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SOLICITATION AMENDMENT MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires

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Title - Sujet TSTS Architectural and Engineering Services	
Solicitation No. - N° de l'invitation EP938-212564/A	Amendment No. - N° modif. 003
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Solicitation Closes - L'invitation prend fin at - à 02:00 PM Eastern Standard Time EST on - le 2021-11-29 Heure Normale du l'Est HNE	
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Solicitation No. - N° de l'invitation l'acheteur	Amd. No. - N° de la modif.	Buyer ID - Id de
EP938-212564/A	003	fe178
Client Ref. No. - N° de ref. du client - FMS No./N° VME	File No. - N° du dossier	CCC No./N° CCC
20212564	FE178.EP938-212564	

AMENDMENT 003

This amendment is issued to make changes to the RFP, to the Project Brief, and to provide Appendix J – Guideline – Project GHG Options Analysis Methodology, and Appendix K – Template Scope of Work Climate Risk Vulnerability Assessment (CRiVA) to the Project Brief:

1. Changes to the RFP:

At section 3.2.1, Experience and Achievements of the Proponent, subsection 2.c

Delete:

- i. Sustainable design performance where loads are significantly reduced through design achieving, or ready to achieve, net zero carbon emissions **and net zero energy**, and

Replace with:

- i. Sustainable design performance where loads are significantly reduced through design achieving, or ready to achieve, net zero carbon emissions, and

2. Changes made to the Project Brief:

At section 1.4.1 Overview, 5th paragraph, 1st and 2nd bullet

Delete:

- Development of detailed operations and maintenance and energy budgets, and smart-lab sustainability strategies, including detailed life-cycle assessment (LCA);
- Development of detailed building component life-cycle Cost analysis (LCCA), which when coupled with the Design Team's LCA serves as the primary consideration in the selection of building components and systems, to the approval of the DR;

Replace with:

- Development of detailed operations and maintenance and energy budgets, and smart-lab sustainability strategies, including detailed **life-cycle cost assessment (LCCA)**;
- Development of detailed building component **life-cycle analysis (LCA)**, which when coupled with the Design Team's LCA serves as the primary consideration in the selection of building components and systems, to the approval of the DR;

At section 1.4.1 Overview, 6th paragraph, 5th bullet

Delete:

- Manage the construction and complete and document performance testing as defined by the Design Team and the GEICs; and

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

Replace with:

- Manage the construction and complete and document performance testing **as well as embodied carbon data for disclosure** as defined by the Design Team and the GEICs; and

At section 1.4.2.1 Sustainability, 1st paragraph

Delete:

Project Brief section 3.3—Sustainability outlines the federal government's heightened minimum sustainability performance objectives, notably; significant energy reduction, targeting net zero operational **and embodied** carbon, and employee health and well being.

Replace with:

Project Brief section 3.3—Sustainability outlines the federal government's heightened minimum sustainability performance objectives, notably; significant energy reduction, targeting **net zero operational carbon, embodied carbon data collecting, climate resilience, as per TBS Greening Government Strategy** and employee health and well being.

At section 1.4.2.1 Sustainability, 3rd paragraph

Delete:

In this Project, science process loads are defined as the energy use from science specific equipment use for experiments, which are **excluded from** total **base** building operating energy use or carbon emissions. The Design Team can extend targeting net zero operational carbon **and energy** towards science process and science-based emissions, offsetting the base building's annual emissions. However, a distinction will have to be made in targeting carbon neutrality and energy efficiency for the base building and targeting carbon neutrality and energy efficiency for the TSTS occupants' science processes.

Replace with:

In this Project, science process loads are defined as the energy use from science specific equipment use for experiments, which are **included in the** total building operating energy use or carbon emissions. The Design Team can extend targeting net zero operational carbon towards science process and science-based emissions, offsetting the base building's annual emissions. However, a distinction will have to be made in targeting carbon neutrality and energy efficiency for the base building and targeting carbon neutrality and energy efficiency for the TSTS occupants' science processes.

Delete:

- a) Reduce life-cycle environmental impacts from design and material choices, with consideration for material content and extended user and manufacturer responsibility (e.g., considering environmental product declarations, health product declarations, exclusion of **'red-listed'** hazardous materials and substances, take-back programs, etc.);

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

Replace with:

- a) Reduce life-cycle environmental impacts from design and material choices, with consideration for material content and extended user and manufacturer responsibility (e.g., considering environmental product declarations (EPDs), health product declarations, exclusion of 'red-listed' hazardous materials and substances, take-back programs, etc.);

At section 1.4.2.1 Sustainability, 5th paragraph

Delete:

Significant and ongoing ~~whole building LCA using industry recognized tools such as the Athena Impact Estimator for Buildings, OneClick or equivalent software~~, energy Modelling and, as described in Project Brief section 4.1.4.3, life-cycle Cost analysis (LCCA) by the Design Team, will span every Project stage.

~~(Note: In this Project Brief, the Athena Impact Estimator for Buildings is referenced. The Design Team may choose an equivalent software, to the approval of the DR, so long as the approved software is consistently used for all sustainability-related Services throughout the Contract.)~~

Replace with:

Significant and ongoing, energy Modelling and, as described in Project Brief section 4.1.4.3, life-cycle Cost analysis (LCCA) by the Design Team, will span every Project stage.

At section 1.4.3 Building Information Modelling, 2nd paragraph

Delete:

The Design Team is required to capture all Project scope in the Model using a common data environment for visualization, analysis and communication of Project information for and between Project stakeholders. The Design Team is required to use the Model to assess embodied carbon in the selection of materials, to document component and systems life-cycle information, and to realize a sustainable and intelligent building complex that integrates building fabric, biometric data systems and biometric end devices, sensors for energy regulation and consumption, access control, preventative maintenance, etc.—a continuous link between the digital and physical asset.

Replace with:

The Design Team is required to capture all Project scope in the Model using a common data environment for visualization, analysis and communication of Project information for and between Project stakeholders. The Design Team is required to use the **Model to create a Bill of Materials (BOM) and facilitate the embodied carbon assessment and data collection of the select materials**, to document component and systems life-cycle information, and to realize a sustainable and intelligent building complex that integrates building fabric, biometric data systems and biometric end devices, sensors for energy regulation and consumption, access control, preventative maintenance, etc.—a continuous link between the digital and physical asset.

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

At section 1.4.4 Design Coordination

Delete:

- b) Integrate their LCA and component-based LCCA with the design of building components and systems, in accordance with Project Brief section 4.1.4.3, as well as other sustainable design requirements;

Replace with:

- b) Integrate their **LCCA** and component-based **LCA** with the design of building components and systems, in accordance with Project Brief section 4.1.4.3, as well as other sustainable design requirements;

At section 1.4.8.1 50% Schematic Design

Section 1.4.8.1 50% Schematic Design has been deleted and replaced with:

Geotechnical and environmental Site characterization by the GEICs, materials testing, the Design Team's multi-disciplinary investigations and analyses will inform the various structural/seismic and building envelope design options.

The Design Team is to fully develop four enhanced sustainability options following the PSPC GHG Options Analysis Methodology by 50% SD. The four enhanced sustainability options to investigate for GHG emission reduction opportunities are outlined in Appendix J – Guideline Project GHG Options Analysis Methodology.

Detailed rationale, scope, and cost estimates are to be included for each option. The whole-building energy analysis and energy Model will support the LCCA by providing estimated annual energy costs, and GHG emissions (\$300/ton to be considered in LCCA). The Design Team is to provide the DR a recommendation as to which enhanced sustainability option to further develop in the DD and in the DP stage.

