

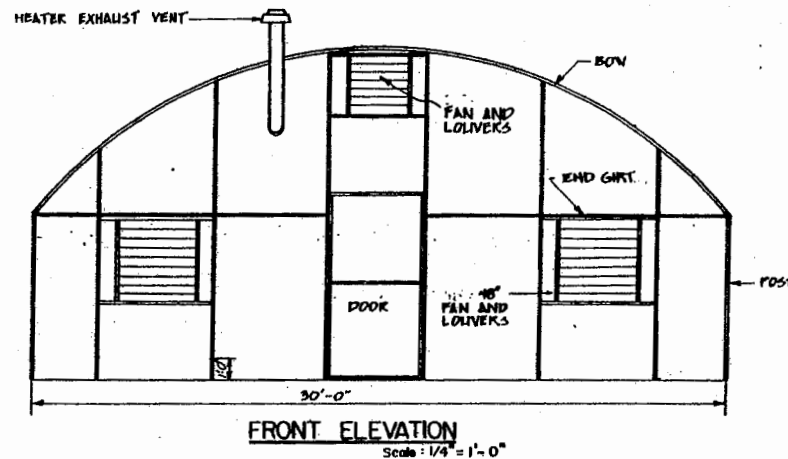
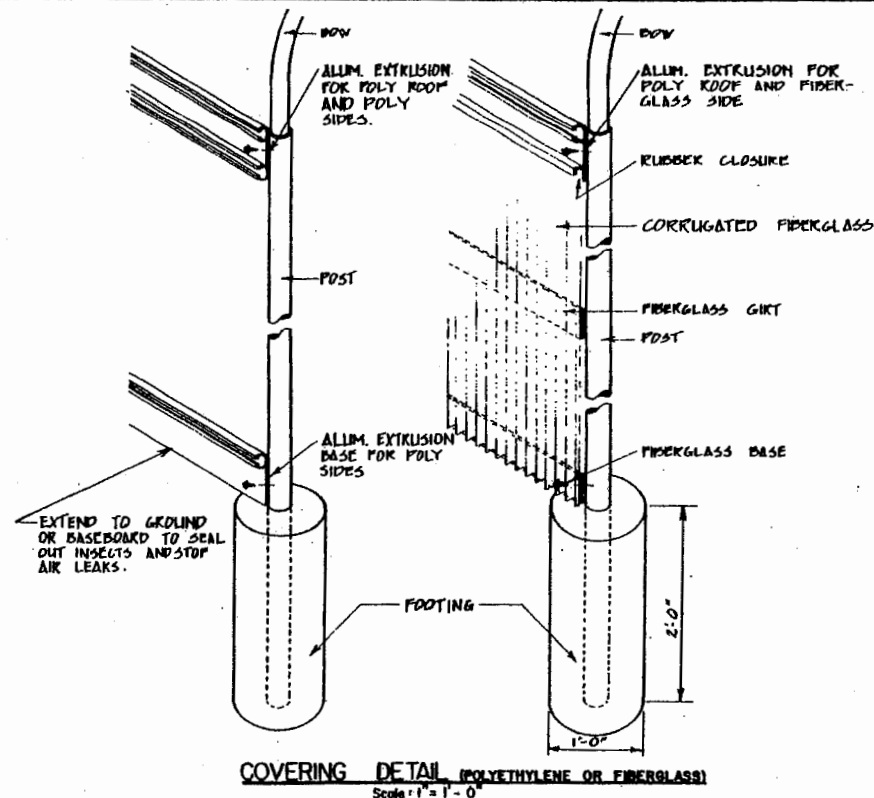
PERSPECTIVE OF QUONSET GREENHOUSE


