Revision Date 1/1/09

Educational Laboratory Greenhouse
Minimum Specifications

I. Frame: 28 X 72 (or min of 2,015 sq. ft)
   a. Freestanding Metal A-Frame house that must meet minimum BOCA requirement of 20 lb/sq. ft snow load & 80 mph wind load or more if local codes require.
   b. Metal ends made from 1-1/2" galvanized steel with flat surfaces ready for polycarbonate attachment.
   c. Truss-cross bracing on every bow except end.
   d. Head height 3' out from side must be a minimum of 7' high.
   e. If gutters are present, gutters must be attached to downspouts at each corner to terminate at grade.

II. Cooling and Ventilation
   a. Two exhaust fans with a minimum of 1.3 air exchange per minute at .10 inches of static pressure.
   b. Each fan installed with guard and shutter in a slant wall housing of guard and shutters and protective screening on both sides.
   c. Units must be completely constructed out of galvanized steel and aluminum or fiberglass.

III. Low Volume Intake Shutter
   a. One 36" aluminum shutter plus motor for inlet air placed opposite the fan end for winter ventilation and for the beginning of the three cooling stages. The shutter should be constructed of all aluminum frames and blades with stainless steel hinge pins and nylon bushings.

IV. Power Vent
   a. 75 sq. ft power vent sized for proper ventilation. The vent should be covered with twin wall polycarbonate and powered by a totally enclosed motor specified for outdoor use.
   b. It should include a rain tight, encased, manual override control unit.
   c. Installed with manual on/off control and crank system.

IV. Evaporative Cooling
   a. 75 sq. ft evaporative cooling system, consisting of 6" pad material with a 65/15-degree water/air flow with 420 ft. per maximum face velocity.
   b. Package should come with aluminum cap and return trough and all PVC pipes need to be predrilled.
   c. Submersible type pump capable of 750 GPH at 15ft. of head.
   d. Power outlet to pump must be GFCI; installed with a water tight receptacle shield.
   e. Valve at the end of the pump filter must be cleaned out.
   f. Unit must be installed for easy access to remove pads and to clean PVC pipes.

V. Heating System
   a. Heater unit should be a power vented system rated for a 60-degree delta T, incorporating a time delay to allow the heat exchanger to rise to a certain temperature before fan is engaged.
   b. The unit should be equipped with a propeller fan plus guard and a stainless steel burner.
   c. Heater should be mounted at the fan end of house using a galvanized steel heater hanger plus necessary hardware to support the weight of the unit.
   d. Galvanized Stove Pipe Assembly-Double-Walled that is properly sized for the heating unit: stove pipe is to vent unburned gases/combustion from heat exchanger to the outside and should consist of a T joint and straight pipe plus a top hat which prevents water from entering the stack.
   e. Local system must specify in bid proposal if they will be using LP or Natural Gas.

VI. Horizontal Air Flow Fans

a. Minimum of three 20" 3-bladed fans complete with a guard/hanger and a split capacitor 115v 60hz 1/15 hp motor required. Must develop 2000 cubic feet/min.

VII. Environmental Controllers

a. Five-stage thermostat control individually labeled for simple operation with no overlapping of heating or cooling units. Stage one of the cooling system operates the shutter for both winter and summer; the #1 fan is on its low speed. As the temperature continues to rise, the first fan goes into high speed. The #2 fan is energized, the shutter closes, and the power vent opens. The final stage of cooling is when the pump for the evaporative cooling system starts and the horizontal airflow fans are turned off. System should be wired for 120v, and enclosed in a watertight panel with easy access for adjusting set limits.

VIII. Doors

a. Minimum of two ADA compliant lock-and-key doors constructed of aluminum stock with a triangular bracing and covering consisting of polycarbonate or transparent sheeting. Storm doors may NOT be installed.

IX. Covering

a. Polycarbonate 8mm twin wall cover should cover the entire structure and should be warranted for no less than a period of 10 years against coloring or reducing light transmission by more than 2% for 20 years.

X. Benches

a. Stationary benches with mesh must consist of a hot dipped galvanized expanded metal 13ga. top that is securely attached to a galvanized steel or aluminum frame with a minimum of 1" x 1" cross braces spaced 2' O.C. Bench legs must be made from a minimum of 1.315 diameter tubing with support rails and spaced 6' O.C.

b. Benches can be constructed with 3', 4', 5', and 6' widths and 8', 10', and 12' lengths. Local system must provide a floor plan on bench arrangement and number of benches requested.

XI. Shade Cloth

a. Shade Cloth of 55% shade and grommets 3' on center are required. Cloth should be wide enough to be attached midpoint on sidewalls for easy installation and removal.

XII. Hanging Basket Runs

a. Runs should match the maximum bench length with the exception of 10' in front of the heater.
b. 6 runs required.
c. The runs should be no higher than 8'6" above the floor.

