



**KNOX  
HERITAGE**

*Preserve. Restore. Transform.*

**Request for Proposals for:  
Knox Heritage Vintage Home Renovation  
1011 Victorian Way Knoxville, TN 37916**

**Solar Photovoltaic System**

**Issue Date: February 23, 2010**

**Proposals Due: 5:00 PM EST, Friday, March 12, 2010**

**Owner:**

**Knox Heritage, PO Box 1242, Knoxville, TN 37901**

PROPOSAL FORM

Address Submissions To:  
Ms. Kim Trent  
Knox Heritage Inc.  
PO Box 1242  
Knoxville, Tennessee 37901

Time and Date for Receiving Proposals:  
5:00 PM EST (Local Time) – Friday, March 12, 2010

Dear Ms. Trent,

The undersigned, having carefully familiarized himself (or themselves) with the existing conditions at the site and with the Construction Documents, hereby propose to furnish all labor, materials and equipment and perform all work to design and install a (choose one) a solar PV or a solar hot water system in a 2100 sf residence in accordance with the enclosed specifications for the sum of:

BASE PROPOSAL:

\_\_\_\_\_ Dollars  
(\$ \_\_\_\_\_ )  
Time of Completion \_\_\_\_\_ Days

STIPULATIONS:

In submitting the Proposal, the undersigned agrees:

1. Proposals will not be withdrawn within the period of 30 calendar days following the opening thereof.
2. If notified of the acceptance of this proposal, to execute a contract for the work and deliver to the Owner that performance and payment bond specified within the 10 calendar days after such notification.
3. That the right is reserved by the Owner to reject any or all bids and to waive any informalities in proposals received.
4. That the Owner shall have the right to award the contract based upon a number of factors, not solely on the sum of the base proposal.
5. No contract is given or implied regarding the project until funding is appropriated and the Owner has offered a written contract to the contractor and both parties have fully executed the contract. No offer has been made to the contractor until the aforementioned items have transpired.
6. The Proposing entity agrees that the Proposal Documents have been thoroughly reviewed prior to submitting a proposal and the discrepancies, conflicts, errors, and/or omissions within the documents have been brought to the attention of the Owner, Owner’s Agents, Architect and/or Architect’s Consultants and have been resolved prior to submission of bids.
7. Proposals will be opened privately by the Owner; submitting entities will be notified within 72 hours if results.

PREREQUITES FOR ISSUING A CONTRACT TO THE SUCCESSFUL PROPOSING ENTITY:

This Contract will not be issued until the Contractor has delivered to the Owner, satisfactory proof of carriage of all insurance required herein, and a complete list of all subcontractors and major material suppliers. Execution of contract is dependent on appropriate federal and local government approval of a subgrant from the Knoxville Solar America Cities Program to Knox Heritage and DOE approval of a Knoxville Solar America Cities subcontract with Knox Heritage.

RECEIPT OF DRAWINGS:

Receipt is acknowledged of the Drawings and addenda, listed under "Addenda Receipt"

NAME \_\_\_\_\_ FIRM \_\_\_\_\_

INCORPORATION \_\_\_\_\_ STATE OF \_\_\_\_\_

BY \_\_\_\_\_

TITLE \_\_\_\_\_

DATE \_\_\_\_\_,

OFFICIAL ADDRESS AND TELEPHONE:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Telephone: \_\_\_\_\_

Note: If by a corporation, this proposal must have the signature required by its bylaws.

ADDENDA RECEIPT: (List addenda and supplementary drawings and the date received).

Title	Date Received
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END OF PROPOSAL FORM

PROPOSAL FORM

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**KNOX HERITAGE HOUSE  
 REQUEST FOR PROPOSALS  
 TECHNICAL AND GENERAL REQUIREMENTS – PV Solar installation  
 February 23, 2010 Specification**

**I. OVERVIEW OF INTENT**

Knox Heritage plans to install both solar hot water and solar PV technology on a residential home of historic significance. The intent of the project is to showcase low-profile or roof-integrated solar power installations that do not destroy or detract from the historic character or integrity of the home. The installations will be one component of a larger gut-rehabilitation of the home to LEED certification standards, a project which has already received national attention and is expected to become a national model for energy efficient rehabilitation and remodeling of historic homes. As such, the solar design and installation process should be innovative and replicable, and should adhere to all historic rehabilitation regulations and solar installation best-practices. Specific historic building regulations pertaining to solar installations are under development with the Historic Zoning Commission. Drafted proposed regulations will be shared at the mandatory pre-proposal meeting on February 23<sup>rd</sup> and are available in Attachment A: Draft Historic Guidelines for Solar.