LC prepared a Project-specific security design brief to outline security requirements and support and inform SD option development by all Design Team disciplines. The Design Team's detail Cost analysis and estimates of security design requirements and options will support the DR's decision-making of security design requirements.

Integral to all SD options are Site exterior lighting, security and circulation systems, universal accessibility, sustainable development strategies including components, systems, and design certification targets/components/systems, operational and functional aspects and visitor screening. A strategy for Site signage and way finding is to initially focus on the transition of the Site to construction operations for the duration of the Project and eventually include the long-term final signage and way

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

finding solution. The Design Team is to present the initial Site signage strategy for transition to construction operations with the 50% SD submission.

Immediately following the 50% SD submission, a value engineering (VE) workshop is to be undertaken by the Design Team and the DR to determine the Cost-benefit of each SD option.

Numerous workshops focused on individual subjects will provide the Design Team essential information to refine and integrate system concepts, construction estimates and sequencing options.

The Consultant is to present the 50% SD options to the NCC's staff for advice and feedback. Presentations are to include the building massing with all related architectural and Site features and impacts.

The Design Team is to integrate the NCC's comments into the next SD submission.

At section 1.4.8.2 90% Schematic Design, 4th paragraph

Delete:

A whole-building LCA, using the Athena [Impact Estimator for Building](#), to evaluate environmental impact reduction opportunities and whole-building energy analysis and energy Model meeting the ASHRAE 140 Standard are required to be 100% complete with the 90% SD submission, in accordance with Project Brief section 4.3.5—Sustainability.

Replace with:

A whole-building energy analysis and energy Model produced with a software that meets the ASHRAE 140 Standard are required to be 100% complete with the 90% SD submission, in accordance with Project Brief section 4.3.5—Sustainability.

At section 1.4.9.1 50% Design Development, 2nd paragraph

Delete:

Based on the recommended SD option, the Design Team is to fully develop two enhanced sustainability options by 50% DD. The two enhanced sustainability options are to include detailed rationale, scope, and estimates for each option and be based on whole-building LCA, using the Athena [Impact Estimator for Building](#) and whole-building energy analysis and energy Model. The Design Team is to provide the DR a recommendation as to which enhanced sustainability option to further develop in the DD and in the DP stage.

At section 1.4.11 Work Restrictions and Sequencing

Delete:

Solicitation No. - N° de l'invitation
l'acheteur

EP938-212564/A

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

20212564

Amd. No. - N° de la modif.

003

File No. - N° du dossier

FE178.EP938-212564

Buyer ID - Id de

fe178

CCC No./N° CCC

-
- a) Environmental control;
 - b) Commissioning and seasonal commissioning;
 - c) Scheduling restrictions;
 - d) Sequence of work;
 - e) Construction safety;
 - f) Hours of work;
 - g) Delivery of equipment/materials;
 - h) Waste disposal;
 - i) Air monitoring;
 - j) Scaffolding;
 - k) Temporary services;
 - l) Noise;
 - m) Welding;
 - n) Security clearances, security of information and physical security of personnel, equipment and the work;
 - o) Shutdown of services;
 - p) Storage;
 - q) Parking;
 - r) Access restrictions to site and building(s) during enabling projects, construction, and post-construction;
 - s) Fire watch;
 - t) Site plan showing limits of work and staging areas;
 - u) Washrooms and lunchrooms; and
 - v) Any other element related to the implementation of the work.

Replace with:

- a) Environmental control;
- b) Collecting embodied carbon data of specific structural materials (through EPDs or equivalent)
- c) Commissioning and seasonal commissioning;
- d) Scheduling restrictions;

Solicitation No. - N° de l'invitation
l'acheteur

EP938-212564/A

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

20212564

Amd. No. - N° de la modif.

003

File No. - N° du dossier

FE178.EP938-212564

Buyer ID - Id de

fe178

CCC No./N° CCC

-
- e) Sequence of work;
 - f) Construction safety;
 - g) Hours of work;
 - h) Delivery of equipment/materials;
 - i) Waste disposal;
 - j) Air monitoring;
 - k) Scaffolding;
 - l) Temporary services;
 - m) Noise;
 - n) Welding;
 - o) Security clearances, security of information and physical security of personnel, equipment and the work;
 - p) Shutdown of services;
 - q) Storage;
 - r) Parking;
 - s) Access restrictions to site and building(s) during enabling projects, construction, and post-construction;
 - t) Fire watch;
 - u) Site plan showing limits of work and staging areas;
 - v) Washrooms and lunchrooms; and
 - w) Any other element related to the implementation of the work.

At section 2.3.1 Approved Design Principles

Delete:

5. b) Includes defining characteristics such as:

- i. Design for carbon neutral and net-zero ready facilities
- ii. Climate-resiliency in facility lifecycle design;
- iii. Achieving specific health and wellness goals; and
- iv. Design for high performance operations;

Replace with:

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

5. b) Includes defining characteristics such as:

- i. **Design facilities to net zero carbon or net-zero carbon ready**
- ii. Climate-resiliency in facility lifecycle design;
- iii. **Achieving specific construction material requirements;**
- iv. Achieving specific health and wellness goals; and
- v. Design for high performance operations;

Delete:

7. b) Implements a holistic, building automation strategy based on data, predictive building maintenance, and a sustainable approach to improve ~~to~~ building performance and occupant comfort.

Replace with:

7. b) Implements a holistic, building automation strategy based on data, predictive building maintenance, and a sustainable approach to improve building performance and occupant comfort.

At section 2.6.1 Description, 1st paragraph

Delete:

Located at 1200 Montreal Road, the ~~NCR~~ campus is a large complex of multi-use and specific-use buildings located on the east side of Ottawa, Ontario.

Replace with:

Located at 1200 Montreal Road, the **NRC** campus is a large complex of multi-use and specific-use buildings located on the east side of Ottawa, Ontario.

At section 3.2 Design Excellence

Delete:

- e) Provide a robust, durable base building ~~rehabilitation~~ that meet or ~~exceed life-cycle requirements and~~ CSA S478-2019 guidelines for durability in buildings and withstand future environmental conditions and extreme weather events due to a changing climate.

Replace with:

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

-
- e) Provide a robust, durable base building that meets or exceeds CSA S478-2019 guidelines for durability in buildings and withstands future environmental conditions and extreme weather events due to a changing climate.

At section 3.3 Sustainability

Delete:

- a) Deliver the TSTS hub with a minimum ~~30%~~ reduction in operating energy as compared to the ~~2017~~ National Energy Code of Canada for Buildings, targeting net-zero carbon;
- ~~b) Obtain industry recognized green building certification of LEED Gold or better and Fitwel 2 Star or better, or equivalent certifications;~~
- c) Meet or exceed requirements outlined in the ~~2019 to 2022 Federal Sustainable Development Strategy, 2020-2023 Departmental Sustainable Development Strategy, TBS Greening Government Strategy and its Real Property Guidance~~, PWGSC Real Property Sustainability Framework Handbook, PWGSC Real Property Sustainable Development and Environment Strategy, and the [PWGSC Technical Reference For Office Building Design](#);
- d) Support BOMA BEST Gold, LEED EB: O&M Gold, or equivalent operational performance; and
- e) Anticipate and integrate sustainability requirements that are reasonably foreseen to be common place by the time the Project is completed, such as charging capacity for more electric cars.

