The University of Colorado at Colorado Springs seeks a qualified firm to provide a Design/Build of a solar thermal pool heating system for the Campus Recreation Center. Posts on 10' center for 68 panels have been already been installed on the roof of the building.

A. MANDATORY PRE-BID MEETING

A mandatory pre-bid meeting and walkthrough will be held at the following location, date, and time:

**Date:** July 18, 2008  
**Time:** 11:00 AM  
**Location:** Campus Recreation Center Conference Room  
Parking is available in Visitor Parking in the Parking Garage. A map of the campus is available online at [http://www.uccs.edu/map.html](http://www.uccs.edu/map.html).

Failure to attend the mandatory meeting will result in your bid being considered non-responsive.

B. DUE DATE FOR THIS BID IS July 31, 2008 at 2:00PM

Please provide 3 copies to the following address:

Rhea Taylor  
University of Colorado at Colorado Springs  
Facilities Services  
1420 Austin Bluffs Parkway  
Colorado Springs, CO 80918  
Phone: 719/262-3505  
Email: rtaylor@uccs.edu

Late bids will not be considered.

C. INQUIRIES:

Due date for inquiries is July 21 at 1:00 PM. Prospective offerors may make written inquires by mail, email or fax before the written inquiry deadline concerning this bid to obtain clarification of requirements. There will be opportunity to make inquiries during the mandatory pre-bid meeting, if any. No inquiries will be accepted after the deadline. Inquiries regarding this bid (be sure to reference the bid number) should be referred in writing to: Rhea Taylor, rtaylor@uccs.edu.
Responses to offerors’ inquiries will be published as a modification on the website www.uccs.edu/facsrvs by July 23, 2008. Offerors cannot rely on any other statements that clarify or alter any specification or other term or condition of the bid.

Should any interested offeror, sales representative, or manufacturer find any part of the listed specifications, terms and conditions to be discrepant, incomplete, or otherwise questionable in any respect, it shall be the responsibility of the concerned party to notify the contact person of such matters immediately upon discovery and prior to the bid opening.

D. ACCEPTANCE OF BID CONTENT:
The contents of the bid (including persons specified to implement the project) of the offeror will become contractual obligations if acquisition action ensues. Failure of the successful offeror to accept these obligations in a contract, purchase order, or similar authorized acquisition document may result in cancellation of the award and such offeror may be removed from future solicitations.

This solicitation is being made with the understanding that the University is still securing necessary approvals. No work shall be authorized before all approvals from the State of Colorado are secured.

Minimum Qualifications

Qualified applicants will be determined as those that can meet the criteria that will be used for selection by the University of Colorado Facilities Services staff. These criteria include: (1) recent, direct experience with projects of a similar scope and budget. (2) Design and understanding of the project. (3) Demonstrated ability to plan, schedule, and manage this project or one of similar scope and budget. (4) Demonstrated understanding of the financial constraints of this project. (5) Minimum of 5 years experience in the Colorado area. The successful applicant will demonstrate broad-based experience in all phases of project planning, construction and management on solar thermal pool heating projects. Those interested in providing these services should submit three (3) copies of a packet with a concise letter of interest providing a summary of qualifications, and a description of the applicant or firm and its consultants including credentials, experience, three current references, and a quote for the cost of the Work. Submittals will be reviewed by UCCS Planning, Design, and Construction. The firm felt to be most appropriate for undertaking this work will be selected and contacted.

E. RFP SUBMITTAL REQUIREMENTS

- System specifications
- Pricing summary (with and without GEO grant funding)
- Estimated cost
- Estimated savings
- System production
- \( \text{SHW} \) – (Btu/hr)
- Payback period
- Project timeline including relevant milestones
- Associated training and support
- Monitoring and reporting plan
- Provide a solar access or shading report for the location of this system for 1 full year.
- State completion and full inspection date. For SHW systems, provide a system simulation report from RETSCREEN http://www.retscreen.net/ang/home.php

F. SUBMITTAL EVALUATION

Submittals will be evaluated based on the criteria identified in Appendix A.