LOCATION

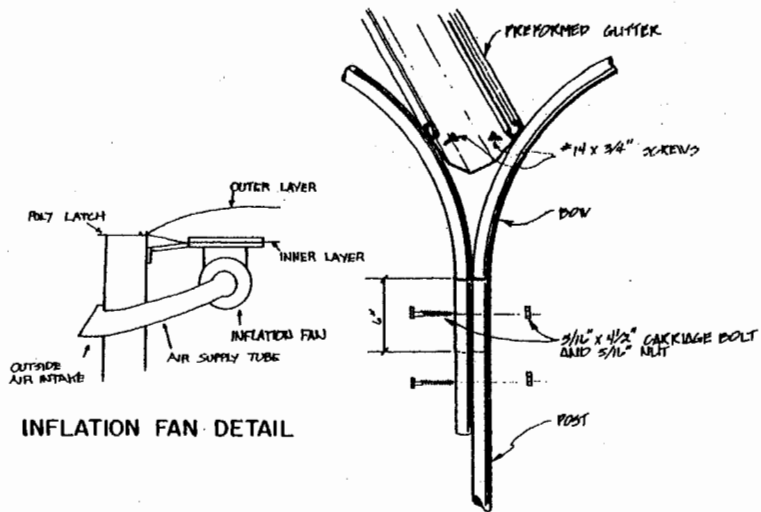
- 1) AVOID SHADE FROM BUILDINGS AND TREES.
- 2) N-S ORIENTATION FOR HOUSES AND ROWS.
- 3) CONSIDER WINDBREAKS ON NORTH (EVERGREEN PINES--PENCE--SHRUBS)
- 4) ACCESS TO UTILITIES AND ROADS.
- 5) ROOM FOR FUTURE EXPANSION
- 6) CONSIDER YOUR NEIGHBORS AND LOCAL GOVERNMENT RESTRICTIONS.

CONSTRUCTION

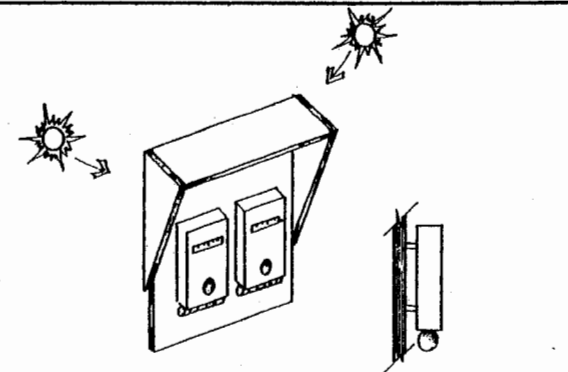
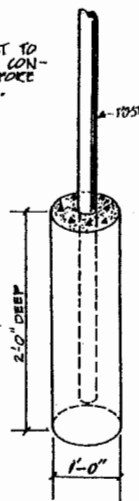
- 1) INEXPERIENCED GROWERS SHOULD START WITH ONE HOUSE 3000 SQ. FT. OR LESS AND EXPAND LATER IF JUSTIFIED BY EXPERIENCE.
- 2) COVER HOUSE WITH 2 LAYERS OF QUALITY GREENHOUSE POLYETHYLENE WITH AIR BETWEEN LAYERS MAINTAINED BY A SMALL SQUIRREL CAGE INFLATION FAN.
- 3) FRAMING SHOULD BE GALVANIZED STEEL TUBING - WOOD SHOULD BE PRESSURE TREATED WITH WATERBOURNE SALTS TO 0.25"/CU. FT. AND 0.1"/CU. FT. FOR GROUND CONTACT.
- 4) PAINT WOOD WHITE TO REFLECT HEAT AND MORE LIGHT TO PLANTS.
- 5) WHITE PAINT ON TOP OF FRAMES WILL REDUCE HEAT LOAD IN HOUSE.
- 6) DO NOT USE CROBOSOTE; TREATMENT SHOULD BE NON-TOXIC TO PLANTS.
- 7) FOOTING - EXCAVATE 6" AROUND FOUNDATION PIPE TO 2'-0" DEEP AND FILL WITH CONCRETE, LET SET AND KEEP MOIST FOR 3 DAYS BEFORE PROCEEDING WITH FRAME.
- 8) USE MINIMUM 5 SACKS OF CEMENT/CUBIC YARDS OF CONCRETE AND A MAXIMUM OF 5 GALLONS OF WATER/SACK OF CEMENT.
- 9) CHECK WITH LOCAL BUILDING AUTHORITIES FOR PERMIT REQUIREMENTS, ZONING RESTRICTIONS, PLAN NEEDS, ETC. CONTACT GREENHOUSE MANUFACTURER OR DEALER FOR BLUEPRINTS NEEDED. CONTACT LOCAL REGISTERED ENGINEER OR LICENSED ARCHITECT FOR PLAN ASSISTANCE IF REQUIRED.
- 10) DETAILS GIVEN ARE TYPICAL AT MANY COMMERCIAL GREENHOUSES IN USE IN LOUISIANA. SPECIFIC MANUFACTURER'S PRODUCTS WILL VARY IN DETAIL, BUT GENERAL CONCEPTS APPLY. CONTACT YOUR COUNTY AGENT FOR ADDITIONAL INFORMATION.



