HAKALAU ENGINEERING, LLC.

Charles P. Cavedoni PE
Mechanical Engineer

PO Box 252
Hakalau, HI 96710
(808) 961-6202 ph/fax
ccavedoni@HakalauEngineering.com

August 6, 2008

Steward Yamada, Chief
Safe Drinking Water Branch
Department of Health
911 Ala Moana Blvd. Room 308
Honolulu, HI 96814

Re: Proposed Public-Use Rain Catchment System
Hawaii Preparatory Academy Energy Lab
Waimea (Kamuela), Hawaii
TMK: (3) 6-5-001:033

Dear Mr. Yamada:

I request review and approval for Hawaii Preparatory Academy (HPA) to develop and operate a Public-Use Rain Catchment Water System at their proposed new Energy Lab located at TMK: (3) 6-5-001:033, a 101.61 acre parcel located in the northeastern portion of the HPA campus at Waiaka, South Kohala, Hawaii, with a street address of 65-1692 Kohala Mountain Road, Kamuela, Hawaii

The goal for the Energy Lab is to create an active learning center on the HPA campus that engages up to 40 students and teachers in the design, construction and evaluation of renewable energy solutions. For the campus showcase project, HPA intends to seek US Green Building Council LEED Platinum accreditation as well as meeting the Living Building Challenge. Key to meeting these sustainability goals is the use of a rain catchment water system. In particular, the Living Building Challenges requires 100% of water use be from captured precipitation.

For your review, please find enclosed the attached documents:

- HPA Energy Lab Proposed Public-Use Rain Catchment Water System
- HPA Energy Lab Preliminary Architect drawings
- HPA Energy Lab Preliminary Plumbing Drawings

Please contact me regarding any additional information you shall require. Thank you for your consideration. I look forward to a positive response.

Sincerely,
Charles P. Cavedoni, PE

HAWAII PREPARATORY ACADEMY ENERGY LAB
PROPOSED PULIC-USE RAIN CATCHMENT WATER SYSTEM
PRELIMINARY SYSTEM DESCRIPTION

Prepared by Chas Cavedoni PE
Hakalau Engineering, LLC

August 6, 2008

1. PROPOSED WATER CATCHEMENT SYSTEM:

The Hawaii Preparatory Academy (HPA) seeks to develop and operate a Public-Use Rain Catchment Water System at their proposed new Energy Lab located at TMK: (3) 6-5-001:033, a 101.61 acre parcel located in the northeastern portion of the HPA campus at Waiaka, South Kohala, Hawaii, with a street address of 65-1692 Kohala Mountain Road, Kamuela, Hawaii

The public-use rain catchment water system would provide both the potable and non-potable water needs for up to 40 students and teachers occupying the Lab.

During normal operation, the proposed water collection and storage system would collect and store all water used at the Energy Lab, however, during times of drought, HPA intends to replenish the storage system using currently available Hawaii County water now serving the entire HPA campus via an 8" service line located on Kohala Mountain Road.

The HPA Plumbing drawings, in particular P5, shows a schematic of the proposed system as well as plan view showing the estimated rain catchment collecting area.

2.0 WATER COLLECTION SYSTEM

2.1 Roofing:

The roofing material for the water collection system shall be galvanized metal painted or enameled with a non-toxic paint. Paint used on roofing materials shall not contain fungicides or poisons. Materials containing lead or uncovered zinc shall not be used anywhere in the system. The roofing material shall be secured in place using SS fasteners with inert non-toxic gasket seals.

2.2 Gutters & Downspouts:

The roof gutters for the water collection system shall be made from inert materials that contain no toxic dye or fungicides. The gutter system shall maintain a downward slope toward the catchment system with no low areas where pooling can occur. The continuous downward slope shall be no less than 1/8" per foot.

2.3 First Flush Diverter:

The water collection system shall have a first flush diverter located between the gutter system and the storage tank that allows dust and debris accumulated on the roof between rainfalls to be diverted away from the storage tank. The first flush diverter shall divert 10 gallons of water for every 1,000 square feet of roof collection area.

3.0 WATER STORAGE SYSTEM:

3.1 Tank:
The water storage tank shall be fabricated from polyethylene made from food-grade quality materials approved by the US Food and Drug Administration. The storage tank shall be fully enclosed with a solid cover. All storage tank vents and openings shall contain a screen mesh with openings no larger then 1/16". The tank shall have a man access hole for maintenance with a sealable and lockable cover.

3.2 Tank Location:
The storage tank shall be located underground in a location that allows for rainwater gravity feed. The tank shall be constructed and installed in a manner that prevents any leakage into the tank from ground water sources.

3.3 Tank Over Flow Devise:
The storage tank shall have an over flow devise with an opening no smaller then the inlet pipe. The over flow devise opening shall contain a screen mesh with openings no larger then 1/16". The overflow devise shall direct the water away from the foundation of the storage tank.

3.4 Tank Drain Pipe:
The storage tank shall have an operable valve on a gravity drain line located at the bottom of the tank for complete drainage of the storage tank for periodic maintenance.

3.5 Building Intake Pipe:
The pipe transporting water from the storage tank to the building shall have its inlet located 4" above the bottom of the tank.

