



Design-Builder Services

TERMS OF REFERENCE



Services
CFIA

GENERAL SERVICES BUILDING SLAB REHABILITATION PROJECT

CANADIAN FOOD INSPECTION AGENCY

CFIA Laboratory
LETHBRIDGE, ALBERTA

Public Works and Government Services Canada

Sep 2016





Table of Contents

| | | |
|----------|--|-----------|
| 1 | PROJECT DESCRIPTION | 3 |
| 1.1 | Terms of Reference | 3 |
| 1.2 | General Information..... | 3 |
| 1.3 | Background Information | 4 |
| 1.4 | Project Delivery Approach | 6 |
| 1.5 | Summary Of Services..... | 7 |
| 1.6 | Summary of Work | 8 |
| 1.7 | Objectives..... | 11 |
| 1.8 | Schedule..... | 12 |
| 1.9 | Existing Documentation | 13 |
| 1.10 | Codes, Acts, Standards, Regulations | 13 |
| 2 | PROJECT ADMINISTRATION | 15 |
| 2.1 | General | 15 |
| 2.2 | Roles and Responsibilities | 15 |
| 2.3 | Communications and Meetings | 16 |
| 2.4 | Deliverables..... | 19 |
| 2.5 | Review and Acceptance | 21 |
| 3 | GENERAL PERFORMANCE REQUIREMENTS | 23 |
| 3.1 | Performance Requirements | 23 |
| 3.2 | Site Requirements | 24 |
| 3.3 | Structural Requirements | 26 |
| 3.4 | Architectural Requirements..... | 29 |
| 3.5 | Mechanical Requirements..... | 31 |
| 3.6 | Electrical Requirements | 32 |
| 4 | APPENDIX 1 – DIVISION 1 SPECIFICATIONS | 37 |
| 5 | APPENDIX 2 – GENERAL PROCEDURES AND STANDARDS | 38 |
| 6 | APPENDIX 3 – SITE PHOTOGRAPHS | 39 |
| 7 | APPENDIX 4 – EXISTING DOCUMENTS | 40 |



1 PROJECT DESCRIPTION

1.1 TERMS OF REFERENCE

1.1.1 PURPOSE

- .1 These Terms of Reference (TOR) have been developed to ensure that the Design Builder has a clear understanding of the project scope, procedures and performance requirements, in order to deliver the completed project within the agreed to budget and schedule.

1.1.2 RELATED DOCUMENTS

- .1 This TOR document must be read, used and applied in conjunction with the terms and conditions of the contract, Division 01 of the specifications and the PWGSC General Procedures and Standards (GP&S 2011) Document (see Appendix 1 and 2), as all these documents are complementary.
- .2 The TOR describes project-specific requirements, performance requirements, services and deliverables while the GP&S document outlines minimum standards and procedures common to all PWGSC projects.
- .3 In the event of a conflict between any of these documents, the contents of a higher precedence document shall govern and override a lower precedence document.
- .4 Notwithstanding GC1.2.2, 'Order of Precedence' the order of precedence of these specific related document is as follows:
 - .1 The TOR,
 - .2 Division 01 of the specifications, and
 - .3 The PWGSC GP&S Document

1.2 GENERAL INFORMATION

1.2.1 PROJECT INFORMATION

| Project Information | |
|-----------------------|---|
| Project Title: | General Services Building Slab Rehabilitation Project |
| Site Location: | CFIA Laboratory |
| Project Address: | Lethbridge, Alberta |
| PWGSC Project Number: | R.082260.001 |
| User Department: | Canadian Food Inspection Agency (CFIA) |

1.2.2 DEPARTMENTAL REPRESENTATIVES

| Department | Departmental Representative |
|-----------------------------------|-----------------------------|
| CFIA Project Leader | TBD |
| PWGSC Departmental Representative | TBD |
| PWGSC Contracting Officer | Sylvia Mayhew |

1.2.3 USER DEPARTMENTS

- .1 The User Department referred to throughout the TOR is Canadian Food Inspection Agency (CFIA)

1.2.4 CFIA VISION

- .1 To excel as a science-based regulator, trusted and respected by Canadians and the international community.



1.2.5 CFIA MANDATE

- .1 Dedicated to safeguarding food, animals and plants, which enhances the health and well-being of Canada's people, environment and economy.

1.3 BACKGROUND INFORMATION

1.3.1 BACKGROUND

- .1 The Canadian Food Inspection Agency (CFIA) was created in 1997 as a Special Operating Agency of the Department of Agriculture and Agri-Food and is Canada's largest science based regulatory agency with almost 6,500 employees.
- .2 CFIA delivers its programs according to its mandate under the *Canadian Food Inspection Agency Act*.
- .3 CFIA is responsible for the delivery of all federally mandated programs for food inspection, plant and animal health products and production systems, and consumer protection as it relates to food.
- .4 The CFIA's mandate is vast and complex, with responsibilities flowing from 13 federal statutes and 42 sets of regulations.
- .5 CFIA is organized into four operational areas (Atlantic, Quebec, Ontario and Western) that are subdivided into 18 regional offices, 185 field offices (including border points of entry) and 408 offices in non-government establishments, such as processing facilities.
- .6 The Agency also has 15 laboratories and research facilities that provide scientific advice, develop new technologies, provide testing services and conduct research.

1.3.2 BUILDING HISTORY

- .1 Main Laboratory
 - .1 The main laboratory was designed by Cohos Evamy as an animal disease research institute and officially opened in 1988, and is located 13 kilometres west of Lethbridge, Alberta on the banks of the Oldman River.
 - .2 A 1,320 m² addition for large animal studies, designed by Public Works and Government Services Canada (PWGSC) was completed in 1992.
 - .3 The Lethbridge Laboratory has been on its present site since 1905, the same year that Alberta became a province, and is the original veterinary research laboratory in Western Canada.
 - .4 The facility's principal role today is in delivering animal and health diagnostic services and research.
 - .5 The main laboratory began settling due to failures of concrete piles brought on by increased levels of ground water around piles, brought on by flooding from the adjacent river. Natural foundation material has been described as "shrinking soils".
 - .6 Main laboratory building's foundation integrity was reinstated through a series of staged repairs.
 - .7 Existing piles were effectively replaced by a network of new piles, constructed in a below grade interstitial space that was expanded to facilitate the underpinning construction program.
 - .8 Jacking steel pipe piles down to founding on bedrock by welding new pipe in sections, using each building pile cap as a counter thrust for the pipe pile jacking operation. New pipe piles were filled with concrete, and new concrete pile caps constructed between existing building pile cap and new pipe piles.
- .2 General Services Building
 - .1 An independently structured General Services Building of 1,406 m² was also designed by PWGSC and completed in 1996.
 - .2 The General Services Building is a two storey structure that houses offices, archives, auxiliary shops for carpentry, welding, farm equipment, wash bay, fire truck and a paint booth.
 - .3 The building provides support services for farm operations, grounds and fleet vehicle maintenance.
 - .4 The building superstructure is a pre-engineered steel frame supported by grade beams and steel piles, which are founded on bedrock.



- .5 The building has a slab on grade throughout which has suffered severe differential settlement. In 2006, voids in excess of 225 mm were found in several locations, with the worst being in the south garage bay, grid 1-2.
 - .6 By 2010, the main electrical service into the building had experienced considerable strain due to differential movement between the slab where the main line enters the building and the sub-panels resulting in a serious potential safety hazard. At the same time, ongoing differential settlement in the floor areas between grids 7 and 12 resulted in gaps of 100 mm or more appearing horizontally within fire separations, resulting in a violation of National Fire Code requirements.
 - .7 Due to the potential health and safety risks, the building was closed in the fall of 2010.
 - .8 In 2012, remedial work was completed between grid lines 7 to 12 to temporarily stabilize the slab settlements in the office area and to prevent damage to the below grade services. Remedial work included excavating a crawl space and underpinning critical areas of the slab-on-grade, and replacement of the existing below grade piping and electrical.
 - .9 Since the repairs were completed, the building has been reopened for partial use and on-going slab settlements in the office areas have been remediated by adjusting the underpinning 2012 shoring posts.
 - .10 An in-slab radiant heating system between grids 3 and 6, which is glycol charged, has not leaked to date. However, it should be noted that in slab heating lines are under severe stress. Any additional differential settlement of the slab into the area where the in-slab heating lines are located could cause a glycol leakage, resulting in soil contamination of the area.
- .3 General Services Building Condition Report
- .1 An investigation titled "General Services Building – Investigation of slab settlement problem and suggested remediation plan" was commissioned by CFIA and undertaken by Rennerberg-Walker Engineering in a letter report dated March 31, 2010 and is attached in Appendix 4.
 - .1 A "DATA SUMMARY SHEET" forms part of this report, and describes the building's structure, exterior shell and floor construction.
 - .2 Ground floor elevations and settlement contours are described.
 - .3 Building As-built pile locations are included.
 - .4 Seismic evaluation of existing structure is described in a separate letter to CFIA from Rennerberg-Walker Engineering.
 - .2 General Services Building Room numbers are provided, listing room name and function of each room on ground and second floors of the building.
- .4 General Services Building Photographs
- .1 Photographs of existing conditions in General Services Building are provided.

1.3.3 SUGGESTED REMEDIATION PLAN

- .1 Replacement of existing slab on grade between building grid lines 1 through 6 with a new structural slab supported by deep foundation system to bedrock. (For gridlines, see 1995 ADRI drawings in Appendix 4).
- .2 Remediation of existing slab on grade between grids 7 through 12 from below by using an underpinning methodology to convert existing slab on grade to a structurally supported slab. Slab to be restored to original top of floor elevation.
- .3 All work, including any damages made to the existing building and pre-existing building slab or structural issues, related to the design and construction of the slab on grade is to be included in the scope of work of this Design/Builder terms of reference.



1.3.4 CONSTRAINTS AND CHALLENGES

- .1 Funding
 - .1 Funding for this project has been approved for Fiscal 2016/2017 and Fiscal 2017/2018.
- .2 Completion Date
 - .1 General Services Building is returned to CFIA for use by October 2017.
- .3 General (Consider working on ½ of building at a time to allow CFIA use of other half.)
 - .1 There is no requirement to maintain existing CFIA operations during construction.
 - .2 All CFIA personnel and equipment, including the fire truck have vacated the building.
 - .3 Use of the General Services Building overhead crane will not be permitted for any construction activities.
- .4 Architectural and Building Code Compliance

New crawl space between grid lines 7 through 12 must be designed and constructed to meet current standards and building codes.
- .5 Demolition

Ground floor slab on grade between grids 1 through 6 is to be selectively removed without damaging existing walls / overhead doors / doors / overhead mechanical and electrical equipment.
- .6 Mechanical
 - .1 Below grade drainage and water supply may be disconnected by construction activities, but are to be re-instated in their entirety at construction completion.
 - .2 Existing mechanical room equipment is to remain in place.
 - .3 In floor glycol heating system is to be replaced in its entirety to meet the heating capacity of the original system.
- .7 Electrical

Below grade electrical power cable is to remain in place without disturbance.
- .8 Commissioning

Coordinating and developing an integrated Commissioning Plan to confirm that all existing building systems function as originally designed.

