Green Roof Irrigation

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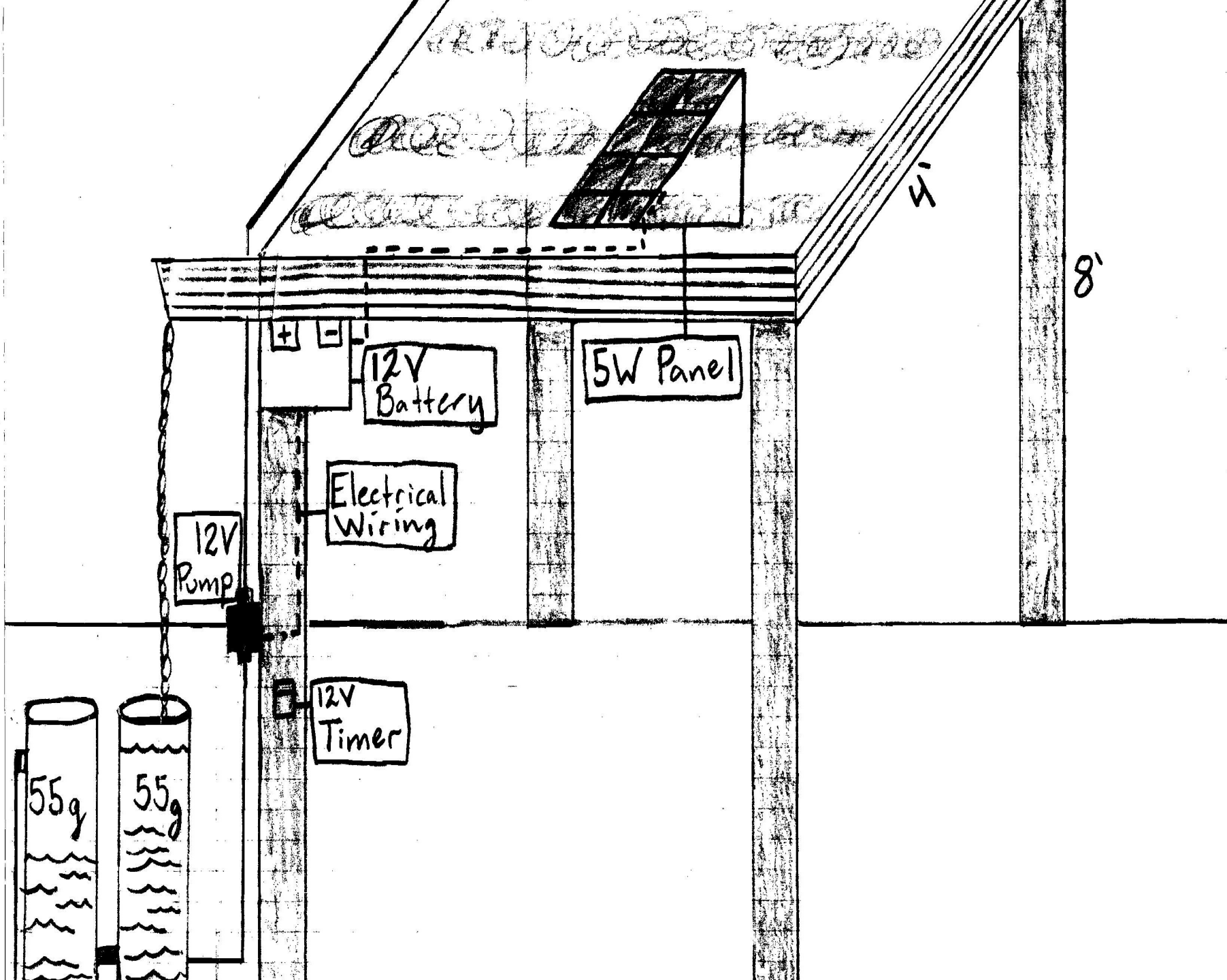
Purpose / Scale

- To construct a self sustaining drip irrigation system to water an eco-roof in the PSU orchard
- The roof will be 8’x4’x1’
  - 4” of soil medium with a variety of native Sedum vegetation for optimal rain water retention.