 LSU AgCenter <small>RESEARCH & EXTENSION</small>	
COMMERCIAL GREENHOUSE	
ENGINEER B. Branch	SCALE AS SHOWN
DRAWN BY W.A. Parrott	SHEET 1 OF 5
TRACED BY W.A. Parrott	DATE 11-30-89 NO. 48-03



RECOMMENDED PRACTICE:
EXCAVATE 6" AROUND POST TO
2'-0" DEEP AND FILL WITH CON-
CRETE. LET SET 3 DAYS BEFORE
PROCEEDING WITH FRAMING.



MOUNT FROM RAFTER OR ON
GROUND STAKES AT PLANT HEIGHT
PLYWOOD PAINTED WHITE ON
OUTSIDE TO REFLECT HEAT

BACK TOWARD SOUTH TO PREVENT
DIRECT SUN ON THERMOSTATS

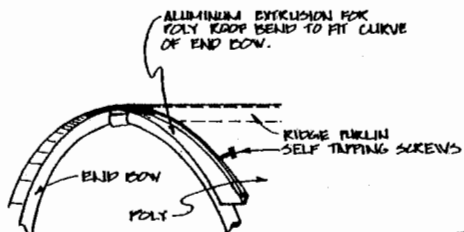
SIZE APPROX. 12" X 12" OR AS
REQUIRED.

THERMOSTATS SPACED
1/2" FROM BOARD TO
ALLOW FREE AIR
CIRCULATION.

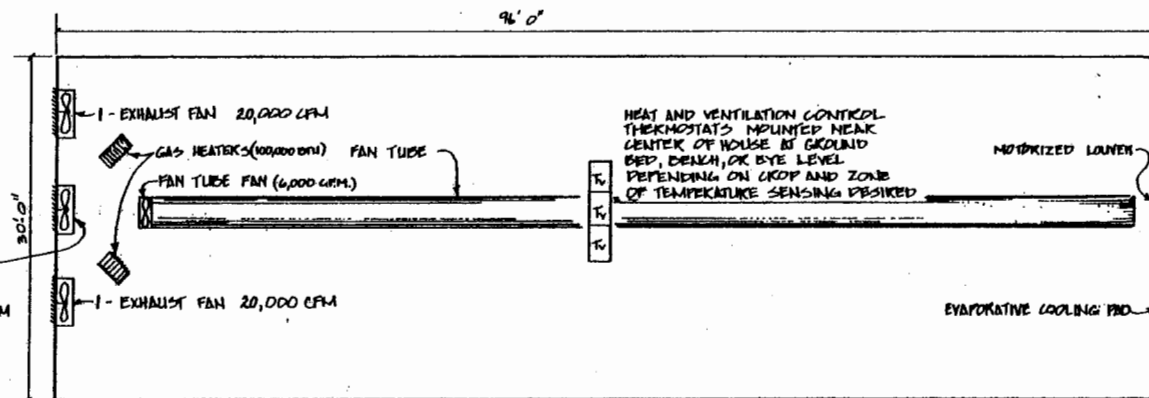
GUTTER CONNECTION DETAIL

FOOTING DETAIL

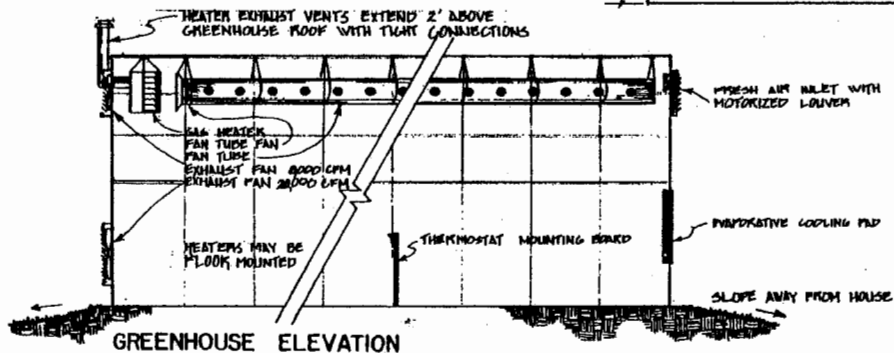
THERMOSTAT MOUNTING BOARD



COVERING DETAIL



GREENHOUSE LAYOUT PLAN
SCALE 1/8" = 1'-0"