G. SCHEDULE

Following is a detailed schedule of events for the Proposal Process:

<table>
<thead>
<tr>
<th>No</th>
<th>Action</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Mandatory Pre-Bid Meeting</td>
<td>July 18, 2008 at 11:00AM</td>
</tr>
<tr>
<td>3.</td>
<td>All Inquiries Due</td>
<td>July 21, 2008 by 1:00PM</td>
</tr>
<tr>
<td>4.</td>
<td>Submittal of Bids - Deadline</td>
<td>July 31, 2008 by 2:00PM</td>
</tr>
<tr>
<td>5.</td>
<td>Short List Released</td>
<td>August 4, 2008</td>
</tr>
<tr>
<td>7.</td>
<td>Award Notification</td>
<td>August 18, 2007</td>
</tr>
<tr>
<td>11.</td>
<td>Construction Start</td>
<td>September 6, 2008</td>
</tr>
<tr>
<td>12.</td>
<td>Desired Construction Finish</td>
<td>October 1, 2008</td>
</tr>
</tbody>
</table>
II Submittal Requirements

Specifications for Solar Water Heating Systems

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC. (ASHRAE)

ASHRAE 90003 Active Solar Heating Design Manual
ASHRAE 90336 Guidance For Preparing Active Solar Heating Systems Operation and
ASHRAE 90003 Methods of Testing to Determine the Thermal Performance of Solar Collectors

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C651 Disinfecting Water Main

FACTORY MUTUAL ENGINEERING AND RESEARCH CORPORATION (FM)

FM P7825 Approval Guide

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 National Electrical Code

SOLAR RATING AND CERTIFICATION CORPORATION (SRCC)

SRCC OG-300-91 Operating Guidelines and Minimum Standards for Certifying Solar Water Heating Systems
1.2 DEFINITIONS

The term "solar" for the purposes of this specification, covers systems that intercept solar radiation and convert it to thermal energy. The thermal energy is collected by a heat transfer fluid and sent to a thermal energy storage tank for use.

1.3 SYSTEM DESCRIPTION

1.3.1 Design Requirements

Design, furnish and install new solar water heating (SHW) systems for the heating of domestic water. The solar water heating system offsets the use of natural gas, propane or electricity by preheating water before the conventional domestic hot water system. System types incorporating both freeze-protection and overheat protection are required. Supplied equipment must be rated and warranted to withstand and operate under lowest-record-low and highest-record-high temperature for the location. It is often the intent to use the system for educational purposes related to the benefits and use of renewable energy, so appearance and quality are considerations in design decisions.

Solar collectors are to be mounted on the roof using the existing structure as suitable for the type of SHW system and needs and limitation of the building and site. System must be of a type suitable to the climate of the site. For systems proposed that are not under passive control, control each system by a simple differential temperature controller. The solar systems are to be integrated with the existing water heating system as its auxiliary subsystem.

Include with each system, components that consist of a solar collector array, array support structure, storage tank, interconnecting piping and fittings, tempering mixing valve, flush-and-fill valves, pressure relief valves, and as required by the system type, any necessary pumps, controls or heat exchangers, as well as all other accessories and equipment required for the proper operation and integration of the solar system with the existing heating system.

Include with system all labor, supervision, equipment inside and outside the building, tools, materials and incidentals necessary to design, procure, install, checkout and place into operation a complete solar water heating system ready for use for the building.

1.3.2 Performance Requirements

Solar water heating systems must be safe, reliable, require no operator intervention for normal operation, be visually unobtrusive, and be designed and installed in accordance with
all applicable codes. Design and size the system so that solar energy supplies approximately the percent of the annualized hot water demand ("Required Solar Fraction") specified in Table 1, next page.

Table 1: Percent of annualized hot water demand to be met by solar hot water heating system in each location covered in this solicitation:

<table>
<thead>
<tr>
<th>Building</th>
<th>Location</th>
<th>Required Solar Fraction</th>
<th>Gallons per Day Demand</th>
<th>Hot Water Delivery Temperature</th>
<th>Avg. Main Water Temperature (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>UCCS Recreation Center</em></td>
<td>Colorado Springs, CO</td>
<td>75%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.4 SUBMITTALS

Submit the following:

1.4.1 Approval drawings and Data

1.4.1.1 Commercial Products Data with Performance Charts and Curves

Annotate descriptive data to show the specific model, type, and size of each item.

1.4.1.2 Solar System Design

Submit calculations of solar system performance leading to the proposed design. Submit reports resulting from the use of any design or performance simulation software used in the design.