Vegetation- Biting Stonecrop, White Stonecrop, Cascade Stonecrop, Hens and Chicks, Dwarf Ice Plant,


4'
8'
+
-
12V Battery
5W Panel
Electrical Wiring
12V Pump
12V Timer
55g
55g

System

- Potential covered cob bench
- Solar Panel
- Battery
- Timer
- Irrigation Drip System
- Pump
- Rain Barrels
- Construction Materials for Planter Box

Calculations

Water Budget:

Roof = 32ft^2 or 10.6ft^3 of medium (soil)

Water required to saturate .75ft^3 of medium = 1 gal.

10.6 / .75 = 14.13 gallons of water required per week

Summer (June, July, August) = 12 weeks ; 12 week X 14.13 gallons = 169.6 gallons of water needed for entire summer

*Rainfall in summer months(32sq ft x 3in(in/dry months) / 12 (in/ft) = 8 Cubic feet of water/dry months. Cubic ft/dry months 8 ft^3 x 7.43 (gallons/cubic foot) ~ 60 Gallons of rain during the 3 summer months.

60 gallons ; 169.6 – 60 =109.6 gallons needed 'at the ready' = two 55 gallon rain barrels.

Calculations

- Pump: Sureflow Model #8000-051-210 ; 12V @ 1.4 Amps with a 35psi bypass ; .45gal/min flow rate through 25psi dripline ; 12V X 1.4A = 16.8W
- Need 14.13 gallons, pumping for 32 minutes will yeild 14.4 gallons (32 min x .45 gal/min)
- Pump Will Flow for 32 minutes/week controlled by digital timer

Calculations

- Solar Panel trickle charges battery which powers pump ; pump controlled by timer
- Pump requires 16.8Wh

  32 min = .53 hours ; .53 x 16.8 = 8.96Wh

Panel Output = 8.96 / (3.5)(88%)(85%) = 3.422W

Therefore we will use a 5W Panel rated at 12V

Battery: 12V, 7.6Ah

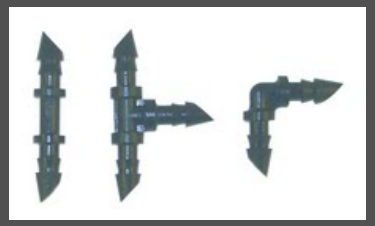
Pricing

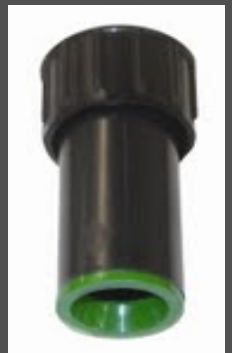
- Panel: $63.95 “Battery Tender” part# 021-1163, 5-year warranty, weighs 5lbs.
- Battery: $16.95 “Battery Mart” part# SLA-12V7-F2, 1-year warranty
- Pump: $134.95 “Shurflo” model 8000-051-210, 12V at 1.4 amps, .45 gal/min at 25psi, including 30 psi bypass

Timer: $121.50 “SuperFeeder” 12V DC, 5-year warranty, includes internal 5-year lithium battery

Materials/Pricing

- Eco-Roof Components: layers to the planter box: “SafeGuard” Green roof kit, $266
- Irrigation: “C.A.P.” Custom Automated Products
  - ¼” drip tubing $7.49
  - 40 - ¼” drip emitters $0.27 each
  - 5 - ¼” Barbed T’s $0.30 each
  - 1 - ¼” Barbed 90° elbow $0.30 each
  - 4 – ¼” Poly End Plug $1.95 each





Pricing

- 3 1x12 8ft boards “Home Depot” $44.34

- Flood Tray liner 4x8 ft “High Caliper” $69.95

And Flood Tray Smart Part $45.95

Total System Cost: $526.48

Future Applications/ Alternatives

- Manual Labor = $15/hour, Ladder - $168, Watering Can- $24.95, Total = $372.95

Question of Scale Transferability of Entire System

Extension of Sustainability Mission of PSU

Sources

- Portland Precip
  http://www.weather.com/weather/wxclimatology/monthly/graph/USOR0275
- Irrigation Supplies
  http://www.capcontrollers.com
- Flood Tray Liner and Smart Pot
  http://www.treebag.com
- Rain Barrel/Water Budget/Ecoroof
  Daniel See @ Home Grown Garden Supply.com
- Pump Retailer
  Clide @ Falkenger Electric (Pump) Shop
- Pump Manufacturer
  Pedro @ The Drip Store.com
- Panel/Battery
  http://www.battermart.com