Replace with:

- a) Deliver the TSTS hub with a minimum ~~30%~~ **28%** reduction in operating energy as compared to ~~the latest version of the~~ National Energy Code of Canada for Buildings, targeting net-zero carbon;
- b) Meet or exceed requirements outlined in the [TBS Greening Government Strategy](#), ~~Placemat – Baseline Greening Commitments Real Property Assets 2021~~, PWGSC Real Property Sustainability Framework Handbook, PWGSC Real Property Sustainable Development and Environment Strategy, and the [PWGSC Technical Reference For Office Building Design](#);
- c) Support BOMA BEST Gold, LEED EB: O&M Gold, or equivalent operational performance; and
- d) Anticipate and integrate sustainability requirements that are reasonably foreseen to be common place by the time the Project is completed, such as charging capacity for more electric cars.

At section 4.1.4.1 Preliminary Building Management Plan

Delete:

- a) Annualized Costs for each utility (i.e., ~~heating, cooling,~~ electricity, water, sewer, and gas), expressed in total dollars per year and total dollars per gross square meter;

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

Replace with:

- a) Annualized Costs for each utility (i.e., electricity, water, sewer, and gas), expressed in total dollars per year and total dollars per gross square meter;

At section 4.1.4.3 Life-Cycle Cost Analysis, 4th and 5th paragraphs

Delete:

Moreover, in accordance with the PWGSC's sustainable development commitment, ~~life-cycle assessment (LCA) and~~ LCCA ~~are~~ methods for assessing the total cost of facility ownership, accounting for all Costs of acquiring, owning, and disposing of a building or building system to maximize net savings and best value to the Crown.

The Design Team is required to undertake a ~~life-cycle assessment (LCA) and~~ life-cycle Cost analysis (LCCA) of each Schematic Design option, ~~each sustainability performance strategy,~~ during DD, at the end of building fit-up DPs, and during post-construction. Incorporate into the ~~LCA and~~ LCCA, for each defined building system, their components, and selection of durable, low-carbon, low-energy materials:

Replace with:

Moreover, in accordance with the PWGSC's sustainable development commitment, a LCCA ~~is a~~ method for assessing the total cost of facility ownership, accounting for all Costs of acquiring, owning, and disposing of a building or building system to maximize net savings and best value to the Crown.

The Design Team is required to undertake a life-cycle Cost analysis (LCCA) of ~~each sustainability performance strategy,~~ each Schematic Design option, during DD, at the end of building fit-up DPs, and during post-construction. Incorporate into the LCCA, for each defined building system, their components, and selection of durable, low-carbon, low-energy materials:

Delete:

- b) ii. Energy Costs over a 40-year period using a carbon shadow price of \$300/metric tonne of GHG ~~of embodied carbon dioxide~~ (CO²e);

Replace with:

- b) ii. Energy Costs over a 40-year period using a carbon shadow price of \$300/metric tonne of GHG (CO²e);

At section 4.3.2 Environmental

Delete:

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

vii. Development, Monitoring, and reporting of a construction activity pollution plan that outlines the measures and methods to prevent environmental impact from construction activities and environmental measures such as control dust, decontamination procedures; ~~and~~

viii. All applicable investigations, enabling projects, and possibly pre-construction work.

Replace with:

vii. Development, Monitoring, and reporting of a construction activity pollution plan that outlines the measures and methods to prevent environmental impact from construction activities and environmental measures such as control dust, decontamination procedures;

viii. Collection of embodied carbon data in structural materials via Environmental Production Declarations (EPDs) document or equivalent; and

ix. All applicable investigations, enabling projects, and possibly pre-construction work.

At section 4.3.3.1 Landscape Architecture

Delete:

- l) Sustainable and maintainable systems that will reduce operating Costs;

Replace with:

- l) **Climate resilient**, sustainable and maintainable systems that will reduce **capital and** operating Costs;

At section 4.3.5 Sustainability

Section 4.3.5 Sustainability has been deleted and replaced with:

The Project sustainability strategies are required to integrate holistic sustainability evaluation. This evaluation includes GHG options analysis, energy efficiency, water, waste, embodied carbon, improvements to the extent possible for laboratory process such as green chemistry, sash management, laboratory waste reduction, and all other relevant sustainability requirements to meet the objectives prescribed in Project Brief section 3.3—Sustainability, while balancing all other Project objectives.

The scope includes:

- a) The Design Team choosing the most appropriate sustainability certification rating system for the Project,

**Solicitation No. - N° de l'invitation
l'acheteur**

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

**Client Ref. No. - N° de ref. du client
- FMS No./N° VME**

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

-
- b) The Design Team producing a sustainable development strategy that will identify and develop integrated design and construction sustainability strategies which incorporate refrigerants with low global warming potential, define and update the benefits and complexities of one sustainability approach over another throughout Project implementation, and document expected sustainability performance per building component/system and summarize applicable sustainability rating(s) in a sustainability scorecard for the chosen rating tool;
 - c) The estimated energy consumption and GHG emissions of science process loads (i.e., process energy use) are to be included in the total base building operating energy use or carbon emissions, such that the energy performance target (28% less than latest version of the National Energy Code for Buildings) is achieved for the base building operating energy use excluding process energy use. Net zero carbon is targeted for the building; TSTS occupant science process loads may be excluded from net zero carbon requirement if client Department obtains exemption from Treasury Board Secretariat Centre of Greening Government;
 - d) The Design Team undertaking a climate change risk and vulnerability assessment (CRiVA) to identify future risks and vulnerabilities related to climate change and incorporating adaptation measures into the design to mitigate the risks that are moderate to high. A detailed scope of work to conduct CRiVA is provided in Appendix K – TSTS Template Scope of Work Climate Risk Vulnerability Assessment (CRiVA);
 - e) The Design Team collecting and disclosing embodied carbon data of structural materials prioritizing concrete. Guidance to disclose on embodied carbon will be provided by a Government representative to the Consultant at contract awarding;
 - f) The Design Team integrating low carbon concrete solutions choosing products which have a carbon footprint 10% less than the industry average (per strength class). Guidance to use low carbon concrete will be provided by a Government representative to the Consultant at contract awarding;
 - g) In collaboration with the DR, the Design Team undertaking whole-building energy analysis and creating an energy Model using software that complies with ASHRAE 140 Standard, 100% complete by 90% SD, fully updated at 50% DD and at completion of all building fit-up DPs, and again before handover to Canada, using software approved by the DR, to evaluate design options and sustainability performance strategies through multiple simulations leading to a combination of best-value measures to optimize energy performance and maximize GHG reduction;
 - h) Development of four enhanced sustainability performance options as per Appendix J – Guideline – Project GHG Options Analysis Methodology, completed by 50% SD. The Design Team's detailed Cost analysis for two complete, distinct and viable options at 100% SD, and the proposed optimized recommended option, will be a fundamental input to the Design Team's recommendation of which enhanced option is to be brought forward for further development in the DD stage and within individual DPs;

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

-
- i) In collaboration with the DR, the Design Team undertaking LCCA in accordance with Project Brief section 4.1.4.3, 100% completed by 90% SD, fully updated at 50% DD, and again before handover to Canada;
 - j) Defining building and energy performance and NRC's ongoing operations and maintenance and reporting requirements after handover to Canada, in accordance with Project Brief section 4.1.4; and
 - k) Applying for, follow-up on, and obtaining the sustainable design/construction certification(s) before Project Completion.

