MINISTRY OF CULTURE, GENDER, ENTERTAINMENT AND SPORT

JAMAICA NATIONAL HERITAGE TRUST

TERMS OF REFERENCE

CONSULTANCY: ENGINEER FOR PROJECT TO DESIGN AIR CONDITION SYSTEM, PROCURE WORKS FOR SUPPLY AND INSTALLATION OF NEW AIR CONDITIONING SYSTEM AND PROVIDE PROJECT MANAGEMENT SERVICES AND ENGINEERING OVERSIGHT THROUGHOUT CONSTRUCTION AND DEFECTS LIABILITY PERIOD

1.0 PROJECT BACKGROUND

As part of the redevelopment of Downtown Kingston, the Jamaica National Heritage Trust has secured funding to assist with the renovation of the Ward Theatre. This phase of the renovation work is the procurement and installation of ventilation and air conditioning (VAC) system for the Ward Theatre.

The Ward Theatre was built in 1912 by Charles James Ward, Custos of Kingston, who presented it to the Mayor and Council of the City of Kingston on December 16 of the same year. Charles James Ward is the “nephew” in the company J.Wray and Nephew which provided the enabling funds.

The Auditorium is on three levels, (Parquette, Dress Circle and Gallery) with many entrances and exits. The Parquette (ground) floor slopes down to an orchestra pit at the base of a wooden stage 1.52m high, 10.36m wide and 10.07m deep. The Proscenium Arch stands at a height of 7.32m (24ft) and the fly tower is 14.63m (48ft) high.

The right wing is 6.10m wide, 10.36m deep (20ft by 34ft); left wing 3.58m wide, 9.75m deep (11ft by 9" by 32ft) and stage door 2.16m high by 2.44m wide (7ft by 8ft).
The Ward Theatre stands as a Jamaican landmark and a showcase for the nation's culture.

**Ward Theatre information retrieved from http://www.wardtheatrefoundation.com

2.0 PROJECT SCOPE - GENERAL

The following scope of services is included as a guide for the proposer. It is designed to identify the minimum service level expected from the successful consultant and as such should be augmented as necessary, in order to complete the project and deliver the performance requirements.

The consultant shall provide engineering services in accordance with the following and other relevant codes, standards, and guidelines applicable in the design for Public Theatre Facilities.

1. 2013 ASHRAE Handbook – Fundamentals.
2. 2015 ASHRAE Handbook – HVAC Applications.
3. 2012 ASHRAE Handbook – HVAC System and Equipment.
4. Jamaica Bureau of Standards JS 21 or later applicable code
5. NFPA 70 – National Electrical Code – 2014.
6. NFPA 101 Life Safety Code.

Consulting services is required to be carried out in three distinct phases; namely: Engineering Assessment Phase; Pre-Construction Contract Phase and Post-Construction Contract Phase. It shall be the Consultant's responsibility to provide all of the design elements for this project. Under no circumstance may they delegate the responsibility of the design; or portions thereof, to the Contractor unless specifically allowed in this Scope of Work.

For each phase, the Consulting firm shall conduct an appropriate number of review meetings with stakeholders so they may determine if the project meets their requirements, question any aspect of the contract deliverables, and make changes where appropriate.

The following services are included under the respective phase:

1. VAC System Assessment
    1.1. Pre-Design Evaluation.
    1.2. Preliminary Cost Estimating and Budgeting.
2. Pre-Construction Contract
    2.1. Preliminary (Schematic) Design.
    2.2. Detail Design (Design Development) and Contract Documents.

2.3. Bidding/Award.

3. Post-Construction Contract

   3.1. Construction Contract Administration.

   3.2. Commissioning performance reporting.

3.0 PRELIMINARY COST ESTIMATING AND BUDGETING

The business case for engaging consulting services and embarking the design of the VAC System is primarily to restore the functionality of the system and comply with codes, standards and best practice guidelines. Given that **Goals #1** as articulated in the **National Energy Policy 2009-2030**; and international trends in sustainability designs, the required approach by the consultant shall be to:

1. Perform a preliminary "simple box" energy modelling analysis or use other means to estimate the cooling load demand. The results should summarize the components contributing to the cooling load such as lighting, envelop, ventilation etc.

2. Assess and present methods that will reduce the cooling load demand, such as energy efficient lighting upgrades, modifying the building envelop attributes (e.g. window films, roof insulation). These strategies are normally more cost effective than the higher capital outlay required for increased VAC system capacity that would result in increased life cycle costs (LCC).

