NJ 08054  
 Toll Free 877-428-4285  
 Local: 856-231-9449  
 Fax: 856-231-9818

# CERTIFICATE OF ANALYSIS

<b>Client:</b>	Ballast Enviro. Conslt'g Ltd.	<b>Report Date:</b>	2/26/2013
	PO Box87073 RPO DouglasSq.	<b>Report No.:</b>	297669
	Calgary AB T2Z 3V7	<b>Project:</b>	Hazmat
		<b>Project No.:</b>	13240

## BULK SAMPLE ANALYSIS SUMMARY

<b>Lab No.:</b>	4926184	<b>Description / Location:</b>	Off-White Joint Compound	
<b>Client No.:</b>	A12		Back Entrance	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

<b>Lab No.:</b>	4926185	<b>Description / Location:</b>	Brown Vinyl Sheet Flooring	
<b>Client No.:</b>	A13		Hoist 2	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	65	Cellulose	35

<b>Lab No.:</b>	4926186	<b>Description / Location:</b>	Off-White Joint Compound	
<b>Client No.:</b>	A14		2nd Flr; Back Entrance	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

<b>Lab No.:</b>	4926187	<b>Description / Location:</b>	Off-White Vinyl Sheet Flooring	
<b>Client No.:</b>	A15		201	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	50	Cellulose	40
		10	Synthetic	

**Accreditation**      **NIST-NVLAP No. 101165-0**      **NY-DOH No. 11021**      **AIHA-LAP, LLC No. 100188**

*This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government  
 This report shall not be reproduced except in full, without written approval of the laboratory.*

**Analytical Method:** EPA 600/R-93/116, by Polarized Light Microscopy

**Comments:** Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

**Analysis Performed By:** S. Clay

**Date:** 2/26/2013



9000 Commerce Parkway, Ste B  
 Mount Laurel, NJ 08054  
 Toll Free 877-428-4285  
 Local: 856-231-9449  
 Fax: 856-231-9818

# CERTIFICATE OF ANALYSIS

<b>Client:</b>	Ballast Enviro. Conslt'g Ltd.	<b>Report Date:</b>	2/26/2013
	PO Box87073 RPO DouglasSq.	<b>Report No.:</b>	297669
	Calgary AB T2Z 3V7	<b>Project:</b>	Hazmat
		<b>Project No.:</b>	13240

## BULK SAMPLE ANALYSIS SUMMARY

<b>Lab No.:</b>	4926188	<b>Description / Location:</b>	Off-White Joint Compound	
<b>Client No.:</b>	A16		201	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

<b>Lab No.:</b>	4926189	<b>Description / Location:</b>	Grey Cementitious	
<b>Client No.:</b>	A17		N Exterior; Main Bldg	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

<b>Lab No.:</b>	4926190	<b>Description / Location:</b>	Grey Cementitious	
<b>Client No.:</b>	A18		S Exterior; Main Building	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

<b>Lab No.:</b>	4926191	<b>Description / Location:</b>	Grey Cementitious	
<b>Client No.:</b>	A19		E Exterior; Main	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

**Accreditation**      **NIST-NVLAP No. 101165-0**      **NY-DOH No. 11021**      **AIHA-LAP, LLC No. 100188**

*This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government  
 This report shall not be reproduced except in full, without written approval of the laboratory.*

**Analytical Method:**      EPA 600/R-93/116, by Polarized Light Microscopy

**Comments:**      Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

**Analysis Performed By:**                S. Clay          

**Date:**                2/26/2013



9000 Commerce Parkway, Ste B  
 Mount Laurel, NJ 08054  
 Toll Free 877-428-4285  
 Local: 856-231-9449  
 Fax: 856-231-9818

# CERTIFICATE OF ANALYSIS

<b>Client:</b>	Ballast Enviro. Conslt'g Ltd.	<b>Report Date:</b>	2/26/2013
	PO Box87073 RPO DouglasSq.	<b>Report No.:</b>	297669
	Calgary AB T2Z 3V7	<b>Project:</b>	Hazmat
		<b>Project No.:</b>	13240

## BULK SAMPLE ANALYSIS SUMMARY

<b>Lab No.:</b>	4926192	<b>Description / Location:</b>	Grey Cementitious	
<b>Client No.:</b>	A20		E Exterior; Main	
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
None Detected	None Detected	None Detected	None Detected	100

<b>Lab No.:</b>	4926193	<b>Description / Location:</b>	Brown Floor Tile	
<b>Client No.:</b>	Dup 2			
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
PC 1.1	Chrysotile	None Detected	None Detected	PC 98.9

<b>Lab No.:</b>	4926194	<b>Description / Location:</b>	Brown Floor Tile	
<b>Client No.:</b>	Dup 3			
<u>% Asbestos</u>	<u>Type</u>	<u>% Non-Asbestos Fibrous Material</u>	<u>Type</u>	<u>% Non-Fibrous Material</u>
PC 1.1	Chrysotile	None Detected	None Detected	PC 98.9

Accreditation **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

*This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government  
 This report shall not be reproduced except in full, without written approval of the laboratory.*

**Analytical Method:** EPA 600/R-93/116, by Polarized Light Microscopy

**Comments:** Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

**Analysis Performed By:** S. Clay

**Date:** 2/26/2013

## CERTIFICATE OF ANALYSIS

**Client:** Ballast Enviro. Consl'tg Ltd.  
PO Box 87073 RPO Douglas Sq.  
Calgary AB T2Z 3V7

**Report Date:** 2/25/2013  
**Report Number:** 297631  
**Project:** Hazmat  
**Project No.:** 13240

### LEAD PAINT SAMPLE ANALYSIS SUMMARY

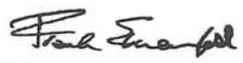
<u>Lab No.</u>	<u>Client No.</u>	<u>Location / Description</u>	<u>Concentration Lead By Weight (%)</u>
4925375	P1	Cream Wall Paint S. Extention Fire Room; West Wall Doors	0.12
4925376	P2	Grey Wall Paint S. Extention 123E Floor	0.14
4925377	P3	Off White Wall Paint S. Extention Middle Room; N&E Wall	0.21
4925378	P4	Cream/Light Green Wall Paint Main; Middle Room N Wall Room-Bottom 1/2	0.033***
4925379	P5	Cream Wall Paint Main; 107; N Wall Room	0.014
4925380	P6	White Wall Paint Exterior Seed Room; Exterior Main & Seed	<0.0063
4925381	P7	Grey Wall Paint Exterior Seed Room; Exterior Main & Seed	<0.0064
4925382	DUP1	Lead In Paint	<0.0053

**Accreditations:** **NATIONAL LEAD LABORATORY ACCREDITATION PROGRAM (NLLAP)**  
AIHA-LAP, LLC No. 100188 NYSDOH-ELAP No. 11021

**Analytical Methods:** ASTM D3335-85A "Standard Method To Test For Low Concentrations Of Lead In Paint By Atomic Absorption Spectrophotometry"  
EPA SW846-(3050B:7000B) "Standard Method To Test For Low Concentrations Of Lead In Soils, Sludges and Sediments By AAS"

**Comments:** Regulatory limit is 0.5% lead by weight (EPA/HUD guidelines). Recommend multiple sampling for all samples less than regulatory limit for confirmation. All results are based on the samples as received at the lab. IATL assumes that appropriate sampling methods have been used and the data upon which these results are based have been accurately supplied by the client. Method Detection Limit (MDL) per EPA Method 40CFR Part 136 Appendix B. Reporting Limit (RL) based upon Lowest Standard Determined (LSD) in accordance with AIHA-ELLAP policies. LSD=0.2 ppm MDL=0.0044% by weight. RL= 0.010% by weight (based upon 100 mg sampled). \* Insufficient sample provided to perform QC reanalysis (<200 mg) \*\* Not enough sample provided to analyze (<50 mg) \*\*\* Matrix / substrate interference possible. Sample results are not corrected for contamination by field or analytical blanks. This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any government agency. This report shall not be reproduced except in full, without written approval of the laboratory.

**Date Received:** 2/22/2013  
**Date Analyzed:** 2/25/2013  
**Analyst:** C. Shaffer

**Approved By:**   
Frank E. Ehrenfeld, III  
Laboratory Director

## **APPENDIX 2**

### Reference Material



- Advances in Environmental Measurement Methods for Asbestos.* Micheal E. Beard and Harry L. Rook, Editors. January 2000. ASTM Stock Number: STP1342.
- Alberta Asbestos Abatement Manual.* Government of Alberta, Employment, Immigration and Industry. October 2012.
- Alberta User Guide for Waste Managers.* Alberta Environmental Protection Environmental Service. January 2008.
- Asbestos Containing Materials in Buildings to be Demolished.* Workplace Health and Safety Bulletin. Alberta Human Resources and Employment. Revised July 2009.
- Asbestos Sampling.* United States Environmental Protection Agency. November 1994.
- Canada-wide Standard for Mercury-containing Lamps.* CCME Council of Ministers. April 30-May 1, 2001. Winnipeg.
- Do I have a Workplace Mould Problem?* Workplace Health and Safety Bulletin. Alberta Human Resources and Employment. Revised October 2006.
- Environment Protection and Enhancement Act.* Government of Alberta. E12-RSA2000. ISBN# 9780779735495.
- Guidelines for the Disposal of Asbestos Waste.* Environmental Protection Services Alberta Environment. August 1989.
- Handbook on PCBs In Electrical Equipment.* Environment Canada. February 2010. <http://www.ec.gc.ca/drgd-wrmd/default.asp?lang=En&n=BCA7C003-1&offset=3&to=show&printer...>
- Hazardous Products Act. (R.S., 1985, c. H-3)* Current to January 1<sup>st</sup>, 2010. Department of Justice Canada. <http://laws.justice.gc.ca/en/H-3/FullText.html>.
- Health and Safety Issues Associated with the Refrigerant HCFC-123 (R123).* Workplace Health and Safety Bulletin. Alberta Human Resources and Employment. Revised November 2006.
- Identification of Lamp Ballasts Containing PCBs.* Environmental Protection Series. Environment Canada. August 1991. Report EPS 2/CC/2
- Lead and Health.* Her Majesty the Queen in Right of Canada, represented by the Minister of Health Canada. 2007. ISBN: 978-0-662-44815-0.
- Lead at the Work Site.* Workplace Health and Safety Bulletin. Alberta Human Resources and Employment. Revised July 2005.



*Measure for Measure*. May 2006. T. Glover & R. Young. Sequoia Publishing Inc. ISBN: 1-889796-00-X.

*Mercury and the Environment*. Environment Canada. Crown Copyright. 1992.

*Mercury at the Work Site*. Workplace Health and Safety Bulletin. Alberta Employment, Immigration and Industry. Revised April 2007.

*Mould Guidelines for the Canadian Construction Industry*. Canadian Construction Association. CCA 82. 2004.

*Occupational Health and Safety Act*. Revised Statutes of Alberta 2000, Chapter O-2. Current as of November 1, 2010. Office Consolidation. Alberta Queen's Printer.

*Occupational Health and Safety Code 2009*. Government of Alberta. 2009. Office Consolidation. Alberta Queen's Printer.

*Occupational Health and Safety Code 2009 Explanation Guide*. Government of Alberta. 2009. Alberta Queen's Printer.

*Occupational Health and Safety Regulation*. Alberta Regulation 62/2003, with amendments up to and including Alberta Regulation 284/2009. Office Consolidation. Alberta Queen's Printer.

*Ozone-Depleting Substances Regulation (AR 125/93)*. Government of Alberta. February 2002.

*Radiation Protection Act*. R-2 RSA2000. Alberta Government. ISBN# 9780779724376.

*Residential Indoor Air Quality Guidelines*. Her Majesty the Queen in Right of Canada, represented by the Minister of Health Canada. 2007. ISBN: 978-0-662-45739-8.

*Standard Guide for Limited Asbestos Screens of Buildings*. ASTM International. August 2005. 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States.

*Standard Guide for Readily Observable Mould and Conditions Conducive to Mould in Commercial Buildings: Baseline Survey Process*. ASTM International. March 2006. 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States.

*Waste Control Regulation*. Government of Alberta. 192/1996.

*Superfund Method for the Determination of Releasable Asbestos in Soils and Bulk Materials*. United States Environmental Protection Agency.



## **APPENDIX 3**

### QA/QC Procedures



## QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

The purpose of Quality Assurance and Quality Control (QA/QC) procedures is to ensure that data used to evaluate site conditions are accurate and reliable. Quality Assurance is a complete program designed to produce results which are valid, scientifically defensible, and of known precision, bias, and accuracy and includes planning, documentation and quality control activities. Quality Control is a system of activities to ensure a quality product, including measurements made to ensure and monitor data quality and includes calibrations, duplicates, blanks, and spiked measurements, inter-laboratory comparisons and audits.

### DUPLICATES

Duplicate samples are analyzed to check the reproducibility of sampling and analytical results. A duplicate is any additional sample collected at the same time as another in a manner that minimizes differences. One duplicate should be collected and analyzed for approximately every twenty samples collected.

Reproducibility of duplicate samples is calculated by calculating the relative percent difference (RPD), which is a measure of precision, and is calculated by:

$$RPD = ((X_1 - X_2)/X_{ave}) * 100$$

where:

$X_1$  = concentration observed with the first detector or equipment;

$X_2$  = concentration observed with the second detector, equipment, or absolute value;

and

$$X_{ave} = \text{average concentration} = (X_1 + X_2)/2$$

The acceptable limits of RPD vary for different constituents ranging from 40% to 50%. An RPD value within the acceptable limit indicates that the laboratory data are consistent and reliable. The following table (Table 1) summarizes acceptable RPD limits:

**Table 1: Constituents and Acceptable RPD Limit**

Constituents	Acceptable RPD
Asbestos	<50%
Lead	<40%

It is common for the paint samples to have interference from the substrate. This arises from the difficulty of sampling paint firmly attached to surfaces.



**Table 2: QA/QC Duplicate Sample Summary for Asbestos**

Sample ID	Result (%)	Duplicate ID	Duplicate Result (%)	RPD (%)	Pass/Fail
A1	1.1	Dup 3	1.1	0	PASS
A8	1.1	Dup 2	1.1	0	PASS

A total of two duplicate samples were taken for asbestos. All of the samples passed the QA/QC.

**Table 3: QA/QC Duplicate Sample Summary for Lead**

Sample ID	Result	Duplicate ID	Duplicate Result (%)	RPD (%)	Pass/Fail
P6	<0.0063	Dup 1	<0.0053	17.2	PASS

One duplicate sample was taken for analyzing lead in paint, and the sample passed the QA/QC.

## **APPENDIX 4**

### Acronym and Unit List



## HAZARDOUS MATERIALS ASSESSMENT ACRONYMS

ACM	asbestos-containing materials
EPA	Environmental Protection Agency
HEPA	high-efficiency particulate air
IATL	International Asbestos Testing Laboratory
ODS	ozone-depleting substances
PCB	polychlorinated biphenyl
PPE	personal protective equipment
TCLP	toxicity characteristic leaching procedure
WHMIS	Workplace Hazardous Materials Information System
Flour.	fluorescent light
QA/QC	Quality Assurance and Quality Control

## UNITS

bgs	below ground surface
cm	centimetre
g	gram
kg	kilogram
km	kilometre
L	litre
lbs	pounds
m	metre
mg	milligram
mS	millisiemens
oz	ounce
µm	micrometre
ppm	parts per million
°C	degrees Celsius





**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

## ***APPENDIX B***

MPE Engineering Ltd.  
Mechanical and Electrical report

**LETHBRIDGE RESEARCH STATION**

**AGRONOMY BUILDING**

*(0925-001-00)*



March, 2013

Suite 300, 714 5 Avenue South  
Lethbridge, AB T1J 0V1  
Phone: 403-329-3442  
1-866-329-3442  
Fax: 403-329-9354



Robert Elsworthy Architecture  
1427 Ranchlands Rd NW  
Calgary, AB T3G 1N2

March 25<sup>th</sup>, 2013

File: 0925-001/Reports/R01.doc

**Attention:** Bob Elsworthy  
Architect

Dear Mr. Elsworthy:

**Re: Lethbridge Research Station, Agronomy Building - Fire Damage Assessment**

We are pleased to submit the "Mechanical/Electrical Fire Damage Assessment" as requested. These reports reflect the current state of Mechanical/Electrical equipment and component conditions within the fire damaged area of the Agronomy Building.

Yours truly,

**MPE ENGINEERING LTD.**

Dan Wood, P.Eng., LEED A.P., LC.  
Building Services Manager

### **Executive Summary (Mechanical and Electrical Review)**

The recent fire in the Agronomy building has posed significant damage on all the mechanical and electrical equipment that was in this building. Much of the equipment has already been removed from the site as it posed a safety risk. All the other equipment has been damaged to a point that it is unusable and should be replaced. There was no mechanical or electrical equipment in this area that was deemed acceptable to be reused. The total cost associated with a complete replacement of the mechanical and electrical equipment was \$114,000.

## **Mechanical Equipment Assessment**

This section of the report describes the extent of the fire damage to the mechanical equipment in the Agronomy North Wing. The analysis was based on a visual site inspection and evaluation of the mechanical equipment condition.

Within the Agronomy building there is a heating system and an air supply and exhaust system with their associated controls. Plumbing, drainage and compressed air systems also serviced the building. All mechanical equipment, ducting, piping and associated control components in Agronomy North Wing were either damaged by heavy smoke, flame or heat.

The mechanical equipment that was damaged in the fire includes:

- Natural gas unit heaters
- Indoor Make up Air units
- Exhaust fans
- Radiant tube heater
- Fire dampers
- Dust collector shakers
- Fire hose cabinet
- Air lines
- Gas lines
- Ducting
- Control components.

The drying room equipment and associated piping and components were completely destroyed by the heat and flame. The mechanical equipment in the threshing and grading room was compromised by heavy smoke and moisture.

The fire damage to the Agronomy North Wing mechanical equipment was extensive. MPE recommends that all of the mechanical equipment in the Agronomy North Wing be replaced. The estimated cost for replacing all the mechanical equipment in the Agronomy North Wing is **\$70,000.00** (Refer to the Cost Estimate).

## Electrical Equipment Assessment

This section of the report describes the extent of the fire damage to the electrical equipment in the Agronomy North Wing. The analysis was based on a visual site inspection and evaluation of the electrical equipment condition.

Two electrical panels fed the equipment in the Agronomy North Wing. Both of these electrical panels were damaged in the fire and should be replaced. The feeder wiring, conduits and over current protection devices for these panels were compromised by the fire. The branch circuit wiring, conduits and breakers supplying electricity to the equipment in Agronomy North Wing were either damaged by heavy smoke, flame or heat.

Some of the electrical equipment that was damaged in the fire is as follows:

- Fluorescent lighting fixtures
- Wall switches
- Receptacles
- Fans
- Dust collector shakers
- Overhead door openers
- Control panels
- Emergency battery packs
- Heaters

The drying room control panel, wall switches and lighting fixtures were completely melted by the heat and flame. The electrical equipment in the threshing and grading room was mostly compromised by heavy smoke.

All the electrical fire detection and signaling devices in the Agronomy North Wing were damaged by the fire. The fire detection devices in the drying room were completely melted by the heat and flame. Fire pull stations, fire bells and fire detection devices in the other rooms suffered heavy smoke damage. The wiring and conduits feeding the fire protection devices and telephone equipment were completely damaged by the fire. Telephone equipment, wiring and conduits were also damaged by the fire.

The fire damage to the Agronomy North Wing electrical equipment was extensive. MPE recommends that all of the electrical equipment in the Agronomy North Wing be replaced. The estimated cost for replacing all the electrical equipment in the Agronomy North Wing is **\$44,000.00** (Refer to the Cost Estimate).

**COST ESTIMATE**

<b>COST ESTIMATE</b>					
	<b>DESCRIPTION</b>	<b>QUANTITY</b>	<b>UNIT</b>	<b>UNIT PRICE</b>	<b>COST</b>
<b>Electrical</b>					
1	Electrical Panel	2	EA	\$ 5,000.00	\$ 10,000.00
2	Lighting Fixtures	30	EA	\$ 200.00	\$ 6,000.00
3	Fire Protection Devices	1	LS	\$ 5,000.00	\$ 5,000.00
4	Receptacles	1	LS	\$ 900.00	\$ 900.00
5	Conduit, Cable, Starters, Disconnects Misc	1	LS	\$ 6,000.00	\$ 6,000.00
6	Labour	150	HR	\$ 65.00	\$ 9,750.00
<b>SUBTOTAL</b>					<b>\$ 38,000.00</b>
CONTINGENCY (10%)					\$ 3,800.00
G.S.T (5%)					\$ 2,090.00
<b>TOTAL</b>					<b>\$ 44,000.00</b>
<b>Mechanical</b>					
1	Heating Units	3	EA	\$ 2,000.00	\$ 6,000.00
2	Ventilation Units	2	EA	\$ 4,000.00	\$ 8,000.00
3	Exhaust Fans	3	EA	\$ 1,000.00	\$ 3,000.00
4	Controls	8	EA	\$ 1,000.00	\$ 8,000.00
5	Piping, ducting, misc	1	EA	\$ 12,000.00	\$ 12,000.00
6	Labor	320	EA	\$ 75.00	\$ 24,000.00
<b>SUBTOTAL</b>					<b>\$ 61,000.00</b>
CONTINGENCY (10%)					\$ 6,100.00
G.S.T (5%)					\$ 3,355.00
<b>TOTAL</b>					<b>\$ 70,000.00</b>
<b>GRAND SUBTOTAL</b>					<b>\$ 99,000.00</b>
TOTAL CONTINGENCY (10%)					\$ 9,900.00
TOTAL GST (5%)					\$ 5,445.00
<b>GRAND TOTAL</b>					<b>\$ 114,000.00</b>



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

## ***APPENDIX C***

KTA Structural Engineers Ltd.  
Structural report



**kta**  
structural engineers

March 20, 2013

File No. 2013-943-019

Robert Elsworthy Architecture  
1427 Ranchlands Road NW  
Calgary, Alberta  
T3G 1L2

Attention: Robert Elsworthy

Dear Bob:

**RE: Fire damage review - Argonomy Building, Lethbridge Research Station**

### **1.0 General**

KTA Structural Engineers Ltd. have been retained to review the extent of the damage caused by a fire in the above-noted building in November 2012. The fire occurred in the southeast corner of the pre-engineered metal building addition on the north side of the original building.

A preliminary visit to the site was done on February 14, 2013 in order to determine the scope of demolition required to ascertain the extent of the damage to the building. Subsequent to this visit, selective demolition was carried out to expose the structure to enable determination of the damage.

A second inspection was carried out on March 14, 2013. At that time the structure had been exposed in the southeast corner of the building.

### **2.0 Structure**

The structure of the building in question is a pre-engineered steel building. The structure consists of steel frames, girts and metal siding. However, the structure of the building in the room where the fire occurred is as follows:

- The north wall of the room is a concrete block wall, but the roof structure is supported by a steel frame. The block wall is non-structural and is acting as either a fire wall or a partition wall.
- The south wall of the room is steel-framed with vertical steel columns support a beam at the roof level and horizontal steel girts between the columns. Behind this wall to south is the concrete block wall of the original that extends to approximately the 10-foot level.
- The west wall is a concrete block wall, and like the north wall is acting as either a fire wall or a partition wall.



- The east wall consists of horizontal steel girts spanning between the steel frame on the north and the steel column in the southeast corner and supporting metal siding.
- The roof consists of steel purlins at approximately 7'-6" on centre supporting metal deck.

### **3.0 Observations & Recommendations**

The fire caused extensive damage to the structure to the building. As a result a major portion of the area will need replacing. The summary of the damage is as follows with the recommendations for remedial.

The four easternmost roof purlins in the room in which the fire occurred require replacement. The heat from the fire has caused either sagging or warping of these purlins and once this has happened, the purlins require replacement. Most of the roof deck in this room has also been damaged by the fire and requires replacement. Refer to photographs 1, 2, 3, & 4.

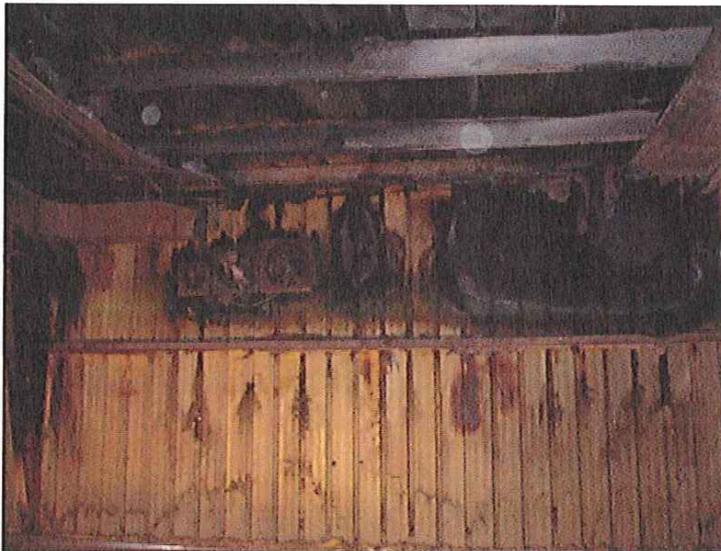


Photo 1 Roof & East Wall



Photo 2 Roof & East Wall



Photo 3 Roof



Photo 4 Roof

The north wall and the west wall of the room appear to have suffered only smoke damage and the steel frame along the north wall and the roof purlin at the west wall have not been damaged by the fire. Refer to photograph 5.

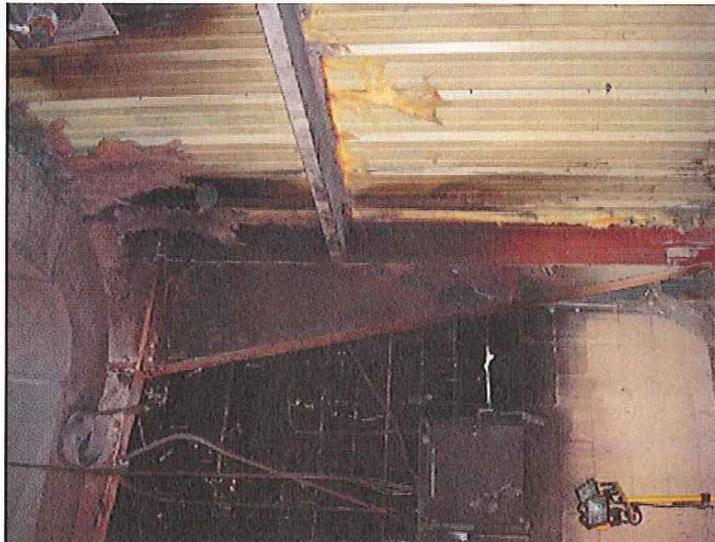


Photo 5 Northeast corner of room

The beam and purlins of the east wall are also warped or have sagged as a result of the fire and require replacing. However, the bottom purlin, at the floor level



appears to be in good condition. The exterior siding is also damaged and requires replacement.