At section 4.3.6 Building Envelope

Delete:

- a) Comprehensive design to meet the NBCC, PWGSC sustainability requirements, security design requirements and, where possible, to exceed the National Energy Code of Canada;

Replace with:

- a) Comprehensive design to meet the NBCC, PWGSC sustainability requirements, security design requirements and, where possible, to exceed the **prescriptive requirements of the** National Energy Code of Canada;

Delete:

- g) Establishing building envelop commissioning and performance requirements, per subsystem, undertaking thermographic scans envelope and whole building air tightness testing to provide hard data regarding the performance of the building envelope, and certifying envelope performance; and

Replace with:

- g) Establishing building envelope~~e~~ commissioning and performance requirements, per subsystem, undertaking thermographic scans envelope and whole building air tightness testing to provide hard data regarding the performance of the building envelope, and certifying envelope performance; and

At section 4.3.12.1 Design Team's Scope

Delete:

- d) Developing full LCA economic Cost analysis in accordance with Project Brief sections 4.1.4.3-Life-Cycle Cost Analysis and paragraphs e) and h) of Project Brief 4.3.5—Sustainable Design, including development of discounted cash flows and sensitivity analysis. In advance of performing each

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

LCA, confirm with the DR the LCA methodology(ies), calculation format, and all assumptions (e.g., escalation and discount rates, component repair/replacement frequency);

Replace with:

- d) Developing full **LCCA** economic Cost analysis in accordance with Project Brief sections 4.1.4.3- Life-Cycle Cost Analysis and paragraphs e) and h) of Project Brief 4.3.5—Sustainable Design, including development of discounted cash flows and sensitivity analysis. In advance of performing each **LCCA**, confirm with the DR the **LCCA** methodology(ies), calculation format, and all assumptions (e.g., escalation and discount rates, component repair/replacement frequency);

At section 6.3 Specialist Consultant Services

Section 6.3 Specialist Consultant Services has been deleted and replaced with:

- a) Program and project management specialist(s) whose role will be to manage, coordinate and direct the Design Team, with experience in design and construction management of large projects (i.e., greater than \$100M, taxes excluded, in Canadian currency, in construction cost);
- b) Building code, life safety and fire protection, and accessibility specialist(s);
- c) Laboratory design and programming specialist;
- d) Building Information Modelling (BIM) specialist(s) with experience in 6D BIM (sustainability and energy Modelling analysis) and 7D BIM (facility management information);
- e) Building science specialist(s);
- f) Security specialist(s), both physical and electronic systems, with experience in:
 - i. Defining facility-wide design, construction, organizational and operational requirements and processes for high-security facilities;
 - ii. The design, construction, and operation of central command centres;
 - iii. Facility-wide biometric data systems with biometric recognition/identification (i.e., physiological and behavioural technologies, etc.); and
 - iv. Site and building-wide access control and surveillance systems;
- g) Information Technology (IT) specialist(s) with experience in the design and construction data centres and facility-wide secure computer systems and networks;
- h) Audio-visual specialist(s) with significant experience in:
 - i. The design and construction of high-technology-related facilities (i.e., 3 to 5 projects each with an AV budget valued at \$1 million CAD or greater),

**Solicitation No. - N° de l'invitation
l'acheteur**

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

**Client Ref. No. - N° de ref. du client
- FMS No./N° VME**

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

-
- ii. The design and construction of a conference rooms and public assembly spaces; and
 - iii. Defining requirements for and leading architectural teams in the integration of audio-visual requirements which include, but are not limited to,
 - 1. Internet protocol television distribution (IPTV);
 - 2. Unified communication systems (e.g., MS Teams, etc.); and
 - 3. Local area network configuration and implementation;
 - i) Sustainable design specialist(s) (i.e., certified professional(s) with a valid LEED AP or equivalent industry recognized professional accreditation) with experience in:
 - i. Defining, coordinating, and documenting high sustainable performance for buildings and sites;
 - ii. Net-zero- carbon design;
 - iii. Smart laboratory solutions;
 - iv. Evaluation of design solution for embodied carbon using life cycle assessment;
 - v. Evaluation of design solutions on occupant health, well-being, and productivity; and
 - vi. Construction and industry-recognized green building certification requirements;
 - j) Climate Risk and Vulnerability Assessment specialist(s) including, but not limited to, Climate and Climate Adaptation specialists, built environment professional specialists and a risk analyst;
 - k) Intelligent building systems specialist(s) with experience in smart laboratory/building design and operation;
 - l) Air flow Modelling, zonal Modelling, computational fluid dynamics Modelling/analysis, wind dispersion modelling, and energy simulation Modelling specialist(s) with experience in zero net energy building design and construction;
 - m) Signage and way finding specialist(s);
 - n) Vertical transportation specialist(s);
 - o) Transportation and traffic specialist(s);
 - p) Property/asset management specialist(s) with management experience in developing whole-facility operating budgets and establishing operations teams and maintenance contracts. The property/asset management specialist is independent from the third-party commissioning specialist;
 - q) Dedicated commissioning specialist(s) with experience in development and execution of enhanced, whole-facility commissioning plans for projects of a similar scale, which

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

include architectural, building envelope, engineering, and who's firm and personnel mandates for this Project do not include the design of building systems;

- r) Acoustics specialist(s) with acoustic design, construction and measurement experience for speech security and speech intelligibility in executive offices, boardrooms and meeting rooms, hard-surface halls and auditorium-type assemblies;
- s) Industrial engineering/material handling specialist(s) with experience in optimizing complex processes and systems involved in the short-distance movement of goods within the confines a building and a transportation vehicle, creating systems which coordinate the useful use of equipment and people; and
- t) Professional Quantity Surveyor(s) with experience in developing estimates for complex laboratory and scientific components and systems, undertaking whole-building life-cycle assessment, and undertaking building component-based life-cycle Cost analysis.
- u) Industrial Hygiene specialist

At section 11.9 Sustainability Analysis

Section 11.9 Sustainability Analysis has been deleted and replaced with:

The Design Team must analyse the sustainability requirements for the Project, as part of the PD report, which includes:

- a) Identifying government policies and objectives, environmental considerations or other requirements that would influence the Project sustainability strategy;
- b) Establishing a sustainability vision for the Project and sustainability principles that govern all design disciplines;
- c) Defining the rationale for and select the most appropriate sustainability certification rating system for the Project;
- d) Undertaking a climate change risk and vulnerability assessment (CRiVA) to identify present and future risks and vulnerabilities related to climate change based on a methodology that conforms to ISO 31000 Risk Management, such as the Engineers Canada's [Public Infrastructure Engineering Vulnerability Committee](#) (PIEVC) protocol or equivalent. Include in the assessment:
 - i. Current and projected climate conditions for the next 60 years;
 - ii. Effects from changes in local climate conditions and potential extreme weather events (e.g., temperature, precipitation, flooding, wind, slow onset hazards, other hazards);
 - iii. Potential design and adaptation measures must take into account:
 - 1. Accelerated deterioration (reduced durability) of the TSTS hub and its landscape; and

