City of Cambridge

PURCHASING DEPARTMENT

Elizabeth Unger
Purchasing Agent

COLEEN CASELLA
Assistant Purchasing Agent for
Goods & Services

NATALIE SULLIVAN
Assistant Purchasing Agent for
Design & Construction

TO: **All Bidders**

FROM: **City of Cambridge**

DATE: **August 20, 2019**

RE: **File No. 8722 – Request for Qualifications for Design Services for Alterations to Cambridge Fire Headquarters - Addendum No. 2**

This addendum is comprised of:

1. **Changes to the Request for Qualifications**

   INSERT: ***Seventhwave Accelerate Performance: Building Design and Performance Requirments*** **specification (attached).**

All other details remain the same.

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Purchasing Agent

Addendum No. 2

Building Design and Performance Requirements

The City partnered with Eversource and Seventhwave to provide this document specifying architectural and MEP performance guidelines for the **Request for Qualifications for Design Services for Alteration to Cambridge Fire Headquarters**. The City's net zero emissions goals are anticipated to be met through both energy reduction and efficiency measures, in conjunction with envelope improvements. Additionally, with a focus on general sustainability goals, the City of Cambridge has a LEED Gold requirement, and has specified the use of the performance based LEED v. 4.1 targets for energy and water usage. The energy metrics identified in this accelerated performance document are focused on achieving net zero emissions. It provides information on the required annual energy target and measured substantiation. The units of energy discussed herein are thousand British thermal units per gross square feet (kBtu/gsf) of total building area as measured at the site.

1. **Project Goal List:** The project goals guide the team to prioritize their focus on the MEP and building performance design of this project. **Refining and achieving these goals will initially require team Charrettes with participation from key stakeholders beginning with programming and following through construction documents, as well as post-occupancy Measurement and Verification with recommended corrections.** The goals are categorized within three main sections: Mission Critical, Highly Desirable, and If Possible.

    A. **Mission Critical:** these are deemed critical to project success.

Meet building programmatic and functional requirements as developed during programming and as stated in the Request for Qualifications for Design Services for Alteration to Cambridge Fire Headquarters. Consider existing site conditions including weather patterns and solar exposures. An energy target of 35 kBtu/gsf annually is being proposed and will be refined through design development. This energy target is necessary to achieve for buildings with net zero emissions goals and aligns with high performing buildings in this use group.

i. LEED Gold Certified
ii. Use low materials and finishes.
iii. Envelope Improvements: reduced air infiltration and an increase in envelope thermal performance through higher insulation R values, as well as high performing fenestration. Design solutions shall be value engineered using energy modeling.
    1. Specify triple pane or double pane with equal performance: high Visual Transmittance, low U factor (window – glass & frame; .18 or better).
    2. Minimize air infiltration: Occupied spaces 0.6 ACH at 50 pascals. The Apparatus Bay may require treatment as a separate building with unique goals.
iv. Meet standard of care for ventilation (design to ASHRAE 62.1 – 2016). Include use of Energy Recovery Ventilation.
v. Execute a measurement and verification (M&V) plan including:

1. Install whole building energy meters for electric and gas service(s). Install pulse output on utility electric meter that connects to the Owner's building management system or other database on hourly or sub-hourly intervals. The database may be provided by a third party (hosted on the web) and must be accessible to designers, contractors, and operators. Database must be capable of storing data for 3 years or more.
2. Owner records notes about building occupancy and significant control changes or commissioning activities for 3 years or more for use in the measurement and verification plan.
3. Separate sub meters for all major equipment and special areas (common area lights, common area plug loads, air handlers, boilers, exterior lights, exhaust fans, etc.) Record sub meter data as described above.

vi. Minimize HVAC chases or ductwork between floors to reduce the stack effect. Each floor shall minimize air infiltration between floor levels and zones of use and shall utilized gasketing at stairwell openings to mitigate the transfer of contaminates.
vii. Achieve Energy Star certification.
viii. Provide high quality natural daylight in office and common spaces; minimize glare and discomfort caused by direct sunlight.
ix. Implement a natural ventilation strategy.

B. **Highly Desirable**: these are a high priority for the project. If not included in the final plans, the trade-offs for these items should be made clear.
   i. Proposed maximum energy target of 35kBtu/gsf annually; lower is preferred.
   ii. Add to the above measurement and verification (M&V) plan:
      1. Install an automatic fault detection and diagnostics system. Incorporate control system points, meter and sub meter data, and weather data to help identify and repair building system performance issues. Provide means to access the system from a remote location.

C. **If Possible**: these goals will influence the recommended design and are considered highly beneficial if they are included in the solution.
   i. Provide signage in common area to explain energy efficiency features to the public. Pursue relevant "LEED education" credits.

