

# Hawkes Drought Experiment at Ladybird Johnson Wildflower Center

## Proposed Specs for Overhead Irrigation System

Please note Figures are not to scale

# System Specifications

Project description: Overhead irrigation system to be built under Rainout Shelter experiment (Figure 1). Rainout Shelter is a structure used to block precipitation from reaching experimental plots located underneath the shelter. Rain events will be simulated under Rainout Shelter using an overhead irrigation system, with city water as the water source, filtered by a coarse DI system. Experiment is located at Ladybird Johnson Wildflower Center (4801 La Crosse Avenue Austin, TX 78739). No electricity is available on site.

Site description: Plot layout includes Rainout Shelter covering four experimental blocks (Figure 1). Each block is 107 ft x 16 ft. There are six plots in each block. Each plot is 16 ft x 16 ft. Frame is steel with polyfilm roofing. Steel cables ~8ft high will be placed over the plots at 12-ft intervals (in line with shelter poles) to facilitate hanging of overhead irrigation system.

Water source: Culligan low grade deionization filter will be attached to city water access port with hose connection. The Culligan deionization filter processes 5 gallons/min with almost zero power required. This item will be provided Hawkes.

Water storage: After city water passes through deionization filter it will be stored in a 1000 gallon tank, relying on city water pressure. Tank material should be FDA- & NSF-approved polyethylene or similar that will not impart residues into the water and are suitable for outdoor storage including heat tolerant and UV resistant (example <http://plastic-mart.com/class.php?item=732>).

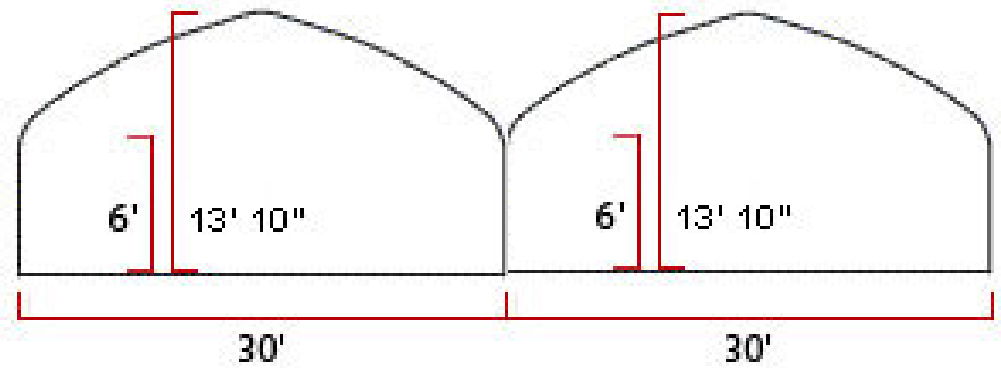
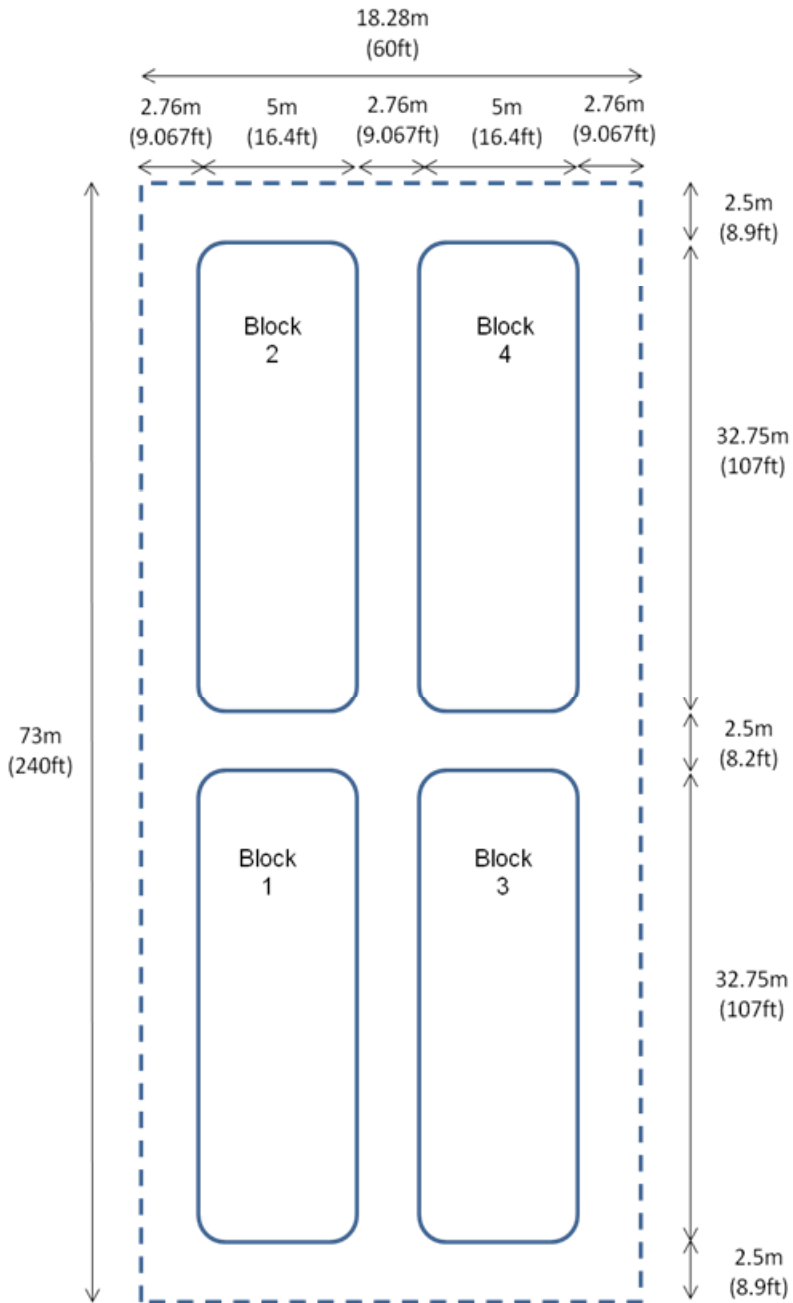
Water pump: Water must be pumped from storage tank to sprinkler heads through irrigation layout. Electricity for the pump must be provided by a solar panel with rechargeable battery system. One possibility is the ShurFlo 2088 Sealed delivery pump powered by a Kyocera 185 Watt solar panel connected to a Crown Battery 395 AH, 6 volts battery with a Morningstar Sunsaver solar charge controller. We suggest two to four pumps, one per line.