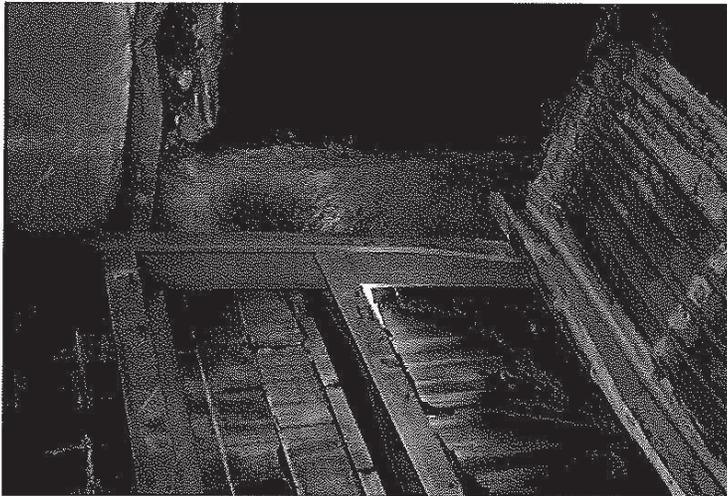


Photo 6 Southeast corner of room



Photo 7 Southeast corner of room

The addition to the building in which the fire occurred is higher than the original building to the south. The south wall has a steel framed wall that has been built against the original building and extends above the roof of the original building. The framing of this wall as well as the exterior siding requires replacement from the southeast corner to the next column to the west. Refer to photographs 8 & 9.



Photo 8 East & South Wall

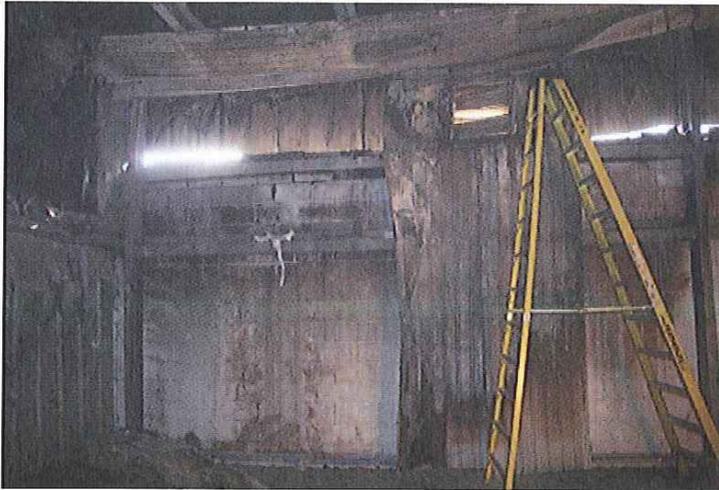


Photo 9 South Wall

In addition to the steel framing along the south wall, the top course of the block wall has been damaged. This course of block will have to be replaced and the connection to the roof of the building to the south will have to be restored. Refer to photographs 10 & 11.



Photo 10 South Wall

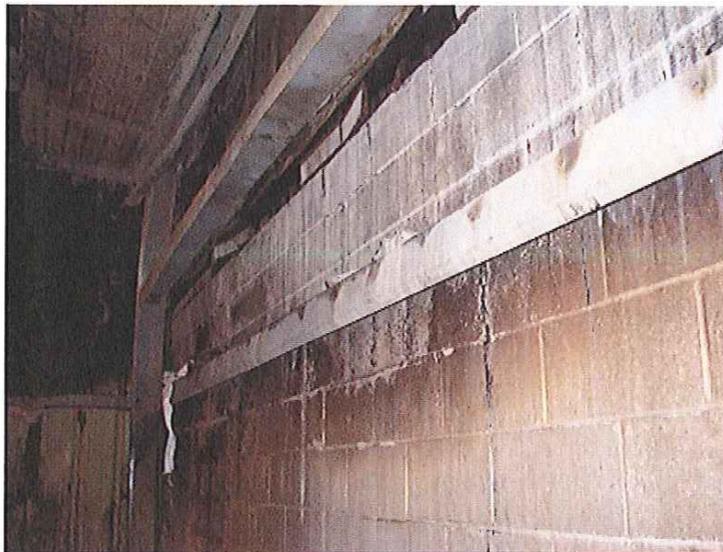


Photo 11 South Wall

#### **4.0 Summary of Remedial**

The fire damage to the structure was confined to the south east room of the pre-engineered steel building that forms the north wing of the Agronomy Building. An itemized list of the remedial work required on the structure of the building is as follows:



1. The entire east wall of the room requires replacement with the exception of bottom girt. This includes the siding and the horizontal purlins.
2. The column in the southeast corner of the room, the column midway down the south wall, the roof beam, girts and siding on the south wall require replacement. This includes the girt on top of the block wall.
3. Four roof joists, in addition to the east wall require replacement.
4. The roof deck over the entire room requires replacement.
5. The top course of the block wall on the south side of the room requires removal and replacement. In addition, the connection between the block wall and the pre-engineered building needs to be restored.;

## 5.0 Conclusion

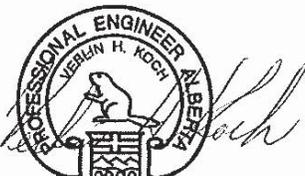
The fire in the southeast corner of the building addition to the agronomy building has caused extensive damage to the building. This damage requires that the east wall and most of the south wall be replaced as well as most of the roof over the room in which the fire occurred. In addition, repair of the block at the top of the wall of the south section of the building requires repair.

This report has been prepared in a manner consistent with good engineering judgment; but should further information become available, KTA Structural Engineers Ltd. requests the opportunity to review this information and our conclusions made in this report

Please note that we have not done a review of the design of the building. The responsibility for the design remains with the original designers.

Yours very truly,

KTA Structural Engineers Ltd.



18 April, 2013 APEGA Permit P08152

Verlin H. Koch, P.Eng.  
President



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

## ***APPENDIX D***

Swan Roofing Consultants (Southern) Ltd.  
Roofing report



SWAN ROOFING CONSULTANTS (SOUTHERN) INC.  
ARCA ACCEPTED INSPECTOR



## ROOF EVALUATION REPORT

Prepared for; Robert Elsworthy Architecture  
Regarding; Agronomy Building  
Located at; Lethbridge Research Station Grounds



P.O. Box 2204 Lethbridge, AB. T1J 4K7  
Tel: (403) – 327 – 4123 Fax: (403) – 327 – 9125



SWAN ROOFING CONSULTANTS (SOUTHERN) INC.

ARCA ACCEPTED INSPECTOR



Swan Roofing Consultants (Southern) Inc. has been retained by **Robert Elsworthy Architecture** to conduct a roof evaluation to ascertain any possible **damages and repairs required**.

**Date:** Tuesday, February 19<sup>th</sup>, 2013 **Time:** 9:30 am pm **Weather:** -5°C, Sunny

**Job #:864** **Contact:** Grant Gillies **Type of Work:** Evaluation

### 1. Existing Roof Conditions:

- 1.1. **Deck;** Precast Concrete
- 1.2. **Vapor Barrier;** Asphalt Felts mopped over deck.
- 1.3. **Insulation;** 3" MEPS (molded expanded polystyrene) with 1" Fiberboard overlay.
- 1.4. **Drainage;** Eavestrough at south and north sections of roof
- 1.5. **Flashings;** 26 gauge prefinished galvanized metal
- 1.6. **Membrane;** 2-ply SBS 1<sup>st</sup> ply mopped Elastophen PS & 2<sup>nd</sup> ply torched Sopralene Flam 180 GR color Grey Granules
- 1.7. **Roof Slope;** 2%

**Age of Roof:** 8 Years **Life Expectancy:** 0 Years

### 2. Observations:

- 2.1. This roof is relatively new and is a SBS roof system.
- 2.2. It has suffered some fire damage which has compromised the roof system.
- 2.3. As shown in Photo 1 a general look of the damage.
- 2.4. The roof membrane has been destroyed by the fire and most of the insulation in the area.
- 2.5. Photo 2 shows the edge of the building and where the fire damaged stopped.
- 2.6. Photo 3 shows a close look at the corner of the three buildings.
- 2.7. In photos 4 & 5, we see a closer look at the damage done to the roof insulations and membrane. They have been melted and burnt away.
- 2.8. The last Photo 6 shows the metal roof above the SBS roof which has buckled and warped. This section is to the north of the SBS roof.

### 3. Conclusions:

- 3.1. The roof system needs to be replaced in the damaged area so that further damage from water infiltration does not occur.
- 3.2. An area can be done that would be 1/3 of the entire roof to ensure no water has enter any more of the roof system.

### 4. Recommendations:

- 4.1. I would recommend two options for repairs of this roof.
- 4.2. The first option would be to cut the existing roof at 12' from the north edge of the roof running east and west as shown on Drawing 2.
  - 4.2.1. Remove this down to existing deck and check for damaged VB then install new VB over entire area.



SWAN ROOFING CONSULTANTS (SOUTHERN) INC.

ARCA ACCEPTED INSPECTOR



- 4.2.2. Then Install new MEPS with hot asphalt to match existing with slope to eaves trough area.
- 4.2.3. Install new 1" Fiberboard overlay back mopped with hot asphalt over MEPS and an addition layer of 1/2" fiberboard to create a level transition to the existing roof that is left.
- 4.2.4. Mop new Elastophene PS over this and onto the existing roof membrane 1 foot.
- 4.2.5. At the location where we have the PS ending a straight line it will then have a cover strip of Sopralap torched over this lapping the PS and the existing membrane 6" on either side.
- 4.2.6. Then Torch the new Sopralene Flam 180 GR from the ridgeline to the north edge.
- 4.3. The second Option would be to redo the entire roof membrane to ensure that it is going to have no chance of moisture in the system and to ensure that it will perform for its life expectancy at the same rate.
  - 4.3.1. This would entail removing the entire roof membrane and exposing the existing fiberboard overlay board.
  - 4.3.2. Repair any damaged and wet insulations, and damaged VB to the level of the existing Fiberboard.
  - 4.3.3. Install over this Soprabase FR overlay board with hot asphalt. Install the Sopralap cover strip at the end joints.
  - 4.3.4. Torch the new Sopralene Flam 180 GR over the entire roof.
- 4.4. For Option 1 it would cost about \$7,000.00 for the replacement of the SBS roof and related flashings.
- 4.5. For Option 2 it would cost about \$23,000.00 for the replacement of the SBS roof and related flashings.

**Swan Roofing Consultants (Southern) Inc.** have completed a visual review of the above roof at said address and this report been prepared for the **use by**, Robert Elsworthy Architecture.

The opinion and findings in this report were valid and in accordance with generally accepted roofing practice and procedures at the time of this report. These may change over the passage of time and should be updated accordingly.

Photos Included: Yes  
Roof Map Included: Yes

Signed:   
Don Wilson

Accepted ARCA Roofing Inspector, Apprenticeship Roofing Instructor, RRO

# Legend



B-Vent Stack



Fire Damage

.....

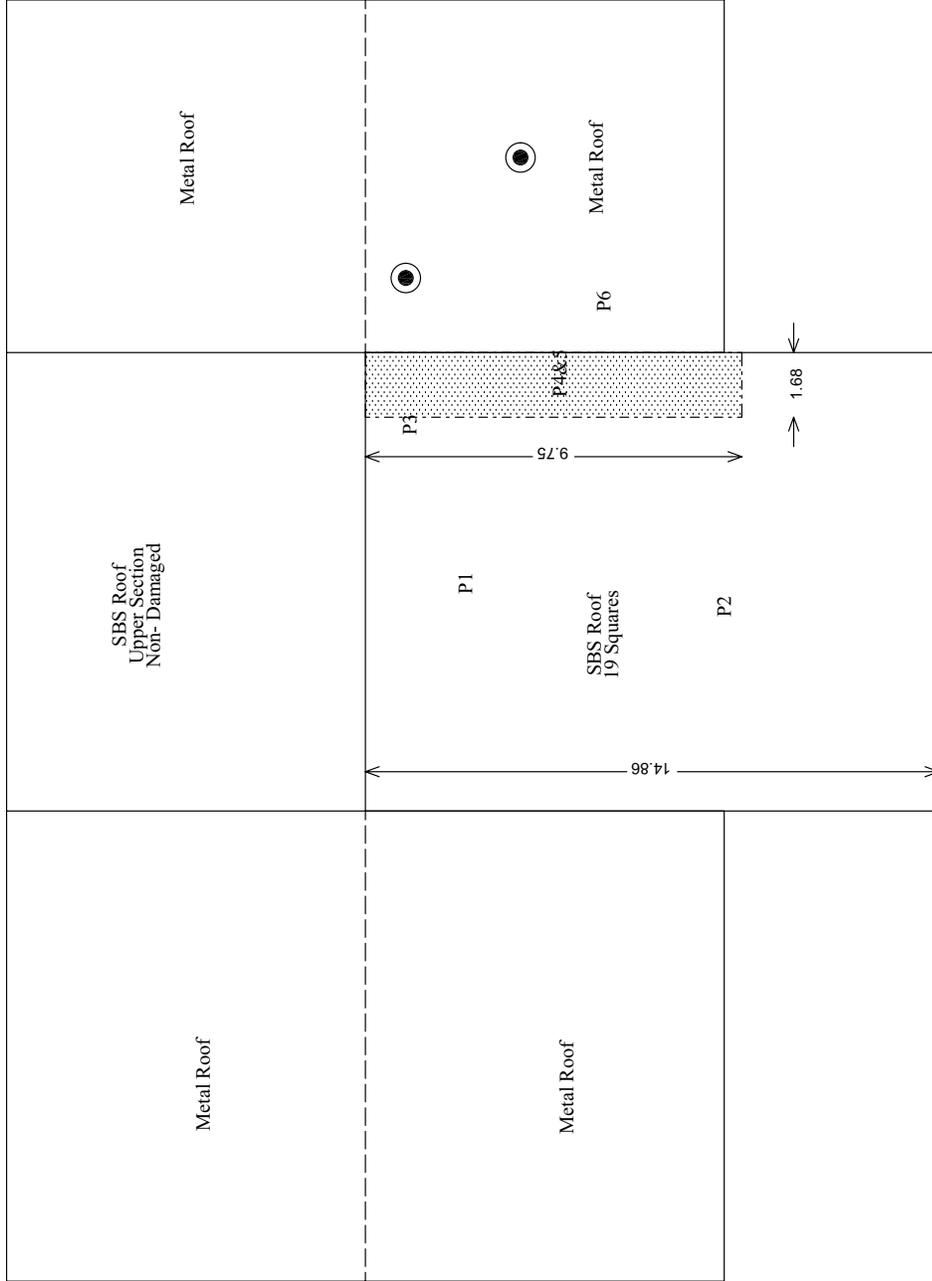


.....  
Agronomy Building

.....  
Agriculture & Agri Food Canada

.....  
DBW

.....  
S.



11.89

14.86

9.75

1.68

Metal Roof

Metal Roof

SBS Roof  
Upper Section  
Non-Damaged

SBS Roof  
19 Squares

P1

P2

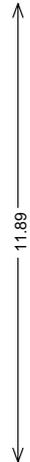
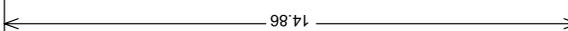
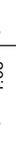
P3

P4&5

P6

●

●



# Legend



B-Vent Stack



Fire Damage



Repair Area

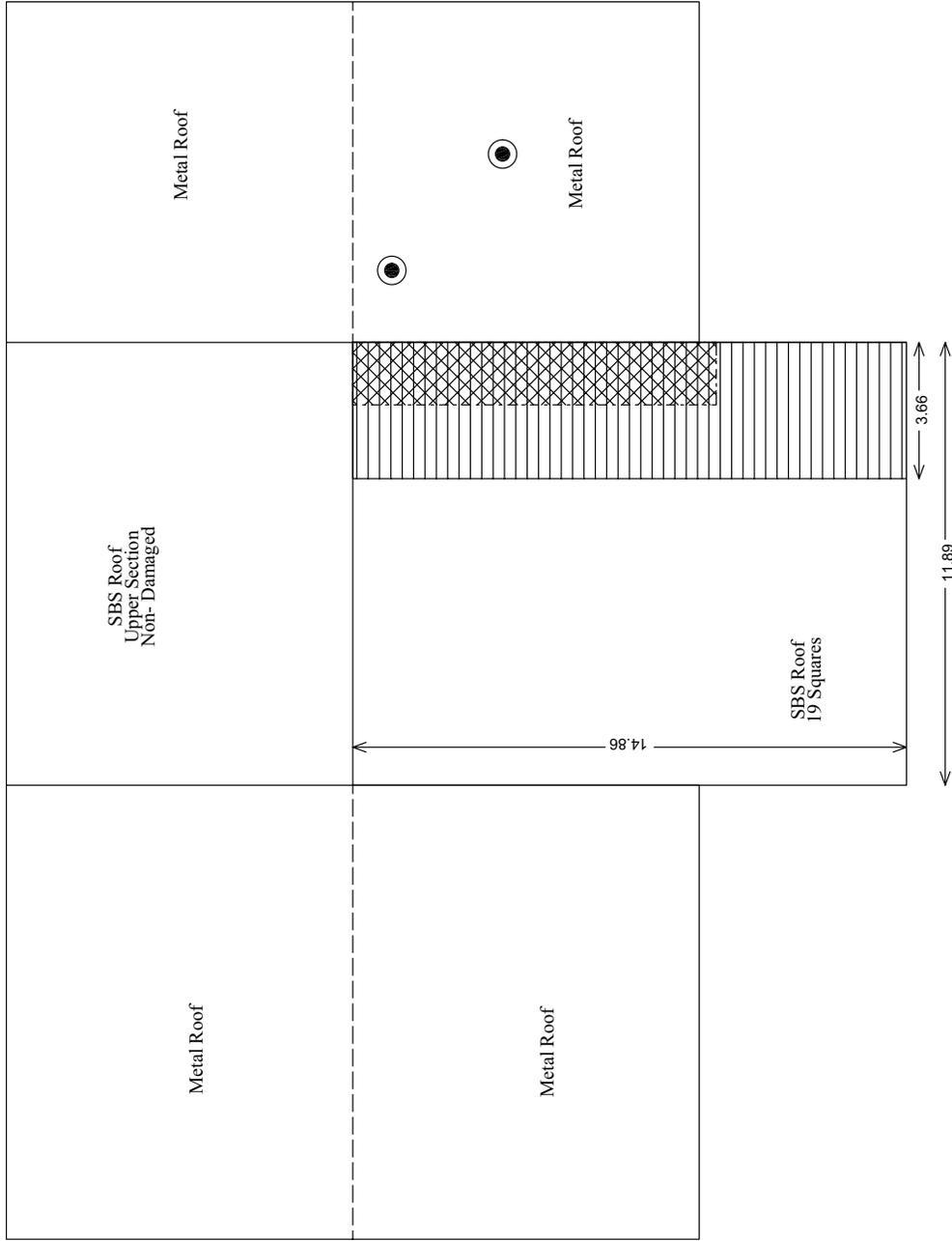


..... Agronomy Building

..... Agriculture & Agri Food Canada

..... DBW

..... S.S.



Metal Roof

Metal Roof

SBS Roof  
Upper Section  
Non-Damaged

SBS Roof  
19 Squares

Metal Roof

Metal Roof

14.86

3.66

11.89



**Photo 1** We see the damage to the roof along the North edge.



**Photo 2** This the rest of the area and we see more of the existing roof which appears undamaged to the south and east.



**Photo 3 This the NW corner of the roof and the upper roof wall and metal roof wall.**



**Photo 4 A closer look of the roof we see the melted insulation and some of the fiberboard.**



**Photo 5** I removed a piece of the MEPS and we see the moisture laying on the VB and it is under the edge of this area.



**Photo 6** The metal roof along the north edge of the SBS



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

## ***APPENDIX E***

*Letter to Authority Having Jurisdiction*



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA  
1427 Ranchlands Road NW  
Calgary AB T3G 1N2  
T: (403) 714-2097

---

March 29, 2013

Davis Inspection Services Ltd.  
Suite 146  
3132 26th Avenue N.E.  
Calgary, Alberta  
T1Y 6Z1

Attention Mr Brandon Lester

E-Mail: lester5@telusplanet.net

Re: Lethbridge Research Centre Agronomy Building Fire Damage  
Alberta Building Code Requirements

---

Dear Mr. Lester,

This letter shall confirm our recent meeting of March 29 in regard to the above noted project. As we discussed, we have been retained by PWC to prepare a report on the damage to the Agronomy Building and present alternate methods of repairing the damage. The fire occurred in early November of 2012 and caused extensive damage to the north wing of the building. We, in our meeting, reviewed the ABC as it could apply to this building and how the Building Code can provide direction to determine the type and extent of repairs that will impact the facility.

We reviewed the Building Code analysis that we had prepared and agreed that the analysis as laid out below is accurate. The 2006 Alberta Building Code is the code in effect at the time of this analysis and will be used as the authority for this review.

**BUILDING CODE ANALYSIS**

The building occupancy is classified as both "D" **Business and personal services occupancies - Offices** and "F-2" **Medium-hazardous industrial occupancies-Laboratories**.

The building has the following characteristics and properties:

AREA	1557.69SM
STORIES	TWO
STREETS	THREE
CONSTRUCTION	NON-COMBUSTIBLE
SPRINKLERED	NON SPRINKLERED

Group "D" occupancy (Business services)

Based upon the above, the building falls under article 3.2.2.53

This clause allows the building to be of combustible or non-combustible construction with floors and roof with a 45 minute Fire Rating if of combustible construction.

Group "F-2" occupancy (Industrial)

Based upon the above, the building falls under article 3.2.2.69, which restricts the unsprinklered building area to 1500 SM.

Being as the building is larger than that allowed under this article, (1557SM), the next article that allows for this larger area would be the one that applies. That Article, 3.2.2.72 requires that the entire structure be sprinklered.

Mr. Lester on behalf of Davis Inspection Services, the Authority Having Jurisdiction, did confirm that if this path of compliance is chosen, it will also require resolution of the other non-complaintant outstanding code related items with the building. They will include resolution of the existing dead-end corridor, resolution of the interconnected floor space, non-fire rated exit stairs and other items.

Options to resolve the Building Code concerns

- A. Sprinkler and upgrade the existing building to meet the latest edition of the Alberta Building Code. This, as noted above, will require correction of the non-compliant items including a new exit stair to avoid the dead-end corridor situation.
- B. Install a Firewall to separate the north wing (fire damaged wing) from the remainder of the building. This would create two (2) separate buildings, neither of which will require sprinklers. The south portion of the building, the one not affected by the fire, could then be "grandfathered" and not be required to be updated to comply with the 2006 Alberta Building Code.

We are recommending that a fire wall solution, Option B be pursued as a possible solution to resolve this problem. The south portion of the building, including the seed storage room and the two story office wing is to become one building while the wing wherein the fire occurred, is to become another building.

This is to be accomplished by constructing two 2-hour rated firewalls, one in each building. The north wall of the seed storage room is to have the north wall (concrete block) extended up past the roof of the north building by 150 mm to form a parapet as required by article 3.1.10.4. We are also proposing that the south wall of the north wing be rebuilt as per the structural recommendation and it be treated with a fire rated spray-on system, similar to ULC assembly ULC W800, W801, W802, or W803 to achieve a 2-hour fire rated wall assembly. Thus we are providing two 2-hour fire rated walls as per article 3.1.10.1 which are independent of each other and designed so that the collapse of one wall assembly will not cause the collapse of the other.

We trust that this is an accurate account of our meeting. Thank you for your time and your professional assessment in the review of this building and your agreement with these options.