1.4 PROJECT DELIVERY APPROACH

1.4.1 TURNKEY APPROACH

- .1 Canadian Food Inspection Agency is proposing to use a turnkey approach to construct the General Services Building Slab Rehabilitation Project, which is to be completed as per the schedule.
 - .1 The approach is essentially a Design-Build approach wherein the expertise lies with the specialized structural underpinning contractor.
 - .1 Design Builder's Independent Commissioning Agent consistent with the expertise of the structural industry shall commission the structural, mechanical and electrical components of this project.
 - .2 Design Builder's Independent Commissioning Agent shall commission architectural, mechanical and electrical components of this project.
 - .2 The design build contractor will be fully responsible for architecture, engineering, construction and satisfactory completion of a fully functioning facility.
 - .3 Under this single source, responsibility will be fixed, maximum cost control will be achieved, and immediate responsiveness from the suppliers will be attained.

1.4.2 DESIGN PHASE

- .1 This project will use a Design-Build approach to deliver the project.
- .2 The primary reason for this approach is to employ an experienced design-builder with expert-level understanding of foundation, underpinning, and settlement mitigation methods specific to the site's collapsible soil conditions in order to: (1) stop the ongoing settlements, (2) convert the current temporary under-slab timber support to a permanent underpinning



solution, (3) save overall project engineering and construction duration, and (4) meet the time frames set out by CFIA.

- .3 The Design Builder will be retained by PWGSC and report directly to the PWGSC Departmental Representative.
- .4 Design Services, including structural, architectural, electrical and mechanical services, will be engaged directly by the Design Builder, who will direct and co-ordinate all the design related work.
- .5 Design Builder's responsibilities will include developing a cohesive functional partnership and open communication between all members of the project delivery team and stakeholders throughout all phases of the project life.

1.4.3 CONSTRUCTION PHASE

- .1 The Design Builder will deliver the project, utilizing industry best practices in conformance with PWGSC standards, respecting the approved scope, quality, budget and schedule.
- .2 The Design Builder will construct the slab rehabilitation project using modern and latest tools and techniques, as well as integrated phased construction methodologies in order to meet project objectives.

1.5 SUMMARY OF SERVICES

1.5.1 CONTEXT

- .1 Include in the Work, required design and construction to replace General Services Building's existing ground floor slab on grade between grids 1 – 6 with new structural slab, including integrated pile foundations down to supporting bedrock; and to underpin General Services Building's existing ground floor slab on grade between grids 7 – 12 with a new structural support system that eliminates existing settlement by underpinning and raising existing slab to originally designed top of floor elevation and provides a consistent structural support that is constructed from underside of existing slab on grade down to supporting bedrock.
- .2 Include in the Work, required demolition and/or deconstruction and retrofit of existing building and site elements as may be required.
- .3 The services of a Design Builder are required for the provision of Design Services and the completion of Design Builder's Work for this Project.
- .4 The Design Builder will report directly to the PWGSC Departmental Representative during the design and construction phases of the project.

1.5.2 DESIGN SERVICES

- .1 The Design Builder, being responsible for the design provides and manages the professional engineering and architectural design services necessary to complete the design of the project in compliance with the requirements in the RFP and all applicable codes, standards and regulations.
 - .1 All professional services shall be conducted by those licensed to practice in the Province of Alberta.
 - .2 Professional consulting services for this project may include the following:
 - .1 Architectural
 - .2 Structural Engineering
 - .3 Mechanical Engineering
 - .4 Electrical Engineering
 - .5 Civil Engineering
 - .6 Geotechnical Engineering
 - .3 Consultants providing professional services are to provide signed and sealed documents and all necessary schedules in a format required by the authorities having jurisdiction including the city of Lethbridge, Alberta.



1.5.3 CONSTRUCTION SERVICES

- .1 The Design Builder manages and delivers the completed Construction associated with the Work for the Project in accordance with the duties outlined in the terms and conditions of the contract and the requirements in the RFP.
- .2 As part of the Work, the Design Builder is also responsible for the implementation of Division 01 contained in Appendix 1

1.5.4 COMMISSIONING SERVICES

Provide Commissioning Service on the basis of CSA Z320-11, Canadian Standards Association Building Commissioning Standard.

1. The Design Builder must commission the following systems after the completion of construction:
 - In-floor radiant heating in the garage area.
 - All interior or exterior electrical, mechanical, plumbing, piping, or utilities services that are added or re-connected (after any service line disconnection performed prior to the structural construction).
2. The Design Builder must ensure the building interiors and services are restored to original conditions and ready for occupancy

1.6 SUMMARY OF WORK

1.6.1 GENERAL

- .1 Performance requirements, where appropriate, state soft metric conversions to accommodate the structural underpinning manufacturing industry's use of imperial units.

1.6.2 CODE ANALYSIS

- .1 For any significant building change such as addition of a crawl space, a Building Code analysis is required. Ensure the following:
 - .1 Review and approval by CFIA;
 - .2 Conformance to 2014 Alberta Building Code and 2015 NBC and NFC;
 - .3 Review by the Federal Fire Prevention Engineer.



1.6.3 NEW GENERAL SERVICES BUILDING CONSTRUCTION WORK

- .1 Between grid lines 1 through 6:
 - .1 A new ground floor structural slab, including integrated structural pile system down to bedrock.
 - .2 Specified uniform design load on floors is 12 kPa. Specified concentrated live load on floors is 54 kN over 250x600mm area. Worst case of uniform or concentrated loads will be used for design.
 - .3 Concrete apron outside the slabs and service bays must also be rehabilitated or replaced/reconstructed to match the new grade of the reconstructed slab
 - .4 Final grading is required to ensure: [1] the surrounding landscape, sidewalk, asphalt, and graveled area are rehabilitated and re-leveled to the new final grade elevation matching the gradient of the reconstructed concrete apron and the building slab to create positive drainage away from the building; and [2] bollards are re-installed accordingly to suit the abovementioned grading work
 - .5 A new mechanical sub-floor drainage system to support existing building functions between grids 1 through 6. Mechanical drainage system is to be supported from above by structural floor slab.
 - .6 A new in-floor glycol heating system to support existing building functions between grids 1 through 6; new piping from grids 1 to 6 and new brass valves are required however the existing heating pump and boiler can be reused.
- .2 Between grid lines 7 through 12:
 - .1 A new structural support system to replace the existing temporary underpinning and to permanently support existing ground floor slab on grade.
 - .2 Specified uniform live load is 4.8 kPa. Specified concentrated live load is 9 kN over 750x750mm area. Worst case of uniform or concentrated loads will be used for design.
 - .3 Specified dead loads to include self weight of structure, partitions, architectural finishes, all mechanical and electrical and other components including housekeeping pads.
 - .4 If a below grade space is created to facilitate the design / builders construction of new structural support system between grids 7 through 12, it shall include permanent access for below grade mechanical and electrical systems. All exits, stairs and access to exits shall conform to National Building and Fire Codes and be reviewed by the Federal Fire Prevention Engineer. Upgrade existing access ramp, retaining walls and doors if necessary.
 - .5 The existing shed will be relocated and removed from site. The excavated space must be filled and compacted with approved fill materials. The existing temporary ramp access must be converted to a permanent access as described in point 4 above.
 - .6 An external secured access is required for this new permanent access via stairs and/or ramps; this may require the construction of (1) retaining walls to the subsurface and crawl space level, (2) added canopy, walls and roofing external to the building, (3) concrete access tunnel or pathway, (4) lighting for the crawl space, and/or (5) the combination of any items above. If the permanent access will become an adjoining component of the building and the access will require modification to the building envelope, any architectural and structural elements, or the existing building system, the design must be in compliance with the applicable codes and regulations.
 - .7 Concrete apron outside the slabs and service bays must also be rehabilitated or replaced/reconstructed to match the new grade of the reconstructed slab
 - .8 Final grading is required to ensure: [1] the surrounding landscape, sidewalk, asphalt, and graveled area are rehabilitated and re-leveled to the new final grade elevation matching the gradient of the reconstructed concrete apron and the building slab to create positive drainage away from the building; and [2] bollards are re-installed accordingly to suit the abovementioned grading work
- .3 Installation or reinstallation of all exterior walkways, mechanical pads, and exterior stair columns affected by the construction work;
- .4 Positive drainage for new slabs constructed in the garage area to proper drainage sump;
- .5 New construction and/or restoration of all above-slab items (including, but not limited to, utilities services, electrical wires, pipes, façade, walls, doors and windows, insulation, concrete apron, asphalt, stairs, wall partition, paints and tiles) as part of the building interior or exterior, subsequent to the slab construction or foundation underpinning;



- .6 Restoration of the GSB building interior (including walls, ceilings, floors, insulation, building envelope, HVAC, plumbing, control systems, hardware, and utilities) that may be temporarily disconnected, displaced, or affected by the construction work;
- .7 Provision of all engineering and architectural services required before, during, and after construction in order to reinstate and improve the interior conditions of GSB after the construction activities associated with underpinning and structural support are completed. This also includes, but not limited to, acquiring required permits, completion of schedules A, B, and C, provision of contract administration, warranty certificate, statement of assurance, post-construction building inspection, and technical rehabilitation and maintenance services to ensure the building is water-tight and free of cracks, and the GSB in a good condition ready for CFIA occupancy and staff to resume normal operation



1.7 OBJECTIVES

1.7.1 GENERAL GOALS

- .1 Deliver the completed Slab Rehabilitation Project to the satisfaction of CFIA and PWGSC, while applying rigorous schedule, budget, quality, and scope controls throughout the design, construction, and post-construction phases of the Project.
- .2 Comply with all sustainable development requirements (waste management, environmental responsibility, etc.).