2. **Substantiation of Energy Performance Target:** This project shall strive to meet the site EUI stated in the project goals list. This requirement shall be delivered by the design and construction teams through the use of any variety of permanent energy efficiency measures utilizing on-site equipment, efficient appliances and lighting, envelope improvements, reconfiguration of use adjacencies through Programming to reduce plug loads through shared equipment and promote efficiencies in heating and cooling loads. Renewable energy systems (solar panels, etc.) and purchased renewable energy credits shall not contribute to meeting the performance targets, though they may be considered independently. The design and construction team shall be responsible for demonstrating that the goal has been achieved using at least one of the following methods:
    A. *Metered Energy Use Method*: The real whole-building energy use will be measured at the building footprint for a 12-month period. It includes all loads in the building, including lighting, HVAC, plug loads, and other miscellaneous equipment connected through the building (such as elevators, distribution transformers, control systems, sump pumps, and servers). It also includes any façade lighting and outside lighting connected through the building, and the transformers. The building site energy use intensity (kBtu/gsf) is calculated by the site energy use divided by the gross building floor area, as defined by Deru and Torcellini[1]. The 12-month data collection period will begin after initial commissioning and after the building is at least 70% occupied, but shall not start more than 4 months after project completion. The building operator will be responsible for tracking occupancy and other changes to building use that may affect energy use. The design and construction team shall deliver a report indicating whether the performance target has been achieved; if the target is not achieved, the report shall provide a comprehensive correction plan for improving performance.
    B. *As-built Energy Model Method*: The design and construction team shall deliver to the owner an energy model that accurately reflects the as-built condition of the facility at the time of project turnover. The as-built model may be similar to a LEED energy model but must include all changes to the design that occur during construction (such as changes to insulation materials, glazing products, light fixtures, HVAC equipment, or control systems). The design and construction team shall deliver a report indicating whether the performance target has been achieved; if the target is not achieved, the report shall provide recommendations for improving performance.

[1] Deru, M.; Torcellini, P. (2005). Standard Definitions of Building Geometry for Energy Evaluation Purposes. Technical Report NREL/TP-550-38600. Golden, CO: National Renewable Energy Laboratory http://www.nrel.gov/docs/fy06osti/38600.pdf

3. **Measurement and Verification Plan Overview and Intent:** A measurement and verification plan will be crucial in later phases to demonstrate that the building meets the performance goal and to maintain high levels of performance over the life of the building. An M&V narrative is required for the Final Plans. This narrative will outline:
    A. Key assumptions and methodologies for tracking performance during the design and operation, including a list of data points to be collected during the M&V phase (several of which are outlined in Sections 1A and B).
    B. In the instance that the building is not meeting the required EUI, the M&V outputs should clearly highlight which end uses are not meeting expectations. In this scenario the M&V plan will also call for a correction plan to be created.
    C. Responsible parties during the design, construction, and operation of building (see Appendix A, Table 2).
    D. Approval of the final energy performance measurement system will take place at substantial completion.

4. **Schedule and Deliverables:** The following schedule and associated deliverables have been developed to optimize the energy performance of this project. The deliverables for each review period are included below.
    A. The owner will meet with the design team to review progress at project team kickoff, 50% DD, 100% CD, Substantial completion, 12 months' post-occupancy (at a minimum). These meetings are anticipated to review the following: energy analysis update, updated design EUI, project budget, project schedule, measurement and verification update.
    B. At each progress review meeting, the design team shall provide or update the following documents:
        i. One-page narrative of the intended approach to meet the energy performance target; provide potential EUI range with this approach.
        ii. Proposed energy efficiency measures (see Appendix A, Table 1).
        iii. Predicted energy consumption by end use (see Appendix A, Figure 1).
        iv. Measurement and Verification plan narrative and scope of responsibility (see Appendix A, Table 2).
        v. Actual energy consumption (after substantial completion).
    C. Representatives from the design team shall also attend construction progress meetings and provide prompt feedback on the potential impact of design adjustments and material substitutions on the performance goals.

Appendix A: Sample Deliverables for Design Progress Meeting (referenced in Section 4.B)

The design team will be responsible for presenting and maintaining up-to-date documents that summarize the means of achieving the project performance goals. The tables and figures below are provided for reference as examples.