3. Assess and present options for the system of VAC to be recommended

4. Assess and present options for optimizing the energy efficiency of the VAC systems by exploring appropriate technologies including but not limited to: demand control ventilation (DCV); energy recover ventilators; variable air volume (VAV) control; variable primary and variable secondary chilled water flow control etc.

It is proposed that selection of the most appropriate solution be based on the result of a life cycle costing analysis and capacity in the budget of the Government of Jamaica to accommodate the capital outlay. Preliminary

costing for the various options must therefore be developed and presented to the **key stakeholders** for approval, prior to embarking on detailed design.

4.0 PRE-CONSTRUCTION CONTRACT

Preliminary (Schematic) Design

1. Meet with stakeholders to understand, clarify and incorporate additional stakeholders' requirements in the design.

2. Develop Basis of Design (BOD) document outlining information, including: name, function, size of each zone; environmental, building envelop, thermal, acoustical, site specific conditions; schedule of lighting, occupancy, internal equipment, appliances, and processes; noise criteria; assumptions and other parameters and standards that will influence the design.

3. Estimate electricity demand and make recommendations for applying newer energy saving strategies. Identify required improvements.

4. Compile information necessary to conduct LCC analysis including fuel cost data; cash discount rate etc. Present this information to the stakeholders for acceptance.

Detail Design (Design Development) & Construction Document

1. Meet with stakeholders to incorporate any additional requirements in the design. Based on feedback from these meetings, document the operational requirements at the Theatre and include this in the Construction Contract documentation in order to minimize disruption during the construction works.

2. Using a computer-based calculation software or similar method, determine the cooling load demand in accordance with ASHRAE non-residential Cooling and Heating Load Calculation procedure. This should be capable of producing load summaries with breakdowns for major areas, subsystems, equipment, and ventilation loads.

3. Determine and optimize the size of air distribution ducting by balancing competing requirements for first cost, operating cost and noise level. Take the recommendations of codes, technical standards and guides into consideration.

4. Determine and optimize the size of the air conditioning system by balancing competing requirements for first cost, operating cost and differential temperature (delta-T). Take recommendations of codes, technical standards and guides into consideration.

5. Conduct life cycle cost analysis to compare design scenarios

   A simple payback method of comparing options is <u>not</u> acceptable.

6. Finalize equipment selection based on the acceptance of the result of the LCC analysis by the stakeholders.

7. Prepare scaled drawings depicting:

   7.1. Floor plans with all air-conditioning delivery components as determined and required service access areas drawn to scale. Show thermostats and building management components.

   7.2. Duct route, pressure class and all air distribution devices layout including: terminals, VAV boxes, return grilles, exhaust fans, balancing dampers, and fire and smoke dampers. Indicate duct sizes and air flow quantities. Prepare a schedule for air distribution devices. Show structural support.

   7.3. Demolition plan.

   7.4. Equipment installation details.

8. Prepare detailed sequence of operations including specific set points for all control loops, including strategy for fire and smoke control.

9. Include designs for electrical system upgrade for all areas directly or indirectly impacted by new air-conditioning equipment

10. Determine capacity and develop specifications for all equipment and component and installation material.

11. Prepare environmental management plan detailing steps to secure any refrigerant which has high ozone depleting potential and disposing of all material in an environmentally responsible manner. Method of disposal of existing equipment shall also be consistent with guidelines set forth by the **Ministry of Finance** for disposal of assets.

12. Prepare detailed Bill of Quantities and Engineer's estimate. In preparing the Bill of Quantities, ensure that:

    12.1. It is sufficiently detailed to allow preparation of bids without a need for bidders to visit the site to quantify portions of the works.

    12.2. Use of provisional sums and contingencies are limited to items of work which could **not** have reasonably been foreseen during the design development phase of the project.

    12.3. Limit the use of "**Lot**" and "**Item**" as unit of measure, which will require clarification during Contract execution and become potential sources of delay and reasons for extending the Construction Contract.

    12.4. A percentage cap for contingencies is to be agreed with the stakeholders.

13. Propose a Design-Bid-Build Construction Contract acceptable to the Ministry of Finance and other stakeholders that will be sufficient to protect the interest of the project stakeholders in delivering the project within the required timeline, budget and scope. Meet with stakeholders to determine certain data for inclusion in the Special Condition of Contract including: Contract duration, Liquidated Damages etc.

14. Propose and prepare technical and financial bid selection criteria.

15. Participate in the procurement process by: conducting site visits; reviewing and preparing response to bidder's queries; conducting evaluation of bid submission.