1.4.1.3 Statements

Prior to installation, submit data showing that the Contractor has successfully designed and installed systems of the same type and design as specified herein and proposed by the contractor.
1.4.1.4 Drawings

Provide drawings for the system type and size containing a system schematic diagram; a collector layout and roof plan noting reverse-return piping for the collector array; a system elevation; a schedule of operation and installation instructions; and a schedule of design information including collector length and width, recommended collector flow rate and pressure drop at that flow rate, number of collectors, number of collectors to be grouped per bank, gross area and net aperture area of collectors, collector fluid volume, collector filled weight, weight of support structure, and tilt angle of collectors from horizontal. Include in the drawings, complete wiring and schematic diagrams, proposed pipe pitch and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work, including clearances for maintenance and operation. Provide a detail of the joint connection between the solar collector mounting brackets and the roof membrane.

1.4.2 Final Drawings and Data

1.4.2.1 Instructions

Submit proposed diagrams, instructions, and other sheets, including a system schematic, wiring and control diagrams, and a complete layout of the entire system for each system type to be installed. Include with the instructions, in typed form, condensed operating instructions explaining preventive maintenance procedures, methods of checking the system for normal safe operation and procedures for safely starting and stopping the system, methods of balancing and testing flow in the system, and methods of testing for control failure and proper system operation. Submit collector array structural design information sealed by a professional engineer.

1.4.2.2 Operating and Maintenance Manuals

Submit manuals that detail the step-by-step procedures required for system filling, startup, operation, and shutdown. Include in the manuals the manufacturer's name, model number, service manual, parts list, and brief descriptions of all equipment and their basic operating features. List routine maintenance procedures, possible breakdowns and repairs, recommended spare parts, troubleshooting guide, piping and equipment layout, balanced fluid flow rates, and simplified wiring and control diagrams of the system as installed.

1.4.2.3 Field Test Reports
Submit reports of piping hydraulic pressure test.
Submit reports of water potability test.
Submit results of system performance testing.

1.4.2.4 Warranties

Provide warranties for all installed equipment. Provide a one year warranty for all labor and material for the system.

PART 2 PRODUCTS

2.1 GENERAL EQUIPMENT REQUIREMENTS

2.1.1 Standard or Pre-approved Products

Furnish materials and equipment that are the standard products of a manufacturer regularly engaged in the manufacture of such products and which essentially duplicate items that have been in satisfactory use for at least 1-year prior to bid opening.

2.1.2 Nameplates

Secure to each major item of equipment the manufacturer’s name, address, type or style, model or serial number, and catalog number on a plate.

2.2 PIPING SYSTEM

Provide a piping system complete with pipe, pipe fittings, valves, strainers, expansion loops, pipe hangers, inserts, supports, anchors, guides, sleeves, and accessories with this specification and the drawings. Pipe shall be designed to observe limits on flow velocity, pressure drop, and gauge pressure associated with the pipe type and characteristics.

Provide, install and test the piping. Provide piping flow rates below 5 feet per second. Piping shall be Type L or Type M copper tubing, ASTM B-88, with 95-5 tin-antimony soldered joints. If cold water piping supplying the SWH system is of another type, such as
PVC, it shall be replaced within 10 feet of the SWH system with copper to avoid bulging and rupture due to proximity to the higher temperatures of the solar system.

2.2.1 Pipe Insulation

Furnish interior pipe insulation and coverings such as Armaflex, Insul-Tube, Rubatex, or approved equivalent. Provide outside array piping insulation with a capability of withstanding 250 degrees F, except that piping insulation within 1.5 feet of collector connections shall be capable of withstanding 400 degrees F. Protect outside piping insulation from water damage and ultraviolet degradation with a suitable outer coating manufactured for this purpose (aluminum, sunlight resistant PVC or approved equal).

2.2.2 Calibrating Balancing Valves (for multiple collector banks)

If systems are proposed with multiple collector banks, provide calibrated balancing valves suitable for 125 psig and 250 degrees F service. Furnish calibrated balancing valves with bronze body/brass ball construction with seat rings compatible with system fluid and differential readout ports across valve seat area. Provide readout ports fitted with internal insert of compatible material and check valve. Provide calibrated balancing valves with a memory stop feature to allow valve to be closed for service and reopened to set point without disturbing balance position, and with a calibrated nameplate to assure specific valve settings. Provide calibrated balancing valves and ball valves at the outlet of each collector bank. The balancing valves are specified to allow the array to be flow balanced. The ball valves are required to enable the array to be disconnected for maintenance or repair. This requirement for balancing valves is not applicable to systems of only one collector bank, where balance of flow is not an issue.

2.2.3 Pressure Gauges

Provide pressure gauges with throttling type needle valve or a pulsation dampener and shutoff valve. Furnish a 3-1/2 inch minimum dial size.