The intent of this request for proposals is to identify a firm that can design and fully install a solar PV system that achieves the goals of the project. The following specifications are issued to provide general guidance regarding historic appropriateness, installation, and grid connection. Interested firms should read the following specifications carefully to ensure they are aware of contract expectations and prepared to turn in all necessary information. The term “Contractor” refers to those submitting a proposal. The term “Owner” refers to Knox Heritage. A total of \$30,000 is available for the combined labor and installation of a solar PV and solar hot water system.

Any and all expenses incurred by the proposing entity(ies) resulting from the preparation of proposals/submissions shall be borne by the proposing entities.

**II. TIMELINE**

This timetable is for the information of submitting entities. These dates are subject to change, but **in no event shall the deadline for submission of the proposals be changed except by written modification from Knox Heritage.**

Availability of RFP.....	February 23 <sup>rd</sup> , 2010
Mandatory Pre-Proposal Meeting*.....	February 23 <sup>rd</sup> , 2010
Deadline to submit questions (in writing) to Knox Heritage**.....	March 5 <sup>th</sup> , 2010
Proposals due.....	5:00 PM, March 12 <sup>th</sup> , 2010
Selection Process.....	March 15 <sup>th</sup> -26 <sup>th</sup> , 2010
Anticipated Contract Start Date.....	April 12 <sup>th</sup> , 2010

The selected contractor will work with Knox Heritage to integrate the installation schedule for the PV system with the overall home rehabilitation schedule. Design of system should commence as soon as possible upon execution of contract; term of contract for installation shall be 21 days from issuance of notice to proceed by Knox Heritage assuming no extreme weather or other approved reasons for delay. It is anticipated that the selected firm will have three weeks to complete design of the system. Award of contract is dependent on appropriate federal and local government approval of a subgrant from the Knoxville Solar America Cities Program to Knox Heritage and DOE approval of a Knoxville Solar America Cities subcontract with Knox Heritage. Actual installation will require federal NEPA approval prior to starting construction.

*\* The mandatory pre-proposal meeting will be held February 23<sup>rd</sup>, 2010 at 2:00 PM (EST) at the offices of Knox Heritage, The Carriage House at Greystone, 1300 N. Broadway Knoxville, TN 37917*

*\*\*Questions should be submitted via email to kimtrent@knoxheritage.org. Answers to all questions shall be issued in writing to all firms that attended the pre-bid meeting and by addendum, so that all firms have equal information when preparing their proposals.*

### **III. Specifications**

These specifications cover the procurement of equipment, hardware, documentation, labor and supervision required for the installation of a grid-connected PV system on the roof of the Knox Heritage house. Construction will occur during the major building renovation expected to begin Spring 2010.

#### **A. General Information**

1. More information about the roof structure/dimensions of the home and shading is provided in Attachment B: Solar PV/Thermal Specification
2. Data and Drawings Package.
3. The system shall be provided on a “turn-key” basis to the Owner. Proposals shall provide energy production estimates with documentation supporting the calculations. There will be no energy storage devices (e.g. batteries) used in the system.
4. Proposals must list all major system components required to complete system installations.
5. The system shall be a grid-tied PV array, mounted flush with the roof, as shown in the attached drawings. There is no specific expected capacity level for the array; rather, proposals should estimate expected output based on the proposed type of technology and location/design of installation.
6. The system shall be properly designed for the installation at the chosen site. The area is subject to long-term high humidity and temperature conditions. The system shall be designed to handle expected ambient temperatures that range from 5°F to 93°F (temperatures provided by ASHRAE). Supplied equipment must be rated and warranted to withstand and operate under these conditions.