Yours truly



Robert Elsworthy, Architect, AAA, MRAIC  
Robert Elsworthy Architecture

CC G. Galambos PWGSC



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

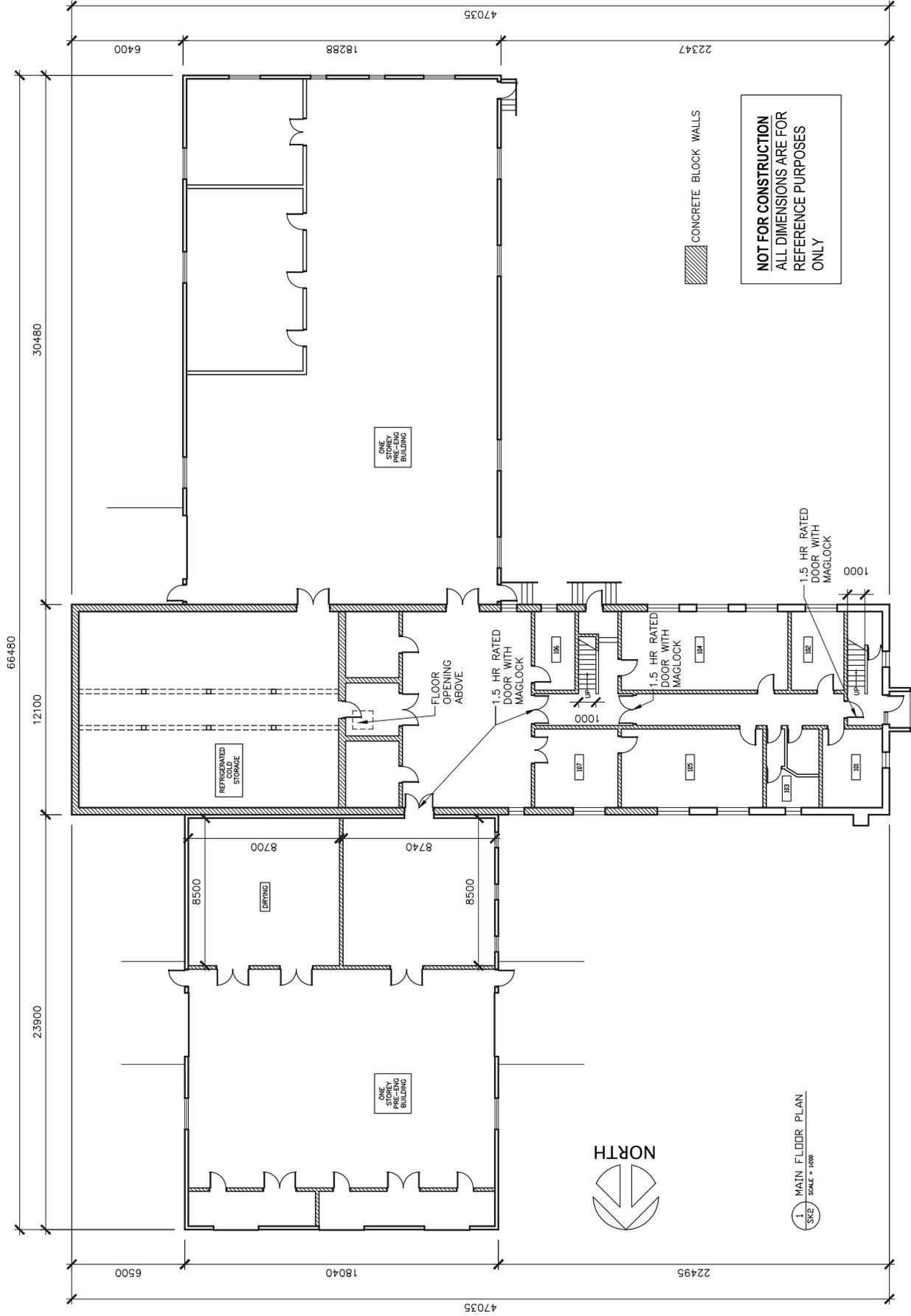
1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

# ***APPENDIX F***

## ***Building Plans***





**NOT FOR CONSTRUCTION**  
 ALL DIMENSIONS ARE FOR  
 REFERENCE PURPOSES  
 ONLY

CONCRETE BLOCK WALLS

ONE OF STONEY PRE-ENG BUILDING

ONE OF STONEY PRE-ENG BUILDING



1 MAIN FLOOR PLAN  
 SK2 SCALE = 1:500

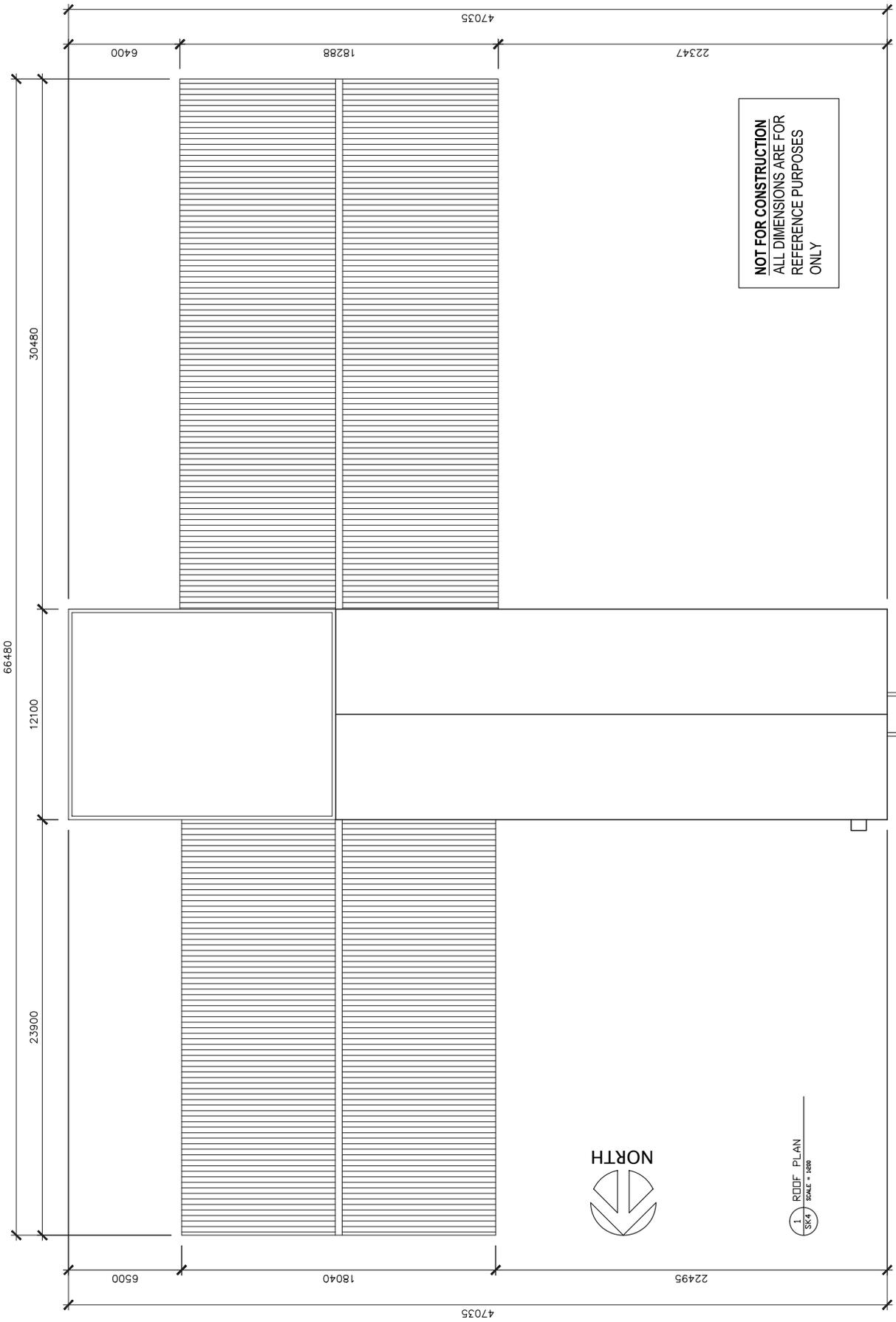


**NOT FOR CONSTRUCTION**  
 ALL DIMENSIONS ARE FOR  
 REFERENCE PURPOSES  
 ONLY

CONCRETE BLOCK WALLS



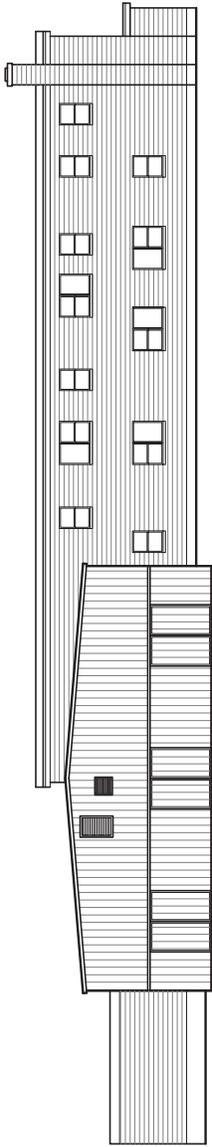
1 2ND FLOOR PLAN  
 SK3 SCALE = 1/8" = 1'-0"



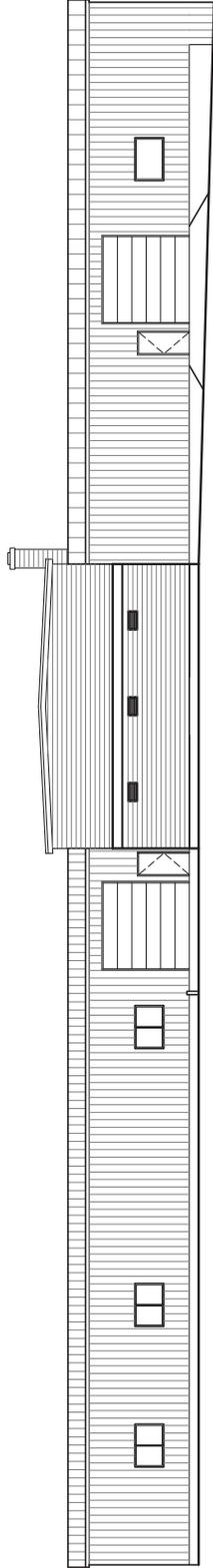
NOT FOR CONSTRUCTION  
 ALL DIMENSIONS ARE FOR  
 REFERENCE PURPOSES  
 ONLY



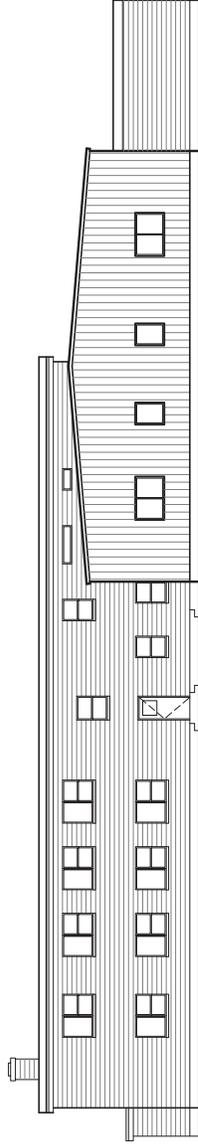
1 ROOF PLAN  
 SK 4 SCALE = 1:500



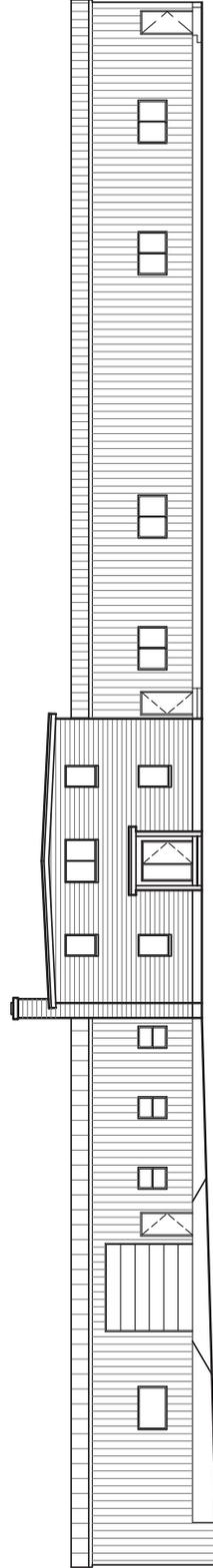
1 NORTH ELEVATION  
SKS / SCALE = 1/800



2 EAST ELEVATION  
SKS / SCALE = 1/800



3 SOUTH ELEVATION  
SKS / SCALE = 1/800



4 WEST ELEVATION  
SKS / SCALE = 1/800



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

## ***APPENDIX G***

KBK Cost Consulting Inc.  
“D” Cost Estimate

**Lethbridge Research Centre  
Agronomics Building, Fire Damage Repairs**

<b>BUILDING ASSESSMENT COST ANALYSIS OPTION A</b>					
Title	: Lethbridge Research Centre		Report Date :	10-Apr-13	
	: Repairs after Fire Damage		Page :		
Location	: 5403 1st Avenue S, Lethbridge AB		C.T. Index :		
Owner/Client	: Public Works and Government Services Canada				
Architect	: Robert Elsworthy Architecture		Total:	1,926.0 m2	
ELEMENT		Sub-total	Total	\$ per m <sup>2</sup> of GFA	%
<b>A</b>	<b>SHELL</b>		<b>\$169,700</b>	<b>88.11</b>	<b>22.3%</b>
A1	SUBSTRUCTURE, incl. SOG	7,100		3.69	0.9%
A2	STRUCTURE	97,600		50.67	12.8%
A3	EXTERIOR ENCLOSURE	65,000		33.75	8.5%
<b>B</b>	<b>INTERIORS</b>		<b>\$76,100</b>	<b>39.51</b>	<b>10.0%</b>
B1	PARTITIONS & DOORS, CEILINGS	58,500		30.37	7.7%
B2	FINISHES	17,600		9.14	2.3%
B3	FITTINGS & EQUIPMENT	0		0.00	0.0%
<b>C</b>	<b>SERVICES</b>		<b>\$237,300</b>	<b>123.21</b>	<b>31.1%</b>
C1	MECHANICAL	166,100		86.24	21.8%
C2	ELECTRICAL	71,200		36.97	9.3%
<b>D</b>	<b>SITE &amp; ANCILLARY WORK</b>		<b>\$80,400</b>	<b>41.74</b>	<b>10.5%</b>
D1	SITE WORK	45,700		23.73	6.0%
D2	ANCILLARY WORK	34,700		18.02	4.6%
<b>Z</b>	<b>GENERAL REQ'S/FEES AND ALLOWANCES</b>		<b>\$162,300</b>	<b>84.27</b>	<b>10.2%</b>
Z1	CONTINGENCY 15% (design/estimating allowance)	84,500		43.87	11.1%
Z2	GC FEE, GENERAL REQUIREMENTS 12%	77,800		40.39	10.2%
Z3	PERMITS AND TESTING, NIC		<b>\$0</b>	<b>0.00</b>	<b>0.0%</b>
Z4	ESCALATION 5%		<b>\$36,300</b>	<b>18.85</b>	<b>4.8%</b>
<b>SUB-TOTAL, excl. GST</b> (expected at tender)			<b>\$762,100</b>	<b>395.69</b>	<b>88.9%</b>
Z5	CHANGE ORDER ALLOWANCE, +/- 12%		\$87,900		
<b>TOTAL excl. GST</b>			<b>\$850,000</b>	<b>441.33</b>	
<b>NOTES:</b>					
The estimated construction costs include app. one year inflation					
Estimate is based on assessment reports issued March, 2013					
Soft costs not included					
GST not included					
It is assumed that this project is bid for a stipulated sum contract					
This Construction Budget is presented as an estimate of probable costs and is intended to be used for budget discussions. While we have made every effort to ensure accuracy of the information presented in this budget, KBK Cost Consulting Inc. or its directors or manager can not be held liable for its content.					

**Lethbridge Research Centre  
Agronomics Building, Fire Damage Repairs**

<b>BUILDING ASSESSMENT COST ANALYSIS OPTION B</b>					
Title	: Lethbridge Research Centre		Report Date :	10-Apr-13	
	: Repairs after Fire Damage		Page :		
Location	: 5403 1st Avenue S, Lethbridge AB		C.T. Index :		
Owner/Client	: Public Works and Government Services Canada				
Architect	: Robert Elsworthy Architecture		Total:	1,926.0 m2	
ELEMENT		Sub-total	Total	\$ per m <sup>2</sup> of GFA	%
<b>A SHELL</b>			<b>\$85,900</b>	<b>44.60</b>	<b>11.3%</b>
A1	SUBSTRUCTURE, incl. SOG	0		0.00	0.0%
A2	STRUCTURE	35,500		18.43	4.7%
A3	EXTERIOR ENCLOSURE	50,400		26.17	6.6%
<b>B INTERIORS</b>			<b>\$38,600</b>	<b>20.04</b>	<b>5.1%</b>
B1	PARTITIONS & DOORS, CEILINGS	28,800		14.95	3.8%
B2	FINISHES	9,800		5.09	1.3%
B3	FITTINGS & EQUIPMENT	0		0.00	0.0%
<b>C SERVICES</b>			<b>\$108,900</b>	<b>56.54</b>	<b>14.3%</b>
C1	MECHANICAL	67,100		34.84	8.8%
C2	ELECTRICAL	41,800		21.70	5.5%
<b>D SITE &amp; ANCILLARY WORK</b>			<b>\$34,100</b>	<b>17.71</b>	<b>4.5%</b>
D1	SITE WORK	3,000		1.56	0.4%
D2	ANCILLARY WORK	31,100		16.15	4.1%
<b>Z GENERAL REQ'S/FEES AND ALLOWANCES</b>			<b>\$77,000</b>	<b>39.98</b>	<b>4.8%</b>
Z1	CONTINGENCY 15% (design/estimating allowance)	40,100		20.82	5.3%
Z2	GC FEE, GENERAL REQUIREMENTS 12%	36,900		19.16	4.8%
Z3	PERMITS AND TESTING, NIC		<b>\$0</b>	<b>0.00</b>	<b>0.0%</b>
Z4	ESCALATION 5%		<b>\$17,200</b>	<b>8.93</b>	<b>2.3%</b>
<b>SUB-TOTAL, excl. GST</b> (expected at tender)			<b>\$361,700</b>	<b>187.80</b>	<b>42.2%</b>
Z5	CHANGE ORDER ALLOWANCE, +/- 12%		\$43,300		
<b>TOTAL excl. GST</b>			<b>\$405,000</b>	<b>210.28</b>	
<b>NOTES:</b>					
The estimated construction costs include app. one year inflation					
Estimate is based on assessment reports issued March, 2013					
Soft costs not included					
GST not included					
It is assumed that this project is bid for a stipulated sum contract					
This Construction Budget is presented as an estimate of probable costs and is intended to be used for budget discussions. While we have made every effort to ensure accuracy of the information presented in this budget, KBK Cost Consulting Inc. or its directors or manager can not be held liable for its content.					

**Lethbridge Research Centre  
Agronomics Building, Fire Damage Repairs**

<b>DETAILED CALCULATIONS, building assessment cost analysis</b>					
Date: 10-Apr-13				<b>Option A</b>	<b>Option B</b>
<b>A1 SUBSTRUCTURE, incl. SOG</b>			<b>Total below:</b>	<b>\$7,100</b>	<b>\$0</b>
Quant.	Unit	Description	Unit price	Cost	Cost
		<u>Option A</u>			
		Remove a portion of SOG and replace		1,000.00	
		Footings for block wall surrounding new exit stair well		6,100.00	
		No work required in <u>Option B</u>			0
<b>A2 STRUCTURE</b>			<b>Total below:</b>	<b>\$97,600</b>	<b>\$35,500</b>
Quant.	Unit	Description	Unit price	Cost	Cost
		<u>Option A</u>			
		Replace half of pre-eng frame, one grid line only		7,800.00	
		Replace wall and roof purlins		10,800.00	
		Replace wall framing		6,500.00	
		Block wall repairs at top of existing wall		4,600.00	
		Block wall infill, low roof to higher roof, SE Corner of fire damaged area		5,800.00	
		Block wall at new stair exit		34,600.00	
		Re-build roof structure over stair well		17,400.00	
		Landing/stairs/railing (concrete filled steel pans, no fire rating of steel stair)		10,100.00	
		<u>Option B</u>			
		Replace half of pre-eng frame, one grid line only			7,800
		Replace wall and roof purlins			10,800
		Replace wall framing			6,500
		Block wall repairs at top of existing wall			4,600
		Block wall infill, low roof to higher roof, SE Corner of fire damaged area			5,800
<b>A3 EXTERIOR ENCLOSURE</b>			<b>Total below:</b>	<b>\$65,000</b>	<b>\$50,400</b>
Quant.	Unit	Description	Unit price	Cost	Cost
		<u>Option A</u>			
		Roofing, Option 2 carried with full replacement, as per consultants report If Option 2 is chosen at an expected cost of \$7,000 the net saving would be \$16,000 subject to G.C. mark-up and contingencies entered on summary page		23,000	
77	m <sup>2</sup>	Replace standing seam roofing and insulation with similar pre-eng material	240.00	18,400	
34	m <sup>2</sup>	Replace fire damaged wall cladding, including interior liner panel	220.00	7,500	
		Gutter repairs		1,500	
36	m <sup>2</sup>	Wall cladding at new stair well	220.00	7,900	
1	Pcs	New exit door	2,550.00	2,600	
		Exterior painting		4,100	
		<u>Option B</u>			
		Roofing, Option 2 carried with full replacement, as per consultants report If Option 2 is chosen at an expected cost of \$7,000 the net saving would be \$16,000 subject to G.C. mark-up and contingencies entered on summary page			23,000
77	m <sup>2</sup>	Replace standing seam roofing and insulation with similar pre-eng material	240.00	18,400	
34	m <sup>2</sup>	Replace fire damaged wall cladding, including interior liner panel	220.00	7,500	
		Gutter repairs			1,500

**Lethbridge Research Centre  
Agronomics Building, Fire Damage Repairs**

<b>B1 PARTITIONS &amp; DOORS, CEILINGS</b>			<b>Total below:</b>	<b>\$58,500</b>	<b>\$28,800</b>
Quant.	Unit	Description	Unit price	Cost	Cost
		<u>Option A</u>			
		Built fire rated wall, and install fire protection spray as required		6,900	
		Rate room with dump waiter		8,100	
		5 new door slabs/frames/hardware, rated		12,800	
		Walls related to new stair exit		8,900	
		2 doors related to new stair exit		4,500	
		Ceilings related to new stair exit		600	
		Allowance for ceiling repairs after sprinkler system installation		14,100	
		Fire stopping		2,600	
		<u>Option B</u>			
		Built fire rated wall, and install fire protection spray as required			6,900
		Rate room with dump waiter			8,100
		5 new door slabs/frames/hardware, rated			12,800
		Fire stopping			1,000
<b>B2 FINISHES</b>			<b>Total below:</b>	<b>\$17,600</b>	<b>\$9,800</b>
Quant.	Unit	Description	Unit price	Cost	Cost
		<u>Option A</u>			
		Painting allowance, incl. cleaning and prep of fire damaged walls		9,900	
		Flooring allowance		7,700	
		Ceramic tiles		0	
		<u>Option B</u>			
		Painting allowance, incl. cleaning and prep of fire damaged walls			6,000
		Flooring allowance			3,800
		Ceramic tiles			0
<b>B3 FITTINGS &amp; EQUIPMENT</b>			<b>Total below:</b>	<b>\$0</b>	<b>\$0</b>
Quant.	Unit	Description	Unit price	Cost	Cost
		No work required under this scope		0	0
<b>C1 MECHANICAL</b>			<b>Total below:</b>	<b>\$166,100</b>	<b>\$67,100</b>
Quant.	Unit	Description	Unit price	Cost	Cost
		<u>Option A</u>			
		Mechanical, as per consultants report		67,100	
		Sprinkler system and sprinkler room		83,700	
		Mechanical related to related to new stair exit		15,300	
		<u>Option B</u>			
		Mechanical, as per consultants report			67,100

**Lethbridge Research Centre  
Agronomics Building, Fire Damage Repairs**

<b>C2 ELECTRICAL</b>			<b>Total below:</b>	<b>\$71,200</b>	<b>\$41,800</b>
Quant.	Unit	Description	Unit price	Cost	Cost
		<u>Option A</u>			
		Electrical, as per consultants report		41,800	
		Fire alarm upgrade, allow		6,000	
		Electrical related to related to new stair exit		7,700	
		Allowance for possible lighting reinstallation and some modification after sprinkler installation		15,700	
		<u>Option B</u>			
		Electrical, as per consultants report			41,800
<b>D1 SITE WORK</b>			<b>Total below:</b>	<b>\$45,700</b>	<b>\$3,000</b>
Quant.	Unit	Description	Unit price	Cost	Cost
		<u>Option A</u>			
		Water service, and site work repairs, subject to review, tie-in and length of water service is unknown as is the extent of hard surface repairs		42,700	
		<u>Option A &amp; B</u>			
		Allowed for minor soft landscaping repairs, crane and truck access may cause minor damage requiring repairs		3,000	3,000
<b>D2 ANCILLARY WORK</b>			<b>Total below:</b>	<b>\$34,700</b>	<b>\$31,100</b>
Quant.	Unit	Description	Unit price	Cost	Cost
		<u>Option A</u>			
		Remove half of pre-eng frame, existing purlins and roofing and cladding, shoring and temp support as required, only where fire damaged		20,000	
		Hazardous materials removal allowance, only if flooring is removed		0	
		Mechanical and electrical demolition, allow		5,100	
		Selective structural and architectural demolition		6,000	
		Cut and remove roof structure		2,800	
		Cut opening for new exit door		800	
		<u>Option B</u>			
		Remove half of pre-eng frame, existing purlins and roofing and cladding, shoring and temp support as required, only where fire damaged			20,000
		Hazardous materials removal allowance, only if flooring is removed			0
		Mechanical and electrical demolition, allow			5,100
		Selective structural and architectural demolition			6,000



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

## ***APPENDIX H***

# Project Photographs

# Project Photographs



*Fire damage east overhead door*



*Fire damage at south wall*

# Project Photographs



*Fire damage in drying room*



*Fire damage to concrete block wall*

# Project Photographs



*North wall of drying room*



*Fire damage to roof of north wing*



**Robert Elsworthy  
Architecture**

Robert Elsworthy  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

# ***APPENDIX I***

## **Project Schedule**



**Robert Elsworth  
Architecture**

Robert Elsworth  
Architect AAA

1427 Ranchlands Road NW  
Calgary Alberta T2G 1N2  
Telephone: (403) 714-2097

---

## PROJECT SCHEDULE

WEEK NUMBER	DURATION IN WEEKS	ACTIVITY	COMMENTS
1	1	START	
5	4	COMPLETE SCHEMATIC DESIGN	
7	2	REVIEW	
11	4	FINALIZE CONTRACT DOCUMENTS	
13	2	REVIEW	
17	4	TENDER	
19	2	REVIEW AND AWARD CONTRACT	
21	2	CONSTRUCTION START	
27	6	CONSTRUCTION 50%	
33	6	CONSTRUCTION 100%	
35	2	COMMISSIONING	



Public Works and  
Government Services  
Canada

Travaux publics et  
Services gouvernementaux  
Canada

Canada



# GENERAL PROCEDURES & STANDARDS

## For Professional & Design Services

MMXI Edition

[www.pwgsc-tpsgc.gc.ca](http://www.pwgsc-tpsgc.gc.ca)



## Table of Contents:

<b>I</b>	<b>INTRODUCTION</b> .....	<b>5</b>
1.1	GENERAL PROCEDURES AND STANDARDS .....	5
1.1.1	<i>General</i> .....	5
1.1.2	<i>Harmonization with the Terms of Reference (TOR)</i> .....	5
1.2	PROJECT DELIVERY.....	5
1.2.1	<i>General Requirements</i> .....	5
1.2.2	<i>Service Delivery for all Projects</i> .....	6
1.2.3	<i>Service Delivery (Buildings)</i> .....	6
1.2.4	<i>Service Delivery (Engineering)</i> .....	6
1.3	PROCUREMENT OF GOODS AND SERVICES.....	6
1.3.1	<i>Public Procurement</i> .....	6
1.3.2	<i>Integrity and Guiding Principles</i> .....	7
<b>2</b>	<b>REQUIRED SERVICES STANDARDS</b> .....	<b>8</b>
2.1	GENERAL.....	8
2.2	COST MANAGEMENT.....	8
2.2.1	<i>General</i> .....	8
2.2.2	<i>Treasury Board (TB) Submissions</i> .....	8
2.2.3	<i>Classes of Estimates</i> .....	9
2.2.4	<i>Class 'D' (Indicative) Estimate</i> .....	9
2.2.5	<i>Class 'C' Estimate</i> .....	9
2.2.6	<i>Class 'B' (Substantive) Estimate</i> .....	9
2.2.7	<i>Class 'A' (Pre-Tender) Estimate</i> .....	9
2.3	SCHEDULE MANAGEMENT.....	10
2.3.1	<i>Scheduler</i> .....	10
2.3.2	<i>Project Schedule</i> .....	10
2.3.3	<i>Milestones</i> .....	10
2.3.4	<i>Activities</i> .....	10
2.3.5	<i>Schedule Review and Approval</i> .....	11
2.3.6	<i>Schedule Monitoring and Control</i> .....	11
2.4	RISK MANAGEMENT.....	12
2.4.1	<i>Context</i> .....	12
2.5	WASTE MANAGEMENT.....	12
2.5.1	<i>Protocol</i> .....	12
2.5.2	<i>Consultant Responsibilities</i> .....	12
2.6	TECHNICAL REPORTS.....	12
2.6.1	<i>Purpose</i> .....	12
2.6.2	<i>Standards for PWGSC Technical Reports</i> .....	12
2.6.3	<i>Pre-Design Report Content</i> .....	13
2.6.4	<i>Schematic Design Report Content</i> .....	14
2.6.5	<i>Design Development Report Content</i> .....	16
2.7	CODES, ACTS, STANDARDS, REGULATIONS.....	19
2.7.1	<i>General</i> .....	19
2.7.2	<i>PWGSC documents available from PWGSC Project Manager:</i> .....	19
2.7.3	<i>Codes and Regulations:</i> .....	19
2.7.4	<i>Standards and Guidelines Produced by the Government of Canada:</i> .....	20