2.2.4 Thermometers

Supply thermometers with wells and separable bronze sockets.
2.2.5 Pipe Hangers and Supports

Support and hang piping so that the weight of the piping is not supported by drywall, siding, or other building members not designed to bear load. Support piping so that thermal expansion and contraction of pipe lengths is accommodated. Supports shall be replaced to ensure piping does not sag.

2.2.6 Valves

Provide valves compatible with the piping. Ball valves shall be used for shutoff, with full port, bronze body, bronze ball and teflon seat. Bronze hose-end gate valves shall be used for draining low points of piping.

2.3 COLLECTOR SUBSYSTEM

2.3.1 Solar Collector Construction

The type of solar collector proposed shall be compatible with the proposed system type. Collectors shall be selected based on optimal cost and performance. Depending on the temperature requirements of the system, collector may be unglazed (low temperature), single or double glazed (mid temperature), or evacuated tube (high temperature) with selective or painted absorber surfaces. Furnish collectors of weather-tight construction and with an aluminum casing. Provide aluminum or stainless steel mounting brackets and hinges. Furnish stainless steel assembly hardware including all bolts, washers, and nuts. Install collectors such that tubes on the absorber plate drain by gravity. Provide cover glazing completely replaceable from the front of the collector without disturbing the piping or adjacent collectors.

2.3.2 Collector Warranty

Provide a minimum 20-year warranty against the following: failure of manifold or riser tubing, joints or fittings; degradation of absorber plate selective surface; rusting or discoloration of collector hardware; and embrittlement of header manifold seals. Include with the warranty full repair or replacement of defective materials or equipment.

2.3.3 Solar Collector Performance

Plot thermal performance on the thermal efficiency curve in accordance with ASHRAE 93 showing the product of glazing transmittance and plate absorptivity and also the thermal loss
coefficient (btu/hr/F) of the solar collector. Show manufacturer's recommended volumetric flow rate and the design pressure drop at the recommended flow rate. Indicate the manufacturer's recommendations for the number of collectors to be joined per bank while providing for balanced flow and for thermal expansion considerations.

2.4 SOLAR COLLECTOR ARRAY

2.4.1 Net Absorber Area and Array Layout

Collector array shall be oriented so that all collectors face the same direction. Space collectors arranged in multiple rows so that no shading from other collectors is evident between 1000 hours and 1400 hours solar time on December 21. Collectors should be south-facing and a tilt equal to the local latitude, but other orientations may be considered for approval. Indicate minimum spacing between rows.

2.4.2 Piping

Connect interconnecting array piping between solar collectors, in a reverse-return configuration with approximately equal pipe length for any possible flow path. Indicate flow rate through the collector array. Provide each collector bank isolated by valves, with a pressure relief valve and with the capability of being drained. Locate manually operated air vents at system high points, and pitch array piping a minimum of 0.25 inch per foot so that piping can be drained by gravity. Supply calibrated balancing valves at the outlet of each collector bank as indicated.

2.4.3 Supports for Solar Collector Array

Provide support structure for the collector array of aluminum, stainless steel, or other corrosion-resistant approved material. Furnish a support structure which secures the collector array at the proper tilt angle with respect to horizontal and orientation with respect to true south. Consideration should be made to mounting collectors parallel to the pitched roofs. The collector tilt angle may vary by +/- 25 degrees, and the azimuthal angle may vary by +/- 45% from the optimal tilt and azimuth. Provide a support structure that will withstand the static weight of filled collectors and piping, wind, seismic, and other anticipated loads without damage. For heavy systems, such as integral storage collectors, provide structural reinforcement for the roof across at least four rafters and provide verification that the structural modifications proposed are satisfactory. Provide a support structure which allows access to all equipment for maintenance, repair, and replacement. Neoprene or EPDM washers shall separate all dissimilar metals. Depending on system type, supports for solar array could terminate in ballast blocks to avoid roof penetrations.
2.5 SOLAR PREHEAT STORAGE TANK

Provide a cylindrical thermal energy storage solar preheat tank with a storage capacity of at least 1.5 gallons per square foot of collector area. Insulate each tank with fiberglass or foam with a loss coefficient of not more than 0.5 W/m²°C. Protect the insulation by a PVC or steel jacket. Provide a tank rated at 100 lb/in² at 190 degrees Fahrenheit. Provide the interior of each tank with glass lining for potable service.