GREENHOUSE ELEVATION



COMMERCIAL GREENHOUSE

ENGINEER	JWB.	SCALE	as shown
DRAWN BY	WAP	SHEET	2 OF 5
TRACED BY	WAP.	DATE	11-30-89
		NO.	48-03

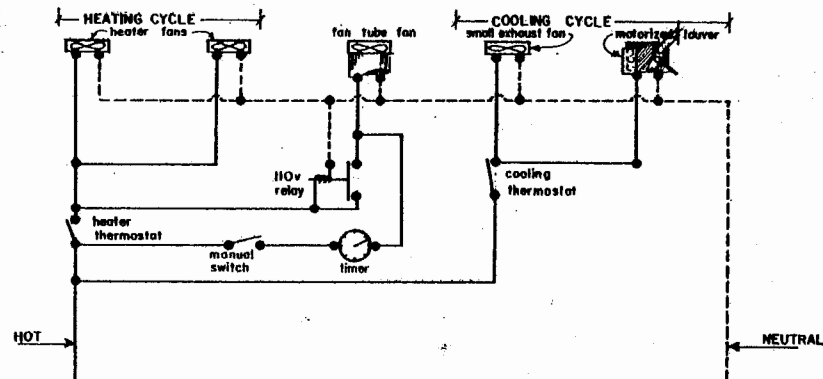
NOTES

- TOTAL FAN VENTILATION CAPACITY TO BE BASED ON 1 1/2 TO 2 AIR CHANGES PER MINUTE. FIRST STAGE OF WINTER VENTILATION SHOULD BE 10% OF HOUSE VOLUME (C.F.M.) WITH AT LEAST 2 MORE STAGES TO REACH MAXIMUM RATE. EACH FAN OR FANSPEED SHOULD BE OPERATED BY A SEPARATE THERMOSTAT OR ONE SIDE OF A 2 STAGE THERMOSTAT.
- ALL FANS TO BE MOUNTED IN END OR SIDE OF HOUSE TO EXHAUST WITH (NOT AGAINST) AIR FLOW OF PREVAILING WINDS. MOUNT FRESH AIR INLET SHUTTERS IN OPPOSITE END OR SIDE.
- HEAT REQUIREMENTS TO BE BASED ON HOUSE TYPE AND SIZE, TYPE OF COVERING, NUMBER OF LAYERS, AND TEMPERATURE DIFFERENTIAL TO BE MAINTAINED. SELECT SIZE AND NUMBER OF UNIT HEATERS TO GIVE TOTAL HEAT OUTPUT REQUIRED.
- WHEN 2 OR MORE HEATERS ARE USED IN ONE HOUSE, RECOMMEND ALL HEATERS BE CONNECTED TO ONE THERMOSTAT THROUGH A SMALL MULTI-POLE RELAY OR USE THE ALTERNATE WIRING DIAGRAM SHOWN SO ALL HEATERS WILL OPERATE TOGETHER FOR MORE UNIFORM HOUSE TEMPERATURE. (CAUTION: TWO OR MORE THERMOSTAT TERMINALS CANNOT BE CONNECTED DIRECTLY ON SAME FIRST THERMOSTAT TO OPERATE PROPERLY, THIS THE RELAY OR ALTERNATE WIRING IS REQUIRED.) WHERE INDIVIDUAL THERMOSTATS ARE USED FOR EACH HEATER, SET THEM TO OPERATE AS CLOSE TO SAME TEMPERATURE AS POSSIBLE FOR THE MOST UNIFORM HOUSE TEMPERATURE.
- WIRE HEATER FANS TO OPERATE CONTINUOUSLY IN WINTER TO PROVIDE AIR CIRCULATION. USE MANUAL SWITCH OR PROPER THERMOSTAT CONNECTIONS TO STOP OPERATIONS DURING SUMMER VENTILATION.
- USE OPTIONAL BOOSTER FANS OR COMMERCIAL POLY-TUBE EQUIPMENT TO INCREASE AIR CIRCULATION IF UNIT HEATER FANS ARE INADEQUATE.
- EVAPORATIVE COOLING PAD MAY BE USED. INSTALL AND USE ACCORDING TO MANUFACTURE'S INSTRUCTIONS. BE SURE TO OBTAIN DATA AND INFORMATION ON WATER REQUIREMENTS, INSTALLATION PROCEDURES, PERFORMANCE CAPACITIES, MAINTENANCE COSTS, AND FEASIBILITY FOR YOUR USE BEFORE PURCHASING COOLING PAD.
- FAN TUBE CAN BE USED TO DISTRIBUTE HEATED AIR OR TO PROVIDE CIRCULATION EITHER CONTINUOUSLY OR THROUGH A TIMER.
- MOTORIZED LOUVER AND SMALL EXHAUST FAN ARE WIRED TOGETHER TO BRING IN COOL FRESH AIR ON CLEAR WARM WINTER DAYS.