**Solicitation No. - N° de l'invitation
l'acheteur**

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

**Client Ref. No. - N° de ref. du client
- FMS No./N° VME**

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

-
2. Extreme weather events (e.g., increased snow load and slow onset impacts such as heatwaves, cold snaps, changes to water supply, more freeze-thaw cycles); and
- iv. Changes to the scope and frequency of building and Site operations and maintenance activities and cyclical repairs (i.e., minor capital works). Identify said changes in the development of Project Brief sections 11.14, 12.3.11, 13.2.11, 14.3.12—Commissioning and Property Management, in accordance with Project Brief section 4.1.4—Operating Requirements;
- Refer to detailed scope of work in Appendix K for more information on how to conduct the CRiVA.
- e) Identifying and developing preliminary design and construction sustainability strategies, benefits and complexities of potential design/construction approaches, and:
- i. Assessing the use of mass timber construction in whole or in part for building elements;
- ii. Summarizing potential sustainability credits in the sustainability scorecard for the chosen rating tools; and
- iii. Not limiting sustainability strategies by or only to credits identified in the chosen rating tools, as rating tools are only a guide to verify an industry recognized level of performance and do not define the Project sustainable design or its delivery;
- f) Developing an initial base building energy Model, based on preliminary sustainability and energy efficiency strategies identified by the FRAMEWORK consultant team, calibrating the energy Model accordingly;
- g) Confirming the assumptions regarding inflation and discount rates, fuel cost escalations, TSTS hub alteration improvement and demolition, recycling and disposal, in accordance with Project Brief section 4.1.4.3—Life-Cycle Cost Analysis;
- h) Confirming the scope, assumptions, and analysis process(es) for whole-building energy analysis, and producing energy Models with software meeting the ASHRAE 140 Standard, using software approved by the DR, to evaluate SD options and determine best-value measures for optimal energy performance. Integrate energy analysis and energy Models with Project Brief section 4.1.4.3—Life-Cycle Cost Analysis;
- i) Obtaining from the DR conversion information/factors to determine GHG emissions based on SD energy analysis and the energy Models;
- j) Input to the development of the Consultant's quality management plan in accordance with Project Brief section 10.2.1.2—Quality Management Planning;
- k) Develop preliminary budgets for sustainability strategies;
- l) Providing an overview of the guidance and education requirements for all building occupants (i.e., occupant employees and managers, operations and maintenance staff, third-party contractors, etc.) related to all proposed sustainability features within the building and Site; and

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

-
- m) Defining 'green' cleaning procedures, materials, and services for the Project Site and CM's control (i.e., waste collection, storage and pick-up requirements, cleaning, recycling and composting), etc.

At section 11.16 Pre-Design Deliverables

Delete:

- h) viii. Sustainability analysis including, among other requirements, the climate change risk assessment, the scope, assumptions, and ~~analysis process(es) for whole-building LCA,~~ whole-building energy analysis and Modelling, and complete the LCA and LCCA in accordance with Project Brief section 4.1.4.3;

Replace with:

- h) viii. Sustainability analysis including, among other requirements, the climate change risk assessment, the scope, assumptions, and whole-building energy analysis and Modelling, and complete the LCA and LCCA in accordance with Project Brief section 4.1.4.3;

At section 12.3.6 Sustainability

Section 12.3.6 Sustainability has been deleted and replaced with:

The Design Team must fully develop the sustainable development strategy by 50% SD which supports the TSTS occupants' functional program and the sustainability objectives in accordance with Project Brief section 3.3—Sustainability.

The Design Team must:

- a) Reaffirm the sustainability vision, objectives, priorities, and principles that govern all design disciplines;
- b) Not be limited by or only to credits/measures identified in the chosen sustainability rating tools, but excluding the use of carbon credits and off-sets available from other jurisdictions;
- c) Explore innovative opportunities beyond those defined in the rating tools and credits where compliance proves too challenging but whose intent can be met anyway;
- d) Meet the [TBS Greening Government Strategy](#) and follow the GHG Options Analysis Methodology, as outlined in Appendix J.
- e) Integrate climate adaptation measures into the design in order to mitigate present and future climate change risks;
- f) Balance the requirements of chosen rating tools with other Project requirements including the functional program, LCCA, energy performance, and environmental life-cycle impacts, to

**Solicitation No. - N° de l'invitation
l'acheteur**

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

**Client Ref. No. - N° de ref. du client
- FMS No./N° VME**

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

confirm pragmatic recommendations supportive of a sustainable strategy that is best suited for this Project and its Site;

- g) Develop in detail design and construction sustainability strategies and explain:
- i. The types of sustainable construction and design strategies to be pursued and the resulting sustainability scorecard for the chosen rating tool;
 - ii. The measures to address a changing climate and future conditions and extreme weather events;
 - iii. Ongoing operations and maintenance and reporting requirements in accordance with Project Brief sections 11.14 and 12.3.11—Commissioning and Property Management;
 - iv. Collection of embodied carbon data from concrete used in structural components, for disclosure purpose;
 - v. Reduction of embodied carbon in concrete by a minimum of 10% compared with the industry average carbon footprint by strength class;
 - vi. Identification of the biggest contributors to the building environment footprint over its life cycle to inform necessary design changes that have the most meaningful and efficient improvement to the overall environmental footprint;
 - vii. Operational energy data resulting from the energy Models;
 - viii. Document all assessment inclusions, exclusions and assumptions;
 - ix. How the strategy is to be re-evaluated/updated in subsequent Project stages; and
 - x. Through comparative analysis, the benefits, drawbacks, complexities of one sustainability approach over another, and:
 1. Provide the CM with detailed information and assumptions for each sustainability strategy for the Cost, schedule, and risk analysis and the Design Team's develop of sustainability-related estimates and timelines for construction; and
 2. Indicate the associated Cost and time implications per strategy;
- h) Per SD option, complete a whole building life-cycle energy Model to determine the impact climate change on the projected building energy use, which includes:
- i. Evaluating design options through multiple energy simulations/Modelling;
 - ii. Determining the best design options and operational sequences, or combination of options and sequences which best enable the Project to optimize energy performance and achieve net zero carbon. Include in energy simulations/Modelling:
 1. Generation of renewable energy on Site such as solar, heat recovery, passive technologies, and thermal storage, if pragmatic;

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

-
2. Robust, durable building components/systems which can withstand future environmental conditions and extreme weather events due to a changing climate;
 3. Use of alternative fuels for emergency power systems; and
 4. Use of battery technologies in lieu of traditional emergency power and UPS systems;
- iii. Special Modelling runs and detailed energy Models of building components to support design decisions, such as maximizing the thermal performance of envelope assemblies, identifying any limitations including impact on durability of materials, environmental life-cycle impacts, and structural limitations;
 - iv. Determining GHG emissions per Model run using the conversion information/factors provided by the DR; and
 - v. Document all energy Model inclusions, exclusions and assumptions;
- i) In conjunction with the DR and building occupants, identify whether full-time or part-time operating personnel are required to operate and maintain building systems and related equipment and if specialized personnel retained through maintenance contracts are required for on-going operations. Indicate the types and estimated annual Cost per maintenance contract;
 - j) Per SD option, perform the LCCA to maximize net savings and best value to the Crown in accordance with Project Brief section 4.1.4.3—Life-Cycle Cost Analysis.
 - k) Confirm that all SD design options, and the final approved option with adjustment/changes made during the SD phase, support the sustainability objectives and meet the minimum sustainability performance requirements for the Project; and
 - l) Identify any incremental increase in the Construction Cost Estimate and the projected life-cycle operating Costs, as well as payback calculations to determine the return on investment for each design option recommendation. Document inclusions, exclusions and assumptions.