XIII. Emergency Lighting/Exit Signs/Fire Extinguishers/Sink/Electricity

a. All should be designed to illuminate the word EXIT at all times, but they also must have emergency lights powered by a rechargeable battery. Emergency lights should come on when the power is interrupted for any reason.
b. One multi-purpose dry chemical A:B:C rated 10-lb fire extinguisher is required. Must be charged with specially formulated siliconized dry chemical UL and rated for fighting wood, paper, fabric, grease, flammable liquid, and electrical fires.
c. Keyless porcelain lamps with waterproof guard should be installed 12' apart down the length of the greenhouse.
d. Minimum National Electrical Codes should be met throughout the Greenhouse.

Greenhouse Facility Options

(Check option to be included in bid package)

_____ 1. Rolling top benches

_____ 2. Automatic Environmental Control Panels: located in front of Greenhouse for easy access with a secure lock system

Recommended units:
1. Wadsworth
2. MicroGrow
3. Sterling

_____ 3. Irrigation Systems:

_____ a. Mist:
Recommended system:
1. Complete system with brass high-pressure regulator, filter, punch tool, PVC pipe, gate valves, zone controller, solenoids, and mist irrigation suspended from overhead with misters spaced 4' O.C.

_____ b. Drip:
Recommended system:
1. Complete system with brass high-pressure regulator, filter, punch tool, PVC pipe, gate valves, zone controller, and solenoids. Each bench and overhead hanging basket line should be controlled individually and have manual shut off. Hanging Basket drippers are to be same rate flow and have the capacity to be turned off. Drippers are to be spaced 24" O.C. and 24" long.

_____ c. Controller:
Recommended:
1. Sterling (8 or 12 stations)

_____ 4. Fertilizer Injector: Installed at a minimum of 30" off of the ground for easy access, all irrigation outlets are serviced through a fertilizer injector. Unit provides a maximum of 30 GPM of fertilizer/water solution output. Unit must be installed with bypass and gate valves for flexibility.
Recommended system:
1. Dosmatic A30 injector

_____ 5. Full Slab Concrete Foundation with Drains

_____ 6. Eye wash station

_____ 7. Chemical storage area

_____ 8. Stationary Hose Reel

_____ 9. Sink & Water Connections to water source

_____ 10. Solid Potting/Work Tables

_____ 11. Florescent Light

Greenhouse Site Prep Option

(Check option to be included in bid package)

_____ A. Greenhouse Contractor will provide:

1. Complete site grading
   a. Pad must be built at a minimum of 6" above surrounding grade with a level finished grade and pad dimensions that are 5' longer and wider than the exact dimensions of the greenhouse
2. Flooring
   a. The footers are to be 16" wide and 6" deep with two runs of rebar for reinforcement. The remaining flooring is to be concrete 4"/ 3000 PSI with a medium broom finish. A fiber reinforcement is recommended. #2 gravel is to be installed in designated areas on floor of greenhouse. Option: Install a weed barrier below gravel.

_____ B. Local System will provide:

1. Rough Grading Site
   a. removal of trees, weeds, and debris
   b. site shall have enough dirt to allow a level finished grade
   c. site shall be accessible for a concrete truck
   d. site shall be accessible for an 18-wheeler truck
   e. underground utilities must be identified and marked

2. Electricity must run within 5' of site and provide a 120/240 volt, 100 amp single phase electrical supply
3. 1" water line with a minimum of 40 psi must run within 5' of site
4. Local system responsible for hooking up gas to the greenhouse heater

_____ C. Local System will provide:

1. Finished Site Grade
   a. Site should be free of all trees, weeds and debris
   b. Pad must be built 6" above surrounding grade with a level finished grade and pad dimensions that are 5' longer and wider than the exact dimensions of the greenhouse

2. Flooring
   a. Labor and materials should be contracted by a local system to completely finish flooring the greenhouse to within 24" of the inside width and length of greenhouse. This would allow contractor to construct the greenhouse and to pour concrete footer to meet existing slab. Note: concrete should be poured 4" thick / 3000 PSI with a medium broom finish. A fiber reinforcement is recommended
   b. Local system should furnish #2 gravel or its equivalent and labor to install gravel in designated areas on floor of greenhouse. Option: Install a weed barrier below gravel.

Greenhouse Equipment Unloading Options

(Check option to be included in bid package)

_____ A. Greenhouse contractor will provide crew to unload trucks

_____ B. Local system will provide crew to unload trucks

Greenhouse Vendors

1. Stuppy Greenhouses, 1212 Clay Street Kansas City, MO 64116 800-733-5025
2. Atlas Greenhouse, Hwy 82 East, PO Box 558, Alapaha, GA 31644, 1-800-346-9902, Marlin McClelland
3. Jaderloon Greenhouse, Cal Looney, 800-258-7171, 864-965-8573, Irmo SC
4. Ludy Greenhouse 1 800 255- Ludy
5. National Greenhouse 404-321-3131
6. Janco Greenhouse765-935-2111
7. XS Smith 800-631-2226

Irrigation Vendors

1. Bernard Chodyla, 294 Buck Blount Rd., Quincy, FL.32351
2. Atlas Greenhouses
3. Jaderloon Greenhouses
4. BWI