2.7.5	<i>Health Canada Standards and Guidelines:</i>	20
2.7.6	<i>Standards and Guidelines:</i>	21
2.7.7	<i>Standards and Guidelines for Transportation:</i>	23
2.8	COMMISSIONING PROCESS	23
2.8.1	<i>General</i>	23
2.8.2	<i>Commissioning Plan</i>	24
2.8.3	<i>Component Verification</i>	24
2.8.4	<i>System &amp; Integrated System Testing</i>	24
2.8.5	<i>Test Requirements</i>	25
2.8.6	<i>Commissioning (Evaluation) Report</i>	25
2.8.7	<i>Overview of Roles and Responsibilities</i>	25
2.8.8	<i>Major Tasks and Responsibilities</i>	26
2.9	CONSTRUCTION DOCUMENTS	27
2.9.1	<i>Purpose</i>	27
2.9.2	<i>Principles for PWGSC Contract Documents</i>	27
2.9.3	<i>Quality Assurance</i>	27
2.9.4	<i>Addenda</i>	27
2.9.5	<i>Submissions</i>	28
2.9.6	<i>PWGSC Role</i>	28
2.10	SPECIFICATIONS	28
2.10.1	<i>General</i>	28
2.10.2	<i>National Master Specification (NMS)</i>	28
2.10.3	<i>Specification Organization</i>	28
2.10.4	<i>Terminology</i>	29
2.10.5	<i>Dimensions</i>	29
2.10.6	<i>Standards</i>	29
2.10.7	<i>Specifying Materials</i>	29
2.10.8	<i>Acceptable Products and Materials</i>	29
2.10.9	<i>Alternate Products and Materials</i>	30
2.10.10	<i>Separate and Alternate Prices</i>	30
2.10.11	<i>Sole Sourcing</i>	30
2.10.12	<i>Unit Prices</i>	30
2.10.13	<i>Cash Allowances</i>	30
2.10.14	<i>Warranties</i>	30
2.10.15	<i>Scope of Work</i>	30
2.10.16	<i>Summary and Section Includes</i>	30
2.10.17	<i>Related Sections</i>	30
2.10.18	<i>Index</i>	30
2.10.19	<i>Health and Safety</i>	31
2.10.20	<i>Experience and Qualifications</i>	31
2.10.21	<i>Prequalification</i>	31
2.10.22	<i>Contracting Issues</i>	31
2.11	DRAWINGS	31
2.11.1	<i>General</i>	31
2.11.2	<i>Title Blocks</i>	31
2.11.3	<i>Dimensions</i>	31
2.11.4	<i>Trade Names</i>	31
2.11.5	<i>Specification Notes</i>	32
2.11.6	<i>Terminology</i>	32
2.11.7	<i>Information to be included</i>	32



2.11.8	<i>Drawing Numbers</i> .....	32
2.11.9	<i>Prints</i> .....	32
2.11.10	<i>Binding</i> .....	33
2.11.11	<i>Legends</i> .....	33
2.11.12	<i>Schedules</i> .....	33
2.11.13	<i>North Points</i> .....	33
2.11.14	<i>Drawing Symbols</i> .....	33
<b>3</b>	<b>PROJECT ADMINISTRATION .....</b>	<b>34</b>
3.1	GENERAL REQUIREMENTS FOR ALL PROJECTS .....	34
3.2	LANGUAGE .....	34
3.3	MEDIA .....	34
3.4	PROJECT MANAGEMENT .....	34
3.4.1	<i>General</i> .....	34
3.4.2	<i>National Project Management System</i> .....	34
3.4.3	<i>Design Stage</i> .....	34
3.4.4	<i>Implementation Stage</i> .....	35
3.4.5	<i>Closeout Stage</i> .....	35
3.4.6	<i>Engineering Projects</i> .....	35
3.5	LINES OF COMMUNICATION.....	36
3.6	MEETINGS .....	36
3.7	CONSULTANT RESPONSIBILITIES .....	36
3.8	PWGSC RESPONSIBILITIES .....	37
3.9	USER DEPARTMENT RESPONSIBILITIES.....	38
3.10	REVIEW AND APPROVAL BY PROVINCIAL AND MUNICIPAL AUTHORITIES .....	38
3.11	BUILDING PERMITS AND OCCUPANCY PERMITS .....	38
3.12	TECHNICAL AND FUNCTIONAL REVIEWS .....	38
APPENDIX A	CHECKLISTS .....	40
APPENDIX B	SPECIFICATION TOC STANDARDS .....	49
APPENDIX C	ADDENDUM FORMAT STANDARD .....	50
APPENDIX D	DIGITAL TENDER DOCUMENTS STANDARDS .....	51
APPENDIX E	PDF CREATION STANDARDS.....	59
APPENDIX F	DEFINITIONS.....	62



## I INTRODUCTION

### I.1 GENERAL PROCEDURES AND STANDARDS

#### I.1.1 GENERAL

- .1 These PWGSC *General Procedures and Standards* (P&S) have been developed to:
  - .1 Facilitate the development of a rational, well-documented design process; and
  - .2 Ensure compliance with federal government standards, PWGSC Policies and Treasury Board directives.

#### I.1.2 HARMONIZATION WITH THE TERMS OF REFERENCE (TOR)

- .1 The P&S document must be used in conjunction with the TOR, as the two documents are complimentary.
- .2 The TOR describes project-specific requirements, services and deliverables while the GP&S document outlines with minimum standards and procedures common to all projects.
- .3 In the case of a conflict between the two documents, the requirements of the TOR override this document.

### I.2 PROJECT DELIVERY

#### I.2.1 GENERAL REQUIREMENTS

- .1 The project delivery requirements outlined in this section are applicable to the design and construction of all PWGSC projects in Western Region, unless otherwise indicated in the TOR.
- .2 Under the direction of the Consultant, the Consultant team shall provide fully integrated and coordinated professional and design services for the delivery of a project, in accordance with the requirements in the TOR and as contained herein.
- .3 The Consultant must:
  - .1 Obtain written authorization from the Departmental Representative before proceeding from one phase of work to the next phase of a project;
  - .2 Coordinate all services with the Departmental Representative;
  - .3 Deliver each project utilizing best practices in support of User Department needs, respecting the approved financial budget, schedule, scope, quality energy budget;
  - .4 Establish a cohesive functional partnership and open communication between all members of the project delivery team throughout all phases of the project life;
  - .5 Ensure that the Consultant team has an in-depth understanding and collective 'buy-in' of the project requirements, scope, budget and scheduling objectives, working constructively to build a collaborative and cooperative team approach with knowledgeable and timely input and contribution by all project team members, including representatives from PWGSC and the User Department;
  - .6 Conduct rigorous quality assurance reviews during the design and construction phases, including the application of value engineering principles during the design of all complex systems;
  - .7 Provide a written response to all PWGSC comments included in Quality Assurance reviews conducted throughout the design of the project;
  - .8 If any alterations are required during the development of the design, analyse the impact on all project components and resubmit for approval before proceeding further;
  - .9 Establish and maintain a change control procedure for scope changes;



- .10 Ensure that an experienced Project Architect or Project Engineer is assigned to each project, who shall be responsible for the production, coordination and delivery of all design and construction documents for all project disciplines;
- .11 Prepare a continuous risk identification and management program employing effective methodologies to ensure construction safety as well as claims avoidance;
- .12 Provide continuous and comprehensive documentation of the project at all stages of the project implementation;
- .13 Ensure continuity of key personnel and maintain a dedicated working team for the life of the project;

### **I.2.2 SERVICE DELIVERY FOR ALL PROJECTS**

- .1 For all projects, the Consultant shall:
  - .1 Deliver the project to be within;
    - .1 The established construction budget,
    - .2 The key milestones, according to the established project schedule.
  - .2 Ensure that each Consultant team member:
    - .1 Understands the project requirements, for seamless delivery of the required services;
    - .2 Functions as a cohesive partnership with open communication between all members of the project delivery team throughout all phases of the project life;
    - .3 Function as an integrated and focused team with an in-depth understanding and collective 'buy-in' of the project requirements, scope, budget and scheduling objectives.
  - .3 Provide;
    - .1 Full co-ordination of services with other consultants engaged by PWGSC,
    - .2 A continuous risk management program to address the risks associated specifically with this project, including construction safety and claims avoidance issues.
  - .4 Deliver the work in a professional manner during all phases of the project, employing best practices for budget, schedule, quality, and scope management;
  - .5 Maintain continuity of key personnel and maintain a dedicated working team for the life of the project.

### **I.2.3 SERVICE DELIVERY (BUILDINGS)**

- .1 For Building projects, where an Architectural firm is the Prime Consultants, the Consultant team shall, as a minimum, adhere to the standards of services outlined in the "Canadian Handbook of Practice for Architects - Volume 2 Management" (latest edition) distributed by the Royal Architectural Institute of Canada (RAIC).

### **I.2.4 SERVICE DELIVERY (ENGINEERING)**

- .1 For Engineering projects, where an Engineering firm is the Prime Consultants, the Consultant team shall adhere to the standards of services established by the Professional Engineering Association in the Province or Territories where the project is located.

## **I.3 PROCUREMENT OF GOODS AND SERVICES**

### **I.3.1 PUBLIC PROCUREMENT**

- .1 Public procurement by Canada is legislated and guided by a number of international and national trade agreements, and acts, as well as policies, directives, and guidelines provided by the Treasury Board Secretariat (TBS) and PWGSC.



- .2 There is one over-arching principle for all PWGSC procurement activities: Integrity. Subordinate to this are guiding principles, which provide the framework for PWGSC procurement process.
- .3 For further information refer to the following web link;
  - .1 <http://www.tpsgc-pwgsc.gc.ca/app-acq/cndt-cndct/contexte-context-eng.html>

### **I.3.2 INTEGRITY AND GUIDING PRINCIPLES**

- .1 PWGSC procurement processes will be open, fair and honest.
- .2 Client Service:
  - .1 PWGSC will make every reasonable effort to satisfy the operational requirements of its clients, while obtaining the best value in each procurement process.
- .3 National Objectives:
  - .1 PWGSC procurement activities will advance established government policies, within the limits imposed by international trade obligations.
- .4 Competition:
  - .1 PWGSC procurement will be competitive, with specific exceptions.
- .5 Equal Treatment:
  - .1 PWGSC must ensure that all potential bidders of a particular requirement are subject to the same conditions.
- .6 Accountability:
  - .1 PWGSC is accountable for the integrity of the contracting process.



## **2 REQUIRED SERVICES STANDARDS**

### **2.1 GENERAL**

- .1 Where Services are called for in the project specific TOR, the standards outlined in the following articles apply.

### **2.2 COST MANAGEMENT**

#### **2.2.1 GENERAL**

- .1 The following provides a general indication of the information needed by the Consultant's cost estimator to prepare specific classifications of estimates.
- .2 These are the minimum requirements only and should be supplemented where additional information exists or is warranted.
- .3 Construction cost estimates are to be prepared and submitted to PWGSC at various stages during the design process.
- .4 In addition to the Consultants' estimate, PWGSC may have independent estimates performed to compare with the Consultant estimate.

#### **2.2.2 TREASURY BOARD (TB) SUBMISSIONS**

- .1 Projects that are subject to TB approval are normally submitted twice.
  - .1 The first submission is for Preliminary Project Approval (PPA) at Pre-Design or Schematic Design stage of a project and must include an Indicative Estimate for the cost of the work.
  - .2 The second submission is for Effective Project Approval (EPA) at the completion of Design Development or Pre-Tender stage of a project and must include a Substantive Estimate for the cost of the work.
- .2 The Treasury Board estimate definitions are:
  - .1 Indicative Estimate;
    - .1 A low quality, order of magnitude estimate that is not sufficiently accurate to warrant TB approval as a Cost Objective.
  - .2 Substantive Estimate;
    - .1 An estimate which is of sufficiently high quality and reliability as to warrant TB approval as a Cost Objective for the project phase under consideration.
    - .2 It is based on detailed systems and component design, taking into account all project objectives and deliverables.
- .3 TB Terminology:
  - .1 Constant dollar estimate;
    - .1 This is an estimate expressed in terms of the dollars of a particular base fiscal year.
      - .1 It includes no provision for inflation.
      - .2 Cash flows over a number of fiscal years may also be expressed in constant dollars of the base year including no allowance for inflation in the calculation of costs.
  - .2 Budget-year (BY) dollar estimate:
    - .1 Budget year dollars is also be referred to as Nominal dollars or Current dollars.
      - .1 This is an estimate based on costs arising in each FY of the project schedule.
      - .2 It is escalated to account for inflation and other economic factors affecting the period covered by the estimate.
    - .2 The costs and benefits across all periods should initially be tabulated in budget year dollars for thee following reasons:



- .1 First; this is the form in which financial data are usually available,
- .2 Second; adjustments, such as tax adjustments, are accurately and easily made in budget year dollars,
- .3 Finally; working in budget-year dollar enables the analyst to construct a realistic picture over time, taking into account changes in relative prices.

### **2.2.3 CLASSES OF ESTIMATES**

- .1 PWGSC applies a detailed, four level, classification using the terms Class A, B, C and D.
- .2 Apply these estimate classifications at the project stages as defined in the TOR.
- .3 For projects required to be submitted to TB for approval:
  - .1 An Indicative Estimate shall be at least a class 'D'; and
  - .2 A Substantive Estimate shall be at least a class 'B'.

### **2.2.4 CLASS 'D' (INDICATIVE) ESTIMATE**

- .1 Based upon a comprehensive statement of requirements and an outline of potential solutions, this estimate is to provide an indication of the final project cost, and allow for ranking of all the options being considered.
- .2 Submit Class 'D' cost estimates in elemental analysis format, in accordance with the latest edition issued by the Canadian Institute of Quantity Surveyors, with cost per m<sup>2</sup> for current industry statistical data for the appropriate building type and location.
- .3 Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.
- .4 The level of accuracy of a class D cost estimate shall be such that no more than a 20% design contingency allowance is required.

### **2.2.5 CLASS 'C' ESTIMATE**

- .1 Based on a comprehensive list of requirements and assumptions, including a full description of the preferred Schematic Design option, construction experience, design experience and market conditions, this estimate must be sufficient for making the correct investment decision.
- .2 Submit Class 'C' cost estimates in elemental analysis format, in accordance with the latest edition issued by the Canadian Institute of Quantity Surveyors, with cost per m<sup>2</sup> for current industry statistical data for the appropriate building type and location.
- .3 Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.
- .4 The level of accuracy of a class C cost estimate shall be such that no more than a 15% design contingency allowance is required.

### **2.2.6 CLASS 'B' (SUBSTANTIVE) ESTIMATE**

- .1 Based on design development drawings and outline specifications, which include the preliminary design of all major systems and subsystems, as well as the results of all site/installation investigations, this estimate must provide for the establishment of realistic cost objectives and be sufficient to obtain effective project approval.
- .2 Submit Class 'B' cost estimates in both elemental analysis format and trade divisional format, in accordance with the latest edition issued by the Canadian Institute of Quantity Surveyors.
- .3 Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.
- .4 The level of accuracy of a class 'B' cost estimate shall be such that no more than a 10% design contingency allowance is required.

### **2.2.7 CLASS 'A' (PRE-TENDER) ESTIMATE**



- .1 Based on completed construction drawings and specifications prepared prior to calling competitive tenders, this estimate must be sufficient to allow a detailed reconciliation and/or negotiation with any contractor's tender.
- .2 Submit Class 'A' cost estimates in both elemental analysis format and trade divisional format, in accordance with the latest edition issued by the Canadian Institute of Quantity Surveyors.
- .3 Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.
- .4 The level of accuracy of a class 'A' cost estimate shall be such that no more than a 5% design contingency allowance is required.

## **2.3 SCHEDULE MANAGEMENT**

### **2.3.1 SCHEDULER**

- .1 The Scheduler shall provide a Project Planning and Control Schedule for the project, for the purpose of Planning, Scheduling, Progress Monitoring (Time Management), during all the design phases up to the construction procurement phase.
- .2 A qualified Scheduler, with experience commensurate with the complexity of the project, is required to develop and monitor the project schedule during the design process.
- .3 The Scheduler shall adhere to good industry practices for schedule development and maintenance, as recognized by the Project Management Institute (PMI).
- .4 PWGSC presently utilizes the Primavera Suite software and Microsoft Project for its current Control Systems and any software used by the consultant should be fully integrated with either of these programs, using one of the many commercially available software packages.

### **2.3.2 PROJECT SCHEDULE**

- .1 A Detailed Project Schedule is a schedule developed in reasonable detail to ensure adequate Time Management planning and control of the project.
- .2 Project Schedules are used as a guide for the planning, design and implementation phases of the project, as well as to communicate to the project team when activities are to happen, based on network techniques using Critical Path Method (CPM).
- .3 When building a Project Schedule, the Consultant must consider:
  - .1 The level of detail required for control and reporting;
  - .2 The reporting cycle shall be monthly, unless otherwise identified in the Terms of Reference;
  - .3 What is required for reporting in the Project Teams Communications Plan; and
  - .4 The nomenclature and coding structure for naming of scheduled activities, which must be submitted to the Project Manager for acceptance.

### **2.3.3 MILESTONES**

- .1 The Major Milestones are standard Deliverables and Control Points within NPMS and are required in all schedule development.
- .2 These Milestones will be used in Time Management Reporting within PWGSC as well as used for monitoring project progress using Variance Analysis.
- .3 Milestones may also be external constraints such as the completion of an activity, exterior to the project, affecting the project.

### **2.3.4 ACTIVITIES**

- .1 All activities will need to be developed based on:
  - .1 Project Objectives;
  - .2 Project Scope;



- .3 Milestones;
  - .4 Meetings with the project team; and
  - .5 The scheduler's full understanding of the project and its processes.
- .2 Subdivide the elements down into smaller more manageable pieces that organize and define the total scope of work in levels that can be scheduled, monitored and controlled.
    - .1 This process will develop the Activity List for the project.
  - .3 Each activity will describe the work to be performed using a verb and noun combination (i.e. Review Design Development Report).
  - .4 These elements will become activities, interdependently linked in the Project Schedule.

### **2.3.5 SCHEDULE REVIEW AND APPROVAL**

- .1 Once the scheduler has identified and properly coded all the activities to the acceptance of the Project Manager, the activities are then sorted into a logical order and appropriate duration are applied to complete the schedule.
- .2 The scheduler, together with the Project Team, can then analyze the schedule to see if the milestone dates meet the project timelines and then adjust the schedule accordingly by modifying durations or changing logic.
- .3 When the schedule has been satisfactorily prepared, the scheduler can present the detailed schedule back to the Project Team for acceptance and application as the project baseline.
- .4 There may be several iterations before the schedule meets with the Project Teams agreement and the critical project timelines.
- .5 The final agreed version must be copied and saved as the baseline to monitor variances during the design process.

### **2.3.6 SCHEDULE MONITORING AND CONTROL**

- .1 Once Baseline, the schedule can be better monitored, controlled and reports can be produced.
- .2 Monitoring is performed by, comparing the baseline activities completed and milestone dates to the actual and forecast dates to identify the variance and record any potential delays, outstanding issues and concerns and provide options for dealing with any serious planning and scheduling issues.
- .3 There will be several schedules generated from the analysis of the baseline schedule as outlined in the Required Services Sections of the TOR.
- .4 Each updated schedule reflects the progress of each activity to date, any logic changes, both historic and planned, projections of progress and completion indicating the actual start and finish dates of all activities being monitored.
- .5 The Scheduler is to provide continuous monitoring and control, timely identification and early warning of all unforeseen or critical issues that affect or potentially affect the project in accordance with the TOR.
- .6 If unforeseen or critical issues arise, the Scheduler will advise the Project Manager and submit proposed alternative solutions in the form of an Exception Report.
  - .1 An Exception Report will include sufficient description and detail to clearly identify:
    - .1 Scope Change: Identifying the nature, reason and total impact of all identified and potential project scope changes affecting the project;
    - .2 Delays and accelerations: Identifying the nature, the reason and the total impact of all identified and potential duration variations;
    - .3 Options Enabling a Return to the project baseline: Identifying the nature and potential effects of all identified options proposed to return the project within baselined duration.



- .7 At each submission or deliverable stage, provide an updated schedule and exception report.

## **2.4 RISK MANAGEMENT**

### **2.4.1 CONTEXT**

- .1 The Departmental Representative prepares the Risk Management Plan.
- .2 The Departmental Representative may ask for assistance from the Consultant Team for identification of risk items and factors arising from the technical requirements of the project.

## **2.5 WASTE MANAGEMENT**

### **2.5.1 PROTOCOL**

- .1 The Construction, Renovation, and Demolition (CRD) Non-hazardous Solid Waste Management Protocol to which PWGSC is bound, provides direction on the undertaking of non-hazardous solid waste management actions on projects.
  - .1 The protocol is designed to meet the federal requirements, provincial/territorial policies and the objectives of the PWGSC Sustainable Development Strategy (SDS).
- .2 The contractor must implement a solid waste management program.
- .3 Contractors must be instructed to plan for extra project time when implementing CRD waste diversion initiatives.
  - .1 Added labour costs can be recuperated and waste management costs savings can be achieved through reduced tipping fees, avoided haulage costs, and the sale of reusable and recyclable materials.

### **2.5.2 CONSULTANT RESPONSIBILITIES**

- .1 Research and investigate hazardous waste disposal strategies in context of the project and make recommendations.
- .2 Include in the contract documents, a requirement for the contractor to develop a waste reduction and management plan during the construction of this project.
- .3 Identify, on the site plan where large (garbage) bins shall be stored, as well as easy disposal truck access/exit to/from same, to assist the Contractor in reducing waste or re-cycling of materials on and off site.

## **2.6 TECHNICAL REPORTS**

### **2.6.1 PURPOSE**

- .1 This section provides direction and standards for the preparation of reports delivered to PWGSC during all the various stages of project delivery and for specific services such as investigations, studies, analysis, strategies, audits, surveys, programs, plans, etc.
- .2 Technical Reports are official government documents, which are typically used to support an application for approval or to obtain authorization or acceptance and as such they must:
  - .1 Be complete, clear and professional in appearance and organization, with proper reference to related parts and contents in the report;
  - .2 Clearly outline the intent, objectives, process, results and recommendations;
  - .3 Present the flow of information and conclusions in a logical, easy to follow sequence;
  - .4 Be in written narrative, graphic, model (traditional and / or computer generated), and photographic format, which can be web enabled;
  - .5 Ensure that all pages are numbered in sequence; and
  - .6 Be printed double-sided, if hard copies are produced.

### **2.6.2 STANDARDS FOR PWGSC TECHNICAL REPORTS**

- .1 Standard practice for the organization of technical reports requires:



- .1 A cover page, clearly indicating the nature of the report, the date, the PWGSC reference number and who prepared the report;
  - .2 A Table of Contents;
  - .3 An Executive Summary;
  - .4 The body of the report is to be structured such that the reader can easily review the document and locate, respond to and /or reference related information contained elsewhere in the report;
  - .5 Appendices used for lengthy segments of the report, supplementary and supporting information and / or for separate related documents.
- .2 The report content must:
- .1 Ensure that the executive summary is a true condensed version of the report following the identical structure, including only key points and results / recommendations requiring review and / or approval;
  - .2 Use a proper numbering system (preferably legal numbering), for ease of reference and cross-reference;
    - .1 The use of 'bullets' is to be avoided.
  - .3 Use proper grammar, including using complete sentences, in order to ensure clarity, avoid ambiguity and facilitate easy translation into French, if required;
    - .1 The use of undefined technical terms, industry jargon and cryptic phrases are to be avoided.
  - .4 Be written as efficiently as possible, with only essential information included in the body of the report and supporting information in an appendix if needed.

### **2.6.3 PRE-DESIGN REPORT CONTENT**

- .1 Administrative aspects to be included (but not limited to) are:
  - .1 Quality management process for the consultant team;
  - .2 Confirmation that all necessary pre-design documentation required for this project is available and confirmation that the information is still current and up-to-date.
- .2 Regulatory Analysis aspects to be included (but not limited to) are:
  - .1 Preliminary summary of regulatory and statutory requirements, authorities having jurisdiction, and codes, regulations, and standards.
- .3 Program Analysis aspects to be included (but not limited to) are a review and analysis of:
  - .1 Functional program, User Department reports and studies, Space data sheets, Work stations, offices, common areas and commercial space requirements, Laboratories, Data Room requirements, etc.
- .4 Site Analysis aspects to be included (but not limited to) are a review and analysis of:
  - .1 Site features and restrictions (i.e. landscape features, topographical feature, climatic influences, setback requirements, easements, existing buildings, and / or structures.);
  - .2 Subsurface, geotechnical analysis of soils;
  - .3 Municipal infrastructure, subsurface and above grade services, including capacities and limitations (i.e. storm water drainage, fire protection, domestic water, power, telecommunications,);
  - .4 Historical/archaeological features, previous uses;
  - .5 Environmental features including sustainable design opportunities.
- .5 Building Analysis aspects to be included (but not limited to) are a review and analysis of:
  - .1 Substructure, including foundations and basement(s), parking;
  - .2 Shell, including superstructure, interior structural systems, exterior enclosure, roofing;
  - .3 Interiors, including interior construction, stairs, interior finishes;



- .4 Services, including conveying (elevators, escalators), plumbing, HVAC, fire protection, electrical, telecommunications, building automation;
- .5 Equipment and furnishings;
- .6 Special construction and demolition, materials abatement.
- .6 Budget, Schedule, and Risk Analysis aspects to be included (but not limited to) are:
  - .1 Updated Class 'D' estimate and revised schedule;
  - .2 Analysis of risk implications and preliminary mitigation strategies.
- .7 Sustainable Development Strategies
  - .1 Proposed policy for the project to minimize environmental impacts consistent with the project objectives and economic constraints, including:
    - .1 Recommendations on Sustainable Development Design standards to be applied to the project;
    - .2 Achievable levels for LEED® or Green Globes certification;
    - .3 Preliminary sustainability targets for water and energy use, waste reduction etc.
  - .2 Environmental impacts and application of the Canadian Environmental Assessment (CEA) Act.