7. Each PV system will be interconnected to the Owner's utility connection through a grid-interactive inverter(s). The design and specification of the PV modules, power conditioners, utility interconnections, PV system electrical design, and PV array mechanical design are described in the following sections. The system will be designed in such a manner as to comply with all requirements of TVA's Generation Partners Program as implemented by the Knoxville Utility Board. (KUB's interconnection guidelines can be found in Attachment C: KUB Interconnection Procedures.)
8. Contractors should be aware of all the documentation and procedural issues required prior to submitting bid. These are listed below.
9. The successful Contractor shall work under any state licenses as required by the local authority having jurisdiction.
10. The successful Contractor should provide documentation of experience in the installation of similarly-sized systems.
11. Owner will incorporate required manufacturer's and vendor's drawings into its as-built drawings for its own records. Therefore, all drawings created for the project shall be provided within three (3) weeks after the award. Drawings will be submitted in an electronic format that may be imported into AutoCAD drafting software. Proper credit of the source of these drawings will be noted on the Owner's drawings.
12. Contractor shall be responsible for educating, coordinating, and satisfying all questions from the Utility before, during, and after installation.
13. Firms may include any value-added services in their proposals and cost estimates, as long as they are not bound to the mandatory portions of this specification.
14. Qualified contractors should have a North American Board of Certified Energy Practitioners (NABCEP) certified solar installer who will oversee design and installation of the project.
15. Under the present design of the rehab, a standing seam roof is planned. If a firm wishes to propose the use of an innovative, low-profile solar technology that is not compatible with a standing-seam, they may do so, as Knox Heritage is open to considering other cost-comparable types of roofs. Firms are welcome to propose a variety of technology (and/or roofing options), so long as all necessary information is provided for each alternative.
16. Please note that additional requirements regarding indemnification and contract termination may be issued by addendum.

#### *B. PV Module Array Specifications*

1. The base bid should include pricing for an array that adheres to historic zoning guidelines and the intent of the project to install a system with low visual impact. Technologies of interest include, but are not limited to, thin film laminate products such as Unisolar (or equivalent) aSi modules. Knox Heritage is interested in proposals that use other low-profile or building-integrated solar PV technologies. The Owner requires that the historical

character of the building be maintained, so any alternate materials must meet the Owner's requirements.

2. The modules shall meet or exceed UL 1703 and IEC 61625 or 61646 as appropriate.
3. Each PV module shall be warranted by the manufacturer for at least 80% of its rated power for 20 years from the date of system acceptance.

#### *C. Other Component Specifications*

1. The system design should optimize power production from multiple roof surfaces and where feasible various orientations.
2. The inverter must be compatible with connection to 240Vac service. Inverter(s) shall be designed specifically for utility grid interconnection of photovoltaic arrays and be capable of automatic, continuous, and stable operation over the range of voltages, currents, and power levels for the size and type of array used.
3. Each inverter shall be compliant with the most recent revisions of UL standard 1741 and IEEE standards 1547 and 1547.1. The inverter shall also comply with IEEE Std. 519 (Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems) and the latest applicable ANSI and FCC standards and addenda dated prior to the award of the purchase order for this procurement.
4. The inverter(s) must have an automatic visual indicator showing whether the system is on-line and operating properly.
5. The inverter(s) must have at least a ten-year repair or replacement warranty from the manufacturer covering parts and labor.
6. The inverter shall be installed indoors at a location approved by Owner.
7. The Utility will require an accessible external AC disconnect of the "visible load break" type.
8. All electrical enclosures shall be in the shade during peak sun hours (or installed indoors if space is available) to enhance system reliability. All electrical enclosures shall be of the appropriate NEMA rating.
9. The contractor shall include in the bid, as a separate line item, a data monitoring system with a display accessible via the internet. As many options are available for these systems (e.g. Fat Spaniel, SMA WebBox, SensorBox, and SunnyPortal, etc.), several system options may be offered with the bid. The Contractor is responsible for the communications wiring between the data monitoring system and the house internet connection. Product details of the proposed data monitoring system shall be included with the bid package.

#### *D. PV System Electrical Design*

1. The electrical design and installation instructions for the PV systems shall conform to the 2008 National Electric Code (NFPA 70). Article 690 of the NEC applies specifically to photovoltaic system safety, production, control and interface with other sources. Other articles of the NEC also apply.