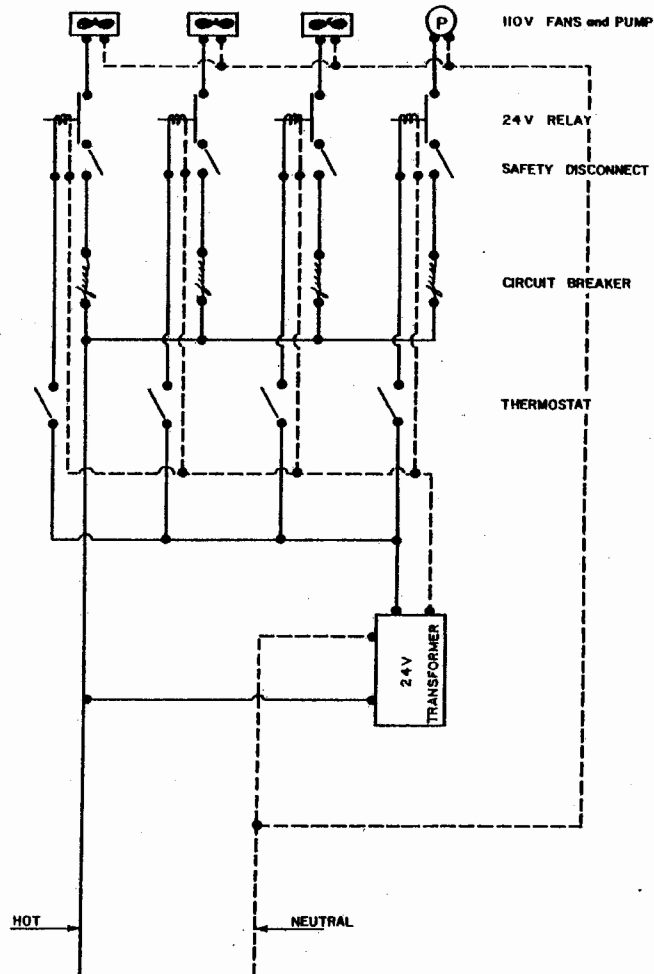
NOTES ON ELECTRICAL WIRING

- HEAT AND VENTILATION FANS ARE WIRED TO PREVENT OPERATION AT SAME TIME. SET HEAT THERMOSTATS AT MINIMUM TEMPERATURE DESIRED IN GREENHOUSE. SET FAN THERMOSTATS AT TEMPERATURE DESIRED FOR VENTILATION TO BEGIN, BUT AT LEAST 10°-20° ABOVE HEATING THERMOSTAT SETTING.
- BE SURE TOTAL AMPERAGE OF FAN MOTORS OR OTHER EQUIPMENT CONNECTED TO THERMOSTATS DOES NOT EXCEED ALLOWABLE LOAD RATING OF THERMOSTAT CONTACTS. IF NECESSARY, USE PROPER POWER RELAYS OR MOTOR CONTACTORS TO HANDLE REQUIRED LOAD. (CAUTION: TWO SEPARATE RELAYS ARE REQUIRED TO OPERATE A TWO-SPEED FAN; THIS USE TWO-SPEED MOTORS WITHIN AMPERAGE RATING OF A TWO-SPEED THERMOSTAT.
- A 24 VOLT SYSTEM (SHOWN) REDUCES LINE VOLTAGE TO FANS AND INCREASES SAFETY LEVEL. A 115 VOLT THERMOSTAT CAN BE USED TO CONTROL POWER TO FANS DIRECTLY.