#### **2.6.4 SCHEMATIC DESIGN REPORT CONTENT**

- .1 Standard practice for the organization of technical reports requires:
  - .1 Executive Summary;
  - .2 Regulatory Analysis;
    - .1 Preliminary building code analysis,
    - .2 Preliminary zoning analysis,
    - .3 Fire and life safety strategy, and
    - .4 Preliminary standards analysis.
  - .3 Program Analysis;
    - .1 Updated Functional Program requirements,
    - .2 Preliminary horizontal and vertical zoning diagrams,
    - .3 Spatial relationship diagrams,
    - .4 Facilities services strategy,
    - .5 Basic area calculations and analyses.
  - .4 Site Analysis;
    - .1 Drawings, renderings and supporting 3D visualization illustrating the building and site,
    - .2 Site features and restrictions (i.e. landscape features, topographical features, climatic influences, setback requirements, easements, existing buildings and/or structures etc.),
    - .3 Subsurface features,
    - .4 Municipal infrastructure, subsurface and above grade services, including capacities and limitations (i.e. storm water drainage, fire protection, domestic water, power, telecommunications etc.),
    - .5 Historical site features,
    - .6 Archaeological features,
    - .7 Environmental features including sustainable design strategies (i.e. storm water management, landscaping etc.).
- .2 Building Analysis and Design Options;
  - .1 Architectural,



- .1 Prepare a site plan indicating relationships, landscape concept, building outlines, main accesses, roadways, vehicular and pedestrian traffic patterns,
  - .2 Provide building plans, showing relative disposition of main accommodation areas, circulation patterns, floors, horizontal and vertical space relationships, mechanical / electrical shafts,
  - .3 Include elevations, sections and typical wall details for the building envelope,
  - .4 Provide perspectives and / or 3D visualization diagrams, and
  - .5 Calculate the gross building area and provide a net area summary of all accommodation areas required.
- .2 Civil,
- .1 Describe the overall impact on the site systems infrastructure,
  - .2 Verify of all site services information,
  - .3 Provide a site plan showing the existing building, proposed site services, building service connections, site drainage, roads, parking and sidewalks, and
  - .4 Include a preliminary analysis of the impact on existing systems, where contributing to existing sewer lines.
- .3 Structural / Seismic,
- .1 Describe the potential impact on the existing building structure and include any required structural modifications and /or upgrades,
  - .2 Provide a general description of structures, including systems considered and benefits/disadvantages,
  - .3 Include design loads for all load cases, and
  - .4 Prepare concept drawings of structural systems proposed, including typical floor plans, foundations, lateral systems and explanatory sketches.
- .4 Mechanical Engineering,
- .1 Provide narratives describing the following,
    - .1 Overview,
    - .2 Code & Standards Considerations & Concerns,
    - .3 Potential Energy Conservation Measures,
    - .4 Description of three distinct mechanical options including,
      - .1 Narratives of each option,
      - .2 Discussion of advantages and disadvantages of each,
      - .3 System schematics sufficient to describe each option,
      - .4 Preliminary energy analysis for each,
      - .5 Discussion of recommendations.
- .5 Electrical Engineering,
- .1 Provide an electrical design synopsis, describing the electrical work in sufficient detail for assessment and acceptance by the Departmental Representative,
    - .1 Include feasibility and economic studies of proposed systems complete with cost figures and loads, and in accordance with Sustainable Development requirements.
  - .2 Prepare a site plan showing the location of electrical and telecommunication service entrances.
  - .3 Prepare floor plans indicating locations and size of,
    - .1 Major electrical equipment and distribution centres,
    - .2 Telecommunications rooms, closets and major conduits,



- .4 Provide Normal and Emergency power distribution details, including a diagram showing the distribution up to distribution centres on each floor,
- .5 Indicate typical lighting concepts for the interior and exterior environments,
- .6 Indicate typical ceiling (or floor) distribution systems for lighting, power and telecommunications, and
- .7 Provide concept descriptions of Fire alarm and Security systems.
- .3 Commissioning;
  - .1 Provide preliminary commissioning plan.
- .4 Cost Management;
- .5 Schedule Management;
- .6 Furniture / Equipment;
  - .1 Prepare a Furniture Recommendation Report based on the Functional Program and on parameters developed in conjunction with the Departmental Representative and the Client / User. Report to include an examination of the following;
    - .1 Procurement process and requirements,
    - .2 Furniture type and layout,
    - .3 Panel screen height,
    - .4 Power requirements,
    - .5 Finishes.
  - .2 Recommendations are to take into consideration current inventory of furniture and reflect the client's vision, functional requirements, proposed planning alternatives, space allocation and project budget.
  - .3 Prepare a Class 'C' cost estimate for refurbishment of existing furniture and / or the purchase of new furniture and equipment.
  - .4 Document scheduling requirements for refurbishment of existing furniture and / or the procurement of new furniture and equipment.
- .7 Budget;
  - .1 Class 'C' Estimates for each option.
- .8 Schedule;
  - .1 Milestone project schedule including allowances for reviews and approvals for each stage of the project life cycle.
- .9 Risk Analysis;
  - .1 Report on any deviations that may affect cost or schedule and recommend corrective measures.
- .10 Sustainable Development Strategies;
  - .1 Indicate how each option can meet the sustainability targets, and
  - .2 Provide energy simulations of the proposed design options, including estimated annual energy cost as predicted by using current energy cost for the appropriate area.
- .11 Response to PWGSC Quality Assurance Report ; and
- .12 Project Log tracking all approved major decisions including those affecting changes to project scope, budget and schedule.

#### **2.6.5 DESIGN DEVELOPMENT REPORT CONTENT**

- .1 Executive Summary
- .2 Regulatory Analysis
  - .1 Preliminary building code analysis;



- .2 Preliminary zoning analysis;
- .3 Fire and life safety strategy;
- .4 Preliminary standards analysis
- .3 Program Analysis
  - .1 Updated Functional Program requirements
  - .2 Preliminary horizontal and vertical zoning diagrams;
  - .3 Facilities services strategy;
  - .4 Basic area calculations and analyses;
- .4 Site Analysis
  - .1 Drawings, renderings and supporting 3D visualization illustrating the building and site,
  - .2 Site features and restrictions (i.e. landscape features, topographical features, climatic influences, setback requirements, easements, existing buildings and/or structures etc.);
  - .3 Subsurface features;
  - .4 Municipal infrastructure, subsurface and above grade services, including capacities and limitations (i.e. storm water drainage, fire protection, domestic water, power, telecommunications etc.);
  - .5 Historical site features;
  - .6 Archaeological features;
  - .7 Environmental features including sustainable design strategies (i.e. storm water management, landscaping etc.);
- .5 Building Analysis and Design Options
  - .1 Architectural
    - .1 Prepare a site plan showing the building and Infrastructure items including the following:
      - .1 Pedestrian, vehicular, security, delivery service access,
    - .2 Provide floor plans of each level (including the roof) showing all accommodation required, including all necessary circulation areas, stairs, elevators, and ancillary spaces anticipated for service use. Indicate building grids, modules, and key dimensions.
    - .3 Provide reflected ceiling plans of ceilings with special features.
    - .4 Show elevations of all exterior building facades indicating all doors and windows, accurately sized and projected from the floor plans and sections.
      - .1 Clearly indicate levels for grade, all floors, ceilings, roof and penthouse levels.
    - .5 Develop cross-sections through the building to show floor levels, room heights, inner corridor elevations, etc.
    - .6 Identify primary architectural materials proposed for the exterior and interior of the building, including choice of finishes.
    - .7 Provide plans and preliminary details for millwork, built-in furniture and lab casework.
    - .8 Provide detail sections of walls with special design features requiring illustration and explanation at this stage, such as firewalls, acoustical barriers, security partitions, isolation or separation of laboratory spaces, etc.
    - .9 Special construction and demolition, including heritage conservation and rehabilitation requirements, hazardous materials abatement,
    - .10 Provide sections and details for any spaces requiring acoustic security.
      - .1 Include STC ratings for doors, transfer ducts and other assemblies
  - .2 Civil



- .1 Further refine site plans showing site services and building service connections referenced to proposed building outlines, site access roads and sidewalks, including existing and proposed grades and drainage improvements.
- .2 Indicate locations of manholes (complete with invert elevations), valves, and fire hydrant locations.
- .3 Identify proposed pipe sizes and slopes, where applicable, and include pipe invert elevations at building foundation.
- .4 Identify, by means of Design Summary Sheets, pipe capacity and estimated flows for storm and sanitary sewers. Where contributing to an existing sewer, include analysis of impact on existing systems.
- .5 Provide Hydraulic Analysis of any relevant alterations to existing water distribution system in the vicinity of the proposed building to confirm anticipated maximum available fire flow. Calculate and compare site flows to building site fire flow.
- .6 Provide typical trench and related details, including profiles of below grade services.
- .3 Structural
  - .1 Provide drawings indicating modifications to existing structure and new structural systems, structural materials, cladding details, fireproofing methods and other significant or unusual details.
  - .2 Indicate all design loads, e.g. dead and live loads on all plans with atypical loads marked. Live loads to include localized seismic, wind and snow.
  - .3 Provide brief design calculations including outputs from computerized analysis.
- .4 Mechanical
  - .1 Provide narratives describing the following
    - .1 Overview
    - .2 Code & Standards Analysis
    - .3 Site Services & Utilities
    - .4 Fire Protection Systems
    - .5 Plumbing Systems
    - .6 Heating Systems
    - .7 Cooling Systems
    - .8 Ventilation Systems
    - .9 Exhaust Systems
    - .10 Insulation
    - .11 Humidification Systems
    - .12 Acoustic and sound control measures
    - .13 Controls
    - .14 Energy Conservation Measures & Energy Analysis & Report
  - .2 Provide system schematics for heating water, chilled water, ventilation and plumbing systems.
  - .3 Provide catalogue cut sheets of representative equipment for each type of component to be used on the project.
  - .4 Provide preliminary layout drawings showing locations of all major components.
  - .5 Provide brief design calculations including outputs from computerized analysis.
- .5 Electrical
  - .1 Update the electrical design synopsis for the selected option. Provide data on the total connected load, the maximum demand and diversity factors, and the sizing of the emergency load.



- .2 Elaborate on proposed emergency power scheme and provide preliminary installation details for any emergency generator installation.
  - .3 Indicate metering locations on distribution diagram.
  - .4 Provide typical lighting, power and telecommunication system details for all workspaces.
  - .5 Include lighting design and control schemes for typical lighting arrangements.
  - .6 Elaborate on exterior lighting scheme. Provide typical fixture concepts.
  - .7 Provide a fire alarm riser diagram.
  - .8 Indicate security system major conduit requirements on floor plans.
  - .9 Provide typical security system details (conduit and boxes) that will be included on construction drawings.
  - .10 Provide brief design calculations including outputs from computerized analysis.
- .6 Sustainable Development Strategies:
    - .1 Indicate how each option can meet the sustainability targets
    - .2 Provide energy simulations of the proposed design options, including estimated annual energy cost as predicted by using current energy cost for the appropriate area,
  - .7 Response to PWGSC Quality Assurance Report

## **2.7 CODES, ACTS, STANDARDS, REGULATIONS**

### **2.7.1 GENERAL**

- .1 The Codes, Acts, Standards and Guidelines listed in the following articles, may apply to this project. The Consultant must identify and analyse the applicable documents in the Code Analysis.
- .2 In all cases the most stringent Code, standard and guideline shall apply.

### **2.7.2 PWGSC DOCUMENTS AVAILABLE FROM PWGSC PROJECT MANAGER:**

- .1 PWGSC Fit-Up Standards: Technical Reference Manual;
- .2 Public Works and Government Services MD Standards – Departmental Representative to provide on request;
  - .1 MD 15000; Environmental Standards for Office Accommodation,
  - .2 MD 15116-2006; Computer Room Air conditioning Systems,
  - .3 MD-15126; Laboratory HVAC (currently in draft form),
  - .4 MD 15128; Laboratory Fume Hoods: Guidelines for owners, design professionals and maintenance personnel – 2008,
  - .5 MD 15129; Guidelines for Perchloric Acid fumehoods and their exhaust systems – 2006,
  - .6 MD 15161; Control of Legionella in Mechanical Systems - 2006,
  - .7 MD 250005; Energy Monitoring and Control Systems Design Guidelines - 2009,
- .3 PWGSC Best Practice; Prescribing indoor humidity levels for Federal Buildings - 2006,
- .4 Public Works and Government Services Commissioning Standards and Guidelines,
- .5 PWGSC Commissioning Manual CP-I version 2006.

### **2.7.3 CODES AND REGULATIONS:**

- .1 The NRC National Building Code of Canada 2010;
- .2 The NRC National Fire Code of Canada, 2010;
- .3 The NRC National Plumbing Code of Canada 2010;
- .4 The NRC Model National Energy Code for Buildings 2011;
- .5 CSA C22.1-09, Canadian Electrical Code Part I Safety Standard for Electrical Installations and CE Code Handbook. Amendments for Provinces;



- .6 Canadian Code for Preferred Packaging;
- .7 National Electrical Manufacturers Association (NEMA);
- .8 Electrical and Electronic Manufacturers' Association of Canada (EEMAC);
- .9 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE) - ANSI/IEEE C62.41-1991, Surge Voltages in Low-Voltage AC Power Circuits;
- .10 American Society for Testing and Materials (ASTM);
- .11 ASTM F 1137-00(2006), Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners;
- .12 The Canada Labour Code;
- .13 <http://laws.justice.gc.ca/en/L-2/>
- .14 The Canada Occupational Health and Safety Regulations;
- .15 <http://laws.justice.gc.ca/eng/SOR-86-304/index.html>
- .16 All other Territorial and Municipal Acts, Codes, By-laws and regulations appropriate to the area of concern.

#### **2.7.4 STANDARDS AND GUIDELINES PRODUCED BY THE GOVERNMENT OF CANADA:**

- .1 Standards and Directives of the Treasury Board (TB):
  - .1 <http://www.tbs-sct.gc.ca/pol/index-eng.aspx?tree=standard>
  - .2 <http://www.tbs-sct.gc.ca/pol/index-eng.aspx?tree=directive>
  - .3 And including;
    - .1 Accessibility Standard for Real Property,
      - .1 <http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12044>
    - .2 Fire Protection Standard.
      - .1 <http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316>
- .2 Labour Canada's, Fire Commissioner of Canada Standards;
  - .1 [http://www.hrsdc.gc.ca/eng/labour/fire\\_protection/policies\\_standards/commissioner/index.shtml](http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/commissioner/index.shtml).
  - .2 And including,
    - .1 FC-301 Standard for Construction Operations, June 1982,
    - .2 FC-302 Standard for Welding and Cutting, June 1982,
    - .3 FC-311 Standard for Record Storage, May 1979.
    - .4 FC-403 Fire Protection Standard for sprinkler Systems, November 1994
- .3 The Standards and Guidelines for the Conservation of Historic Places in Canada
  - .1 [www.historicplaces.ca](http://www.historicplaces.ca);
- .4 Labour Canada's, Technical Documents;
  - .1 [http://www.hrsdc.gc.ca/eng/labour/fire\\_protection/policies\\_standards/guidelines/index.shtml](http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/guidelines/index.shtml)
  - .2 And Including,
    - .1 Fire Protection for Information Technology Facilities and Equipment.
- .5 Canadian Food Inspection Agency's Containment Standard for Facilities Handling Plant Pests.
- .6 Public Health Agency of Canada's Laboratory Biosafety Guidelines, 3<sup>rd</sup> Edition,
- .7 Canadian Council of Animal Care's Guidelines on: Laboratory Animal Facilities – Characteristics, Design and Development.

#### **2.7.5 HEALTH CANADA STANDARDS AND GUIDELINES:**

- .1 Guidelines for Canadian Drinking Water Quality – Sixth Edition – 1996;
- .2 Guidelines for Canadian Drinking Water Quality – Summary Table – Dec 2010;



- .3 Guidance for Providing Safe Drinking Water in Areas Of Federal Jurisdiction – Version I – 2005;
- .4 The Canadian Council of Ministers of the Environment (CCME) ;
- .5 Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products (CCME, 2003);
- .6 Canada – Wide Strategy for the Management of municipal Waste Water Effluent;
- .7 The Canadian Environmental Protection Act (CEPA, 1999);
- .8 The Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations, published in Canada Gazette Part II on June 12, 2008 (Registration SOR/2008-197).

#### **2.7.6 STANDARDS AND GUIDELINES:**

- .1 Air Conditioning and Refrigeration Institute (ARI);
- .2 American Conference of Governmental Industrial Hygienists (ACGIH, Industrial Ventilation Handbook);
- .3 Air Diffusion Council (ADC);
- .4 Air Movement and Control Association (AMCA);
- .5 American Association of State Highway and Transportation Officials (AASHTO) Standards
- .6 American National Standards Institute (ANSI);
- .7 ANSI/AIHA Z9.5, Laboratory Ventilation;
- .8 .1 ANSI/NEMA C82.1-04, Electric Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast;
- .9 .2 ANSI/NEMA C82.4-02, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps;
- .10 ANSI/TIA/EIA-606- Administration Standard for the Telecommunications Infrastructure of Commercial Buildings;
- .11 ANSI Z358.1, Emergency Eyewash and Shower Equipment;
- .12 American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), including but not limited to;
  - .1 ASHRAE Laboratory Design Guide,
  - .2 ASHRAE Standards and Guidelines,
  - .3 ASHRAE Applications Handbook – 2007,
  - .4 ASHRAE HVAC Systems and Equipment Handbook – 2008,
  - .5 ASHRAE Fundamentals Handbook – 2009,
  - .6 ASHRAE Refrigeration Handbook – 2010,
  - .7 ASHRAE 52.2 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size – 2007,
  - .8 ANSI/ASHRAE 55, Thermal Environmental Conditions for Human Occupancy – 2004,
  - .9 ANSI/ASHRAE 62.1, Ventilation for Acceptable Indoor Air Quality – 2010,
  - .10 ASHRAE 90.1, Energy Efficient Design of New Buildings – 2010,
  - .11 ASHRAE 105: Standard Method of Measuring and Expressing Building Energy Performance,
  - .12 ASHRAE 110, Method of Testing Performance of Laboratory Fume Hoods,
  - .13 ASHRAE 111; Practices for Measurement, Testing, Adjusting and Balancing of Building HVAC&R Systems,
  - .14 ASHRAE 114; Energy Management Control Systems Instrumentation, and
  - .15 ASHRAE 135; BACnet: A Data Communication Protocol for Building Automation and Control Networks.
- .13 Asphalt Institute Standards for Hot Mix;



- .14 American Society of Mechanical Engineers (ASME);
- .15 American Society for Testing and Materials (ASTM);
- .16 American Water Works Association (AWWA) Standards;
- .17 American Welding Society (AWS);
- .18 Associated Air Balance Council (AABC);
- .19 Canadian Standards Association;
- .20 CSA A23.3-04 (2010) Design of Concrete Structures;
- .21 CSA B51-09 Boiler, pressure vessel and pressure piping Code;
- .22 CSA B52-05 Mechanical Refrigeration Code;
- .23 CSA B64-01 Backflow Preventers and Vacuum Breakers;
- .24 CSA B139-09 Installation Code for Oil Burning Equipment;
- .25 CSA B149.1-10 Natural Gas and Propane Installation Code;
- .26 CSA B651-04 Accessible Design for the Built Environment;
- .27 CSA C22.2 No. 41-07 Grounding and Bonding Equipment;
- .28 CSA S16-09 Design of Steel Structures;
- .29 CSA Z204-1994 Guideline for Managing Indoor Air Quality in Office Buildings;
- .30 CSA Z320-11 Building Commissioning Standard & Check Sheets;
- .31 CSA Z316.5-94, Fume Hoods and Associated Exhaust Systems;
- .32 CAN/CSA-23.1-04 and CAN/CSA-A23.2-04 Concrete materials and methods of concrete construction; and Methods of test and standard practice for concrete CAN/CSA-C22.2 No. 214-94 "Communications Cables";
- .33 CAN/CSA-C22.3 No.3-[98(R2007)], Electrical Co-ordination;
- .34 CAN/CSA-B651-04(R2010), Accessible Design for the Built Environment;
- .35 CAN3 C235-[83(R2010)], Preferred Voltage Levels for AC Systems, 0 to 50,000 V;
- .36 CAN/CSA-T528-93, "Design Guidelines for Administration of Telecommunications Infrastructure in Commercial Buildings", Canadian Standards Association;
- .37 CAN/ULC – S524-06 Standard for the Installation of Fire Alarm Systems;
- .38 CAN/ULC – S537-04 Fire Alarm System Verification Report;
- .39 CAN/ULC – S102-07 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies;
- .40 CAN/ULC – S102.2-07 Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies  
CAN/ULC SI 12-M90 (R2001) Standard Methods of Fire Test of Fire-Damper Assemblies;
- .41 CAN/ULC SI 15-05 Standard Method of Fire Tests of Fire stop Systems;
- .42 International Mechanical Code – Latest Version;
- .43 Institute of Boiler and Radiation, Hydronic Institute (IBR);
- .44 Manufacturers Standardization Society of Valve and Fitting Industry (MSS);
- .45 National Fire Protection Association (NFPA), including:
  - .1 NFPA 10; Standard for Portable Fire Extinguishers – 2010,
  - .2 NFPA 13; Standard for Installation of Sprinkler Systems – 2010,
  - .3 NFPA 14; Standard for Installation of Standpipe and Hose Systems – 2010,
  - .4 NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances-2010,
  - .5 NFPA 30; Flammable and Combustible Liquids Code,
  - .6 NFPA 45; Standard on Fire Protection for Laboratories Using Chemicals,
  - .7 NFPA 1142: Standard on Water Supplies for Suburban and Rural Fire Fighting-2007.



- .46 SEFA 1.2, Scientific Equipment & Furniture Association;
- .47 Sheet Metal and Air Conditioning Contractors National Association (SMACNA);
- .48 Transportation Association of Canada (TAC) Guide for Canadian Roads;
- .49 Manual of Uniform Traffic Control Devices (MUTCD);
- .50 Telecommunications Industry Association (TIA);
  - .1 Commercial Building Telecommunications Cabling Standard TIA/EIA-568,
    - .1 Part 1: General Requirements, TIA/EIA-568-B.1,
    - .2 Part 2: Balanced Twisted Pair Cabling Components, TIA/EIA-568-B.2,
    - .3 Addendum 1 - Transmission Performance Specification for 4-pair 100 Ohm Category 6 Cabling, TIA/EIA-568-B.2-1,
    - .4 Optical Fibre Cabling Components Standards, TIA/EIA-568-B.3.
  - .2 ANSI/TIA/EIA-569-A Commercial Building Standards for Telecommunications pathways and spaces,
  - .3 Pathways and Spaces, ANSI/TIA/EIA-569-B,
  - .4 Telecommunications Infrastructure Standard for Data centers TIA-942,
  - .5 J-STD-607-A Commercial Building Grounding and - Bonding Requirements for Telecommunications.
- .51 Underwriters' Laboratories of Canada (ULC);
- .52 ULC/CSA Approval is required for all electrical and mechanical equipment.

### **2.7.7 STANDARDS AND GUIDELINES FOR TRANSPORTATION**

- .1 Canadian Highway Bridge Design Code
- .2 Transportation Association of Canada - Manuals, Guides and Handbooks.

## **2.8 COMMISSIONING PROCESS**

### **2.8.1 GENERAL**

- .1 This section summarizes the PWGSC commissioning process, the requirements and associated roles and responsibilities as they relate to the various phases in the delivery of a project.
- .2 It is to be used as a guide in further developing the commissioning plan, specification and related documents for a project.
- .3 Commissioning is not a replacement for good design and construction practices.
  - .1 It requires coordinated efforts on the part of all parties involved in the Project.
- .4 The Commissioning overlaps the design phase through construction and into the operation phase.
- .5 The PWGSC Commissioning Manual CP.1 4<sup>th</sup> edition, November 2006, is available for free download at the following site:
  - .1 <http://www.tpsgc-pwgsc.gc.ca/biens-property/sngp-npms/bi-rp/tech/miseenservice-commissioning/manuel-manual-eng.html>
- .6 The PWGSC Commission Manual CP.2 – Commissioning Glossary is available for free download at the following site:
  - .1 <http://www.tpsgc-pwgsc.gc.ca/biens-property/sngp-npms/bi-rp/tech/miseenservice-commissioning/manuel-manual-b-eng.html>
- .7 “Commissioning” is a quality assurance process, in which the functional requirements of the Owner/occupant and the operational requirements of facility management are proven to function as intended.



- .8 The “commissioning process” is a planned program of quality management and information transfer that extends through all phases of a project’s development and delivery, up to and including the warranty period.
- .9 The process consists of a series of checks and balances to ensure that the work is designed, installed and proven to operate as intended.
- .10 Commissioning has two main components, functional and operational.
  - .1 The functional component deals with:
    - .1 Security, Health (indoor air quality) and occupant safety;
    - .2 Comfort (temperature, relative humidity, ventilation, air flow patterns, air purity and well being);
    - .3 Cost-effectiveness of design; and
    - .4 Systems and equipment supporting Owner’s functional requirements.
  - .2 The operational component deals with:
    - .1 Operation and Maintenance (O&M) issues; e.g., design review with a particular concern for the operation and maintenance of the systems today and in the future, when repairs are required;
    - .2 Performance evaluation of systems and equipment;
    - .3 Accessibility to O&M Documentation; and
    - .4 Review of the training plan against the current needs now and in the future.

### **2.8.2 COMMISSIONING PLAN**

- .1 The Commissioning Plan will typically be developed by the Contractor through his own Commissioning Agent.
- .2 The Commissioning Plan is the project-specific document and which describes the process for verifying that all built works meet the Investor’s requirements within the limits of the working documents.
- .3 It is essential that the Consultant provide specifications that detail requirements for all submittals and testing in each Specification Section in order for the Contractor to properly prepare a complete Commissioning Plan.
- .4 The Commissioning Plan will be reviewed and accepted by the Departmental Representative prior to commencement of construction.
- .5 The Commissioning Plan may require periodic update throughout design.