2.6 TRANSPORT SUBSYSTEM

2.6.1 Heat Exchanger (if required by system design)

For system designs requiring a heat exchanger, provide a minimum design pressure rating of 100 psi. Construct heat exchanger of 316 stainless steel, titanium, copper-nickel, or brass. Furnish heat exchanger with a capability of withstanding temperatures of at least 240 degrees F. Tube-in-tube copper side-arm heat exchangers are acceptable for appropriate system types.

2.6.2 Pumps (for active systems)

For active solar system designs requiring a pump, provide electrically-driven, single-stage, centrifugal type circulating pumps such as those manufactured by Grundfos, Hartel, March, Taco or approved equivalent. Support pumps on a concrete foundation or mounting intended for the purpose, or by the piping on which installed if appropriate to the size. Construct the pump shaft of corrosion resistant alloy steel with a mechanical seal. Provide stainless steel impellers and casings of bronze. Control motors with switches that can be activated by either the differential temperature controller or by manual override (Hand-Off-Automatic). Pumps shall be installed with isolation valves so the pump can be serviced without draining the system.

2.6.3 Heat Transfer Fluid

Heat transfer fluid shall be compatible with all materials in the system. The nature and amount of heat transfer fluid will depend on the type of system proposed and the freeze conditions encountered at the site. Any anti-freeze, conditioners or corrosion inhibitors
added to the heat transfer fluid must be non-toxic and intended for use in potable water systems.

2.7 CONTROL AND INSTRUMENTATION SUBSYSTEM

2.7.1 Differential Temperature Control Equipment (if required)

If the system design includes controls, furnish the differential temperature control equipment as a system from a single manufacturer. Furnish a solid-state electronic type controller complete with an integral transformer to supply low voltage. Controller accuracy shall be plus or minus 1 degree F. Supply controllers that are compatible with the thermistor temperature sensors. Provide differential controls with direct digital temperature readings of all temperatures sensed. Supply controls with a visual indicator when pumps are energized. Provide a controller that will identify open and short circuits on both the solar collector temperature sensor circuit and the storage tank sensor circuit.

2.7.2 Thermistor Temperature Sensors (if required)

Provide temperature sensors that are compatible with the differential temperature controller, with an accuracy of plus or minus 1 percent at 77 degrees F. Supply sensors that have passed an accelerated life test conducted by subjecting thermistor assemblies to a constant temperature of 400 degrees F or greater for a period of 1000 hours minimum with an accuracy of within plus or minus 1 percent as stated above. Furnish hermetically sealed type thermistors. Provide immersion wells or watertight threaded fittings for temperature sensors. Temperature sensors shall be mechanically attached to the surface they are measuring and wire to the sensor must be mechanically attached and protected along it’s length.

2.7.3 Tempering Valve (if required)

If required, all systems installed under this procurement action have a tempering or mixing valve to limit the temperature of the hot water supplied to the system. The tempering valve is to be located downstream of the electric water heater and is to be set to a temperature suitable for the application.
2.8 ELECTRICAL WORK

If pumps are required in the system design, provide electric motor-driven equipment complete with motor, motor starters, and controls. Provide electrical equipment and wiring in accordance with NFPA 70. Furnish motor starters complete with thermal overload protection and other appurtenances necessary for the motor control specified. Provide each motor of sufficient size to drive the equipment at the specified capacity without exceeding the nameplate rating of the motor. Motors shall be high efficiency motors.

2.9 PAINTING AND FINISHING

Furnish equipment and component items, with the factory applied manufacturer's standard finish.

PART 3 EXECUTION

3.1 INSTALLATION

Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from sheetrocked or suspended ceilings. Keep interior and ends of new piping thoroughly cleaned of foreign matter. Keep piping systems clean during installation by means of plugs or other approved methods. Discharge storage tank pressure and temperature relief valves into floor drains. Horizontal runs should be flat and vertical runs should be plumb. Install any multiple pipes in an order which does not require them to cross or interfere with each other or other building systems. Provide air vents with threaded plugs or caps. Install control and sensor wiring in conduit.

3.1.1 System Flushing and Disinfection

Flush and disinfect the piping system.

3.1.2 Collector Subsystem

3.1.2.1 Collector Array
Install solar collector array at the proper tilt angle, orientation, and elevation above roof. Install the solar collectors with the ability to be removed for maintenance, repair, or replacement.