1.7.2 BUILDING PERFORMANCE

- .1 Construct the Work in a manner that will:
 - .1 Enable long-term efficient and cost effective life cycle performance, and
 - .2 Effectively and appropriately serve PWGSC for an expected minimum life of fifty (50) years.
- .2 The Design Builder will provide a final design that will ensure that the new structural slab and underpinned slab will:
 - .1 Provide continuous structural support for design loading with minimum deflections to levels allowed by design codes.
 - .2 Embody contemporary sustainable principles and be implemented in an environmentally responsible manner,
 - .3 Provide a healthy and safe environment that meets or exceeds all codes for fire, health, and life safety, and fully supports optimum work productivity,
 - .4 Fully integrate and optimize the performance of components and systems,
 - .5 Be efficient and cost-effective over its 75-year investment life cycle,
 - .6 Use materials that are high quality, durable and constructed with the best workmanship possible,
 - .7 Incorporate building systems that can be accessed and easily repaired and / or replaced in the building life cycle as required.

1.7.3 QUALITY CONTROL AND ASSURANCE

- .1 Together with PWGSC, the Design Builder will apply rigorous quality assurance reviews during the design and construction phases, including participation in reviews of the building systems, components, construction tools and techniques of the proposed design.
- .2 The primary responsibility for construction quality control remains with the Design Builder.
- .3 The Design Builder will be responsible for ensuring that both the design and construction teams adhere to:
 - .1 Best industry practices and standards in both the development of the Construction Documents and following them during construction,
 - .2 Professional conduct in all phases of the project, employing best practices for budget, schedule, quality, and scope management.
- .4 The Design Builder's Team will work cooperatively to:
 - .1 Adopt good project delivery processes such as Risk Management and Value Engineering studies,
 - .2 Ensure that all Health, Safety, Security and Sustainable Development issues are properly adhered to, and
 - .3 Apply state-of-the-art cost and scheduling processes and techniques.



1.8 SCHEDULE

1.8.1 PROJECT COMPLETION

- .1 As time is of the essence, this Project is required to be complete and ready for operation by as per schedule.

1.8.2 KEY MILESTONE DATES

| ITEM | DELIVERABLES AND MILESTONES | ESTIMATED COMPLETION DATE |
|--------------------------------|---|---------------------------|
| PRE-CONSTRUCTION | | |
| 1.0 | Contract Award | Dec 2, 2016 |
| 1.1 | Contractor's Detailed Construction Schedule | Dec 9, 2016 |
| 1.2 | 66% Construction Drawings and Specifications including (also refer to section 2.4): | Jan 30, 2017 |
| | .1 Garage Area: Slab Demolition, Piling/Foundation, and New Slab Construction Drawings and Specifications -Issue for Review (IFR) | |
| | .2 Office Area: Crawl Space Expansion, Piling/ Foundation/ Underpinning, and New Exterior Entrance to the Crawl Space - Construction Drawings and Specifications - Issue for Review (IFR) | |
| | .3 Mechanical and Electrical Drawings and Specifications - Issue for Review (IFR) | |
| 1.3 | 99% Construction Drawings and Specifications | Feb 27, 2017 |
| 1.4 | Final Construction Drawings and Specifications | Mar 10, 2017 |
| 1.5 | Release of the Building Permit from the County of Lethbridge | Mar 24, 2017 |
| CONSTRUCTION (April-June 2017) | | |
| 2.0 | Construction Mobilization | Apr 3, 2017 |
| 2.1 | Slab on Grade Demolition, Grids 1 through 6 | Apr 7, 2017 |
| 2.2 | Piling (Substantial Completion) | Apr 14, 2017 |
| 2.3 | In-Slab Heating Piping and Structural Slab Construction (Substantial Completion) | Apr 28, 2017 |
| 3.0 | Commencement of Underpinning Construction in Crawl Space | Apr 14, 2017 |
| 3.1 | Hydraulic Pipe Jacking and Underpinning Construction (Substantial Completion) | May 31, 2017 |
| 3.2 | Installation of Permanent Access to Crawl Space | Jun 30, 2017 |
| 3.3 | Final Grading and Final Completion | Jun 30, 2017 |
| 3.4 | GSB Interior and Architectural Works | Jun 30, 2017 |
| POST-CONSTRUCTION | | |
| 4.0 | Final Commissioning. As-Builts and O&M Manual | Jul 14, 2017 |



Submission

| | | |
|-----|---|--------------|
| 4.1 | CFIA Move-in | Jul 17, 2017 |
| 4.2 | Contractor's Inspection of construction and settlement (one year after completion of construction) | Jul 14, 2018 |
| 4.3 | Project Closeout | Jul 18, 2018 |

1.9 EXISTING DOCUMENTATION

1.9.1 DOCUMENTS AVAILABLE FOR ALL PROPONENTS

- .1 The following list of reports and design documents associated with the design and construction of existing General Services Building are provided in Appendix 4.
 - .1 "Seismic Site Classification, Main Laboratory Building, Animal Disease Research Institute", Lethbridge, Alberta, dated Mar 9, 2010, prepared by AMEC Earth and Environmental, Lethbridge, Alberta
 - .2 "Animal Diseases Research Institute, General Services Building", Lethbridge, Alberta - Architectural, Structural, Mechanical and Electrical Design drawings, dated December 22, 1995, prepared by Architectural & Engineering Services, Western Region, PWGSC
 - .3 "General Services Building, CFIA Lethbridge Laboratory - Investigation of Slab Settlement Problem and Suggested Remediation Plan", Lethbridge, Alberta, dated March 31, 2010, prepared by Renneberg Walker Engineering Associates Ltd.
 - .4 "General Services Building, Ground Level Floor Plan, prepared by CFIA
 - .5 "As-builts for the Lethbridge ADRI – Foundation Plans and Drawings", Lethbridge, Alberta, dated March 12, 2013, prepared by W&R Foundation Specialists Ltd.

1.9.2 ACCESS TO DOCUMENTATION FOR PROPONENTS

- .1 All geotechnical, monitoring and design documents are available All documents are available in hard copy format only.

1.9.3 DOCUMENTS AVAILABLE FOR THE SUCCESSFUL PROPONENT (THE DESIGN BUILDER)

- .1 Copies of all pertinent documentation will be made available to the Design Builder.
- .2 Reference information will be available in the language in which it is written.
- .3 Limited as-built/record drawings and Operation & Maintenance Manuals will be available on the project site and the Design Builder will be responsible for verifying the accuracy of the information required for construction.

1.9.4 DISCLAIMER

- .1 The documentation may be unreliable and is offered, "as is" for the information of the Design Builder.

1.10 CODES, ACTS, STANDARDS, REGULATIONS

1.10.1 GENERAL

- .1 The Work shall, unless otherwise specified, be designed, constructed, and commissioned in a manner which:
 - .1 Is compliant with all applicable federal, provincial, territorial, municipal or regional laws, acts, regulations and codes.
 - .2 Provides for safe emergency evacuation of all of occupants.
- .2 Adherence to latest version of applicable codes and standards and without limiting the generality of the foregoing, shall include the following:
 - .1 The NRC National Building Code of Canada, 2015;
 - .2 The NRC National Fire Code of Canada, 2015;
 - .3 The NRC National Plumbing Code of Canada, 2015;



- .4 Alberta Building Code, 2014;
- .5 The Canada Labour Code,
- .6 Canada Occupational Health and Safety Regulations,
- .7 Canadian Drinking Water Standards,
- .8 American Society of Heating Refrigerating and Air Conditioning Engineers, (ASHRAE) Standards and Handbooks
- .9 CSA S478-95 Guideline on Durability in Buildings
- .10 CSA, ULC approval is required for all electrical and mechanical equipment.
- .11 Canadian Electrical Code ,
- .12 Atomic Energy Control Board Regulations
- .13 Canadian Code for Preferred Packaging,
- .14 National Electrical Manufacturers Association (NEMA)
- .15 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
- .16 Federal Fire Protection Standards,
http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/index.shtml
- .17 National Fire Protection Association (NFPA) standards,
- .18 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
- .19 American Society for Testing and Materials (ASTM)
- .20 American National Standards Institute (ANSI)

1.10.2 PWGSC DOCUMENTS

- .1 In addition to applicable legislated codes- and standards, the latest version of PWGSC documents listed below apply to this project:
 - .1 The National Project Management System (NPMS)
- .2 Commissioning Service on the basis of CSA Z320-11, Canadian Standards Association Building Commissioning Standard.
- .3 Storage of Dangerous Substances Design Guidelines



2 PROJECT ADMINISTRATION

2.1 GENERAL

2.1.1 PROJECT SITE OFFICE

- .1 (TBC) The Site Office for this project will be located in Lethbridge, Alberta.

2.1.2 SECURITY CLEARANCE AND SECURITY INFORMATION

- .1 The Design Builder shall:
 - .2 Be required to submit a project site security and backup procedures plan for all documentation related to this project, for review and acceptance by the Departmental Representative.
 - .3 Be expected to reasonably protect the documents in their care and the information to which they have access.
- .2 The Design Builder is responsible for maintaining appropriate security measures on site to ensure that equipment and various components are temporarily stored and protected against damage, theft and vandalism.

2.2 ROLES AND RESPONSIBILITIES

2.2.1 GENERAL

- .1 The responsibilities identified in this section are in addition to the requirements in the GP&S document.

2.2.2 DESIGN BUILDER

- .1 The Design Builder shall:
 - .1 Assign qualified staff or engage the services of Specialist Consultants licensed to practice in the Province of Alberta as required to provide the design services to meet the General Performance Requirements in Section 3.
 - .2 Complete the Work using the Design Builder's Own Forces and the Design Builder's contracted Sub-Trades.
 - .3 Provide all necessary personnel to perform the Services and duties for the Project, either by assignment of Design Builder qualified staff or by engagement of services contracted directly to the Design Builder.
 - .4 Engage and manage the Services and Work of qualified and experienced individuals or firms to provide the Services for which the Design Builder does not have qualified personnel on staff.
 - .5 Ensure continuity of key personnel and maintain a dedicated working team for the life of this project.
 - .6 Submit in writing, to the Departmental Representative for review and acceptance:
 - .1 The respective names, addresses and confirmation of qualifications of any and all individuals and/or firms engaged to provide Services for this Project.
 - .2 Proposed changes to the roles of any and all persons to be employed by the Design Builder or any and all firms to be contracted by the Design Builder to provide the Services and Work for the Project and shall include the names, addresses, qualifications and experience of the proposed individual(s) or firm(s).
 - .3 A statement of Payroll Costs, when fees are on a Payroll Cost basis, for all persons to be employed by the Design Builder to provide the Services and Work for the Project and any amendments thereof.