### **2.8.3 COMPONENT VERIFICATION**

- .1 Component verification sheets (CV) sheets are developed by the Consultant and incorporated in the contract documents to ensure the facility is an operating entity and meets the requirements as described in the Agreement.
- .2 The CV sheets are intended to monitor and track the supply and shop drawing requirements associated with each component. The *Consultant* must verify that the components being installed in the built works are acceptable to their design and the approved shop drawings.
- .3 The commissioning process requires the documentation of all the components installed as part of a system that will have performance verification testing conducted.
- .4 Sample CV sheets for various types of components are to be provided by the Consultant in Div 01.

### **2.8.4 SYSTEM & INTEGRATED SYSTEM TESTING**

- .1 The “performance verification tests” (PVTs) are developed by the Design-Builder to ensure the facility is an operating entity and meets the requirements as described in the Agreement.



- .2 The PVTs are intended to demonstrate the functional performance of the systems & integrated system during the various modes of operation, against the design intent. Each test must be uniquely identified and reflected in the contractor's commissioning schedule.
- .3 Once the contract has been awarded the Design-Builder must monitor the sub-contractor's process to help ensure the timely completion of these tests. The Design-Builder must witness each test. The Design-Builder must provide final certification of the test results. After an acceptable review of the test document, the PWGSC Commissioning Specialist will recommend to the Departmental Representative the acceptance or rejection of the test results.
- .4 Sample PVT sheets for various types of system are to be provided by the Consultant in Div 01.

### **2.8.5 TEST REQUIREMENTS**

- .1 Each CV or PVT shall be uniquely named, numbered and categorized by discipline.
- .2 Tests shall define:
  - .1 Test Purpose;
  - .2 System design narrative;
  - .3 Test Prerequisites;
  - .4 Testing Procedures;
  - .5 Test Comments; and
  - .6 Test Sign-off Block.
- .3 System Performance Verifications Tests
  - .1 These tests have prerequisites that are to be completed and approved prior to conducting the tests, which, may include but are not limited to:
    - .1 CV and PVT sheets developed and accepted,
    - .2 Contractor proving start-up and tests,
    - .3 Manufacturers start-ups,
    - .4 Consultant has certified testing, adjusting & balancing (TAB) results, per TAB specification.
      - .1 TAB work must be completed and approved prior to the control system Pts.
    - .5 Associated control device calibrations and physical point verifications are completed and approved.
      - .1 Note, control system end to end checks to be completed and approved prior to the control system PVTs.
    - .6 Other specified deliverables, i.e. factory test reports, O&M submissions, etc.
    - .7 System performance tests associated with the integrated systems under test,
    - .8 Integrated System Performance Verifications,
    - .9 Fire alarm verifications.

### **2.8.6 COMMISSIONING (EVALUATION) REPORT**

- .1 The Commissioning (Evaluation) Report must provide:
  - .1 An executive summary,
  - .2 Completed CV and PVT sheets,
  - .3 A complete assessment of the project,
  - .4 Lessons learned from this project and any necessary recommendations,
  - .5 Variances between the actual and planned levels of performance,
  - .6 An evaluation of the validation and acceptance process and of the commissioning phase.

### **2.8.7 OVERVIEW OF ROLES AND RESPONSIBILITIES**



- .1 The following provides a general overview of the roles, responsibilities and implementation of the commissioning process. The commissioning process is a logical sequence of verifications from component verifications through to system & integrated system, performance verification testing.
- .2 At completion of the commissioning process all results are documented and audited for acceptance.

### **2.8.8 MAJOR TASKS AND RESPONSIBILITIES**

- .1 Schematic Design and Design Development Phase:
  - .1 Consultant;
    - .1 Develop commissioning strategy,
    - .2 Develop preliminary commissioning plan.
  - .2 Construction Documentation Phase:
    - .1 Consultant;
      - .1 Complete the final commissioning plan,
      - .2 Specify the Commissioning requirements in Div 01 and provide sample Commissioning CV and PCT sheets in Div 01 for Bidders purposes,
      - .3 Develop project specific CV and PVT sheets.
  - .3 Construction Phase:
    - .1 Consultant;
      - .1 Monitor and report on contract commissioning activities,
      - .2 Finalize development of job specific CV and PVT sheets,
      - .3 Review and certify component verification sheets as they are completed by the Contractor, and
      - .4 Review commissioning schedule
    - .2 Contractor;
      - .1 Comply with the requirements in the Specifications,
      - .2 Complete the component verification,
      - .3 Conduct the equipment system start-up and proving, and
      - .4 Develop the commissioning schedule, reflecting the PVTs.
  - .4 Commissioning Phase
    - .1 Consultant
      - .1 Witness all system and integrated systems tests,
      - .2 Review and certify commissioning test results,
      - .3 Track and compile all commissioning documentation submitted by the contractor and confirm that all commissioning tasks are completed,
      - .4 Incorporate all commissioning documentation into a preliminary commissioning report and recommend interim acceptance.
      - .5 Identify “deferred” commissioning tests due to seasonal constraints, etc.
    - .2 Contractor
      - .1 Comply with the requirements in the specifications,
      - .2 Conduct the system testing, and
      - .3 Conduct the integrated system testing.
  - .5 Operating Phase
    - .1 Consultant
      - .1 Provide advice and recommendations for fine tuning, if required,
      - .2 Witness “deferred” commissioning tests,



- .3 Review and certify “deferred” systems test results,
- .4 Incorporate deferred system test results and all other commissioning documentation into a final commissioning report with an executive summary recommending final acceptance.
- .2 Contractor
  - .1 Address warranty issues,
- .6 Evaluation Phase
  - .1 Consultant
    - .1 Provide advice and recommendations during the final evaluation.

## **2.9 CONSTRUCTION DOCUMENTS**

### **2.9.1 PURPOSE**

- .1 This section provides direction in the preparation of construction contract documents (namely specifications, drawings and addenda) for PWGSC.
- .2 Drawings, specifications and addenda must be complete and clear, in order that a contractor can prepare a bid without guesswork. Standard practice for the preparation of construction contract documents requires that:
  - .1 Drawings are the graphic means of showing work to be done, as they depict shape, dimension, location, quantity of materials and relationship between building components.
  - .2 Specifications are written descriptions of materials and construction processes in relation to quality, colour, pattern, performance and characteristics of materials, installation and quality of work requirements.
  - .3 Addenda are changes to the construction contract documents or tendering procedures, issued during the tendering process.

### **2.9.2 PRINCIPLES FOR PWGSC CONTRACT DOCUMENTS**

- .1 PWGSC’s contract documents are based on common public procurement principles.
- .2 PWGSC does not use Canadian Construction Document Committee (CCDC) documents.
- .3 The construction contract and the terms and conditions are prepared and issued by PWGSC, along with all other related bidding and contractual documents.
  - .1 For more detailed information, the clauses are available on the following web site:
  - .2 <http://ccua-sacc.tpsgc-pwgsc.gc.ca/pub/acho-eng.jsp>
  - .3 Any questions should be directed through the PWGSC Project Manager.

### **2.9.3 QUALITY ASSURANCE**

- .1 Consultants are required to undertake their own quality control process and must review, correct and coordinate (between disciplines) their documents before issuing them to PWGSC.

### **2.9.4 ADDENDA**

- .1 Format
  - .1 Prepare addenda using the format shown in Appendix ‘C’.
  - .2 No signature type information is to appear.
  - .3 Every page of the addendum (including attachments) must be numbered consecutively.
  - .4 All pages must have the PWGSC project number and the appropriate addendum number.
  - .5 Sketches shall appear in the PWGSC format, stamped and signed.
  - .6 No Consultant information (name, address, phone #, consultant project # etc.) may appear in the addendum or its attachments (except on sketches).
- .2 Content



- .1 Each item should refer to an existing paragraph of the specification or note/detail on the drawings. The clarification style is not acceptable.

### **2.9.5 SUBMISSIONS**

- .1 For each construction document submission, the Consultant shall provide:
  - .1 A completed and signed Checklist for the Submission of Construction Documents (See Appendix 'B')
  - .2 Original specification; printed one side on 216 mm x 280 mm white bond paper.
  - .3 Index, as per Appendix 'C'
  - .4 Reproducible original drawings; sealed and signed by the design authority.
  - .5 Addenda (if required), as per Appendix 'D;' (to be issued by PWGSC)
- .2 Tender information:
  - .1 Include a description of all units and estimated quantities to be included in unit price table.
  - .2 Include a list of significant trades including costs.
    - .1 PWGSC will then determine which trades, if any, will be tendered through the Bid Depository.
- .3 Government Electronic Tendering System (MERX):
  - .1 Consultants shall provide an electronic true copy of the final documents (specifications and drawings) on one or multiple CD-ROM in Portable Document Format (PDF) without password protection and printing restrictions.
  - .2 The electronic copy of drawings and specifications is for bidding purposes only and do not require to be signed and sealed.

### **2.9.6 PWGSC ROLE**

- .1 PWGSC shall provide:
  - .1 General and Special Instructions to Bidders
  - .2 Bid and Acceptance Form
  - .3 Standard Construction Contract Documents

## **2.10 SPECIFICATIONS**

### **2.10.1 GENERAL**

- .1 In preparing project specifications, the Consultant must use the current edition of the National Master Specification (NMS) in accordance with the "NMS User's Guide".

### **2.10.2 NATIONAL MASTER SPECIFICATION (NMS)**

- .1 In preparing project specifications, the Consultant must use the current edition of the National Master Specification (NMS) in accordance with the "NMS User's Guide".
- .2 The NMS is a master construction specification available in both official languages, which is divided into 48 Divisions (Masterformat 2004) and is used for a wide range of construction and/or renovation projects.
- .3 The Consultant retains overriding responsibility for content and shall edit, amend and supplement the NMS as deemed necessary to produce an appropriate project specification, free of conflict and ambiguity.

### **2.10.3 SPECIFICATION ORGANIZATION**

- .1 Narrow scope sections describing single units of work are preferred for more complex work; however, broad scope sections may be more suitable for less complex work.
- .2 Use either the NMS 1/3 - 2/3 page format or the Construction Specifications Canada full-page format.



- .3 For specifications not included in the NMS, but required for the project, follow the number and title recommendations of Masterformat 2004
- .4 Number each page and start each Section on a new page
- .5 Bind specifications
- .6 Include Division I, edited to PWGSC requirements.
- .7 Note: Consultant's name is not to be indicated in the specifications..

#### **2.10.4 TERMINOLOGY**

- .1 Use the term "Departmental Representative" instead of Engineer, PWGSC, Owner, Consultant or Architect.
- .2 "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.
- .3 Notations such as: "verify on site", "as instructed", "to match existing", "example", "equal to" or "equivalent to", "to be determined on site by "Departmental Representative", should not be indicated in the specifications as this promotes inaccurate and inflated bids.
- .4 Specifications must permit bidders to calculate all quantities and bid accurately.
  - .1 If quantities are impossible to identify (i.e. cracks to be repaired) give an estimated quantity for bid purposes (unit prices).
- .5 Ensure that the terminology used throughout the specifications is consistent and does not contradict the applicable standard construction contract documents.

#### **2.10.5 DIMENSIONS**

- .1 Dimensions are to be in metric only (no dual dimensioning).

#### **2.10.6 STANDARDS**

- .1 As references in the NMS may not be up to date, it is the responsibility of the consultant to ensure that the project specification uses the latest applicable edition of all references quoted.
- .2 Canadian standards should be used wherever possible.

#### **2.10.7 SPECIFYING MATERIALS**

- .1 The practice of specifying actual brand names, model numbers, etc., is against departmental policy except for special circumstances.
- .2 The method of specifying materials shall be by using industry recognized standards.
- .3 If the above method cannot be used and where no standards exist, specify by a non-restrictive, non-trade name "prescription" or "performance" specifications.
- .4 In exceptional or justifiable circumstances, or if no standards exist and when a suitable non-restrictive, non-trade name "prescription" or "performance" specification cannot be developed; specify by trade name
- .5 Include all known materials acceptable for the purpose intended, and in the case of equipment, identify by type and model number.

#### **2.10.8 ACCEPTABLE PRODUCTS AND MATERIALS**

- .1 The term "Acceptable Manufacturers" must not be used, as this restricts competition and does not ensure the actual material or product will be acceptable.
  - .1 A list of words and phrases that should be avoided is included in the NMS User's Guide.
- .2 Listing of acceptable products or materials is to be an exception, due to a unique specification or for the purpose of assisting bidders in identifying lesser known potential products or materials.



- .3 For exceptions, provide justifiable reasons for listing products and materials and submit to the *Departmental Representative* for acceptance.
- .4 When authorized to list acceptable products or materials, list all, with a minimum of three (3), trade names of products and materials acceptable for the intended purpose.

#### **2.10.9 ALTERNATE PRODUCTS AND MATERIALS**

- .1 Alternates must be approved by addendum issued by the *Departmental Representative* in accordance with Instructions to bidders.
- .2 Review applications for approval of alternate products and materials and provide recommendations to the *Departmental Representative*.
- .3 Compare products/materials to specifications. Do not compare product-to-product or material-to-material.

#### **2.10.10 SEPARATE AND ALTERNATE PRICES**

- .1 Do not include Separate or Alternate Pricing .

#### **2.10.11 SOLE SOURCING**

- .1 Sole sourcing for materials and work may be used for proprietary systems (i.e. fire alarm systems, EMCS systems).
- .2 Substantiation and/or justification will be required.
- .3 Prior to including sole source materials and/or work, the Consultant must contact the *Departmental Representative* to obtain the approval for the sole sourcing.

#### **2.10.12 UNIT PRICES**

- .1 Unit prices are used where the quantity can only be estimated (e.g. earth work) and the approval of the Project Manager must be sought in advance of their use.

#### **2.10.13 CASH ALLOWANCES**

- .1 Construction contract documents should be complete and contain all of the requirements for the contractual work.
- .2 Cash allowances are to be used only under exceptional circumstances (i.e. utility companies, municipalities), where no other method of specifying is appropriate.
- .3 Obtain approval from the Project Manager in advance to include cash allowances and then use "Section 01 21 00 - Allowances" of the NMS to specify the criteria.

#### **2.10.14 WARRANTIES**

- .1 It is the practice of PWGSC to have a 12-month warranty and to avoid extending warranties for more than 24 months.
- .2 When it is deemed necessary to extend a warranty beyond the 12 month period provided for in the General Conditions of the contract, obtain approval from the Project Manager.
- .3 Delete all references to manufacturers' guarantees.

#### **2.10.15 SCOPE OF WORK**

- .1 No paragraphs noted as "Scope of Work" are to be included.

#### **2.10.16 SUMMARY AND SECTION INCLUDES**

- .1 In Part -I All Sections; do not use (delete):
  - .1 "Summary" and
  - .2 "Section Includes."

#### **2.10.17 RELATED SECTIONS**

- .1 In Part I All Sections; do not use (delete)

#### **2.10.18 INDEX**



- .1 List all the plans and specification sections with correct number of pages, section names and correct drawing titles in the format shown in Appendix C.

### **2.10.19 HEALTH AND SAFETY**

- .1 Confirm with the Project Manager to determine if there are any instructions to meet regional requirements.

### **2.10.20 EXPERIENCE AND QUALIFICATIONS**

- .1 Remove experience and qualification requirements from specification sections.

### **2.10.21 PREQUALIFICATION**

- .1 Do not include in the specification any mandatory contractor and/or subcontractor prequalification requirements that could become a contract award condition.
- .2 If a prequalification process is required, contact the Project Manager.
- .3 There should be no references to certificates, transcripts or license numbers of a trade or subcontractor being included with the bid.

### **2.10.22 CONTRACTING ISSUES**

- .1 Specifications describe the workmanship and quality of the work.
  - .1 Contracting issues should not appear in the specifications.
- .2 Division 00 of the NMS is not used for PWGSC projects.
- .3 Remove all references within the specifications, to the following:
  - .1 General Instructions to Bidders
  - .2 General Conditions
  - .3 CCDC documents
  - .4 Health and Safety requirements
  - .5 Priority of documents
  - .6 Security clauses
  - .7 Terms of payment or holdback
  - .8 Tendering process
  - .9 Bonding requirements
  - .10 Insurance requirements
  - .11 Alternative and separate pricing
  - .12 Site visit (Mandatory or Optional)
  - .13 Release of Lien and deficiency holdbacks

## **2.11 DRAWINGS**

### **2.11.1 GENERAL**

- .1 Drawings shall be in accordance with PWGSC Western CADD Standards and CSA B78.3.
- .2 Refer to:
  - .1 <http://www.tpsgc-pwgsc.gc.ca/cdao-cadd/ouest-western/tm-toe-eng.html>
  - .2 The above link is subject to change
  - .3 The Consultant shall check with the Project Manager to ensure that the link is current.
- .3 Download and use the Toolkit which includes drawing border templates, layer utility and drawing standards checker.

### **2.11.2 TITLE BLOCKS**

- .1 Use PWGSC title block for drawings and sketches (including addenda).

### **2.11.3 DIMENSIONS**

- .1 Dimensions are to be in metric only (no dual dimensioning).

### **2.11.4 TRADE NAMES**



- .1 Trade names on drawings are not acceptable.
- .2 Refer to SECTON 2.3, SPECIFICATIONS; 2.3.6 Specifying Materials for specifying materials by trade name.

**2.11.5 SPECIFICATION NOTES**

- .1 No specification type notes are to appear on any drawing.

**2.11.6 TERMINOLOGY**

- .1 Use the term "Departmental Representative" instead of Engineer, PWGSC, Owner, Consultant or Architect.
- .2 "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.
- .3 Notations such as: "verify on site", "as instructed", "to match existing", "example", "equal to" or "equivalent to", "to be determined on site by "Departmental Representative", may not be indicated on the drawings or in the specifications as this promotes inaccurate and inflated bids.
- .4 Specifications & drawings must permit bidders to calculate all quantities and bid accurately.
- .5 If quantities are impossible to identify (i.e. cracks to be repaired) give an estimated quantity for bid purposes (unit prices).
- .6 Ensure that the terminology used throughout the drawings & specifications is consistent and does not contradict the applicable standard construction contract documents.

**2.11.7 INFORMATION TO BE INCLUDED**

- .1 Drawings must show the quantity and configuration of the project, the dimensions and details of how it is constructed.
- .2 There should be no references to future work and no any information that will be changed by future addenda.
- .3 The scope of work should be clearly detailed and elements not in contract should be eliminated or kept to an absolute minimum.

**2.11.8 DRAWING NUMBERS**

- .1 Number drawings in sets according to the type of drawing and the discipline involved as follows:
  - .1 The requirements of SECTION 2 PWGSC NATIONAL CADD STANDARD will supersede these requirements, where warranted.
- .2 During the Design Phase of the project each submission and review must be noted on the Notes block of the drawing title, but at the time of construction document preparation, all revision notes should be removed.

Discipline	Drawing
Demolition	D1, D2, etc.
Architectural	A1, A2, etc.
Civil	C1, C2, etc.
Landscaping	L1, L2, etc.
Mechanical	M1, M2, etc.
Electrical	E1, E2, etc.
Structural	S1, S2, etc.
Interior Design	ID1, ID2, etc.

**2.11.9 PRINTS**



- .1 Print with black lines on white paper.
- .2 Blue prints are acceptable for document submissions at stages outlined in the TOR.
- .3 Confirm with Departmental Representative the size of prints to be provided for review purposes.

#### **2.11.10 BINDING**

- .1 Staple or otherwise bind prints into sets.
- .2 Where presentations exceed 20 sheets, the drawings for each discipline may be bound separately for convenience and ease of handling.

#### **2.11.11 LEGENDS**

- .1 Provide a legend of symbols, abbreviations, references, etc., on the front sheet of each set of drawings or, in large sets of drawings, immediately after the title sheet and index sheets.

#### **2.11.12 SCHEDULES**

- .1 Where schedules occupy entire sheets, locate them next to the plan sheets or at the back of each set of drawings for convenient reference.
  - .1 See CGSB 33-GP-7 Architectural Drawing Practices for schedule arrangements.

#### **2.11.13 NORTH POINTS**

- .1 On all plans include a north point.
- .2 Orient all plans in the same direction for easy cross-referencing.
- .3 Wherever possible, lay out plans so that the north point is at the top of the sheet.

#### **2.11.14 DRAWING SYMBOLS**

- .1 Follow generally accepted drawing conventions, understandable by the construction trades, and in accordance with PWGSC publications.



## **3 PROJECT ADMINISTRATION**

### **3.1 GENERAL REQUIREMENTS FOR ALL PROJECTS**

- .1 The administration requirements outlined in this section are applicable to all PWGSC projects in Western Region, unless otherwise indicated in the TOR.
- .2 “Project Team” refers to key representatives involved in this project.
- .3 All team members must maintain a professional, cordial and collaborative relationship.

### **3.2 LANGUAGE**

- .1 Construction documents must be prepared in English.

### **3.3 MEDIA**

- .1 The Consultant shall not respond to any media inquiry.
- .2 Direct all media requests to the Departmental Representative.

### **3.4 PROJECT MANAGEMENT**

#### **3.4.1 GENERAL**

- .1 Public Works and Government Services Canada administers the project on behalf of Canada and exercises continuing control over the project during all phases of development.
- .2 This project is to be organized, managed and implemented in a collaborative manner.
- .3 The PWGSC project management team, the Consultant, the Contractor and the User Department teams are to work cooperatively at every stage of the design and construction process in order to assure the creation of a successful and meaningful work of architecture.
- .4 Under the leadership of the PWGSC Departmental Representative, all team members are responsible for establishing and maintaining a professional and cordial relationship.

#### **3.4.2 NATIONAL PROJECT MANAGEMENT SYSTEM**

- .1 PWGSC uses the National Project Management System (NPMS) for management of its building projects in order to align with the Federal Government approvals processes. Refer to the PWGSC NPMS web site for more details.
- .2 <http://www.tpsgc-pwgsc.gc.ca/biens-property/sngp-npms/index-eng.html>
- .3 This GP&S document speaks to services that are normally provided by the professional during the Project Delivery Phase of the NMPS.

#### **3.4.3 DESIGN STAGE**

- .1 Pre-design Process
  - .1 The purpose of this phase is to analyze all project requirements including codes, regulations, programming, sustainability, cost, time management and risk to demonstrate a full understanding of the project
  - .2 The approved deliverable will become the formal project work plan and will be utilized throughout the project to guide the delivery.
- .2 Schematic Design Process
  - .1 The purpose of this phase is to explore three distinctly different design options and to analyze them against the project requirements.
  - .2 The Schematic Design will be in sufficient detail to illustrate and communicate the project characteristics.
    - .1 Provide a detailed review and analysis of the project requirements including all updates and amendments to ensure all requirements are fully integrated into the Schematic Design.



- .2 Out of this process the Schematic Design will be accepted and authorization to proceed to Design Development will be based on the accepted Schematic Design.
- .3 The *Departmental Representative*, in concert with others shall choose one option to be further developed.
  - .1 Although the *Consultant* is required to identify a preferred option, the *Departmental Representative* may select another option.
  - .2 The approved deliverable will become the formal project work plan and will be utilized throughout the project to guide the delivery.

#### 3.4.4 IMPLEMENTATION STAGE

- .1 Design Development Process
  - .1 The purpose of this phase is to further develop the design option selected for refinement at the Schematic Design stage.
  - .2 The Design Development documents consist of drawings and other documents to describe the scope, quality and cost of the project in sufficient detail to facilitate design approval, confirmation of code compliance, detailed planning of construction and project approval.
  - .3 This design will be used as the basis for preparation of construction documents.
  - .4 The approved deliverable will become the formal project work plan and will be utilized throughout the project to guide the delivery.
- .2 Commissioning Process
  - .1 “Commissioning” is a quality assurance process, in which the functional requirements of the Owner/occupant and the operational requirements of facility management are tested, verified and proven to function as intended.
  - .2 Commissioning deliverables occur at various phases throughout the project as detailed in section 2.8.
  - .3 Commissioning shall be in accordance with the PWGSC Commissioning Manual CP.1 (2003).
- .3 Construction Document Process
  - .1 The purpose of this phase is to translate design development documents into construction drawings and specifications, for use by the contractor to determine a cost for the work and to construct the building.
- .4 Contract Procurement Process
  - .1 The purpose of this phase is to obtain and evaluate bids/proposals from qualified contractors to construct the project, as per the Construction Contract Documents and to award the construction contract according to government regulations.
- .5 Construction Contract Administration Process
  - .1 The purpose of this phase is to implement the project in compliance with the Construction Contract Documents and to direct and monitor all necessary or requested changes to the scope of work during construction, commissioning and closeout.

#### 3.4.5 CLOSEOUT STAGE

- .1 Post Construction Process
  - .1 The purpose of this phase is to ensure the orderly completion and recording of all aspects of the work during the construction and liaise with the Public Works And Government Services Canada and other agencies as appropriate to close out the project.

#### 3.4.6 ENGINEERING PROJECTS



- .1 Refer to the project specific TOR where the stages for an Engineering Project differs slightly.

### **3.5 LINES OF COMMUNICATION**

- .1 In general, communications will be through the Departmental Representative, unless directed otherwise.
  - .1 This includes formal contact between the Consultant, the Contractor, the PWGSC Project Team and the User Department.
- .2 Direct communication between members of the PWGSC Project Team on routine matters may be required for resolution of technical issues.
  - .1 However, this shall not alter project scope, budget or schedules, unless confirmed in writing by the Departmental Representative.
- .3 During construction tender call, PWGSC will conduct all correspondence with bidders and award the contract.

### **3.6 MEETINGS**

- .1 The Departmental Representative will arrange meetings throughout the project, with representatives from:
  - .1 The User Department;
  - .2 PWGSC
  - .3 The Consultant team; and
  - .4 The Contractor (during the construction phase)
- .2 Standing agenda items shall include:
  - .1 Project Schedule,
  - .2 Cost,
  - .3 Risk,
  - .4 Quality,
  - .5 Health and safety

### **3.7 CONSULTANT RESPONSIBILITIES**

- .1 The “Consultant Team” includes the Consultant’s staff, sub-consultants and specialists.
  - .1 This team must maintain its expertise for the duration of the project.
  - .2 The team must include qualified registered architectural and engineering professionals, with extensive relevant experience, capable of providing all required services.
  - .3 Team members may be qualified to provide services in more than one discipline.
  - .4 The Consultant may expand the team to include additional disciplines.
- .2 The Consultant is responsible for:
  - .1 Obtaining Departmental Representative acceptance for each project phase before proceeding to the next phase.
  - .2 Accurately communicating design, budget, and scheduling issues to staff, sub-consultants and specialists.
  - .3 Co-ordinating input for the Departmental Representative’s Risk Management Plan
  - .4 Co-ordinating the quality assurance process and ensuring that submissions of sub-consultants are complete and signed-off by reviewers;
  - .5 During the design phases:
    - .1 Attend meetings,
    - .2 Record the issues and decisions,
    - .3 Prepare and distribute minutes within two working days of the meeting,



- .4 Ensure all meetings are green i.e. using electronic documents or double-sided hard copies and
- .5 Ensure sub-consultants attend required meetings.
- .6 During the construction phase:
  - .1 Attend meetings and provide site inspection services
  - .2 Ensure sub-consultants provide site inspection services and attend required meetings.
- .3 The Consultant is responsible for:
  - .1 Coordinating and directing the work of all team activities, sub-consultants and specialists
  - .2 Preparing a design that meets project requirements.
  - .3 Obtaining approvals on behalf of the Departmental Representative from the User and other levels of government such as provincial and municipal governments
    - .1 The Consultant shall adjust the documentation to meet the requirements of these authorities.