Table 1: Proposed energy efficiency measures

Category	Proposed energy efficiency measure: brief list of improvements
Envelope	*e.g. Final Wall and Roof thermal properties, building shape and orientation, etc.*
Windows	*e.g. Final window to wall ratio, Window U value and shading coefficient, shading, etc.*
Lighting	*e.g. Lighting power density target, daylighting controls, occupancy sensors, etc.*
HVAC - Airside	*e.g. Static pressure reduction, energy recovery, demand control ventilation, radiant heating and cooling, etc.*
Heating Plant	*e.g. Supply water temperature reduction and reset, condensing boiler, etc.*
Cooling Plant	*e.g. Water temperature reset, improved EER, chiller and tower VFD, etc.*
Plug Load	*e.g. spatial adjacencies, equipment efficiencies and locations/users, occupant behaviors/automation to power down*

Figure 1: Annual energy consumption by end use

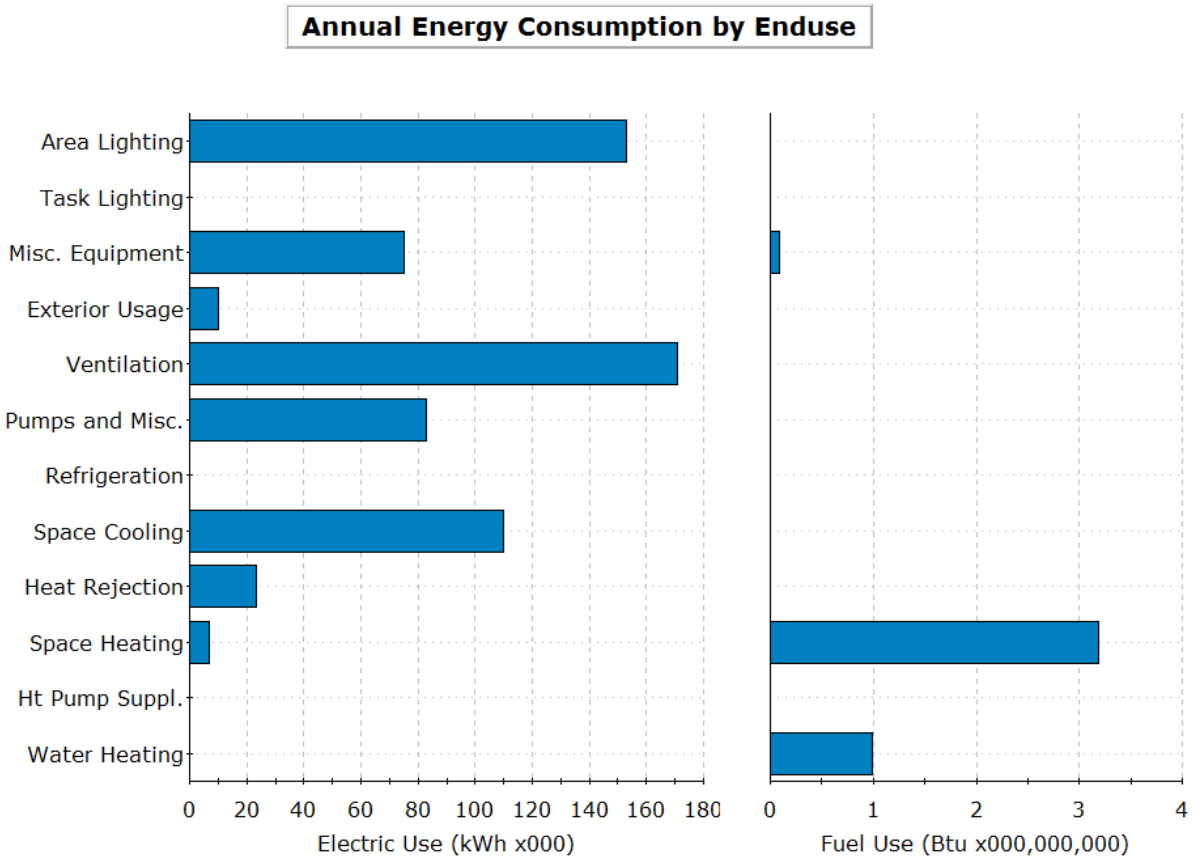

Table 2: Measurement and Verification Scope of Responsibility

Matrix Legend

■	Responsible party
X	Supporting party
	No responsibility

	Owner's Building Manager	IT Consultant	Mechanical Engineer	Electrical Engineer	Controls Engineer	Commissioning Engineer	Energy Consultant	General Contractor	Mechanical Contractor	Electrical Contractor	Controls Contractor	Dashboard Service Provider	Not applicable
Design the M&V system													
Perform a blower-door test													
Install HVAC sensors													
Install current transformers													
Low voltage wiring for sensors													
Configure meters and sensors													
Calibrate meters and sensors													
Program correct names and units													
Set up internet connectivity													
Maintain internet connection													
Administer data/information sharing													
Store data for a specified time period													
Host a public-facing web dashboard													
Install a public-facing kiosk													
Set up automatic fault detection													
Survey occupants													
Record notes about building operations													
Upload energy data to Portfolio Manager													
Upload energy data to City of Chicago													
Upload energy data to LEED													
Build a calibrated energy model													
Verify energy performance against target													