2.2.3 THE DESIGN BUILDER TEAM

- .1 The Design Builder's Key Personnel shall be located in Lethbridge, or in the immediate surrounding area, for the entire period of their involvement in the Project.
- .2 The Design Builder team shall:



- .1 Have an in-depth understanding and collective ‘buy-in’ of the project requirements, including scope, budget and scheduling objectives,
- .2 Work constructively to ensure a collaborative and cooperative team approach with knowledgeable and timely input and contribution by all project team members

2.2.4 PWGSC

- .1 PWGSC will:
 - .1 Manage the project through managing the contract with the Design Builder.
 - .2 Provide authorizations to the Design Builder for Change Orders and tendering packages

2.2.5 THE PWGSC TEAM

- .1 The PWGSC Project Manager is the Departmental Representative during the design and construction phase of the project, and
 - .1 Is responsible for conveying all resultant CFIA requirements to the Design Builder
 - .2 Is the liaison amongst and between the Design Builder, Public Works and Government Services Canada and the User Departments
- .2 PWGSC Professional & Technical Resources Teams:
 - .1 The Architectural & Engineering Resources Team will be represented by the following disciplines:
 - .1 Architectural,
 - .2 Engineering:
 - .1 Structural,
 - .2 Mechanical,
 - .3 Electrical,
 - .3 Geotechnical,
 - .4 Cost Planning Specialist,
 - .2 CFIA Team
- .3 The CFIA Project Leader/Manager:
 - .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 CFIA executive management, and
 - .3 Will play several critical roles for the successful implementation of the project, including coordinating the quality, timing and completeness of information and decisions required on issues related to the functional performance of the facility.
- .4 The CFIA Project Leader:
 - .1 Is the primary CFIA contact for all issues arising during the design and construction phases of the project that require input or decisions from the User’s perspective,
 - .2 Arranges for CFIA input and reviews during the design phase and comments on all proposed changes to the work.

2.3 COMMUNICATIONS AND MEETINGS

2.3.1 COMMUNICATION

- .1 Unless otherwise directed by the Departmental Representative, the Design Builder will conduct all project communication through the Departmental Representative only.
- .2 If any communication with the User Departments results in the need for any change to the Project’s scope of work, quality, cost or schedule, the Design Builder shall inform the Departmental Representative, and seek direction, before taking any action.
- .3 The Departmental Representative will arrange for the Design Builder to obtain access to PWGSC’s secured shared document management site (Buzzsaw).
- .4 Correspondence:



- .1 All correspondence from the Design Builder shall be distributed as directed by the Departmental Representative.
- .2 There shall be no correspondence between occupants or users of the facility and the Design Builder unless directed by the Departmental Representative.
- .3 All correspondence must carry the Contract name/number, PWGSC Project title, PWGSC Project number and File number and a date (i.e. Month/Day/Year).
- .4 Automatic date fields shall not be used except when preceded by the text "Printed on:".
- .5 The Design Builder shall:
 - .1 Develop a communication and correspondence protocol, submit it to the Departmental Representative for review and acceptance prior to implementation and incorporate it into the Project Procedures Manual.
 - .1 Account for the involvement of all Stakeholders in this protocol.
 - .2 Direct communication and correspondence between members of the PWGSC Project Team, Design Builder and the User Departments on routine matters as may be required to enable the project to proceed in a timely and efficient manner.
 - .1 However, no communication shall alter the terms of the project scope, budget or schedules unless directed in writing by the Departmental Representative.
 - .3 Provide agenda minimum 2 working days in advance of meetings.

2.3.2 MEETINGS DURING THE CONSTRUCTION DOCUMENT PHASE

- .1 Meetings with PWGSC, the Design Builder and CFIA will normally be held at the CFIA facilities in Lethbridge or by teleconference.
- .2 Design Builder will arrange meetings bi-weekly, or scheduled at a frequency acceptable to the Departmental Representative, through to the completion of the construction documents including the development of the Commissioning Plan for the project, with representatives from:
 - .1 PWGSC
 - .2 Design Builder team; and
 - .3 CFIA representatives
- .3 Design Builder will be responsible for:
 - .1 Preparing minutes of meetings during the design phases, and
 - .2 Forwarding minutes to the Departmental Representative and CFIA
 - .3 These meetings are for the accurate exchange of information.
 - .4 All requests and decisions taken must follow the formal lines of communications.

2.3.3 MEETINGS DURING THE CONSTRUCTION PHASES

- .1 Design Builder shall:
 - .1 Arrange and coordinate all construction meetings on site:
 - .1 Regular meetings to be held bi-weekly, or scheduled at a frequency acceptable to the Departmental Representative, through the duration of the project, with representatives from:
 - .1 PWGSC;
 - .2 Design-Builder team including consultants as required);



- .2 CFIA representatives.
- .3 Prepare and distribute minutes within two (2) working days of the meeting.
- .4 Endeavour to hold all meetings as Green Meetings (i.e. Electronic copies of documents where possible or double sided hard copies).
- .2 Establish a list of standing agenda items, including (as a minimum) the following standing agenda items:
 - .1 Schedule and progress,
 - .2 Cost issues and changes,
 - .3 Risk and quality issues,
 - .4 Quality,
 - .5 Scope of work,
 - .6 Site safety,
 - .7 Sustainable development, and
 - .8 Commissioning.

2.3.4 SUBMISSIONS TO PWGSC AND CFIA

- .1 Where submissions to PWGSC include summaries, reports, network diagrams, drawings, plans, specifications or finish schedules, submit two (2) original hard copies to the Client (CFIA), three (3) hard copies to Departmental Representative; and submit also in electronic format to Departmental Representative, unless otherwise directed in writing.
- .2 CFIA mailing addresses for the two hard copies, unless notified otherwise:
 - 59 Camelot Drive, First Floor, East, Room 211, Ottawa, Ontario K1A 0Y9 (one copy)
 - Twp Rd 9-1, Lethbridge AB. SW 7-9-22-W4 (Site Address – one copy)
- .3 PWGSC mailing addresses for the three hard copies, unless notified otherwise:
 - Suite 759, 220 - 4th Avenue SE, Calgary, Alberta, T2G 4X3 (two copies)
 - 219 - 800 Burrard Street, Vancouver, B.C. V6Z 0B9 (one copy)
- .4 Electronic format:
 - .1 The electronic deliverables shall be provided using Microsoft applications.
 - .2 Alternatively, the Design Builder may submit all work in Adobe Acrobat *.pdf format except for Network Diagrams which must be submitted in their original electronic format.

2.3.5 PROJECT RESPONSE TIME

- .1 It is a requirement of this project that the key personnel of the Design Builder are personally available to attend all meetings and respond to inquiries promptly.
- .2 During the project, the Design Builder's Key Personnel shall be:
 - .1 Available to attend meetings and respond to inquiries within one (1) working day's notice,
 - .2 Able to respond to emergencies within one (1) hour, including those occurring during off-hours and on weekends/ holidays
- .3 On occasion, there may be urgent, problem-solving meetings.
 - .1 The Design Builder must be available to attend such meetings in Lethbridge within four (4) business hours.



2.4 DELIVERABLES

2.4.1 KEY DELIVERABLES

Contractor must submit the following deliverables prior to the commencement of construction for review by PWGSC and CFIA:

- Letter of Assurance
- Warranty Statement
- 66% Construction Drawings and Specifications*
- 99% Construction Drawings and Specifications*
- 100% Construction Drawings and Specifications*
- Architectural Plans, Sections, and Details required for acquisition of Development Permit and Building Permit

*The key drawings in the construction drawing package include, but are not limited to the following:

- key plan or index plan
- site layout and laydown plan
- piling location plan
- mechanical and piping demolition drawings (for removal of the existing radiant heating pipes)
- process and piping diagram (for the new radiant heating pipes)
- mechanical drawings (for the new radiant heating pipes and the system integration with the existing radiant heating pump and boiler)
- demolition plans, sections, and details (for slabs in the service bays)
- structural slab plans, sections, and details
- new crawl space layout, plans, sections, and details
- demolition plans (for the removal of the existing timber support in the crawl space)
- hydraulic pipe jacking layout, sections, and details
- architectural plans and structural plans, sections, and details (for the external permanent tunnel access to the crawl space)
- electrical plans for lighting in the crawl space
- civil final grading and drainage plans, sections, and details (for sidewalk, asphalt, and concrete apron rehabilitation and replacement)

Contractor must submit the following deliverables during construction for review by PWGSC and CFIA:

- Weekly progress reports (also see section 2.4.4 below) including the inspection reports completed by independent third party consultants (e.g. for the verification of soil bearing capacity, pile inspection, and concrete material tests)
- Monthly reports (also see section 2.4.4 below)

Contractor must submit the following deliverables after completion of construction for review by PWGSC and CFIA:

- As-builts
- Operation and Maintenance Manual (for radiant heating system)
- Commissioning Documents



2.4.2 ACCEPTANCE OF PROJECT DELIVERABLES

- .1 While PWGSC acknowledges the Design Builder's obligations to meet project requirements, the project delivery process entitles PWGSC to review all work.
- .2 PWGSC (and CFIA via PWGSC) reserves the right to reject undesirable or unsatisfactory work.
- .3 The Design Builder must obtain Departmental Representative acceptance of all required deliverables for the Project.
 - .1 Acceptance indicates that, based on a general review of material for specific issues, the material is considered to comply with the performance requirements and that the overall project objectives appear to be satisfied.
 - .2 Acceptance does not relieve the Design Builder of responsibility for the work and compliance with the contract.
 - .3 Acceptance does not prohibit rejection of work, which is determined to be unsatisfactory at later stages of review.

2.4.3 PROJECT PROCEDURES MANUAL

- .1 The Design Builder shall develop a Project Procedures Manual in consultation with the Departmental Representative for the execution of key Project activities.
- .2 The Manual will provide a clear description of procedures, roles, responsibilities, levels of authority and the information systems for the execution of the Project, including details of the processes and sample formats.
- .3 The manual will include the process and methods to:
 - .1 Maintain all Project records including commissioning manual records – verification and test sheets,
 - .2 Implement a quality assurance program,
 - .3 Prepare, update, monitor and maintain the Master Schedule,
 - .4 Update, monitor and maintain the Cost Plan, Expenditures, Change Orders and Cash Flow,
 - .5 Manage communications between Project Delivery Team participants based upon the documented roles, responsibilities and authority of Team members, and maintain a listing of meetings, frequency, type, etc.,
 - .6 Manage correspondence, reports and performance records,
 - .7 Distribute correspondence electronically and by facsimile,
 - .8 Process Shop Drawings,
 - .9 Document the process for reviews and approvals of Tender Package Contracts and change orders, and
 - .10 Maintain a decision log during the construction of the entire project, recording participants, date and place of all decisions affecting schedule, budget, scope, or quality.