Irrigation system: One overhead sprinkler should be positioned above the center of each plot (Figure 2). Each sprinkler must be able to deliver water independently of all other sprinklers. Sprinkler heads must provide uniform coverage, large droplet size to resist wind, and an application radius of **5m** (the diameter of the plot). An example sprinkler is the Senninger mini-wobbler (<http://www.senninger.com/miniwob.php>). System should be system with programmable timer. Pipes must be appropriate for sprinklers, such as PVC or Poly Pipe, and of appropriate diameter to maintain flow rates.

Water application: Pump flow rate and pressure at the pump must be enough to allow at least four sprinklers to run simultaneously (one plot per block) with consistently equal water delivery pressure at each plot. Each plot should also have an in-line meter or other method to measure water delivery volume. Four sprinklers running simultaneously must deliver identical volumes of water at identical flow rates. The maximum water application per sprinkler at one time will be **~200 gallons**.

Figure below shows layout of experimental area under coldframe shelter. Shelter edge is indicated by the dashed line. Rectangles are experimental blocks.

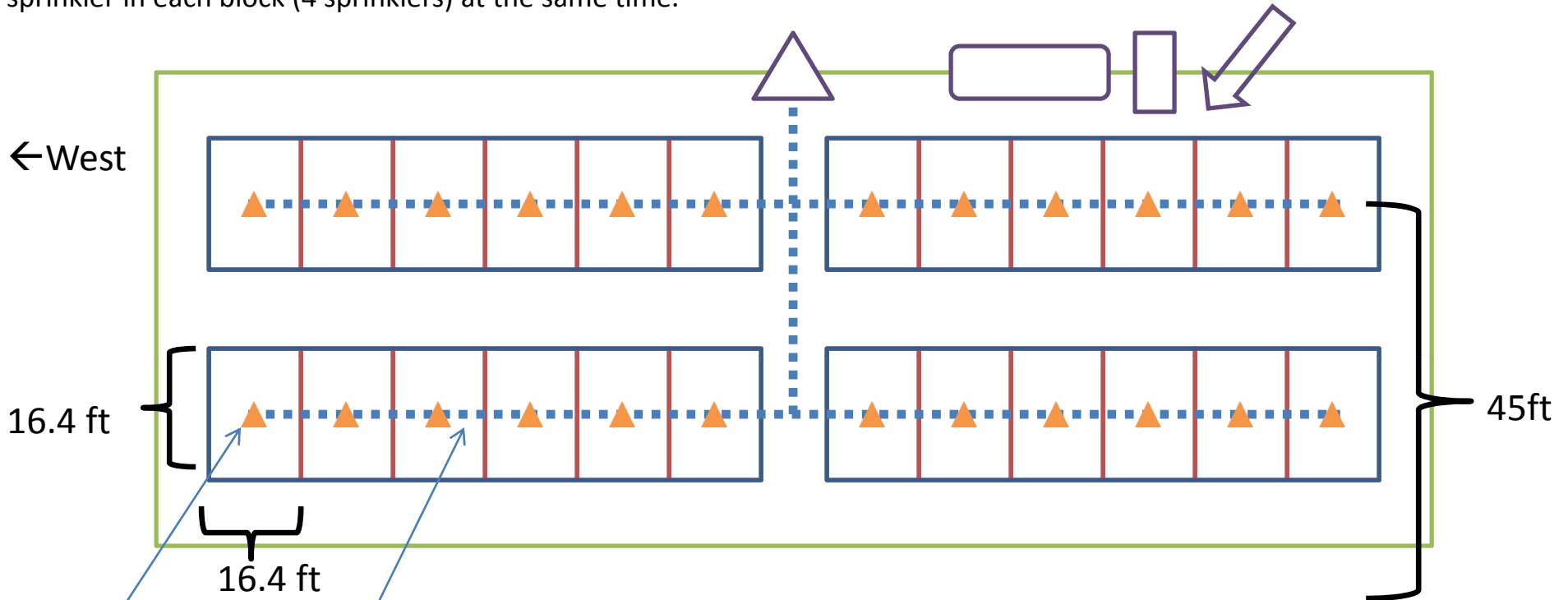
**Figure 1**



## Rainout Shelter Overhead Irrigation Design

Figure 2

This figure shows the four blocks under the rainout shelter. Each 16.4 ft by 16.4 ft area is one plot. There are six plots in each block. There is one sprinkler over each plot. We must be able to turn on one sprinkler in each block (4 sprinklers) at the same time.



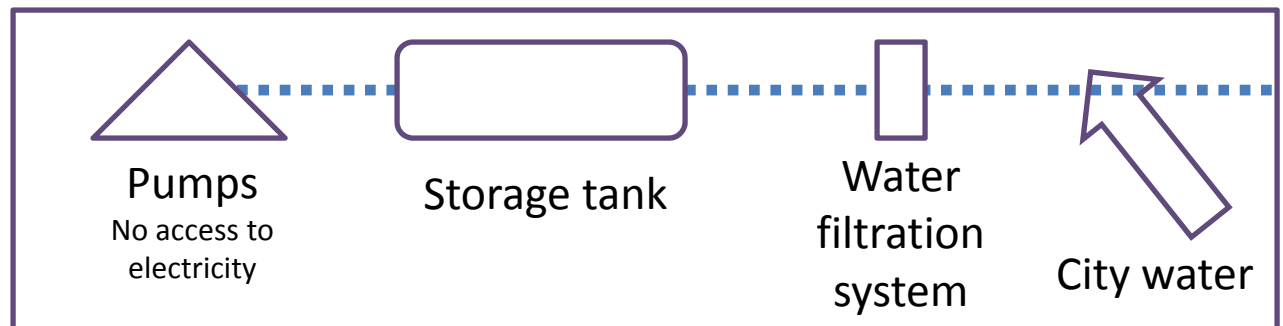
Sprinklers

Irrigation line

Sprinklers are indicated by triangle (orange)

Irrigation line is indicated by dashed lines (blue)

The rectangle below describes the water source components



## Plot Treatment Assignments

This figure shows the assignments of six rainfall treatments to plots within each block. Assignments were made randomly.

Figure 3