At section 12.3.12 Cost

Delete:

- g) Complete ~~LCA and~~ LCCA per submission, per option, as described Project Brief sections 12.3.6—Sustainability and 4.1.4.3—Life-Cycle Cost Analysis;

Replace with:

- g) Complete LCCA per submission, per option, as described Project Brief sections 12.3.6—Sustainability and 4.1.4.3—Life-Cycle Cost Analysis;

At section 12.6 Schematic Design Deliverables

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

Delete:

m) xiv. 2. Complete ~~LCA and~~ LCCA per submission, per option;

Replace with:

m) xiv. 2. Complete LCCA per submission, per option;

At section 13.2.4 Site

Delete:

- a) For sustainability sub-options A and B, as described in Project Brief section 13.2.6—Sustainability, complete revised whole building LCA using the Athena [Impact Estimator for Buildings](#) to update/verify the development of an optimal and balanced strategy that best supports the sustainability performance requirements;

At section 13.2.5.1.1 Design Details

Section 13.2.5.1.1 Design Details has been deleted and replaced with:

The Design Team must include within the DD report:

- a) As described in Project Brief section 13.2.6 Sustainability, complete PSPC GHG Options Analysis;
- b) For sustainability sub-options A and B, complete revised whole building life-cycle energy Model to update/verify the impact climate change on the projected building energy use;
- c) Detailed and coordinated design narratives for all members of the Design Team;
- d) Functional program updates (e.g., changes to room data sheets and requirements for FF&E, IT, AV, physical security and ISS, furniture and equipment storage, LVA for each science-space), including a summary of all changes with explanation of why the change was necessary, who and when each change was requested, and who and when each change was authorized;
- e) A complete design with Model-generated graphics and a narrative description including, but not limited to:
 - i. All works proposed with detailed interior and exterior Model renderings and fly-bys of selected areas (e.g., Site, laboratories, security screening);
 - ii. Colour-coded architectural floor Drawings for every floor level, confirming no conflict between the spatial layout and functional program. Include building grid lines and indicate key dimensions;
 - iii. Interior and exterior building elevations and sections of the TSTS hub to detail floor levels, room heights, corridor elevations, interior elevations of significant spaces including high

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

and mid bay laboratories, meeting rooms and other spaces, including the composition of walls, floors, roofs, foundations, windows and doors, etc. Include building grid lines and indicate key dimensions;

- iv. Reflected ceiling Drawings for all floors, including detailed ceiling requirements for specialize laboratory lighting;
- v. Confirmation of compliance with the [Accessible Canada Act](#) , [CAN/CSA B651-18](#), other applicable polices and regulations and, if necessary, proposed exemptions from the Act, standard, polices and regulations. Identify the incremental accessibility requirements beyond those mandated by CSA B651;
- vi. Architectural features, including materials, millwork, finishing details and samples sufficient to permit choice of materials and finishes;
- vii. Materials sample boards for all finishes including, but not limited to, walls, floors, and carpet colour options;
- viii. Security zones and transition areas, detailed security applications per area, and related security requirements;
- ix. Electromagnetic shielding materials, requirements and locations, coordinated with building program, fit-up, FF&E, laboratory, and electrical plans;
- x. Circulation flow for building and for the Site, respecting/supporting security zones for the public, employees, security and operations personnel, as well as furniture and equipment storage circulation routes between storage rooms and the space(s) they support;
- xi. Room numbering Drawings;
- xii. Signage and way finding for interior spaces, digital and e-signage;
- xiii. Acoustic zones, ratings for walls, doors, transfer ducts, conduits and other assemblies, and wall, door and other relevant design details, including a summary of architectural implications of acoustic and speech security/privacy requirements;
- xiv. Drawings, elevations, sections, and related details for built in furniture, fit-up, FF&E, laboratory, kitchen and other speciality equipment, and complete schedules (e.g., room, door, window, kitchen, janitorial, loading dock and other speciality equipment);
- xv. Bird-friendly building design sections, details, attachment Drawings, etc. per location;
- xvi. Services including vertical conveyancing, plumbing, HVAC, laboratory piping, fire detection and suppression, electrical, Connectivity, building automation, etc.;
- xvii. Connectivity equipment layouts, including pathways and their connection with base building systems, laboratory equipment and placement/installation details (e.g., in ceilings, walls, speciality rooms, special mounting requirements);
- xviii. Lighting and speciality lighting requirements and details;

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

-
- xix. Special construction and deconstruction requirements; and
 - xx. Area calculations that include individual and summarized listings of each building space and all the area by the type of accommodation.

At section 13.2.6 Sustainability

Section 13.2.6 Sustainability has been deleted and replaced with:

The Design Team must further develop and Model sustainable design requirements based on the approved SD sustainability strategy and submit in the DD report enhanced sustainable design requirements, which:

- a) Reaffirm the sustainability vision. Refine the sustainability principles that govern all design disciplines based on the approved SD sustainability strategy and SD design option, if necessary;
- b) Develop two sustainability sub-options by the 50% DD stage to further analyse the requirements of and changes to the approved SD design option. Each sustainability sub-option must:
 - i. Demonstrate incremental improvements in the approved SD sustainability strategy, which:
 - 1. Optimize the building envelope;
 - 2. Reduce internal loads;
 - 3. Leverage high-efficiency systems; and
 - 4. Generate renewable energy; and
 - ii. Actively contribute to the regeneration of people and have a positive impact on social liveability and ecological health;
 - iii. Integrate results from energy Modelling and LCCA to inform and evaluate strategies.
- c) Develop sub-option A, an enhanced variant of the approved SD sustainability strategy which:
 - i. Exceeds overall SD sustainability performance;
 - ii. Integrates additional measures from industry recognized health and wellness standards, such as Fitwel or WELL; and
 - iii. Further analyzes individual design strategies to improve energy performance, with detailed energy Modelling and simulations on bundled design strategies, to identify the best enhanced design option;
 - iv. Identifies and describes:
 - 1. Incremental risks and their impact to the building complex;
 - 2. Changes in building operations and maintenance requirements and frequency; and

**Solicitation No. - N° de l'invitation
l'acheteur**

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

**Client Ref. No. - N° de ref. du client
- FMS No./N° VME**

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

-
- 3. Improvements to energy, water, waste, air quality, GHG mitigation and overall environmental performance;
 - 4. Improvements to health and wellness and ecological integrity;
 - v. Evaluates design strategies for improved energy performance, further enhancing water and waste management strategies, reducing chemical use, and increasing the use of green chemistry to reduce GHG emissions in terms of Cost to GHG reduction impact; and
 - vi. With the support and input of the CM, identifies incremental increases in the Construction Cost Estimate and the projected life-cycle operating Costs, as well as payback calculations to determine the return on investment for each design strategy. Document inclusions, exclusions and assumptions;
- d) Develop sub-option B, an enriched variant of sub-option A, which:
- i. Exceeds overall sub-option A sustainability performance;
 - ii. Evaluates possible design strategies to reduce the Project energy use intensity and improve passive/renewable strategies to achieve net zero carbon;
 - iii. Evaluates the generation of on-Site carbon-free renewable energy, including geothermal and geo-exchange technologies and passive heating and cooling strategies;
 - iv. Demonstrates the greatest sustainability potential for adaptive, restorative and regenerative design solutions that improve social liveability and ecological integrity;
 - v. Further analyzes individual design strategies to improve energy performance, with detailed energy Modelling and simulations on bundled design strategies, to identify the best enriched design option;
 - vi. Identifies and describes further:
 - 1. Incremental risks and their impact to the building complex and science processes;
 - 2. Changes in building operations and maintenance requirements and frequency; and
 - 3. Improvements to energy, water, waste, air quality, GHG mitigation and overall environmental performance;
 - 4. Improvements to health and wellness and ecological integrity;
 - vii. Evaluates design strategies for improved energy performance and reduced GHG emissions in terms of Cost to GHG reduction impact; and
 - viii. With the support and input of the CM, identifies incremental increases in the Construction Cost Estimate and the projected life-cycle operating Costs, as well as payback calculations to determine the return on investment for each design strategy. Document inclusions, exclusions and assumptions;
- e) For sub-options A and B, complete revised whole building life-cycle energy Model to update/verify the impact climate change on the projected building energy use;