2. All electrical components, including overcurrent protection, disconnect, surge suppression devices, conduit, wiring and terminals must have UL or equivalent listing and have appropriate voltage, current and temperature ratings for the application. Special attention should be given to appropriate ratings for components used in DC circuits.
3. All wiring shall be listed for a minimum operation of 600 volts and temperature rating of 90°C in wet locations. Wiring and conduit shall be sunlight-resistant where required. Ampacity calculations must take into account appropriate de-ratings as required. If transformerless inverters are used, PV module wiring must be "PV WIRE" rather than the standard "USE-2".
4. Total voltage drop in the system (including DC and AC) shall be no more than two percent (2%), including losses in conductors and through all fuses, blocking diodes, and termination points.
5. Interconnection shall be made via NEC 690.64(B), in conjunction with the TVA and KUB Generation Partners interconnection guidelines.
6. All overcurrent devices shall have trip ratings no greater than the de-rated ampacity of the conductors being protected.
7. Each series-connected string of modules (also known as source circuits) shall include a series fuse as required by UL and NEC to prevent damage to wiring or other system components. Parallel connections of modules within individual source circuits are not permitted.
8. The inverter shall include an array ground-fault protection device, which must be capable of detecting array ground faults, shunting the fault current to ground, and disabling the array until the fault has been cleared.
9. All terminations must be listed multi-contact, box terminal, or compression type connections. Twist on wire splices, crimped, soldered or taped connections are not permitted for the required field installed wiring. Proper torque specifications should be provided for all of the required field connections.
10. All module frames, panel/array support structures, metal enclosures, panel boards and the inverter cabinet(s) should be provided with connections for bonding to a common equipment grounding conductor, terminating at the utility service ground. Framed modules shall be grounded with tin-plated copper lay-in lugs rated for outdoor use (typically labeled as suitable for direct burial).
11. Appropriate surge suppression devices should be installed on both the DC and AC sides of the system. Devices from Surge Suppression, Inc. or Citel are recommended.
12. The Contractor shall coordinate interconnection details with the Utility, and shall be responsible for the required interconnection paperwork with input from the Owner. The installation shall comply with all Utility requirements.
13. Loss of Line: The inverter(s) shall not operate without the line voltage present. The inverter(s) restart shall occur automatically after restoration of line voltage and frequency for at least five minutes.

#### *E. PV Array Mechanical Design*

1. The Contractor shall provide the mechanical hardware for mounting the photovoltaic arrays. The Contractor shall provide all other hardware required for assembling the photovoltaic modules and panels and structurally attaching them to the roof supports.
2. The PV array, including modules, hardware and attachments shall be designed to withstand the required wind loads and comply with all applicable local and national codes. Verifying documentation shall be provided to the Owner.
3. Array mounting hardware (as required for alternates) supplied by the bidder should be compatible with the site considerations and environment. Special attention should be paid to minimizing the risk from exposed fasteners, sharp edges, and potential damage to the modules or support structure. Corrosion resistance and durability of the mechanical hardware should be emphasized – the use of stainless steel fasteners and an aluminum support structure is preferred. Galvanic corrosion should be avoided.
4. Aesthetics of the overall installation are extremely important to the Owner. To create a uniform appearance of the array, spacing between individual modules and panels should be kept to a minimum. As much as possible, all mechanical hardware, conduit, junction boxes and other equipment should be concealed. Preference will be given to bids that seek to address the sensitive aesthetic requirements of this historic restoration project through designs that are unobtrusive to a street level observer.
5. The array layout should be consistent with the ordering (and labeling) of source circuits in the array combiner boxes.

#### **IV. INFORMATION TO BE SUPPLIED WITH PROPOSALS**

- A. Proposals must include (at a minimum) the following information to be considered responsive:
  - a. The total price for the design and installation of a qualifying solar PV system.
  - b. General design concept for the PV system outlining/showing:
    - i. Proposed technology to be used;
    - ii. Size of system;
    - iii. Proposed location on roof;
    - iv. Visual impact of all system components from street-level view
  - c. Information (descriptions and any appropriate graphics) showing details of module/array mechanical support.
  - d. Parts lists, quantities, and cut sheets for the major components (PV module, inverter, module mounting system).
  - e. Anticipated construction schedule outlining the expected or required lead-time in delivery of equipment, and the projected completion date.