2.4.4 PROJECT MONITORING AND REPORTING

- .1 The Design Builder shall:
 - .1 Provide a system for documentation and project monitoring and reporting through each stage of project delivery, for review and acceptance by the Departmental Representative.
 - .2 Prepare and submit, at the start of the project, a sample of the report structure for all reports for review by the Departmental Representative.
 - .1 Resubmit, as may be required for approval and acceptance.
 - .2 The date of issue of the Design Builder Monthly Report will be established to fall on the same date each month and within one week before the established date of issue of the PM Monthly Report.
 - .3 The structure of the Design Builder Monthly Report shall be used for all subsequent project stages.
 - .3 Prepare and submit monthly progress reports during the Construction Document Stage, in a format agreed to with the Departmental Representative.



- .1 The purpose of the report will be to review and monitor the progress of the Services by the Design Builder. The report shall:
 - .1 Identify the progress of the work,
 - .2 Identify all expenditures to date (including all change orders) in a form that compares the original budgets for each trade with the expected costs,
 - .3 Identify all instances where the schedule is not being met,
 - .4 Outline remedial measures being taken, and
 - .5 Identify any anticipated or potential problems to be addressed.
- .4 Prepare and submit WEEKLY reports during construction to address status and variances with respect to schedule, budget, quality, and scope.

2.5 REVIEW AND ACCEPTANCE

2.5.1 FEDERAL GOVERNMENT

- .1 Except for reasonable design changes after contract award, the Design Builder shall consider the RFP design submission as having completed the Design Development stage, as defined in the General Procedures and Standards (GP&S) document after the Design Development presentation as per the Key Milestone Dates article.
- .2 Following the contract award the Design Builder, shall as part of the Construction Documentation Process, submit to the Departmental Representative for review 66% and 99% complete working drawings and specifications.
 - .1 Design Builder shall respond in writing to Departmental Representative's written review comments.
- .3 The PWGSC Departmental Representative, as well as the Federal Authorities identified below will review work in progress on a continuing basis.
- .4 The following are authorities having Federal Government jurisdiction over the project:
 - .1 Treasury Board of Canada:
 - .1 Project funding and contract approvals.
 - .2 Fire Prevention Co-ordinator / Fire Protection Engineer.
 - .2 Public Works and Government Services Canada
 - .1 Contracting authority and project delivery
- .5 The Design Builder shall:
 - .1 Provide a Submission Schedule to the FPE for the purpose of Review and Approval of Code, Health and Life safety issues,
 - .2 Submit to the FPE, in a format acceptable to the FPE, a Life Safety Report, as required,
 - .1 Allow time in the design schedule for FPE review period and incorporation of FPE comments, as necessary.
- .6 Provide shop drawings for all building material components, systems and integrated systems for Departmental Representative review.

2.5.2 PROVINCIAL, MUNICIPAL AND OTHER AUTHORITIES HAVING JURISDICTION

- .1 Although the Federal Government is not formally subject to jurisdictions at other levels of government, voluntary compliance with the requirement of these other Authorities is a requirement unless otherwise directed by the Departmental Representative.
 - .1 Codes, regulations, by-laws and decisions of authorities identified herein as having jurisdiction shall be observed.
 - .2 In areas of conflict between authorities, the Federal authority prevails.
 - .3 In areas of conflict between codes, standards and regulations, the most rigid requirements shall be adhered to.
 - .4 The Design Builder shall identify other jurisdictions appropriate to the project.
- .2 Provincial Acts, Regulations, Standards and Inspections:



- .1 The Federal government does not defer to provincial and municipal authorities, except for specific regulations, standards and inspections noted below.
- .2 Unless directed otherwise by the Departmental Representative, the Design Builder will:
 - .1 Adhere to all applicable provincial Construction Health and Safety Acts and regulations, in addition to the related Canada Occupational Safety and Health Regulations.
 - .2 Adhere to the requirements of the Alberta Ministry of Labour for:
 - .1 Employment Standards
 - .2 Construction Safety
 - .3 Designated Substance Management
 - .4 Workers Compensation
 - .3 Adhere to the requirements of the Alberta Ministry of the Environment for:
 - .1 Building Discharges into the air, water and ground
 - .2 Disposal of Designated Substances including Asbestos
 - .4 Adhere to the requirements of the Alberta Ministry of Consumer and Commercial Relations Elevating Devices Branch for:
 - .1 Construction Hoists
 - .2 Hydraulic scissors lift
- .3 **Municipal By-laws, Regulations, Standards and Inspections:**
 - .1 The Federal government does not defer to municipal authorities, except for specific by-laws, regulations, standards and inspections noted below.
 - .2 Unless directed otherwise by the Departmental Representative, the Design Builder will:
 - .1 Make preliminary municipal submissions at stages required by the County of Lethbridge,
 - .2 Provide all required supporting documentation for permit applications,
 - .3 Apply for and obtain all permits and approvals necessary for the work, including, but not limited to Building, Electrical and Plumbing Permits,
 - .4 Resolve all Building Permit related issues, as may be required,
 - .5 Provide fire safety equipment and access for fire-fighting services, as required by the city,
 - .6 If required by the city, apply for an Occupancy Permit and co-ordinate the resolution of all outstanding issues related to obtaining the permit,
 - .7 Provided Municipal authorities with access to the site as required and arrange for inspections of the construction work by the city or governing utility officials.



3 GENERAL PERFORMANCE REQUIREMENTS

3.1 PERFORMANCE REQUIREMENTS

3.1.1 CONTEXT

- .1 These performance requirements indicate the minimum technical standards, which satisfy CFIA's basic needs and requirements for the General Services Building Slab Rehabilitation project.
- .2 The full impact of the existing site, aesthetics, functionality, general fit and all relevant codes and regulations have not been addressed in detail herein, but must be addressed by the Design Builder's design professionals in the final design.
- .3 Although the final design may vary, due to limiting factors yet to be examined, or because of necessary modifications in certain areas to satisfy authorities having jurisdiction, the Design Builder is required to complete a fully functional new facility that meets all of CFIA's basic minimum requirements.
- .4 In the event of discrepancies between these requirements and applicable codes, the strictest requirements shall govern.
- .5 The design work is to be carried out by registered professionals, licensed to practice in the Province of Alberta, who shall provide stamped final drawings.
 - .1 The Design Builder's professional architectural, structural, geotechnical, mechanical and electrical engineering team and independent commissioning agent and related team shall design and commission the General Services Slab rehabilitation project based on the performance requirements outlined herein.
- .6 These performance requirements are only intended to provide a guideline for the Design Builder to understand CFIA's minimum requirements and do not necessarily include for every system, component and accessory required for a complete and fully rehabilitated ground floor slab for General Services Building.
 - .1 Notwithstanding that some systems, components and accessories may not be either identified, fully detailed or completely defined in these performance requirements (or on the drawings), the Design Builder shall design and construct a complete and fully functional slab rehabilitation project for General Services Building with all required systems, components and accessories required for normal building operation.

3.1.2 DESIGN QUALITY

- .1 Design/Build team shall maintain a high standard of design, based on recognized contemporary design principles. Architecture and engineering shall be coordinated and be consistent with good design practices.
- .2 Material quality and construction methods shall be at the level consistent with other Government of Canada buildings. Avoid experimental materials and take into account the total life cycling of the building. Minimize operating costs.
- .3 The character, scale and materials shall be compatible with the surrounding context.
- .4 The project shall be designed to "Long Life", 30-50 years, as per CSA Standard S478-95 (R2007).

3.1.3 BUILDING PERFORMANCE

- .1 General
 - .1 Provide buildings and systems that will enable long-term, efficient and cost effective life cycle performance.
 - .2 Buildings to be of non-combustible construction
- .2 Sustainable Design
 - .1 Incorporate, where reasonably possible, sustainable design features.
- .3 Energy Efficiency



- .1 Implement design strategies, systems and equipment, which result in energy efficient design.
- .4 Minimized Maintenance Costs
 - .1 Operations involving minimal 'hands-on' maintenance and repairs
- .5 Fire Protection
 - .1 Use, where feasible, fire resistant materials.
 - .2 Unless specified otherwise, equip facilities with appropriate alarms and extinguishers.

3.1.4 CONSTRUCTION QUALITY

- .1 All piping shall be cleaned thoroughly and pressure tested after installation is completed, including, but not limited to, heating pipes, and water lines.
- .2 Design Builder is responsible for maintaining appropriate security measures on site for safety of workers and third parties, in conformity with all levels of authorities governing construction in Province of Alberta.
- .3 Design Builder shall put together the following manuals:
 - .1 Operating and Maintenance Manual
 - .2 Commissioning Report/Manual.
 - .3 Each section in each manual shall be indexed and labelled, and submitted in an extension type catalogue binders bound with heavy duty green fabric, hot stamped gold lettering on front and spine, sized for 215 x 280 mm paper. Submit 6 copies to PWGSC Departmental Representative
 - .4 Manual shall include detailed system operation, parts number, maintenance schedule and other pertinent information, each section as further identified in Division 01 specifications.
- .4 Pay all fees associated with authorities having jurisdiction.
- .5 Design Builder, shall, provide any necessary temporary heating, obtain temporary connections for all services such as water and electrical, that may be required for execution of work.
- .6 Supply tools, equipment and certified personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, troubleshooting and servicing all systems and equipment during commissioning period, prior to final acceptance.
- .7 Provide spare maintenance parts and material, as specified.
- .8 Construction Drawings and Product Data:
 - .1 Submit three (3) copies of construction drawings, and product data for review by the PWGSC Departmental Representative.
 - .2 Submit two (2) copies of construction drawings, and product data for review by the CFIA Departmental Representative
 - .3 Indicate details of construction, dimensions, capacities, weights and mechanical and electrical performance characteristics of equipment or material.

3.1.5 APPLICATION OF GENERAL PERFORMANCE REQUIREMENTS

- .1 Performance requirements in this Section are general in nature and applicable to all the Work unless specified otherwise.
 - .1 Additional performance requirements relevant to the General Services Building Slab Rehabilitation project are specified in respective Sections.