HEATING SYSTEM WIRING



COOLING SYSTEM WIRING

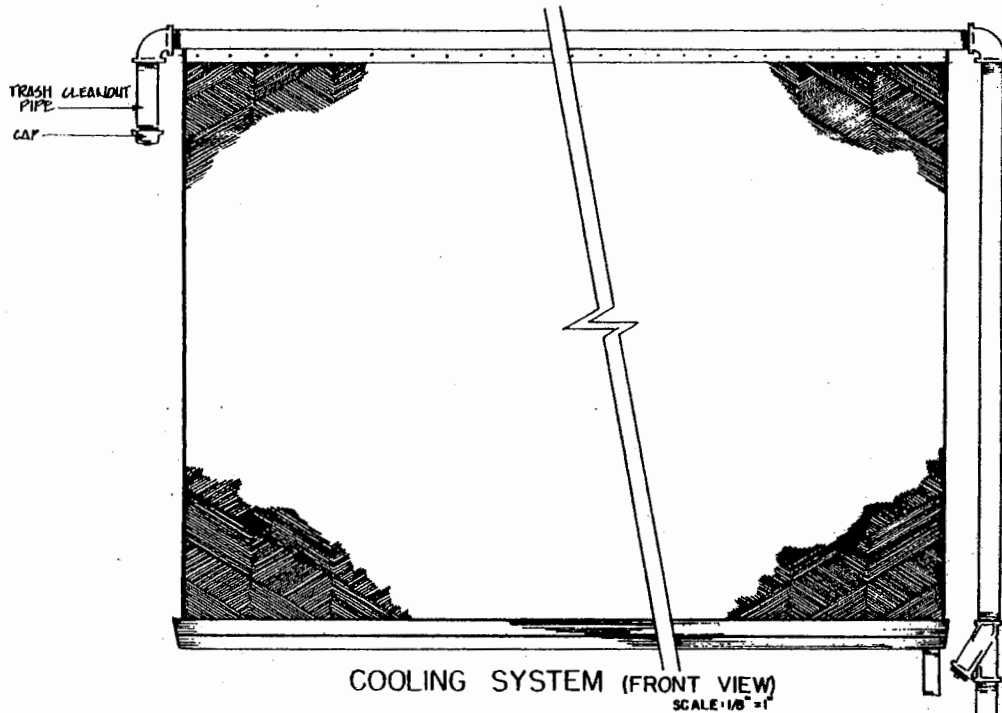


LOCATE FANS AT NORTH END OF HOUSE.
LOCATE PUMP AT SOUTH END OF HOUSE.