- f. A price list for all replacement components, including individual modules and inverters shall be included. These prices are to remain in effect for one year after the date of acceptance.
  - g. Description of test plan for final system acceptance (as outlined in Sect VI. E below)
  - h. Warranty information on individual components.
  - i. Description of your organization's qualifications with regard to conducting similar projects by providing the following:
    - i. Names, contact information, and résumés of the top management team of your organization and (more importantly) the résumés of the persons who will actually be doing the work if your firm is selected.
    - ii. Proof of NABCEP-Installer certification, where relevant.
    - iii. Names of any subcontractors (including key personnel and résumés) and their scope of services;
    - iv. Proposed responsibilities of each team member;
    - v. Any other information necessary to explain your qualifications and/or demonstrated competence.
  - j. Proof of State of Tennessee-issued General Contractors and City of Knoxville-issued Electrician license, with license numbers, type of license, and expiration date.
  - k. Proof of Certificate of Insurance (More information on Knox Heritage's insurance requirements for contractors will be posted by addendum).
- B. Proposed design concepts will be considered as part of the proposal review process. The drawings and other technical information will be checked for completeness, accuracy, and aesthetic compatibility of the structure. Firms whose proposals include insufficient design information may be requested for additional supporting material or have their bid dismissed outright.
- C. Please submit four copies of the full proposal for review by committee.

## **V. EVALUATION CRITERIA**

The criteria listed below will be used to evaluate written submissions. The scoring weight is listed for each criterion. These criteria will be applied and interpreted solely at the discretion of the proposal evaluation committee established by Knox Heritage, and their decision(s) shall be final. Proposals should include all necessary information pertinent to these evaluation criteria. Additional information required for proper assessment of proposals may be requested at the discretion of Knox Heritage. Evaluation criteria and points are as follows:

- A. System Design and Innovation (30 points)
  - i. Aesthetic qualities of design concept, technologies, and the overall expected installation.
  - ii. Compliance with the intent of Historic Zoning regulations.
  - iii. Ease of system maintenance.
  - iv. Ability of design to be replicated on other historic properties.
- B. Cost Effectiveness (30 points)
  - i. Expected cost per watt expected capacity

- ii. Warranty of system components and installation.
- iii. Supplier stability
- C. Firm Qualification (30 points)
  - i. Demonstrated competence of critical personnel involved with the project.
  - ii. Experience of the firm in managing similar projects and fulfilling project requirements.
- D. Total Cost of Project (10 points)
  - i. Includes Design, Equipment, Construction, and all other expenses related to the project.
  - ii. Proposals totaling over \$30,000 will not be accepted.

**VI. INFORMATION TO BE PROVIDED BY CONTRACT AWARDEE BEFORE PROJECT COMPLETION**

- A. The Contractor is responsible for providing two complete hard copies of all installation, operations and maintenance manuals, plus two copies on data CDs.
- B. As-built diagrams indicating overall layout of entire system, including PV array, and location of BOS hardware and inverter with respect to the array.
- C. A site survey of the intended array location should be completed before the installation begins.
- D. A copy of the interconnection agreement between the Owner and Utility must be provided by the Contractor to the Owner.
- E. An acceptance test must be performed on the system once the installation is complete. This includes measuring the short circuit currents and open-circuit voltages on all source circuits while measuring irradiance and module temperature. This also includes measuring the instantaneous DC input and AC output of the system to determine its efficiency. These tests will be conducted in accordance with the test plan submitted as part of the original bid package.
- F. A copy of the permit obtained from the appropriate legal authority for system installation.
- G. A copy of the **minimum one-year** system warranty including parts and labor as well as individual subsystem component warranties.
- H. Array structural design information sealed by a professional engineer as required or when not required all work shall follow appropriate code guidelines.
- I. The processing of paperwork for the technical information required by the Utility that may be required for the Owner to participate in any green power production programs.
- J. A copy of the NABCEP Installer certificate by the person who is overseeing the design and installation of the solar PV system.

## **VII. BONDS**

The Contractor will be required to provide a Performance and Payment Bond in the full amount of this contract.

### **SUMMARY:**

In your bid response, please provide line item costs for:

1. PV Array + BOS materials
2. PV Labor
3. Internet-accessible data monitoring system
4. Bond

Thank you for considering our project.

### **Attachments:**

A: Draft Historic Guidelines for Solar

B: Solar PV/Thermal Specification Data and Drawings Package

C: KUB Interconnection Procedures