3.2 SITE REQUIREMENTS

3.2.1 GENERAL

- .1 Site work, including:
- .2 Removal of excavated materials and disposal to location as approved by CFIA

3.2.2 SITE SERVICES

- .1 Design Builder must establish location and extent of services.
- .2 Any damage done to existing work to be repaired at Design Builder's expense and to PWGSC Departmental Representatives' satisfaction.



.3 Grading

3.2.3 ACCESS ROADS AND DRIVEWAYS.

.1 **MAINTAIN EXISTING ROADS AND DRIVEWAYS IN CURRENT CONDITION.**

3.2.4 MISCELLANEOUS SITE WORKS

.1 Not required.

3.2.5 BACKFILLING

Excavated areas to be backfilled are to be compacted to meet structural requirements.

.1 Minimum requirements are:

- .1 Under exterior parking area and roadways: preparation should consist of excavation of soft and organic soils to a minimum depth of 0.725 M below top of design grade. Actual depth of excavation required will be determined in field. After excavation, existing subgrade should be brought to a water content near optimum, and then compacted to 95% of its maximum dry density. Pit-run gravel shall be used for backfill. Backfill should be in layers not exceeding 0.2 m. Top most lift of backfill should be 200 mm base course of Type 1 fill to underside of slab. All backfill layers shall be compacted to minimum of 98% of its maximum dry density.

.2 Trenches:

- .1 Type 1 fill, compact to 98% standard maximum dry density under parking areas and gravel roadways and compact to 95% in other areas.
- .2 Type 1 fill:
- .1 Clean hard, durable crushed gravel or stone consisting of angular particles, free from shale, clay friable materials, organic matter and other deleterious substances.
- .2 Gradation to be within following limits:

| Sieve size | % Base Course |
|------------|---------------|
| 25 mm | 100 |
| 18 mm | 87 - 100 |
| 12.5 mm | 82 - 93 |
| 5 mm | 45 - 57 |
| 2 mm | 26 - 56 |
| 0.9 mm | 18 - 39 |
| 0.4 mm | 13 - 26 |
| 0.16 mm | 7 - 16 |
| 0.071 mm | 6 - 11 |

- .2 Stockpile fill materials in areas designated by the PWGSC Departmental Representative.
- .3 Prevent bottoms of excavation from freezing.
- .4 Earth bottoms of excavations to be free of rocks, debris and organic matter

3.2.6 WEEPING TILE

.1 Not required

3.2.7 WATER DISCHARGE

- .1 Gutter downspouts to concrete splash pads at grade: provide screen with maximum opening size of 6.35 mm, or maintain existing downspouts and splash pads at grade
- .2 Storm runoff from building gutter collection system based on NBC requirements.

3.2.8 SOILS INFORMATION

- .1 Soil tests were carried out and report and listed is section 1.9.1



3.3 STRUCTURAL REQUIREMENTS

3.3.1 GENERAL SCOPE OF STRUCTURAL WORK

- .1 The structural requirements describe the minimum criteria under which structural work will be executed and supplied.
 - .1 The intent is to cover major aspects of work, without entering into all levels of detail.
- .2 The Design Builder shall furnish a structure that conforms with Section 1.10 Codes, Acts, Standards, Regulations.
- .3 Materials
 - .1 Concrete shall conform minimum to CSA A 23.1 for exposure and classification.
- .4 All floors will be designed to prevent uplifting by soil heaving.
- .5 Floor Loads shall be:
 - .1 Design for loads as listed in Section 1.6.3.
 - .2 At the ADRI building, underpinning was done primarily at structural foundations below columns, where vertical building loads downward were capable of resisting temporary upward jacking forces.
 - .3 In the General Services Building, underpinning below slab on grade designed for uniformly distributed loading, additional temporary dead load may be required to offset temporary vertical jacking load from below, or a structural frame built below grade and connected to structural pile grid. If temporary ground floor dead load is required at each jacking location, this temporary dead load is to be provided by Design / Builder. Required relocation or removal of equipment and stored material in ground floor rooms is to be reinstated in "as-found" condition.
 - .4 Design and construction of slab rehabilitation and structural tie-in to existing structure is to conform to seismic design requirements.
 - .5 Design / builder shall be responsible for overall design of underpinning methodology. If using hydraulically jacked steel pipe pile underpinning system, design shall include pipe pile segment connections and load transfer struts.
 - .6 Safe working capacity of piles shall have a minimum factor of safety of 2.0 when compared to maximum jacking load during installation.
 - .7 Jacking forces applied to existing footings and existing slab on grade shall be spread over a sufficient area in order to ensure that bearing stresses within concrete surface are well below allowable values prescribed by CAN/CSA-A23.3.
 - .8 The maximum vertical jacking force that may be exerted at any one location, shall be governed by the structural capacity of the building elements to take the load in this manner at this location.
- .6 Technical Documents Requirements
 - .1 Documents to include following items of information
 - .1 Drawings for typical and special proposed methods of underpinning showing procedures and techniques that are planned to be used
 - .2 Sectional pile properties.
 - .3 Jacking and setting arrangements.
 - .4 Pile logging format.
 - .5 Type of instrumentation to be used for monitoring.
 - .6 Building monitoring setup.
 - .7 Concrete encasing procedure.
 - .8 Construction Schedule.
 - .9 Safe work procedure.
 - .10 Proposed levelling procedure.
 - .11 Shoring and temporary support details.
 - .12 Ventilation requirements.
 - .13 Crew size.
 - .14 Welding / welder qualifications and weld procedure documentation regarding all different types of welds proposed to be used.
 - .15 Pile sizes, locations and material grades.
 - .16 Connection details.



- .17 Pile installation procedures with a detail of floor space required.
- .18 Jacking forces and methods of application to structure.
- .19 Material quantities.
- .20 Rebar shop drawings indicating bar bending details, lists, quantities of reinforcement, sizes and spacing.
- .2 Documents shall provide all design and installation details of piles including capacity, length, reinforcement, installation procedures and tolerances. Provide structural calculations, construction drawings and shop drawing of reinforcement showing as minimum bar sizes, spacing, location and quantities of reinforcement, welded wire fabric. Calculations and shop drawings to be signed and sealed by a Professional Engineer certified in the Province of Alberta.
- .3 Provide certification that compressive strength, water cement ratio, cement type, water cement ratio, slump, entrained air content and other specified properties of concrete will be met, using proposed concrete mix designs.
- .7 Building Protection
 - .1 Inspect existing conditions, including elements subject to damage or movement. Beginning of work means acceptance of existing conditions.
 - .2 Provide protection from elements for areas which may be exposed by uncovering work, maintain excavations free of water.
 - .3 All precautions will be taken to properly support structure during work. If safety of structure appears to be endangered, underpinning operations shall cease and Departmental Representative notified immediately.
 - .4 Avoid overloading that may endanger safety of structure or cause permanent deformation. Do not cut, drill or sleeve any load bearing structural element or existing slab on grade, unless specifically indicated, without written approval of Departmental Representative.
 - .5 Care shall be exercised when operating equipment within existing building, in order to prevent any damage from occurring to building exterior, overhead doors, interior, mechanical and electrical systems.
 - .6 Notify Departmental Representative of any unexpected subsurface conditions and discontinue work in area until notified by Departmental Representative to resume work.
- .8 Installation of hydraulically jacked piles:
 - .1 Use high pressure hydraulic equipment for pile installation as recommended by Design-Builder design criteria.
 - .2 Establish and verify required cut-off elevations for jacked pile underpinning.
 - .3 Excavation to take place as required to gain access to underside of foundation. Shoring and/or temporary support for the structure and adjacent soil to take place as excavation proceeds.
 - .4 Minimum length of pile required will be such as to allow for penetration of the dense gravel immediately above the shale bedrock or in areas where the depth of dense gravel above the shale is shallow, into the shale bedrock.
 - .5 In the event that obstructions or difficult advancement of the pile is apparent, equipment must be provided to advance the piles to the minimum depths required by one or more of churn drilling, coring, jetting, augering or hydro-vacuuming.
 - .6 Length of pile installation at each location will be determined on the basis of prior established load/settlement/time criteria as proposed by the Design-Builder and reviewed by the PWGSC Departmental Representative. Upon completion of installation of all hydraulically jacked piles below an individual column footing and grade beam, fill piles with concrete. Piles must be free of water prior to concreting. Jetting and/or pumping equipment must be provided for this purpose.
 - .7 Perform internal visual inspection of steel pipe, joints and base prior to placing of concrete. Ensure pipe inside is free from foreign matter.
 - .8 Fill steel pipe pile with concrete using methods to limit freefall and to prevent segregation. Ensure adequate vibration of upper portion of pile in order to completely fill cross section of pipe.
 - .9 Leveling of structure shall take place as mutually determined and agreed by PWGSC Departmental Representative and Design-Builder. Leveling will not take place until all underpinning is installed. The Design-Builder must have sufficient hydraulic equipment consisting of pumps, rams, safety valves, manifolds, connectors and hose in order to lift on a minimum of 100 pile locations at one time.