**Solicitation No. - N° de l'invitation
l'acheteur**

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

**Client Ref. No. - N° de ref. du client
- FMS No./N° VME**

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

-
- f) For sub-options A and B, perform the LCCA to maximize net savings and best value to the Crown in accordance with Project Brief section 4.1.4.3—Life-Cycle Cost Analysis;
- g) Based on the detailed analysis of sustainability sub-option A and B and with due consideration of the Construction Cost Estimate and the projected long-term building operating Costs, evaluate and recommend to the DR an optimized option based on the above analysis that provides the best-value sustainable design approach for the Project with or before the 50% DD submission, balancing overall functionality and all Project objectives;
- h) With the approval of the DR, integrate the approved design strategies into the 90% DD submission, updating the sustainable development strategy accordingly;
- i) Define the guidance and education requirements for all building occupants (e.g., occupant employees and managers, operations and maintenance staff, third-party contractors) related to all sustainability features within the building and Site;
- j) Provide an overview of post-construction requirements/instructions for:
- i. Embodied carbon data collection in concrete and other structural materials where possible (e.g. steel, mass timber etc.) in accordance with the Government of Canada's requirement, requiring EPDs or equivalent;
 - ii. 'Green' purchasing of materials and products (e.g., floor finishes, disinfectants, janitorial paper products, trash bags, hand soaps/sanitizers) that meet relevant product standards including Green Seal, UL EcoLogo, EPA Standards, and FSC certification;
 - iii. Operations and maintenance guidance, including cleaning materials and methods, landscape and integrated pest management practices within the building and on the Site;
 - iv. Performance expectations/requirements for energy, water, and waste;
 - v. The use of:
 - 1. Powered cleaning equipment that includes safeguards, ergonomic design and environmentally preferable batteries as applicable; and
 - 2. Vacuum cleaners that meet relevant certifications such as the Carpet and Rug Institute Seal of Approval/Green Label Vacuum Program and operate with a maximum sound level of 70 dBA or less in accordance with ISO 11201;
 - vi. Waste collection, storage and pick-up requirements, including recycling and composting, and the following operational waste reduction targets:
 - 1. Divert 75% by weight of all non-hazardous operation waste, including 75% of plastic waste and 95% of paper materials; and
 - 2. Eliminate the use of unnecessary single-use plastics in operations, events and meetings; and
- k) Apply for, on behalf of PWGSC, Project sustainability certification(s) under the industry recognized environmental performance rating systems. Prepare and include all documentation

Solicitation No. - N° de l'invitation
l'acheteur

EP938-212564/A

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

20212564

Amd. No. - N° de la modif.

003

File No. - N° du dossier

FE178.EP938-212564

Buyer ID - Id de

fe178

CCC No./N° CCC

necessary and all submissions required for said certification(s). Provide a copy of the certification application(s) to the DR with the 90% DD submission.

At section 13.2.7 Building Envelope

Delete:

- a) For sustainability sub-options A and B, as described in Project Brief section 13.2.6—Sustainability, complete revised whole building LCA using the Athena [Impact Estimator for Buildings](#) to update/verify the development of an optimal and balanced strategy that best supports the sustainability performance requirements;

At section 13.2.8 Structural and Seismic

Delete:

- a) For sustainability sub-options A and B, as described in Project Brief section 13.2.6—Sustainability, complete revised whole building LCA using the Athena [Impact Estimator for Buildings](#) to update/verify the development of an optimal and balanced strategy that best supports the sustainability performance requirements;

At section 13.2.9 Mechanical

Delete:

- a) For sustainability sub-options A and B, as described in Project Brief section 13.2.6—Sustainability, complete revised whole building LCA using the Athena [Impact Estimator for Buildings](#) to update/verify the development of an optimal and balanced strategy that best supports the sustainability performance requirements;

At section 13.2.10 Electrical

Delete:

- a) For sustainability sub-options A and B, as described in Project Brief section 13.2.6—Sustainability, complete revised whole building LCA using the Athena [Impact Estimator for Buildings](#) to update/verify the development of an optimal and balanced strategy that best supports the sustainability performance requirements;

Solicitation No. - N° de l'invitation
l'acheteur

EP938-212564/A

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

20212564

Amd. No. - N° de la modif.

003

File No. - N° du dossier

FE178.EP938-212564

Buyer ID - Id de

fe178

CCC No./N° CCC

At section 14.3.5 Site Design

Delete:

- q) Per design discipline, after completion of the 50% DP, re-running the building LCA tool using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

At section 14.3.6.1 Building Program

Delete:

- h) After completion of the 50% DP, re-running the building LCA tool using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

At section 14.3.6.2 Building Design

Delete:

- p) After completion of the 50% DP, re-running the building LCA tool using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

At section 14.3.6.3 Security Design

Delete:

- e) viii. After completion of the, or as applicable each, 50% DP, re-running the building LCA tool using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

At section 14.3.6.4 Audio-Visual Design

Delete:

- c) viii. After completion of the, or as applicable each, 50% DP, re-running the building LCA tool using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

At section 14.3.6.5 Information Technology Design

Delete:

- c) viii. After completion of the, or as applicable each, 50% DP, re-running the building LCA tool using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

At section 14.3.6.6 FF&E Design

Delete:

- m) After completion of the 50% DP, re-running the building LCA tool using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

At section 14.3.6.9 Acoustic Design

Delete:

- f) After completion of the 50% DP, re-running the building LCA tool using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

At section 14.3.7 Sustainable Design

Section 13.2.7 Sustainability Design has been deleted and replaced with:

The Design Team must further develop and Model sustainable design requirements based on the approved SD sustainability strategy and submit in a sustainability-specific DP report a detailed listing of all enhanced sustainable design performance requirements, which include:

- a) Complete and detailed all sustainable design requirements and confirm all sustainable requirements and Project-specific performance verification measures are 100% coordinated and fully detailed in individual design discipline Drawings and Specifications and based on up-to-date sustainability information in the energy Model;

**Solicitation No. - N° de l'invitation
l'acheteur**

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

**Client Ref. No. - N° de ref. du client
- FMS No./N° VME**

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

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- b) Reconfirming those materials and equipment specified reflect the sustainability analysis and energy Model established at DD;
 - c) Providing input to update the overall Project commissioning plan to confirm all sustainability requirements and performance verification measures are fully integrated;
 - d) The applicable operations and maintenance provisions as prescribed by the component/system manufacturer until handover to Canada, and as appropriate beyond handover to Canada;
 - e) Confirmation to the DR and CM that the issuance of each DP does not compromise the approval sustainability performance strategies;
 - f) After the completion of all building and fit-up DPs, run a whole-building energy Model to confirm expected post-construction energy performance and GHG emissions;
 - g) After the completion of all building and fit-up DPs, and subject to a change in the 100% DD approved Project parameters requiring revised DD funding or building program approval (i.e., change in scope, or Cost, or time, or sustainability requirements), update the LCA and the LCCA to reconfirm maximized net savings and best value to the Crown in accordance with Project Brief section 4.1.4.3–Life-Cycle Cost Analysis;
 - h) Development of Project-specific guidance and education requirements for all building occupants (i.e., occupant employees and managers, operations and maintenance staff, third-party contractors) related to all sustainability features within the building and Site;
 - i) Development of Project-specific post-construction requirements/instructions for:
 - i. Embodied carbon data collection in concrete and other structural materials where possible (e.g. steel, mass timber etc.) in accordance with the Government of Canada's requirement, requiring EPDs or equivalent
 - ii. 'Green' purchasing of materials and products (e.g., floor finishes, disinfectants, janitorial paper products, trash bags, hand soaps/sanitizers) that meet relevant product standards including Green Seal, UL EcoLogo, EPA Standards, and FSC certification;
 - iii. Operations and maintenance guidance, including cleaning materials and methods, landscape and integrated pest management practices within the building and on the Site;
 - iv. Performance expectations/requirements for energy, water, and waste;
 - v. The use of:
 - 1. Powered cleaning equipment that includes safeguards, ergonomic design and environmentally preferable batteries as applicable; and

Solicitation No. - N° de l'invitation
l'acheteur

Amd. No. - N° de la modif.