4.0 WATER PUMPING SYSTEM
The pumping system shall consist of a water pump, pressure tank, check valve and high/low pressure switch sized to maintain the point of use water pressure between 30 psi and 50 psi at a flow rate of no less than 15 gpm. The pressure tank shall have a minimum storage capacity of 60 gallons. The pump suction line shall be gravity fed from the water storage tank. The water pumping system shall have a spin-down filter located upstream of the pump. The water pumping system shall have a one-way valve located between the water pump suction filter and the water storage tank. All wetted parts of the water pumping system shall be fabricated from materials approved by the US Food and Drug Administration.

5.0 WATER DISTRIBUTION SYSTEM
The building water supply between the pump and filtration system shall branch into two circuits, one for potable water and one for non-potable water. The potable circuit shall service all potable fixtures including but not limited to sinks, lavatories, showers, drinking fountains and hose bibs. The non-potable circuit shall service all other fixtures including but not limited to all water closets, trap primers and urinals.

6.0 WATER FILTRATION SYSEM

6.1 Potable Water Filtration
The potable water filtration system shall be sized for a minimum flow rate of 15 gpm at a minimum pressure of 30 psi. The potable water filtration system shall contain the following purification filters arranged in series:

- Spin down pump pre filter upstream of the water pump,
- A 50 micron sediment filter,
- A 5 micron particulate filter
- An ultraviolet disinfectant class "A" (UV) light with an integral power doze meter, alarm, integral quartz sleeve wiper and flow restrictor.

6.2 Non-Potable Water Filtration

The non-potable water filtration system shall be sized for a minimum flow rate of 15 gpm at a minimum pressure of 30 psi. The non-potable water filtration system shall contain the following purification filters arranged in series:

- Spin down pump pre filter upstream of the water pump,
- A 50 micron sediment filter,

The water filtration system shall be located in a locked utility closet accessible only by authorized personnel trained in proper use and maintenance of the system.

7.0 RAINWATER CATCHEMENT SYSTEM MAINTENANCE:

7.1 Maintenance Personnel:

All required service and maintenance of the rain catchment water system shall be performed by personnel trained in the proper maintenance of the system. The training shall be in accordance with Hawaii Department of Health Safe Drinking Water Branch guidelines. HPA shall maintain an active log of personnel trained and certified in accordance with the guidelines. HPA shall maintain on staff a minimum of two employees trained and certified. Maintenance personnel shall maintain written records of all maintenance performed on the system. One log shall be posted in the filtration utility closet and a second redundant copy shall be maintained in the campus wide maintenance logs.

7.2 Periodic Regular Maintenance:

7.2.1 Once per Month Maintenance:

a) Flush clean rainwater y-strainer
b) Drain clean pre-pump spin down filter
c) Replace 50 micron filters
d) Manually clean the UV Light quartz sleeve using the integral wiper
e) Inspect and clean gutter system
f) Inspect and clean flow divergent weep hole

7.2.2 Once per Two Month Maintenance:

a) Replace 5 micron filters
b) Check UV Light power output and replace if deficient

7.2.3 Once per Six Month Maintenance:

a) Inspect storage tank for sediment and/or sludge and drain as required

7.2.4 Once per Year Maintenance:

a) Replace UV lights

7.2.5 Once per Year Water Testing:

A minimum of once per year sample and test the water in accordance with U.S. EPA approved drinking water analysis methods. The water analysis shall include but not be limited to pH,

salinity, total coliform count, fecal coliform count, heterotrophic bacterial count, and inorganic contaminates.

Additional water testing shall be initiated whenever the water is reported to have a distinctive color, odor or taste.

8.0 Back-Up Water Supply:

The water storage tank shall be connected to the existing site Hawaii County water system. During periods of abnormally dry weather, the Energy Lab water storage tank shall be manually replenished with County water. See Civil for connection details.

9.0 RAIN CATCHEMNT SYSTEM SIZING

Rainfall at the site is typically 40" per year, however, the rain catchment system sizing is based on "worst-case" conditions representative of a "dry year". A historic "dry year" consists of no more than 30" per year rainfall with a minimum of 1" per month rainfall for up to three consecutive months.

9.1 Sizing Assumptions based on a Dry Year

a) 6,000-sqft of rainwater catchment area
b) 30 inches per year minimum rainfall during a dry year
c) 1 inch per month minimum rainfall for a maximum of 3 consecutive months
d) Maximum occupancy of 40 students and staff per day, 5 days per week
e) 225 gal/day estimated potable and non-potable (calculated per LEED Water Usage Calculator Sheet)

9.2 Sizing Results based on a Dry Year:

a) Annual Rain Collection = 112,500 gal per year
b) Annual Usage = 54,000 gal per year
c) Yearly Safety Margin = 112,500/54,000 = 2.08 FS
d) Monthly Rain Collection at 1" per month = 3,750 gal per month
e) Monthly Usage = 4,500 gal per month
f) Drought Collection Monthly Safety Margin = 3,750/4,500 = 0.83 FS
g) Drought Storage Tank Safety Margin = 10,000 = X(4,500-3,750) X =13.3 FS

9.3 Summary Results:

During a worst-case dry year (30" per year), the project intends to collect 2.08x more water per year than estimated yearly water use.

During a typical year (40" per year), the project intends to collect 2.8X more water per year than estimated yearly water use.

During a worst-case "drought month" of 1" per month rainfall, the project intends to collect 83% of the water consumed for the month.

The Rain Catchment Storage Tank has the capacity to store 13 months of estimated monthly water use assuming 1" per month of rainfall for 13 consecutive moths.

The Rain Catchment Storage Tank has the capacity to store 2.2 months of estimated monthly water use assuming no rainfall at all.