- .10 All tops of piles, including load transfer struts and epoxy grouted base plates are to be encased in concrete for corrosion protection. Dowels connecting the existing structure to the new pile cap to be installed into cored holes, epoxy filled, prior to the pile cap steel being installed.
 - .11 Steel pipe for underpinning to be to CSA G40.21, Grade 300 W minimum. Steel pipe to be used for hydraulically jacked piles must have sufficient strength to resist imposed jacking loads safely within allowable deformations. Grade of steel used, must be clearly indicated in shop drawings.
 - .12 Welding electrodes to CSA W48 series. Weld in accordance with CSA W59 and CSA W59S1. Welding certification of companies in accordance with CSA W47.1 and CSA W47.1S1. All individual welders must be certified under CSA W59. Provide sample weld procedure documentation (reviewed by the Canadian Welding Bureau) for all different types of welds to be used on this project as part of the submittal requirements.
 - .13 Load transfer steel: materials to CAN/CSA-G40.21, Grade 300 W minimum.
 - .14 Submit for performance evaluation and for review, details of equipment for installation of piles to PWGSC Departmental Representative.
 - .15 Maintain accurate records for each pile, including:
 - Pile size and length.
 - Final tip and cutoff elevations.
 - Amount of plug in pipe at final jacking load.
 - .16 Record elevation taken on adjacent piles, before, during and after installation of each pile or maintain some load on previously installed piles within the group to prevent heave. Information to be incorporated in as-built documents.
 - .17 Allowable design load capacity of pile at final jacking load to be as indicated on shop drawings.
 - .18 All piles will be installed open-ended and not more than 2% of their length out of plumb with pile head within 150mm of plan location. Any pile that is more than 2% out of plumb or 150mm out of location will be rejected. Leave rejected pile in place, place new adjacent pile and modify pile cap as required. No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles
 - .19 Repair defective welds as reviewed by PWGSC Departmental Representative . Repairs to be made according to CSA W59 and CSA W59S1. Unauthorized weld repairs may be rejected. Pile testing will be the responsibility of the Design-Builder. Supply and erect equipment and temporary structures necessary for making tests. PWGSC Departmental Representative will select piles to be tested at beginning of work or during performance of work. PWGSC Departmental Representative will observe tests performed by Design-Builder or appoint a representative to observe testing.
 - .20 Provide suitable enclosures and lighting so that observation, testing and recording of data can proceed under adverse weather conditions and at night.
 - .21 Do pile load tests and prepare reports in accordance with ASTM D 1143. Testing shall be carried on at least one pile for every different size hydraulically jacked pile installed but no less than one hydraulically jacked pile for every fifty (50) piles installed.
 - .22 Provide 4 copies of test report as stipulated in ASTM D 1143.
 - .23 Design-Builder is to provide a qualified geotechnical engineer to interpret results for predicting pile performance and capacity.
 - .24 Load testing to be carried out according to ASTM D1143, Design-Builder will provide calibration charts for all gauges, pumps and hydraulic rams used during testing.
- .9 Concrete:
- .1 For formwork materials, use wood and wood product formwork materials to CSA-O121 and CAN/CSA-O86.1 including for ties, form release agent, etc.. Use falsework materials to CSA-S269.1.
 - .2 Reinforcing steel to be:
 - Deformed bars of new billet steel to requirements of CAN/CSA-G30.18, Grade 400 minimum.
 - .3 Welded steel wire mesh: to CSA G30.5. Provide in flat sheets only.
 - .4 Concrete to be:
 - Portland cement: to CAN/CSA-A3001, Type HS.
 - Exposure class S-3 with minimum 28 day compressive strength of 30 Mpa except garage areas to be exposure class C-1 with minimum 28 day compressive strength of 35 Mpa.
 - Max. sized coarse aggregate: 20 mm.



- .5 Fly ash permitted as required by Design-Builder's mix design criteria.
- .6 Epoxy grout: non-sag gelled epoxy for use under high modulus, high strength, and moisture resistant. Provide product data for review to PWGSC Departmental Representative.
- .7 Verify lines, levels and centers before proceeding with formwork/falsework and ensure dimensions agree with drawings. Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
- .8 Leave formwork minimum 72 hours after placing concrete for structural slab concrete and in load transfer pile caps as per Design-Builder's design requirements.
- .9 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .10 Upon approval of PWGSC Departmental Representative, weld reinforcement in accordance with CSA W186 as required. Do not field bend or field weld reinforcement except where indicated or authorized by PWGSC Departmental Representative. Replace bars which develop cracks or splits.
- .11 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1. Prior to placing concrete, obtain PWGSC Departmental Representative's review of reinforcing material and placement. Ensure cover to reinforcement is maintained.
- .12 Concrete testing: to CAN/CSA-A23.2 by testing laboratory designated and paid for by PWGSC Departmental Representative. Give PWGSC Departmental Representative minimum 48 h notice before each concrete pour.
- .13 Formed surfaces exposed to view sack rubbed finish in accordance with CAN/CSA-A23.1-94.
- .14 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.
- .15 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .10 INSPECTION (by Independent Third-Party Consultant retained by Contractor)
 - .1 Contractor will appoint and pay for services of testing laboratory except as follows:
 - .2 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .3 Inspection and testing performed exclusively for Design-Builder's convenience.
 - .4 Tests specified to be carried out by Design-Builder under the supervision of PWGSC Departmental Representative.
 - .5 Employment of inspection/testing agencies does not relieve responsibility to perform work in accordance with contract documents.
 - .6 Furnish 2 copies of test results and mix designs to PWGSC Departmental Representative.
- .11 Monitoring
 - .1 Departmental Representative will start monitoring the structure as underpinning is completed.
 - .2 The monitoring system will accurately determine vertical and horizontal movements to an accuracy of + /- 1 mm.
 - .3 Departmental Representative will be checking at regular intervals as directed after underpinning is complete.
 - .4 Monitoring will be considered complete once vertical and horizontal movements have stabilized and up to a maximum of five (5) years.
 - .5 Monitoring of the structure is not part of this project.

3.4 ARCHITECTURAL REQUIREMENTS

3.4.1 GENERAL SCOPE OF ARCHITECTURAL WORK

- .1 The architectural requirements in these performance requirements describe the minimum criteria under which architectural work will be executed and supplied.
 - .1 The intent of these performance requirements is to cover major aspects of work, without entering into all levels of detail.
- .2 Provide all labour, materials, permits, equipment for installation, testing and commissioning of work shown on drawings and described in specification.



- .3 Ensure required fire rated separation integrity separating the new basement space, if constructed and existing ground floor space, if interior access from ground floor to new basement space is permitted.
- .4 Re-instate designed fire rated separations to same standard as designed and constructed between public corridors, electrical, mechanical and storage rooms located on ground floor.
- .5 Provide new floor and wall finishes to same standard as designed and constructed to all re-instated areas requiring re-construction, including public corridors, storage rooms, washrooms and change rooms.
- .6 Provide new wall finishes to same standard as designed and constructed where practicable to re-instated walls in mechanical and electrical rooms.
- .7 Application of materials and installation of equipment shall, unless specified otherwise, be installed to manufacturer's written instructions and also state that the manufacturer is familiar with the project and trade and accepts all related site conditions.
- .8 Where penetrations are necessary, maintain fire separation and building envelope air barrier integrity by using suitable materials, methods and trades.

3.4.2 CONCRETE

- .1 General
 - .1 Chamfer all exposed concrete corners.
- .2 Concrete flooring:
 - .1 Concrete ground floor originally designed and constructed to slope to drains shall be replaced or re-instated with concrete floor that slopes to drains.
 - .2 Concrete floor originally designed and constructed to be flat and horizontal and at same elevation with adjacent concrete floors or door sills shall be replaced or re-instated with concrete floor that are flat and horizontal and at same elevation as adjacent concrete floors or door sills.
 - .3 Apply slip resistant non-metallic surface hardener.
 - .1 Apply hardener to suit heavy industrial traffic conditions to same standard as designed and constructed.

3.4.3 DOORS AND DOOR HARDWARE

- .1 New Entrance/Exit Doors to Basement Area (if created through this construction contract)
 - .1 New Welded steel doors and frames:
 - .1 Minimum with 914mm unless specified otherwise,
 - .2 Exterior door 1.2 mm thick sheet, interior door sheet 1.6 mm,
 - .3 Galvanized and painted,
 - .4 Commercial quality to Canadian Steel Door and Frame Manufacturer's Association (CSDFMA),
 - .5 Temperature rise rated doors as per NBC, Table 3.1.8.15,
 - .6 Exterior door shall be insulated in a thermally broken frame.
 - .2 New Door Hardware
 - .1 Obtain the services of a qualified Architectural Hardware Consultant (by Door Hardware Institute - DHI) to:
 - .1 Meet and develop door hardware requirements with the CFIA and Departmental Representative based on operational, health and safety, code requirements and DHI best practices.
 - .2 Submit a hardware schedule for review by the Departmental Representative.
 - .2 Provide door hardware complying to ANSI/BHMA standards of heavy duty institutional grade 1 rating, corrosion resistant.
 - .3 Locksets and latch sets, mortised type, levered handle complete with rose. Finish to match existing.
 - .1 Master keying as directed by Departmental Representative.
 - .4 Hinges minimum 1 ½ pair per door, four ball bearing type. Finish to match existing.
 - .5 Door closer on all doors.



- .6 All doors, stainless steel kick plates on both sides of the doors, height to suit equipment passing through the door way –900mm +/- range

3.4.4 FINISHES – RE-INSTATEMENT OF WALLS / FLOORS

- .1 General:
 - .1 Use lowest possible VOC content without compromising quality and performance.
 - .2 Where special painting, coating or decorative system applications are to be used, a respective manufacturer shall provide, as part of the Work, certification of surfaces and conditions for specific material/product application as well as on-site supervision and approval of application.
 - .3 Post on site, all Manufacturer's Material Safety Data Sheets (MSDS).
- .2 Paint Finish:
 - .1 All walls, doors and frames, whether exterior, interior, or basement access doors and building components and materials are typically required to be painted
 - .2 Paint finish to Master Painter's Institute (MPI), Premium Grade.
 - .1 Conform to formula numbering system and use Approved Product Listing (APL).
 - .2 Use "Environmentally Friendly" products rated at the minimum E2 and preferably E3.
- .3 Pre-galvanized finish: touch up field welds, cuts, burns and scratches with zinc rich primer.
- .4 Ceramic Tile:
 - .1 All washroom and change room walls and floors to same standard and colours as originally designed and constructed.
- .5 Washroom Partitions:
 - .1 Remove and safely store existing washroom partitions, and re-install with is same condition as currently exist. If damaged during selective removal, replace with new washroom partitions to same standards and colours as originally designed and constructed.

3.4.5 CFIA EQUIPMENT / OPERATIONS

- .1 General:
 - .1 Remove and storage CFIA equipment located in Grids 1 – 6, including wash bay equipment, hoist bay equipment, paint booth and other equipment located in this area. Disconnect all mechanical and electrical connections.
At completion of structural slab construction within Grids 1 – 6, re-install all wash bay, hoist bay, paint booth and other equipment in it's original location, reconnecting all mechanical and electrical connections.

3.5 MECHANICAL REQUIREMENTS

3.5.1 SCOPE OF MECHANICAL WORK

- .1 New Mechanical work is included, but is not limited to repair and replacement of plumbing, heating, cooling, fire suppression systems and related mechanical work where required to meet the Code as well as all reference standards detailed in this TOR.
- .2 The mechanical requirements in this section describe the minimum criteria under which work will be executed and supplied.
- .3 The intent of these performance requirements is to cover major aspects of work, without entering into all details.

3.5.2 EXISTING MECHANICAL SERVICES

- .1 Mechanical services as described in as-built documents are available in existing General Services Building.

3.5.3 MECHANICAL DRAINAGE SYSTEM

- .1 Existing interior ground floor mechanical trench drain system, including elements cast into concrete floor slab and all below grade mechanical drainage piping is to be replaced with new trench drain and underground piping to match originally designed and constructed drainage systems.