Buyer ID - Id de

EP938-212564/A

003

fe178

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

File No. - N° du dossier

CCC No./N° CCC

20212564

FE178.EP938-212564

-
- 2. Vacuum cleaners that meet relevant certifications such as the Carpet and Rug Institute Seal of Approval/Green Label Vacuum Program and operate with a maximum sound level of 70 dBA or less in accordance with ISO 11201;
 - vi. Waste collection, storage and pick-up requirements, including recycling and composting, and the following operational waste reduction targets:
 - 1. Divert 75% by weight of all non-hazardous operation waste, including 75% of plastic waste and 95% of paper materials; and
 - 2. Eliminate the use of unnecessary single-use plastics in operations, events and meetings; and
 - j) An update of the design intent brief to document the overall Project sustainability strategy illustrating the design strategies, design decisions required/taken, recommendations proposed and the resulting sustainability scorecard of the chosen rating tool and, with the input and support of the CM, the overall sustainability Cost.

At section 14.3.8 Building Envelope Design

Delete:

- o) After completion of the 50% DP, re-running the building LCA tool using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

At section 14.3.9 Structural Design

Delete:

- i) After completion of the 50% DP, re-running the building LCA tool using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

At section 14.3.10 Mechanical Design

Delete:

- l) After completion of the 50% DP, re-running the building LCA tool using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

Solicitation No. - N° de l'invitation
l'acheteur

EP938-212564/A

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

20212564

Amd. No. - N° de la modif.

003

File No. - N° du dossier

FE178.EP938-212564

Buyer ID - Id de

fe178

CCC No./N° CCC

At section 14.3.11 Electrical Design

Delete:

- j) After completion of the 50% DP, re-running the building LCA tool using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

At section 14.3.13 Cost

Delete:

- h) After completion of each 50% building and fit-up DP, LCA as described per Design Team discipline in the proceeding Project Brief 14.3 subsections;
- i) After the completion of all building and fit-up DPs, and subject to a change in the 100% DD approved Project parameters requiring revised DD funding or building program approval (i.e., change in scope, or Cost, or time, or sustainability requirements), update the ~~LCA and the~~ LCCA to reconfirm maximized net savings and best value to the Crown in accordance with Project Brief section 4.1.4.3—Life-Cycle Cost Analysis; and

Replace with:

- h) After completion of each 50% building and fit-up DP, LCCA as described per Design Team discipline in the proceeding Project Brief 14.3 subsections;
- i) After the completion of all building and fit-up DPs, and subject to a change in the 100% DD approved Project parameters requiring revised DD funding or building program approval (i.e., change in scope, or Cost, or time, or sustainability requirements), update the LCCA to reconfirm maximized net savings and best value to the Crown in accordance with Project Brief section 4.1.4.3—Life-Cycle Cost Analysis; and

At section 14.4.1 50% Complete Design Package Documentation

Delete:

- m) After completion of each building and fit-up 50% DP, LCA using the Athena [Impact Estimator for Buildings](#) to optimize the reduction of environmental impacts related to embodied and operating energy, embodied carbon, GHG emissions to air, water, and land; and

At section 17.3 Manuals

Solicitation No. - N° de l'invitation
l'acheteur

EP938-212564/A

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

20212564

Amd. No. - N° de la modif.

003

File No. - N° du dossier

FE178.EP938-212564

Buyer ID - Id de

fe178

CCC No./N° CCC

Delete:

- f) Update the design intent brief, SDB, AVDB, and ITDB to reflect seasonal commissioning adjustments. Update the rationale for all sustainable features and strategies for revisions during post-construction, the post-construction ~~LCCA and~~ energy Model, and their resulting implications for building performance and TSTS occupants (i.e., what are the changes for occupants), lessons learned to date, and final sustainability certification awarded.

Replace with:

- f) Update the design intent brief, SDB, AVDB, and ITDB to reflect seasonal commissioning adjustments. Update the rationale for all sustainable features and strategies for revisions during post-construction, the post-construction energy Model, and their resulting implications for building performance and TSTS occupants (i.e., what are the changes for occupants), lessons learned to date, and final sustainability certification awarded.

At section 17.5 Deliverables

Delete:

- e) Final, as-commissioned energy Model, ~~LCA, and LCCA~~ at or just before handover to Canada;

Replace with:

- e) Final, as-commissioned energy Model, at or just before handover to Canada;

At Appendix C – Acronyms

Insert:

EPD	Environmental Product Declaration
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At Appendix H – Deliverables Summary

Insert:

Pre-Design Services

Deliverables	Timeline	Project Brief Reference
Climate Change Risk and Vulnerability Assessment (CRIVA)	By the completion of Pre-Design Services	Section 11.9

Solicitation No. - N° de l'invitation
l'acheteur

EP938-212564/A

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

20212564

Amd. No. - N° de la modif.

003

File No. - N° du dossier

FE178.EP938-212564

Buyer ID - Id de

fe178

CCC No./N° CCC

Delete:

Post Construction Services

Deliverables	Timeline	Project Brief Reference
Rerun energy models, LCA and LCCA. Confirm energy consumption meets the DD and DP defined requirements	11 months after substantial performance	Section 17.1 Section 17.5

Replace with:

Deliverables	Timeline	Project Brief Reference
Rerun energy models. Confirm energy consumption meets the DD and DP defined requirements	11 months after substantial performance	Section 17.1 Section 17.5

3. Appendix J – Guideline – Project GHG Options Analysis Methodology

See next page for details.

Solicitation No. - N° de l'invitation
l'acheteur

EP938-212564/A

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

20212564

Amd. No. - N° de la modif.

003

File No. - N° du dossier

FE178.EP938-212564

Buyer ID - Id de

fe178

CCC No./N° CCC

APPENDIX J – Guideline Project GHG Options Analysis Methodology

4. Appendix K - TSTS Template Scope of Work Climate Risk Vulnerability Assessment (CRiVA)

See next page for details.

Solicitation No. - N° de l'invitation
l'acheteur

EP938-212564/A

Client Ref. No. - N° de ref. du client
- FMS No./N° VME

20212564

Amd. No. - N° de la modif.

003

File No. - N° du dossier

FE178.EP938-212564

Buyer ID - Id de

fe178

CCC No./N° CCC

APPENDIX H – Project Brief

Laboratories Canada - Transportation Safety and Technology Science Hub Project

APPENDIX K – TSTS TEMPLATE Scope of Work Climate Risk Vulnerability Assessment (CRiVA)

ALL OTHER TERMS AND CONDITIONS REMAIN THE SAME.