### **3.8 PWGSC RESPONSIBILITIES**

- .1 Administration
  - .1 PWGSC administers the project and exercises continuing control over the project during all phases of development.
  - .2 The following administrative requirements apply during all phases of the project delivery.
- .2 Reviews
  - .1 PWGSC will review the work at various stages and reserves the right to reject unsatisfactory work at any stage.
  - .2 If later reviews show that earlier acceptances must be withdrawn, the Consultant shall re-design and re-submit at no extra cost.
- .3 Acceptance
  - .1 PWGSC acceptance of submissions from the Consultant simply indicates that, based on a general review, the material complies with governmental objectives and practices, and meets overall project objectives
  - .2 Acceptance does not relieve the Consultant of professional responsibility for the work and for compliance with the contract.
- .4 PWGSC Project Management
  - .1 The Project Manager assigned to the project is the Departmental Representative.
  - .2 The Departmental Representative is directly responsible for:
    - .1 The progress and administration of the project, on behalf of PWGSC
    - .2 Day-to-day project management and is the Consultant's single point of contact for project direction.
    - .3 Providing authorizations to the Consultant on various tasks throughout the project.
  - .3 Unless directed otherwise by the Departmental Representative, the Consultant obtains all Federal approvals necessary for the work.
- .5 PWGSC Professional & Technical Resources Team
  - .1 Provides professional advice and quality assurance reviews of consultant deliverables by Architectural and Engineering professional disciplines.
  - .2 Offers expert technical advice on related project issues, such as functional programming, options analysis, risk management, cost planning, scheduling, contract interpretation, specifications, terms of reference, commissioning, claims management, project delivery approach and project compliance.



- .3 Participates regularly in design phases and may attend (during construction), contractor meetings and conduct field reviews on behalf of the Departmental Representative.
- .4 Provides a Design Manager for the project, who will coordinate the services of the Professional & Technical Resources Team through the Departmental Representative;
  - .1 The Design Manager is the assembler and coordinator of the Resources Team of Architects, Engineers, Interior Designers, Project Planners, Cost Planners and Commissioning Specialists, all with specific areas of expertise.
- .6 PWGSC Commissioning Specialist represents the Departmental Representative's interests in the commissioning process for buildings by:
  - .1 Providing technical advice on O&M matters, operational criteria and quality assurance on the commissioning process throughout the project life cycle;
  - .2 Coordinating and overseeing internal PWGSC commissioning activities during all project phases to ensure that O&M concerns are addressed;
  - .3 Working closely with the Consultant, the Consultant's Commissioning Manager, the Contractor, and the Departmental Representative for Commissioning activities and,
  - .4 Reviews all documentation and reported results relative to commissioning throughout the project delivery.

### **3.9 USER DEPARTMENT RESPONSIBILITIES**

- .1 The User Department Project Leader
  - .1 Is accountable for the expenditure of public funds and delivery of the project in accordance with terms accepted by the Treasury Board
  - .2 Reports to senior User Department executive management
  - .3 Will play several critical roles for the successful implementation of the project, as follows:
    - .1 Coordinate the quality, timing and completeness of information and decisions relating to issues related to the functional performance of the facility;

### **3.10 REVIEW AND APPROVAL BY PROVINCIAL AND MUNICIPAL AUTHORITIES**

- .1 The federal government generally defers to provincial and municipal authorities for specific regulations, standards and inspections but in areas of conflict, the more stringent authority prevails.
- .2 Municipal authority review
  - .1 The purpose of this review is information and awareness;
  - .2 Submissions will be reviewed at the completion of specific phases as outlined in the Required Services Section of the TOR.

### **3.11 BUILDING PERMITS AND OCCUPANCY PERMITS**

- .1 The Consultant will support the Contractor in applying for building permits by providing the required documentation.
  - .1 These documents will be submitted at phases as requested by the municipal authorities.
  - .2 The Consultant will negotiate and resolve building permit related issues.
- .2 The Consultant shall support the Contractor in its application for an occupancy permit and coordinate the resolution of all outstanding issues relating to the permit.
- .3 The Contractor shall pay for the permits on behalf of PWGSC.

### **3.12 TECHNICAL AND FUNCTIONAL REVIEWS**

- .1 This includes both COE reviews and User Department reviews.



- .1 The Purpose of these reviews is technical and functional quality assurance;
- .2 Submissions will be reviewed at the completion of specific phases as outlined in the Required Services Section of the TOR.
- .2 HRSDC Reviews of building projects
  - .1 The purpose of these reviews is for fire protection, health and life safety;
  - .2 Submissions will be reviewed at the completion of specific phases as outlined in the Required Services Section of the TOR.



## APPENDIX A CHECKLISTS

### A.1 CHECKLIST FOR THE SUBMISSION OF CONSTRUCTION DOCUMENTS

#### AI.1 TITLE BLOCK

<b>Project Title:</b>		<b>Date:</b>
<b>Project Location:</b>		<b>Project Number:</b>
<b>Consultant's Name:</b>		<b>Contract Number:</b>
<b>PWGSC PM:</b>	<b>Review Stage:</b>	

#### AI.2 STANDARDS & GUIDELINES

ITEM	Checked by:	Progress Submission	Pre-Tender or Tender Ready Submission	Comments:
<b>1. General</b>				
The design meets the requirements of;				
.1	National Building Code - 2005			
.2	National Fire Code - 2005			
.3	National Plumbing Code - 2005			
.4	Canada Labour Code			
.5	NFPA 10 - Standard for Portable Fire Extinguishers - 2002			
.6	NFPA 13 - Standard for the Installation of Sprinkler Systems - 2007			
.7	NFPA 14 – Standard for the Installation of Standpipe and Hose Systems - 2003			
<b>2. Treasury Board</b>				
The design meets the requirements of;				
.1	Chapter 3-6: Fire Protection Standard for Correctional Institutions. <a href="http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=13580">http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=13580</a>			
.2	Chapter 3-2: Fire Protection Standard for Design & Construction. <a href="http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=13581">http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=13581</a>			
.3	Fire Protection Standard for Electronic Data Processing			



Equipment. <a href="http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=13582">http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=13582</a>				
<p><b>3. HRSDC Fire Protection Engineer Standards</b></p> <p>The design meets the requirements of;</p>				
.1 Federal Fire Protection Standards. <a href="http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/index.shtml">http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/index.shtml</a>				
.2 FC-403 Standard for Sprinkler Systems. <a href="http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/commissioner/403/page00.shtml">http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/commissioner/403/page00.shtml</a>				
.3 FC-311-M Standard for Record Storage. <a href="http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/commissioner/311/page00.shtml">http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/commissioner/311/page00.shtml</a>				
<p><b>4. Labour Canada Standards</b></p> <p>The design meets the requirements of;</p>				
.1 Canada Labour Code. <a href="http://laws.justice.gc.ca/en/L-2/">http://laws.justice.gc.ca/en/L-2/</a>				
.2 Canada Occupational Health and Safety Regulations. <a href="http://laws.justice.gc.ca/eng/SOR-86-304/index.html">http://laws.justice.gc.ca/eng/SOR-86-304/index.html</a>				
.3 Movable Storage Units Standard. <a href="http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/guidelines/mobile.shtml">http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/guidelines/mobile.shtml</a>				
<p><b>5. ASHRAE Standards</b></p> <p>The design meets the requirements of;</p>				
.1 ANSI/ASHRAE 55 – 2004 Thermal Environmental Conditions for Human Occupancy				
.2 ASHRAE 62.1 – 2007 – Ventilation for Acceptable Indoor Air Quality				
.3 ASHRAE Applications Handbook				
.4 ASHRAE Fundamentals Handbook				



<p><b>6. PWGSC MD Standards</b></p> <p>The design meets the requirements of;</p>				
.1	MD 15116 – Computer Room Air Conditioning Systems - 2006			
.2	MD 15128 – Minimum Guidelines for Laboratory Fume Hoods – March 2004			
.3	MD 15129 – Perchloric Acid Fume Hoods - 2006			
.4	MD 15161 – Guidelines for the control of Legionella in mechanical systems			
.5	MD 250005 – Energy Monitoring and Control Systems Design Guidelines - 2009			

**AI.3 SPECIFICATIONS – ALL DISCIPLINES**

ITEM	Checked by:	Progress Submission	Pre-Tender or Tender Ready Submission	Comments:
<p><b>1. General</b></p> <p>The Specifications meet the requirements of;</p>				
.1	The NMS Users Guide. .			
.2	Masterformat 2004			
.3	The current edition of the NMS database			
.4	Deletion of “Related Sections” and “Section Includes” throughout.			
.5	PWGSC GCs for projects tendered through PWGSC			
.6	Consistent use of CCDC or other for privately tendered projects.			
.7	Non-proprietary Specifications.			
.8	Being completely edited with removal of all square choice brackets and Spec Notes.			
.9	Including all relevant Sections as evident by the by the scope of work indicated by the drawings.			
.10	Not referring to the Tender Submission (Contract B)			
.11	Use of command imperative style of language.			
.12	Formatting in either the NMS			



	1/3 - 2/3 page format or the Construction Specifications Canada full page format.				
.13	Each Section starting on a new page and the Project Number, Section Title, Section Number and Page Number show on the header of each page only.				
.14	Specification headers not including date or consultant's name.				
.15	Departmental Representative being used throughout instead of Engineer, PWGSC, Owner, Consultant or Architect. (That is; the contractual entity)				
.16	Non use of notations such as: "verify on site", "as instructed", "to match existing", "example", "equal to", "equivalent to" and "to be determined on site by".				
.17	Dimensions being provided in metric only.				
.18	Indicating the latest edition of all references noted in Part 1 of each Section and that un-used reference Standards are deleted.				
.19	No bolding of text.				
.20	Use of Western Regions standard payments procedures clause.				

#### AI.4 DRAWINGS GENERAL – ALL DISCIPLINES

ITEM	Checked by:	Progress Submission	Pre-Tender or Tender Ready Submission	Comments:
<b>1. General</b>				
The Drawings meet the requirements of;				
.1 PWGSC Western Region AutoCAD drafting standards.				
.2 Using the "toolkit" and the "drawing checker".				
.3 All dimensions in SI. No dual dimensioning has been used.				
.4 Providing a north arrow.				
.5 Providing a legend on all relevant sheets.				
.6 Indicating grid lines on all				



	sheets.				
.7	Using standard scales. (1:50, 1:100 etc.)				
.8	Cross referencing and detailing is consistent.				
.9	No Specifications on drawings.				
.10	All notes being written in the command imperative style of speech.				
.11	Not naming the "Contractor" or "sub trades" in the notes.				
.12	Numbering all rooms on all floor plans.				
.13	Using appropriate line weights to differentiate new versus existing versus demolition.				
.14	Using font sizes and types following PWGSC drafting standards.				
.15	Providing separate drawings for demolition and new work.				
.16	Drawing acceptance by the FPE of HRSDC.				

#### AI.5 DRAWINGS - DISCIPLINE SPECIFIC

ITEM	Checked by:	Progress Submission	Pre-Tender or Tender Ready Submission	Comments:
<b>1. Architectural</b>				
The Drawings meet the requirements of;				
.1	Providing a Building Code Analysis.			
.2	Indicating fire separations and firewalls and rating.			
.3	Providing a complete site plan with all related details.			
.4	Providing a fully detailed reflected ceiling plan showing lighting, diffusers, sprinkler heads, etc.			
.5	Wall sections being coordinated with the structural and other disciplines drawings.			
.6	Building elevations showing all mechanical and electrical ancillaries.			
.7	Sub surface drainage being shown on the foundation plans and coordinated with all other disciplines.			



.8	Accessibility conforming to CAN/CSA 651-04.				
.9	Coordination of door, finish, hardware schedules in conjunction with fire separations and other disciplines.				
.10	All conflict points identified by BIM have been resolved.				
<b>2. Structural</b>					
The Drawings meet the requirements of;					
.1	Ensuring that General Notes provide additional information that is NOT covered in Specifications.				
.2	Remove all information that is or should be covered by the Specifications.				
.3	Note loads used for design.				
.4	PWGSC policy of using general product descriptions, not proprietary product names followed.				
.5	Table of Abbreviations used provided.				
.6	Section bubbles properly cross referenced.				
.7	Coordination with all other disciplines.				
<b>3. Mechanical</b>					
The Drawings meet the requirements of;					
.1	Separate drawings for Plumbing, HVAC, Fire Suppression, etc.				
.2	Provision for humidification with a clean source of water and no standing water				
.3	Provision of separate HVAC zoning for each unique thermal zone.				
.4	Providing Ventilation to ASHRAE 62.1.				
.5	Meets all requirements of ASHRAE 62.1, Section 5.				
.6	All thermostats are wall mounted.				
.7	The building and systems and equipment meeting all requirements of Section 5 of ASHRAE 62.1.				
.8	Conformance to ASHRAE 55 for;				
.1	Operative				



temperature .2 Air motion .3 Radiant Temperature Asymmetry .4 Draft .5 Vertical Temperature Difference .6 Floor Surface Temperature .7 Temperature Variations with Time .8 Cyclic Variations .9 Drifts and Ramps				
.9 Providing building cross-sections at all key locations showing clearances for the mechanical installation and access for maintenance.				
.10 Providing sufficient access to mechanical equipment for maintenance.				
.11 Providing mechanical schematics showing design pressure and temperatures as well as all instrumentation and control points labels.				
.12 Design complies with all referenced PWGSC MD Standards.				
.13 Equipment schedules on the drawings coordinate and agree with the Book Specifications.				
.14 Duct attenuation is designed to conform to the STC requirements shown on the architectural drawings.				
.15 Coordination with all other disciplines.				
<b>4. Electrical</b> The Drawings meet the requirements of;				
.1 Separate drawings for Lighting, Power, Fire Alarm System, Communication and Data, Security & CCTV etc.				
.2 Verification and acceptance of the Grounding condition for this project.				
.3 The Overcurrent and Short Circuit Study and confirming all components are fully coordinated.				
.4 The Arch-Flash Study and confirming all components are fully coordinated.				
.5 Providing Arch protection				



	warning signs and labeling.				
.6	Providing lighting Levels in accordance with the National Building Code and IESNA recommendations.				
.7	Not using Armored Cable. Using Armored Cable will be allowed only for jumping from one light fixture to the other in a distance up to 3m.				
.8	Providing identification for each circuit including: .1 Name .2 Voltage, .3 Phase, .4 Amps, .5 Circuit-s .6 Fed from Panel, Destination.				
.9	The Voltage Drop Calculation for each circuit and conformance to CEC requirements.				
.10	Providing phase load and total load for each panel and ensuring proper balance of the Electrical System.				
.11	Coordination with all other disciplines.				
<b>5. Civil</b>					
The Drawings meet the requirements of;					
.1	The design criteria. (e.g. design vehicle for surface structures, design period and other data for WM.WW, SW and other systems including data and calculations showing design requirements and provided capacities)				
.2	The reference standards. (e.g. minimum service connection pipe or minimum WM size, etc have been used for municipal works, name the local authority whose standards are used.)				
.3	Indicating existing sub-grade soil properties and strength that has been used for the design is indicated on drawings or in a report.				
.4	Indicating Bench Marks used for the Topographic Survey are shown with Northing, Easting and elevation data.				
.5	Indicating the Final				



	Geometric layout for existing and new infrastructures and facilities including centerline of all access roads and pipes. The data provided includes Northing and Easting of all points including start and end point and for all other points wherever there is change in direction, and all horizontal curve data				
.6	Providing typical X-sections for all structures, including type, thickness of various materials for pavement structures, and pipe diameter, material types and thickness and SDR values.				
.7	Providing design grades and slopes.				
.8	Providing details for all infrastructures and facilities indicating all works and type of materials and all geometrics and dimensions..				
.9	Coordination with all other disciplines.				



## APPENDIX B SPECIFICATION TOC STANDARDS

### B.1 GENERAL

#### BI.1 SPECIFICATIONS

.1 List all Divisions, Sections (by number and title) and number of pages.

#### BI.2 DRAWINGS

.1 List all Drawings by number and title.

### B.2 SAMPLE OF TABLE OF CONTENTS

Project No:	Table of Contents	Index
R.xxxxxx		Page I of xx

#### SPECIFICATIONS:

- .3
- .4
- No. Pages
- .5 Division 01 – GENERAL REQUIREMENTS
- .6 01 11 00 – Summary of Work      xx pages
- .7 01 14 00 – Work Restrictions      xx pages
- .8 01 29 00 – Payment Procedures      xx pages
- .9 Division 02 – EXISTING CONDITIONS
- .10 ETC.
- .11

#### DRAWINGS:

- C-I              Civil
- L-I              Landscaping
- A-I              Architectural
- S-I              Structural
- M-I              Mechanical
- E-I              Electrical



## APPENDIX C ADDENDUM FORMAT STANDARD

### C.1 SAMPLE OF ADDENDUM FORMAT

#### CI.1 DRAWINGS

- .1 Indicate drawing number and title, then list changes or indicate revision number and date, and re-issue drawing with addendum.

#### CI.2 SPECIFICATIONS

- .1 Indicate section number and title.
- .2 List all changes (i.e. delete, add or change) by article or paragraph

<b>Project Title:</b>	<b>Addendum No:</b>
<b>Project Location:</b>	<b>Project Number:</b>
<b>Consultant's Name:</b>	<b>Date:</b>
<b>The following changes in the bid documents are effective immediately. This addendum will form part of the contract documents</b>	
<b>Drawings</b>	
1 AI Architectural	
<b>Specifications</b>	
1 Section 01 00 10 - General Instructions	
.1 Delete article (xx) entirely.	
.2 Refer to paragraph (xx) and revise "xxx", to read "xxxx"..	
2 Section 23 05 00 - Common Work Results - Mechanical	
.1 Add new article (x.xx) as follows:	



## APPENDIX D DIGITAL TENDER DOCUMENTS STANDARDS

### D.1 CONVENTION STANDARDS FOR TENDER DOCUMENTS

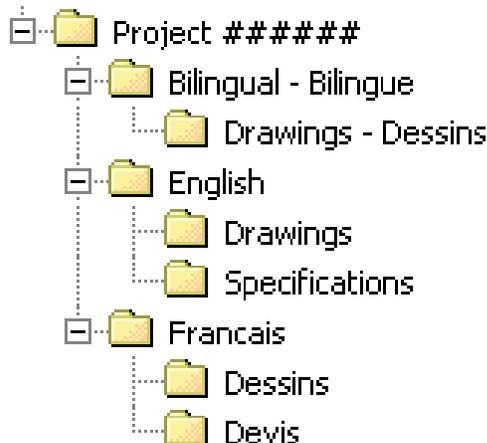
#### DI.1 USER MANUAL

- .1 Refer to the User manual on directory structure and naming convention standards for construction tender documents on CD ROM.
  - .1 Issued by: Real Property Contracting Directorate, PWGSC,
  - .2 Version 1.0, May 2005.

#### DI.2 PREFACE

- .1 The Government of Canada (GoC) has committed to move towards an electronic environment for the majority of the services it offers.
- .2 This covers the advertisement and distribution of contract opportunities, including construction solicitations.
- .3 As a result, it is now necessary to obtain a copy of construction drawings and specifications (in PDF format *without* password protection) on one or multiple CD-ROM to facilitate for the GoC the transfer of the construction drawings and specifications electronically to the Government Electronic Tendering System (GETS).
- .4 There is therefore a need to adopt a common directory structure and file-naming convention to ensure that the information made available to contractors electronically and in hard (printed) copy is in accordance with the sequence adopted in the real property industries, both for design and construction.
- .5 This manual defines the standard to be followed by both consultants and print shops at time of formatting and organizing the information, whether drawings and specifications are created by scanning print documents or saved as PDF files from the native software (AutoCAD, NMS Edit, MS-Word, etc...) in which these were created.
- .6 It is important to note that the procedure described in this manual is not an indication that consultants are relieved from following the established standards for the production of drawings and specifications.
- .7 The sole purpose of this manual is to provide a standard for the organization and naming of the electronic files that will be recorded on CD-ROM.

#### DI.3 DIRECTORY STRUCTURE



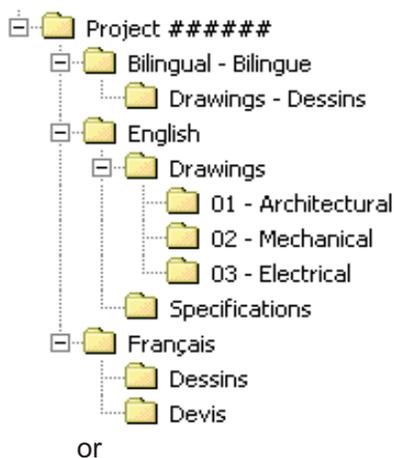


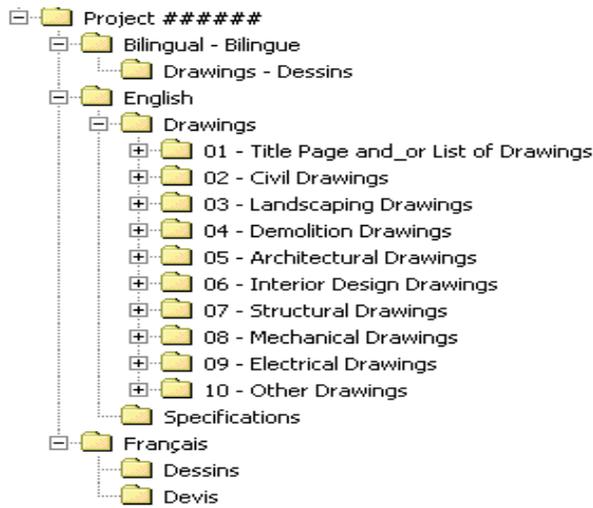
#### DI.4 1<sup>ST</sup>, 2<sup>ND</sup> AND 3<sup>RD</sup> TIER SUB-FOLDERS

- .1 Each CD-ROM, whether it is for the original solicitation (tender call) or for an amendment (addendum), must have the applicable elements of the following high-level Directory Structure created:
- .2 The following important points are to be noted about the Directory Structure:
  - .1 The “Project #####” folder is considered the 1<sup>st</sup> Tier of the Directory Structure where ##### represents each digit of the Project Number.
  - .2 The Project Number must always be used to name the 1<sup>st</sup> Tier folder and it is always required.
  - .3 Free text can be added following the Project Number, to include such things as a brief description or the project title;
- .3 The “Bilingual - Bilingue”, “English” and “Français” folders are considered the 2<sup>nd</sup> Tier of the Directory Structure. The folders of the 2<sup>nd</sup> Tier **cannot** be given any other names since GETS uses these names for validation purposes. At least one of the “Bilingual - Bilingue”, “English” and “Français” folders is always required, and these must always have one of the applicable sub-folders of the 3<sup>rd</sup> Tier;
- .4 The “Drawings - Dessins”, “Drawings”, “Specifications”, “Dessins” and “Devis” folders are considered the 3<sup>rd</sup> Tier of the Directory Structure. The folders of the 3<sup>rd</sup> Tier **cannot** be given any other names since GETS also uses these names for validation purposes. There must be always at least one of the applicable 3<sup>rd</sup> Tier folder in each document.
- .5 IMPORTANT NOTE:
  - .1 The applicable elements of the Directory Structure (1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> Tier folders) are always required and cannot be modified.

#### DI.5 4<sup>TH</sup> TIER SUB-FOLDERS FOR DRAWINGS

- .1 The “Drawings – Dessins”, “Drawings” and “Dessins” folders must have 4<sup>th</sup> Tier sub-folders created to reflect the various disciplines of the set of drawings.
- .2 Because the order of appearance of the sub-folders on the screen will also determine the order of printing, it is necessary to start with a number the identification name of the sub-folders in the “Drawings – Dessins”, “Drawings” and “Dessins” folders.
- .3 Note:
  - .1 The first sub-folder must be always reserved for the Title Page and/or the List of Drawings unless the first drawing of the set is an actual numbered discipline drawing.
- .4 Examples of 4<sup>th</sup> Tier sub-folders for drawings:





## DI.6 NAMING CONVENTION - 4<sup>TH</sup> TIER DRAWINGS

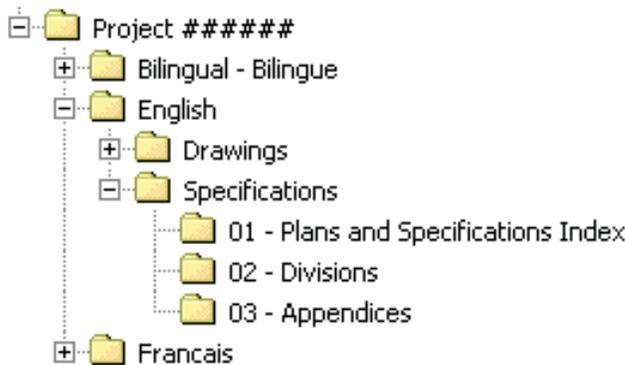
- .1 The 4<sup>th</sup> Tier sub-folders for drawings must adhere to the following standard naming convention.
  - .1 For the “Drawings” and “Dessins” folders:
    - 1 ## - Y, Where:
      - 1 ## = A two digit number ranging from 01 to 99 (leading zeros must be included)
      - 2 Y = The title of the folder
    - 2 Example: 03 – Mechanical
  - .2 For the “Drawings - Dessins” folder:
    - 1 ## - Y – Z, Where:
      - 1 ## = A two digit number ranging from 01 to 99 (leading zeros must be included)
      - 2 Y = The English title of the folder
      - 3 Z = The French title of the folder
    - 2 Example: 04 - Electrical – Électricité
- .2 It should be noted that the numbering of the 4<sup>th</sup> Tier sub-folders is for sorting purposes only and is not tied to a specific discipline. For example, “Architectural” could be numbered 05 for a project where there is four other disciplines before “Architectural” in the set of drawings or 01 in another project where it’s the first discipline appearing in the set.
- .3 It is essential to ensure that the order of the drawings on the CD-ROM be exactly the same as in the hard copy set. GETS will sort each drawing for both screen display and printing as per the following rules:
  - .1 The alphanumerical sorting is done on an ascending order;
  - .2 The alphanumerical order of the sub-folders determines the order of appearance on the screen as well as the order of printing (as an example: all the drawing PDF files in the 01 sub-folder will be printed in alphanumerical order before the drawings in the 02 sub-folder etc...);
  - .3 Each drawing PDF file within each sub-folder will also be sorted alphanumerically. This will determine the order of appearance on the screen as well as the order of printing



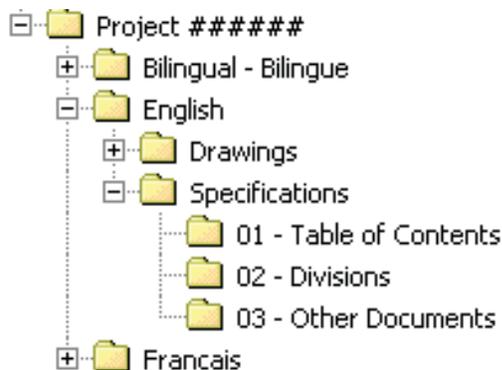
(i.e. Drawing A001 will be printed before Drawing A002, Drawing M02 before Drawing M03, etc...).