3.1.2.2 Array Piping

Install collector array piping in a reverse-return configuration so that path lengths of collector supply and return are of approximately equal length. Install air vents in the high points of the collector array piping. Provide proper pitch for draining of collector array.

3.1.2.3 Array Support

Install array support in accordance with the recommendations of the collector manufacturer.

3.1.2.4 Pipe Expansion

Provide for the expansion and contraction of supply and return piping with changes in the direction of the run of pipe or by expansion loops. Do not use expansion joints in the system piping.

3.1.2.5 Valves

Install ball valves at the inlet and outlet of each bank of manifolded collectors. Install calibrated balancing valves at the outlet of each collector bank and mark final settings on each valve. Install a union adjacent to each ball valve. Balance flow through the collector piping with at least one balancing valve left in the open position. Locate tempering mixing valve downstream of auxiliary water heater to control hot water delivery temperature.
3.1.2.6 Roof Penetrations

All roof penetrations shall be made permanently waterproof. Copper or other approved flashing shall be used. Contractor shall provide a five year warranty on materials and labor, including consequential damages, for any roof leaks due to or arising out of the solar water heating system installation.

3.2 INSPECTION AND TESTING

3.2.1 Instructions

Provide instructions for each system type. Include in these instructions a system schematic, and wiring and control diagrams showing the complete layout of the solar system. Prepare condensed operating instructions explaining preventative maintenance procedures, balanced flow rates, methods of checking the system for normal safe operation, and procedures for safely starting and stopping the system, in typed form, framed as specified above, and posted beside the diagrams. Post the framed instructions before acceptance testing of each system.

3.2.2 Acceptance Testing and Final Inspection

Maintain a written record of the results of all acceptance tests, to be submitted in booklet form. Provide the following tests:

3.2.3 Hydrostatic Test

Hydrostatically test each system. Isolate valving and instrumentation not suitable for the intended test pressure.

3.2.4 Operational Test

Operationally test each system over a period of 48 consecutive hours with sufficient solar insolation to cause activation of the solar energy system during daylight hours.
3.2.5 Overall System Operation

Demonstrate each solar energy system will operate properly while unattended for a period of at least 72 hours. As required by system design, demonstrate the system controller will start the pumps after being warmed by the sun, and that it will properly shut down during cloudy weather or in the evening over a minimum of three complete cycles. It is permissible to manipulate the temperature of the storage tank by the introduction of cold water.

Code Review and Code Approval

3.2.6 Temperature Sensor Diagnostics

As required by system design, demonstrate the controller will correctly identify open and short circuits on both the solar collector temperature sensor circuit and the storage tank sensor circuit.

3.3 FIELD TRAINING

Provide a field training course for operating and maintenance staff members, after the system is functionally complete. Include in the training a discussion of the system design and layout and demonstrate routine operation, maintenance and troubleshooting procedures.

END OF SECTION

Appendix A – Design and Evaluation Criteria
I.) Design Criteria

- Glazed panels preferred
- Area of pool 4327 sq. ft.
- Spa area 200 sq. ft.
- Temperature 82 degrees
- Makeup water 5%
- Current estimated annual fuel consumption 16,967 CCF
- Estimated natural gas cost/year for pool - $12,386
- Expected system energy performance – 25%-33% reduction in pool heating energy

II.) Evaluation Criteria for solar provider selection

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prior relevant experience and performance</td>
<td>30%</td>
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<tr>
<td>Successful and significant experience with design and</td>
<td></td>
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<tr>
<td>installation of solar thermal systems specifically for</td>
<td></td>
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<tr>
<td>recreation center pools, experience of staff assigned</td>
<td></td>
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<tr>
<td>to this project, references, training provided to</td>
<td></td>
</tr>
<tr>
<td>owner, and location/access.</td>
<td></td>
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<tr>
<td>2. Schedule and timeline for completion</td>
<td>15%</td>
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<tr>
<td>The ability to obtain materials and complete the project</td>
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<tr>
<td>in a timely manner.</td>
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<tr>
<td>3. Energy Performance/Life Cycle Cost</td>
<td>30%</td>
</tr>
<tr>
<td>Ability to demonstrate that system will meet or exceed</td>
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</tr>
<tr>
<td>UCCS energy goals for this system of a 25-33% reduction</td>
<td></td>
</tr>
<tr>
<td>in energy use for pool.</td>
<td></td>
</tr>
<tr>
<td>4. Cost</td>
<td>25%</td>
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<tr>
<td>Final List</td>
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</table>