5.0 PRE-CONSTRUCTION CONTRACT

1. Conduct post-construction contract administration to include:

    a) Contract Administration for the works to include commissioning and handing over of the complete works.
    b) Supervision of works
    c) Provide contractual advice during progress of works.
    d) Evaluate and review contractor's claims for variations, loss, expense and extensions of time, etc.
    e) Review and certify contractor's claims for payment.

f) Convene regular site and technical meeting throughout the period of the execution of the contract.
g) Convene meeting with the technical team as is necessary during the execution of the works
h) Prepare and submit periodical progress reports on all the works.
i) Produce the final accounts document upon completion of the works.

2. Validate performance of the system and submit final commissioning report.

3. Management of defects liability period

6.0 DELIVERABLES

1. Project Schedule in the form of a Gantt chart which shall be updated throughout the project.

2. Convening minimum of one presentation for each phase of this project. Record the minutes of each design meeting/presentation and distribute within seven (7) calendar days to all attendees and those persons specified to be on the distribution list.

3. VAC Assessment Phase Deliverables

   3.1. 6 copies of Assessment Report color printed and bound and one copy in Adobe portable document format (.pdf) on CDROM. Include all requested equipment and other information, and building data in the report.

   3.2. 6 copies of all drawings printed on ANSI size D sheets and one copy in Adobe portable document format (.pdf) on CDROM. All requested information is to be depicted on the drawings as specified.

4. Pre-Construction Contract Phase Deliverables

   4.1. 3 copies of Basis of Design document colour printed and bound, and one copy in Adobe portable document format (.pdf) on CDROM.

   4.2. 3 copies of cooling load report.

   4.3. Energy modelling or calculations result used in determining the annual energy consumption of the VAC System.

4.4. Blank and priced (engineer's estimate) Bills of Quantities and in Microsoft Excel format.

4.5. Equipment and installation specification in Microsoft Word. Equipment specification should be written in a descriptive manner as oppose to a solely propriety-based method where only particular equipment manufacturers and equipment model numbers are specified.

4.6. Development of tender to prepare and submit to procurement unit to include;

a) Invitation for Bids
b) Section I Instructions to Bidders
c) Section II Bidding Data Sheet
d) Section III Forms of Bid, Qualification Information, Letter of Acceptance, Agreement
e) Section IV General Conditions of Contract
f) Section V Particular Conditions of Contract
g) Section VI Specifications
h) Section VII Bill of Quantities
i) Section VIII Drawings
j) Section IX Forms of Securities

4.7. Bid evaluation criteria in Microsoft Word format.

5. Post-Construction Contract Phase Deliverables

5.1. Floor and reflective ceiling plans with all components and required service access areas drawn to actual scale. As a minimum, include: duct sizes and air flow quantities for each zone; air distribution equipment schedules; piping route; location of manual and control valves; thermostats; structural support etc.

5.2. Detailed floor plans of mechanical rooms.

5.3. Piping and instrumentation diagram for the chilled water system.

5.4. Installation details.

5.5. Final commissioning report

7.0 QUALITY EXPECTATIONS

The project will be considered successfully implemented if it is delivered within agreed time and budget, while meeting all specified technical, safety and environmental standards.

8.0 ACCEPTANCE CRITERIA

The documentation should be in the prescribed format and with sufficient details to minimize changes during post contract administration which would result in time and cost overruns.

9.0 RISKS

1. Delay in procuring the services and eventual construction works through the normal GOJ procurement procedures.

2. Costs might be outside of the Agency's Budget.

3. Long lead time to procure equipment necessary to provide long term solution.

10.0 ORGANIZATIONAL RELATIONSHIPS

Consulting team reports directly to the Project Manager

11.0 MINIMUM QUALIFICATIONS

1. The team should be comprised of individuals with: Local Professional Certification and Registered. Team services required Architecture Civil Engineering, Quantity Surveying, Environmental Engineer and Mechanical and Electrical Engineering.
2. Seven (7) years of experience in jobs specific to VAC system design installation and commissioning

12.0 FEES

PROFESSIONAL

1. The Consultant is expected to submit a detailed financial proposal for the execution of all the works described herein. That is, for the assessment and designs. Consideration should be given to the format of charges for the assessment as against those for the actual design works. The agreed fees shall be fixed, and

shall include terms of payment for services defined and provisions for charging for any work not defined.

2. Fees shall include estimated provisions for reimbursable expenses including rates where applicable.

3. No price adjustments shall be allowed save as described for additional works not defined or significant changes in the scope of works.

4. Provisions shall be included in this proposal for General Consumption Tax.

5. The fee proposal shall include for the administration and supervision during the implementation of the works as outlined.