- .1 Support below grade mechanical piping under structural slab, in areas between Grids 1 through 6 with new structural supports from below-grade piping up to and connecting to ground floor structural slab.
- .2 Support below grade mechanical washroom drainage piping in areas between Grids 7 and 12 with new structural supports from below-grade piping up to and connecting to ground floor concrete slab.
- .3 Drainage piping shall be Code approved, designed and built to Canadian Plumbing code requirements and requirements of local authorities having jurisdiction.

3.5.4 MECHANICAL GLYCOL IN FLOOR HEATING SYSTEM

- .1 New radiant heating in-slab piping system from Grid 1 to 6 (replacing the existing system in Grid 3-6) with separate controls for each service bay
- .2 Remove and dispose of existing in-floor heating system cast into existing slab on grade, in area bounded by Grids 3 - 6.
- .3 New radiant system will reuse the existing glycol supply and return lines, heat pump and boiler. Radiant piping must be installed with metal tracing wire along the pipes before the slab concrete is poured in order to help the detection/ locate in the future.
- .4 Supply and install new in floor heating system, casting into new structural slab system. Connections to existing manifold system are to be made where practical, and new glycol is to be supplied and installed.
- .5 Mechanical flushing, start-up and commissioning for new in-floor heating system is included.
- .6 In Floor Heating System shall be Code approved, designed and built to Canadian Plumbing code requirements and requirements of local authorities having jurisdiction.

3.5.5 CONTROLS SYSTEM

- .1 Existing Controls system is to remain as originally designed and constructed. If work of this contract is to change or damage existing controls system, it is to be re-instated as originally designed and constructed. Re-commissioning of controls system is required if altered by work of this contract.

3.6 ELECTRICAL REQUIREMENTS

3.6.1 EXISTING ELECTRICAL SERVICES

- .1 Normal Power
 - .1 Existing electrical power distribution system is to remain as originally designed and constructed. If work of this contract is to change or damage existing electrical power distribution system, it is to be re-instated as originally designed and constructed. Re-commissioning of electrical power system is required if altered by work of this contract.
- .2 Lighting
 - .1 The new expanded crawl space require new lighting design.

3.6.2 GENERAL SCOPE OF ELECTRICAL WORK

- .1 The items listed hereunder are for reference only and shall not be considered as a complete list of all items required to do the work. Thorough scrutiny of the complete contract documents and the existing conditions at the place of the work shall be done to obtain a complete list of all items, quantities, dimensions, extents, procedures and locations required for the completion of the Work.
- .2 The scope of work describes the minimum criteria under which electrical work will be executed and supplied.
 - .1 The intent is to cover re-instatement aspects of work, without entering into all details.
 - .2 The DB is not only to meet the Code requirements and CSA standards, but to use his/her diligence to provide the best possible product.
- .3 The Design Builder shall:



- .1 Complete installation in accordance with the Canadian Electrical Code, CSA C22.10 (latest edition) except where specified otherwise.
- .2 Comply with CSA Certification and Electrical standards.
- .3 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material and electrical line diagrams.
- .4 Provide all labour, materials, permits, equipment for installation, testing and commissioning of work described below:
 - .1 Test and verify status of existing underground Main feeder from adjacent ADI building's electrical room to existing General Services Building electrical room. Replacement of underground electrical cable is not included.
 - .2 Test and verify status of existing underground electrical distribution system from General Services Building electrical room to internal routings. Replacement of underground electrical cables is not included.
 - .3 Disconnect all mechanical room electrical and grounding wiring below and above grade within mechanical room required to allow re-instatement of existing slab to design elevation. Reconnect all mechanical room electrical wiring to existing system, adding additional lengths of wire or providing shorter connections, as required to suit connections, after mechanical room slab has been re-instated to original design elevation.
 - .4 Disconnect all electrical room electrical wiring and conduit below and above grade within electrical room required to allow re-instatement of existing slab to design elevation. Reconnect all electrical room electrical wiring and conduit to existing system, replacing existing with longer lengths of wire and conduit, or providing shorter connections, as required to suit connections, after electrical room slab has been re-instated to original design elevation.
 - .5 Review condition of electrical wire and conduit at ceiling /architectural wall locations and re-instate electrical conduit and wiring to new electrical code requirements in all architectural walls between grids 7 to 12. Architectural walls are being raised from below with re-instated concrete slab on grade.
 - .6 Provide and install lighting fixtures in new basement space, if created by Design / Builder. New basement space lighting fixtures to include new electrical distribution wiring and conduit, powered from existing electrical distribution panel in electrical room, General Services Building.
 - .7 Provide and install exterior lighting fixture above new exterior access to new basement space, if created by Design / Builder. New exterior lighting fixture to include new electrical distribution wiring and conduit, powered from existing electrical distribution panel in electrical room, General Services Building.

3.6.3 CARE, OPERATION AND START-UP

- .1 Instruct CFIA operating personnel in the operation, care and maintenance of equipment.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.
- .4 Cooperate with other trades for start-up of equipment.
- .5 Verify the operation of each motor; take note of full load current reading and record for CFIA's use.
- .6 Verify operation of basement and exterior access supplemental light controls.
 - .1 Controls to be tested are automatic control by computer controller and by control switch "Manual-Off-Auto" switches.
- .7 Complete identification.

3.6.4 INSPECTION

- .1 Furnish Certificates of Acceptance from Electrical Inspection Department on completion of work to the PWGSC Departmental Representative.

3.6.5 MATERIALS AND EQUIPMENT



- .1 Equipment and material to be new and CSA certified and manufactured to standards in order to meet specified performance.
- .2 Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from authorities having jurisdiction.
- .3 Factory assemble power panels, control panels and component assemblies.

3.6.6 FINISHES

- .1 Shop finish metal enclosure surfaces by removal of rust and scale, cleaning, application of rust resistant primer inside and outside, and at least two coats of finish enamel.
- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

3.6.7 EQUIPMENT IDENTIFICATION

- .1 Identify equipment with nameplates.
- .2 Nameplates:
- .3 Lamacoid 3 mm thick plastic engraving sheet, black face, white core, mechanically screw attached, unless specified otherwise.

NAMEPLATE SIZES

- | | | | |
|----|--------|------------|--------------------------|
| .1 | Size 1 | 10 x 50 mm | 1 line 3 mm high letters |
| .2 | Size 2 | 12 x 70 mm | 1 line 5 mm high letters |
- .4 Wording on nameplates to be approved prior to manufacture.
 - .5 Allow for average of twenty-five (25) letters per nameplate.
 - .6 Fully comply with Arc Flash protection requirements Identification and labelling.
 - .7 Identification to be in English
 - .8 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics

3.6.8 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tubes on both ends of phase conductors of feeder branch circuit wiring and control wiring. Gummed tape is not acceptable.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour code: to CSA

3.6.9 POWER AND CONTROL WIRING

- .1 All power wires to be RW90.
- .2 All wires to be copper
- .3 Use minimum size, #12 AWG for 15 A, 1 Ø convenience outlets, #14 AWG for control wiring. Conductors to be sized to take into account, connected load and voltage drop as required by codes and standards.
- .4 24 V ac wiring between computer cabinets and motor starter cabinets to be colour coded. Acceptable product/material: Beldon. #20 AWG, 25 conductors per cable.

3.6.10 CONDUIT AND CABLE IDENTIFICATION

- .1 Identify conduit and metallic sheathed cables with panel number.

3.6.11 WIRING TERMINATIONS

- .1 Lugs, terminals, screws used for termination of wiring to be suitable for copper.

3.6.12 MANUFACTURERS' AND CSA LABELS

- .1 Manufacturers' nameplates and CSA labels to be visible and legible after equipment is installed.

3.6.13 WARNING SIGNS



- .1 Provide warning signs, as specified or to meet requirements of local authorities and PWGSC Departmental Representative.
- .2 Use decal signs, 175 x 250 mm minimum.

3.6.14 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless otherwise specified or indicated.

3.6.15 PROTECTION

- .1 Protect exposed live equipment during construction for personnel safety.
- .2 Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage.
- .3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked, except when under electrician's direct supervision.

3.6.16 LOAD BALANCE

- .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- .3 Submit, at completion of work, a report listing phase and neutral currents on panelboards, dry core transformers, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

3.6.17 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit, and sleeves, prior to pouring of concrete.
- .2 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to a minimum. Arrange for holes through exterior walls and roof to be flashed and made weatherproof in accordance with PWGSC Departmental Representative's provisions. No penetration through glazing allowed.

3.6.18 SEALING

- .1 Where cables, conduits, pipes and ducts pass through outside or inside wall, pack space between items and sleeve or opening, full with caulking compound or other acceptable materials

3.6.19 TESTS

- .1 Conduct and pay for following tests:
 - .1 Existing Electrical Distribution system from ADI building to General Services Building, including voltage and grounding.
 - .2 Existing Electrical Distribution system within General Services Building, including voltage and grounding.
 - .3 New circuits originating from branch distribution panels.
 - .4 New lighting and its control.
- .2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
- .3 Carry out tests in presence of PWGSC Departmental Representative.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .5 Submit test results.

3.6.20 INSULATION RESISTANCE TESTING

- .1 Megger test circuits, feeders and equipment up to 350 V with a 500 V instrument.
- .2 Megger test 350-600 V circuits, feeders and equipment with a 1000 V instrument.
- .3 Check resistance to ground before energizing.



3.6.21 COORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as over current trips, relays, fuses, are installed to values and settings as indicated.

3.6.22 CLEANING

- .1 Do final cleaning at completion of work for all trades.
- .2 At time of final cleaning, clean lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dust and dirt.

3.6.23 EQUIPMENT LOCATION

- .1 Locate new lighting panels, lighting control panels and electrical distribution equipment in electrical room.

3.6.24 GROUNDING

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list: lightning fixtures, ballasts and controls, conduits, switches, supports of the light fixtures, service equipment, transformers, distribution panels, duct system, frames and motors, motor control centers, starters, building steel work, generator, and outdoor lighting.
- .2 Ground equipment and circuits as per electrical safety code.
- .3 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, and accessories. Where EMT is used, run ground wire in conduit.
- .4 Install R90 insulated green grounding conductor in conduits containing power, control, branch circuit wiring.
- .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .6 Protect exposed wiring from mechanical injuries.
- .7 Install separate grounding conductor to outdoor lighting standards.
- .8 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.



4 APPENDIX 1 – DIVISION 1 SPECIFICATIONS



5 APPENDIX 2 – GENERAL PROCEDURES AND STANDARDS



6 APPENDIX 3 – SITE PHOTOGRAPHS



7 APPENDIX 4 – EXISTING DOCUMENTS