### DI.7 4<sup>TH</sup> TIER SUB-FOLDERS FOR SPECIFICATIONS

- .1 The “Specifications” and “Devis” folders must have 4<sup>th</sup> Tier sub-folders created to reflect the various elements of the specifications.
- .2 Because the order of appearance of the sub-folders on the screen will also determine the order of printing, it is necessary to start with a number the identification name of the sub-folders in the “Specifications” and “Devis” folders.
- .3 Examples of 4<sup>th</sup> Tier sub-folders for specifications:



or



### DI.8 NAMING CONVENTION - 4<sup>TH</sup> TIER SPECIFICATIONS

- .1 The 4<sup>th</sup> Tier sub-folders for specifications must adhere to the following standard naming convention.
  - .1 For the “Specifications” and “Devis” folders:
    - 1 ## - Y, Where:
      - 1 ## = A two digit number ranging from 01 to 99 (leading zeros must be included)
      - 2 Y = The title of the folder
    - 2 Example: 02 – Divisions
  - .2 It should be noted that the numbering of the 4<sup>th</sup> Tier sub-folders is for sorting purposes only and is not tied to an element of the specifications.



- .3 It is essential to ensure that the order of the elements of the specifications on the CD-ROM be exactly the same as in the hard copy. GETS will sort each element of the specifications for both screen display and printing as per the following rules:
- .4 The alphanumerical sorting is done on an ascending order;
  - .1 The alphanumerical order of the sub-folders determines the order of appearance on the screen as well as the order of printing (as an example: all the specifications PDF files in the 01 sub-folder will be printed, in alphanumerical order before the PDF files in the 02 sub-folder, etc...);
  - .2 Each specifications PDF file within each sub-folder will also be sorted alphanumerically.
    - 1 This will determine the order of appearance on the screen as well as the order of printing (i.e. Division 01 will be printed before Division 02, 01 - Appendix A before 02 - Appendix B, etc...).

#### DI.9 NAMING CONVENTION FOR PDF FILES

- .1 Each drawing, specifications division or other document that are part of the tender documents must be converted in PDF format (without password protection) in accordance with the following standard naming convention and each PDF file must be located in the appropriate sub-folder of the Directory Structure.

#### DI.10 DRAWINGS

- .1 Each drawing must be a separate single page PDF file.
- .2 The naming convention of each drawing must be:
  - .1 X### - Y, Where;
    - 1 X = The letter or letters from the drawing title block ("A" for Architectural or "ID" for Interior Design for example) associated with the discipline,
    - 2 ### = The drawing number from the drawing title block (one to three digits),
    - 3 Y = The drawing name from the drawing title block (for bilingual drawings, the name in both English and French is to appear).
  - .2 Example; A001 - First Floor Details.
- .3 Each drawing that will be located in the appropriate discipline 4<sup>th</sup> Tier sub-folders must be named with the same letter ("A" for Architectural Drawings for example) and be numbered.
- .4 The drawing number used to name the PDF file must match as much as possible the drawing number of the actual drawing (the exception being when leading zeros are required).
- .5 The following important points about drawings are to be noted:
  - .1 The drawing PDF files within each sub-folder are sorted alphanumerically for both displaying and printing. If there are more than 9 drawings in a particular discipline the numbering must use at least two numerical digits (i.e. A01 instead of A1) in order to avoid displaying drawing A10 between A1 and A2.
    - 1 The same rule applies when there are more than 99 drawings per discipline i.e. three digits instead of two must be used for the numbering (for example M003 instead of M03);
  - .2 If drawing PDF files are included in the "Bilingual - Bilingue" folder, these cannot be included as well in the "English" and/or "Français" folders;
  - .3 If drawings not associated with a particular discipline are not numbered (Title Page or List of Drawings for example), these will be sorted alphabetically.
    - 1 While this does not represent a problem if there is only one drawing in the sub-folder, it could disrupt the order when there are two or more drawings. If the alphabetical order of the drawings name does not represent the order on the

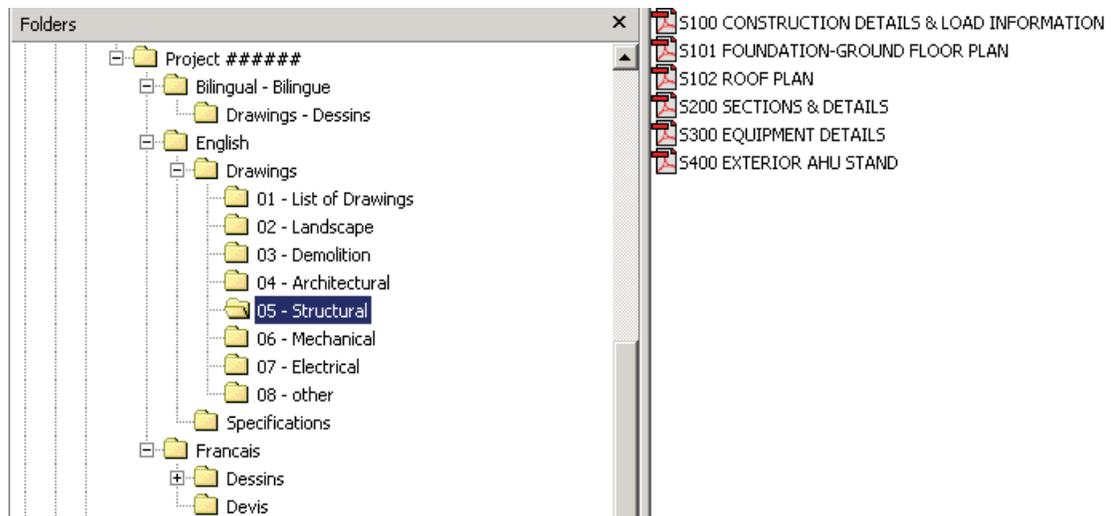


hard copy set, the drawings are to be named as per the following standard convention when converted in PDF format to ensure proper display and printing order.

- 1 ## - Y, Where:
  - 1 ## = A two digit number ranging from 01 to 99 (leading zeros must be included)
  - 2 Y = The name of the drawing
- 2 Example:
  - 1 01 - Title Page
  - 2 02 - List of Drawings

- .4 If numbers are not used in the PDF files name, “*List of Drawings*” will be displayed before “*Title Page*” because “L” comes before “T” in the alphabet.

#### DI.11 EXAMPLE OF A 4<sup>TH</sup> TIER DRAWINGS SUBFOLDER’S CONTENT:



#### DI.12 SPECIFICATIONS

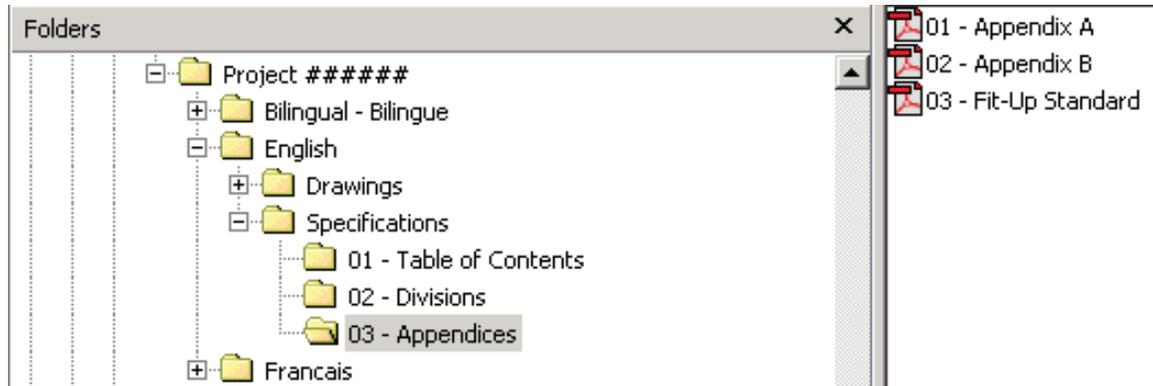
- .1 Each Specifications Division must be a separate PDF file and all pages contained in each PDF file must have the same physical size (height, width).
- .2 The Plans and Specifications Index must also be a separate PDF file.
- .3 If there are other documents that are part of the Specifications (e.g. Appendix or other) these are to be separate PDF files as well.

#### DI.13 DOCUMENTS OTHER THAN SPECIFICATIONS DIVISIONS

- .1 Because PDF files within the Specifications sub-folders are sorted alphanumerically (in ascending order) for both on screen display and printing order, all files that appear in folders other than the “*Divisions*” sub-folder must be named using a number:
  - .1 ## - Y, Where:
    - 1 ## = Two digit number ranging from 01 to 99 with leading zeros required
    - 2 Y = Name of the document
  - .2 Example: 01 - Plans and Specifications Index



#### DI.14 EXAMPLE OF A SUB-FOLDER CONTENT (SUB-FOLDER OTHER THAN “DIVISIONS”):



#### DI.15 SPECIFICATIONS DIVISIONS

- .1 The Specifications Divisions must be named as follows:
  - .1 Division ## - Y, Where:
    - 1 Division ## = The actual word “Division” followed by a space and a two digit number ranging from 01 to 99 (with leading zeros required)
    - 2 Y = Name of the Specifications Division as per CSC/CSI MasterFormat™
  - .2 Example: Division 05 – Metals
- .2 The following important point about specifications is to be noted:
  - .1 The Numbering of the Divisions cannot be altered from CSC/CSI MasterFormat™ even if some Divisions are not used in a given project.
    - 1 For example, Division 05 will always remain Division 05 even if Division 04 is not used for a given project.

#### DI.16 EXAMPLE OF A “DIVISIONS” SUB-FOLDER CONTENT:





### DI.17 CD-ROM LABEL

- .1 Each CD-ROM is to be labelled with the following information:
  - .1 Project Number;
  - .2 Project Title;
  - .3 Documents for Tender;
  - .4 CD X of X.
- .2 Example:
  - .1 Project 123456;
  - .2 Repair Alexandra Bridge;
  - .3 Documents for Tender;
  - .4 CD 1 of 1.



## APPENDIX E PDF CREATION STANDARDS

### E.1 CONVERTING CONSTRUCTION DRAWINGS INTO PDF

#### EI.1 REFERENCE GUIDE

- .1 Refer to the basic reference guide on converting construction drawings into portable document format (PDF), Issued by Real Property Contracting Directorate. PWGSC, Version 1.0, May 2005.

#### EI.2 PREFACE

- .1 Portable Document Format (PDF) is the standard format for documents that are posted on the Government Electronic Tendering System (GETS).
- .2 There is therefore a need to obtain from architectural and engineering consultants an electronic copy of drawings and specifications in PDF for tendering Government of Canada (GoC) construction projects.
- .3 In order to have the highest quality in term of resolution and printing, consultants should to the greatest extent possible have the PDF drawing and specification files derived from the native software in which they were created. Scanning is permissible but only in special circumstances, for example when there is no electronic version of a drawing being included in a construction tender package.
- .4 The purpose of this document is to provide basic information on the conversion of Computer Aided Design and Drafting (CADD) drawings in PDF. Creating a PDF file from a CADD drawing is a relatively simple process once all the necessary configurations and settings are in place.
  - .1 It actually should not take any longer than it would take to create a plot file or to send a drawing to a printer.
  - .2 The information in this guide is not intended to cover all technical aspects of the conversion, which can be done using various methods, but rather to highlight important points about the process and file settings.
  - .3 The conversion of specifications is not covered in this basic reference guide since it does not require any special configuration or setting.
- .5 The information provided in this basic reference guide is not an indication that consultants are relieved from following the established standards for the production of drawings and specifications.
  - .1 The sole purpose of this guide is to provide basic information on the PDF conversion process bearing in mind that additional detailed technical information is available from the various software manufacturers.

#### EI.3 PRINTER DRIVERS

- .1 Adobe Acrobat provides two different printer drivers that are able to convert CADD drawing into PDF format, Acrobat PDF Writer and Acrobat Distiller.
- .2 Before creating a PDF file from a CADD drawing, a choice must be made as to which one will be used.
- .3 Acrobat PDF Writer is a non-PostScript printer driver that works best with documents that don't contain complex graphics.
- .4 Acrobat Distiller is a PostScript printer driver that works best with documents that contain PostScript fills, Encapsulated PostScript (EPS) graphics, or other complex elements.
- .5 It is recommended that Acrobat Distiller be used to create PDF file of architectural and engineering drawings due to their size and complex graphical nature.



#### **EI.4 PRINTER CONFIGURATION**

- .1 Before converting a CADD drawing to PDF, an Acrobat printer configuration file for the PDF paper size needs to be created.
- .2 This function can be done in the CADD software rather than using a custom paper size defined for the Acrobat distiller feature.
- .3 The recommended method is to add a PostScript Adobe plotter in the CADD software and making the necessary setting in terms of media source and size, scale and orientation.
- .4 The configuration can then be re-used to simplify the conversion process for future files that use the same page size.
- .5 As an alternative, although not recommended, a custom-defined size can be created in Acrobat Distiller in the *properties* menu.

#### **EI.5 CREATING PDF FILES**

- .1 Once the printer configuration has been done in the CADD software, open Acrobat Distiller and make the necessary settings in the *preferences* and *job options* sub-menu.
  - .1 Ensure that the page size match the sheet size selected in the CADD software to create the file.
  - .2 Particular settings can be saved under different names for future use.
- .2 With the Acrobat Distiller application open, ensure the required sheet size is displayed in the job options window. Then it is simply a matter of bringing the CADD file into the Acrobat Distiller creation box.
- .3 A progress bar will show during the conversion and the newly converted PDF file should open up and be displayed for verification.

#### **EI.6 PDF FILES SETTINGS**

- .1 Security
  - .1 Adobe Acrobat contains security features that can be used to secure the files by restricting any changes to the files.
  - .2 Since the files will be posted on MERX and will be used for printing copies, the files must not be password protected and must allow printing.

#### **EI.7 DRAWING ORIENTATION**

- .1 The final PDF drawing files must be displayed on the screen in the same direction that the users are intended to view them. This can be achieved by adjusting the setup of the plotter. If the drawing is not oriented properly after the conversion, it can be rotated manually within Adobe Acrobat.

#### **EI.8 FONT TYPE**

- .1 In order to avoid any problems during the conversion and to minimize the potential for font display errors, the fonts used for the production of construction drawings must be PostScript or True Type fonts.

#### **EI.9 RESOLUTION**

- .1 Since the PDF files will be used for printing, it is important that a proper resolution be selected. It is recommended to select 600 dots per inch (dpi).

#### **EI.10 SCALE**

- .1 When choosing the Plot scale in Adobe, it is important to choose the 1:1 scale to ensure the integrity of the scale from which the drawings were created in the CADD software.

#### **EI.11 SCANNING**



- .1 Scanning is not recommended and should be done only when the drawing is not available electronically.
- .2 When scanning a drawing, it is important that it be done in real size (scale 1:1) to ensure that the scale remains intact in subsequent printing.
- .3 It is recommended that each scanned drawing be opened and verified to ensure that the resolution, scale and border are of an acceptable quality.

#### **EI.12 FINAL CHECKLIST**

- .1 When the drawing file has gone through the PDF conversion, it is recommended to open it and verify the following:
  - .1 That the sheet size displayed is what was intended to be created (the size is viewable in the lower left corner of the drawing);
  - .2 That the orientation of the sheet is correct;
  - .3 That the line types, line weights and fonts match the CADD drawing.
  - .4 That the PDF file is in black and white;
  - .5 That each drawing is a single PDF file;
  - .6 That the PDF file is not password protected and printable.
- .2 If all the items are verified, the PDF file is useable.

#### **EI.13 ADDITIONAL INFORMATION**

- .1 For more information about the creation of PostScript and EPS files please refer to the User's Guide of the CADD software being used to produce the drawings. For more information about creating PDF file please refer to the Acrobat Distiller User's Guide and/or visit the Adobe Web site at [www.adobe.com](http://www.adobe.com).



## APPENDIX F DEFINITIONS

### F.1 TERMINOLOGY

TERMS	DESCRIPTION
As-builts/Record Drawings	See Record Drawings
Base Building	Refers to the building shell, as opposed to the tenant fit-up. It includes finished floors, exterior walls, interior core, finished ceilings with lighting, and other building systems for the planned general use of the building. Generally, the work for the base building is separate from the work for tenant-fit-ups
Circulation	Space used, primarily by people, to move from one area to another. It includes major as well as secondary aisles.
Client	A term that refers to the client, the client department or user department
Co-location	Placing items together for better organization
Consultant	The word refers both to an individual consultant, or a consultant team. The consultant is generally selected by PWGSC using a Request for Proposal.
Contractor	The company, organization or firm who is responsible for the construction of the project
Consolidation	Reducing the number of co-located items by placing them in a common floor facility to eliminate duplication of space.
Constant dollar estimate	This is an estimate expressed in terms of the dollars of a particular base fiscal year.
Cost Specialist	Refers to the cost estimating, planning and control team or an individual performing these functions.
Current dollar estimate	Refer to: <i>budget year dollars</i>
Budget-year dollars	This is an estimate based on costs arising in each FY of the project schedule, which is escalated to account for inflation and other economic factors affecting the period covered by the estimate <b>Budget year</b> dollars is also be referred to as <b>Nominal</b> dollars or <b>Current</b> dollars
Departmental Representative	The person designated in the contract, or by written notice to the Consultant or Contractor, to act for PWGSC for the purposes of the contract. It can also be a person designated in writing by the Departmental Representative to act on his/her behalf. In most cases, the PWGSC Project Manager is the Departmental Representative
EMV	Expected monetary value of risk event (i.e. cost or saving to the project if risk event occurs)



Final Certificate of Completion	A document issued by the Project Manager after the final inspection by the Project Acceptance Board. The final payment to the Contractor by PWGSC is based on the final certificate of completion
Final Inspection	The inspection performed by the Project Acceptance Board after project completion and after correction of deficiencies identified during Interim Inspection
Fit-up for initial occupancy	The preparation of accommodation for initial occupancy, in accordance with the federal Fit-up Standards. This fit-up may include alternations to the base building and its building systems.
Fit-up of existing space for reuse, Refit	Work required to alter space previously occupied by one organization to meet the requirements of a different organization.
Fit-Up Cost Limits	The funding limits for the fit-up of office accommodation. The limits are based on the average cost per useable square meter, for fit-up elements in specific urban centres across Canada, and are updated from time to time. The limits do not include soft costs or items funded by clients or under base building costs.
Fit-Up Items	Components that are installed removed or relocated to prepare the space for occupancy. They include partition walls, doors, frames, hardware, counters and cabinetry, modifications to base building systems, etc. as detailed in the Fit-up standards. Some base building components are included in consultant scope of work, such as the flooring and the ceiling finishes or telecommunications spaces and related environmental controls.
Focus Group	Group sessions held to establish qualitative requirements. They are most effective at the strategic planning level. They are used primarily to translate the Client Department's mission statement into organizational requirements and to assess planning alternatives
Full-time equivalent.	It measures of labour utilization in the federal government which approximates the actual number of persons "employed" by the government for carrying out the unit of work
Functional space equation	Identifies space requirements (in usable m2) by group along with summary of the total space required for all groups.
Gross Space	The total floor space
High risk	A project (or element of a project) may be assessed as high risk if one or more hazards exist in a significant way and, unless mitigated, would result in probable failure to achieve project objectives
Impact	The result of the occurrence of an event on the project either positive or negative (i.e. a schedule delay as a result of late delivery of a piece of equipment may have a high negative impact on a project; increased access to a construction site due to early departure of occupants in an office space may have positive



	<p>impact on a project).</p> <p>The Impact of individual Risk Events can be qualified as low, medium, high or quantified in terms of time, cost (immediate cost or in-service cost (O&amp;M)) or performance.</p>
Interim Certificate of Completion	The certificates issued by Project manager following the Interim Inspection. Interim payment to the Contractor by PWGSC is based on the interim certificates. This payment takes place of a regular progress claim.
Interim Inspection	The inspection performed by the Project Acceptance Board after substantial completion of the project. A list of deficiencies is prepared, and subject to the Contractor's agreement to correct these, the Project Manager accepts the work and prepares the interim certificates
LEED®	Leadership in Energy & Environmental Design; an environmental rating system
Low risk	A project (or element of a project) should be assessed as low risk if hazards do not exist or have been reduced to the point where routine project management control should be capable of preventing any negative effect on the attainment of project objectives
Medium risk	A project (or element of a project) may be assessed as medium risk if some hazards exist but have been mitigated to the point that allocated resources and focused risk management planning should prevent significant negative effect on the attainment of project objectives
National Project Management System	The system used by PWGSC for management of its projects. It replaces the earlier Project Delivery System (PDS).
PI Forms	Product Information forms; used in commissioning documentation
Probability	The likelihood that an event will occur (i.e. Low, Medium, High)
Project Acceptance Board	A team assembled by the Project Manager to perform interim and final inspections of the Client Department's improvements.
PV Forms	Performance Verification forms; used in commissioning documentation
Record drawings	Drawings used to record field deviations, dimensional data, and changes or deviations from the 'Construction Document-Issued for Construction'. They indicate the work as 'actually' installed. They are also called as-builts
Rentable Space	Usable space plus space occupied by columns, convectors, elevator lobbies and washrooms. It also includes some common base building areas such as telephone and janitorial closets.
Request for Proposal	The document used for requesting consultant services. It includes the Terms of Reference as well as other contracting documents



Risk management	The art and science of identifying, analysing, and responding to risk factors throughout the life of a project and in the best interests of its objectives
Risk Event	A discrete occurrence that may affect the project for better or worse (i.e. late delivery of a piece of equipment is a “risk event” that may cause a schedule delay)
Scheduler	Refers to the Time Scheduler; also referred to as Time Specialist
Space Equation	A spreadsheet that reflects the Client’s organizational structure, functional requirements, and proposed planning alternatives. It is used to determine the total usable area required to accommodate the following: Open and enclosed workstations/worksettings; Support space; Special purpose space circulation factor; Building loss factor; Total population; and Total space required; and Summary by group
Space Optimization	Maximizing the utilization of space.
Special Purpose Spaces	Non-standard spaces required to accommodate activities that are essential to departmental programs. This space is often not suitable for conversion to office accommodation because of its special requirements. Examples include: laboratories, health units or clinics, meeting or training complexes which serve outside groups, processing space, departmental libraries, gymnasiums, warehouses, file or storage areas not allowed by the PWGSC Fit-Up Standards, trade shops, mailrooms, computer training rooms, cash offices and similar spaces requiring special service and security features and hearing rooms.
Support Space	Space for typical office support functions not included in workstation or circulation space but necessary for office operation. The Fit-Up Standards identify specific sizes and ratios for kitchenette / recycling centre / lunchroom / resource areas, shared equipment spaces, meeting rooms, quiet / touch down rooms, printer stations, reception / mail drop / waiting / display areas and coat / storage closets. Limited allowances for “Other” support spaces including non-dedicated workstations, storage rooms, LAN rooms, breakout rooms, interview rooms, training rooms, reading rooms etc. are also identified in the Fit-Up Standards.
Terms of Reference	A document prepared by PWGSC when requesting Consultant services, which forms part of the RFP and is also included in the Consultant Agreement with PWGSC.
Universal Footprint	One standard module which can be multiplied to accommodate



	all office functions including workstations, support space and special purpose space
Usable space, “Walk-on” Space	The space, in M <sup>2</sup> , that is actually usable by the occupant. Measurement calculations do not include columns and convectors, building service areas and accessory areas.
Worksettings	Common work areas that support both collaboration and privacy. They include: teaming areas, non-dedicated workstations, privacy nooks, resource areas and multipurpose areas.
Workstations	An enclosed or open area dedicated for the use of individual employees.

## F.2 ACRONYMS

ACRONYM	DESCRIPTION
A&E	Architecture & Engineering
AHJ	Authorities Having Jurisdiction
AMP	Asset Management Report
ASAE	American Society of Agricultural Engineers
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASPE	American Society of Plumbing Engineers
BCC	Building components and connectivity
BCR	Building Condition Report
BMM	Building Maintenance Manual
CAD	Computer aided drawing
CCDC	Canadian Construction Document Committee
CBIP	Commercial building incentive program
COE	PWGSC Centre of Expertise
EMCS	Energy Monitoring & Control System
EPA	Effective Project Approval
FHBRO	Federal Heritage Building Restoration Office
FOBS	Federal Office Building Standards (PWGSC)
FTE	Full-time equivalent
HCP	Heritage Conservation Program
HRSDC	Human Resources and Skills Development Canada
IT/MM	Information Technology/Multi-media
MMS	Maintenance management system
NBC	National Building Code
NCA	National Capital Area;
NCR	National Capital Region;
NFBC	National Farm Building Code
NGMA	National Greenhouse Manufacturers' Association
NMS	The National Master Specification used by PWGSC



NPMS	National Project Management System
OAA	Ontario Association of Architects
O&M	Operation and Maintenance
P&S	General Procedures and Standards
PA	Project administration
PI	Product Information
PD	Project Description
PM	Project Manager
PV	Performance verification
PWGSC	Public Works and Government Services Canada
RAIC	Royal Architectural Institute of Canada
RAS	Requirements and Standards
RS	Required Services
RSR	Resident site services
RPCD	Real Property Contracting Directorate
TOR	Terms of Reference