COMMERCIAL GREENHOUSE

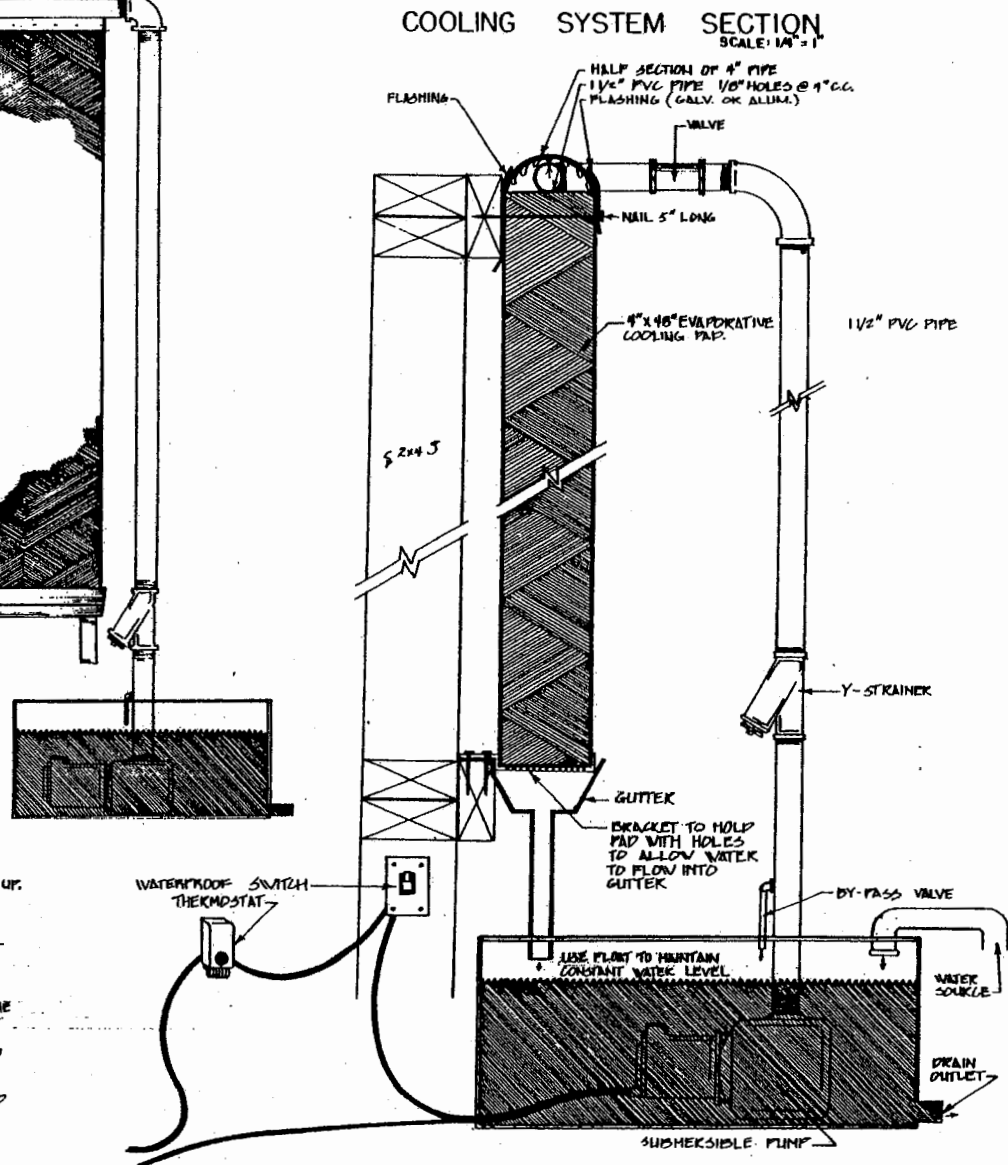
ENGINEER	J.W.B.	SCALE	AS SHOWN
DRAWN BY	W.A.P.	SHEET	3 OF 5
TRACED BY	W.A.P.	DATE REVIEWED	NO. 48-03



COOLING SYSTEM (FRONT VIEW)
SCALE: 1/8" = 1'

NOTES:

1. COMMERCIAL PADS ARE CORRUGATED CARDBOARD AND LAST APPROXIMATELY 5 YEARS, DEPENDING ON H₂O QUALITY. A SMALL AMOUNT OF CHLORINE MAY BE ADDED TO TANK WHEN ALGAE GROWTH BEGINS ON PAD.
2. PLUMBING - (CORROSION AND FREEZING) USE 1 1/2" OR LARGER LINES IF 1 1/2" PUMP IS USED. SHOULD PROVIDE 1/2 GALLON OF WATER/MINUTE/LINEAR FEET OF PAD. THIS KEEPS PAD WET AND ALLOWS FOR EVAPORATION. WATER SHOULD BE DISTRIBUTED THROUGH A DISTRIBUTION GUTTER OR 1 1/2" PVC PIPE WITH 1/8" HOLES DRILLED AT 4" CENTERS. TWO PERCENT OF WATER SHOULD BE BLEED FROM SLIMP TO REDUCE SALT BUILD UP.
3. AIR FLOW - PROVIDE AT LEAST 1 1/2 AIR CHANGES/MINUTE UP TO 2 AIR CHANGES/MINUTE. EXAMPLE: ASSUMING 2 AIR CHANGES/MINUTE TO AVERAGE HEIGHT OF 10 FEET USING A 30'x96' PLASTIC GREENHOUSE. THE VOLUME OF AIR TO BE EXHAUSTED IS: 30'x96'x10' (HEIGHT) APPROXIMATELY 6000 CFM/MINUTE. FANS SELECTED WOULD BE: 1 SMALL FAN AT APPROXIMATELY 6,000 CFM AND 2 LARGE FANS AT APPROXIMATELY 26,000 CFM A PIECE. SET THERMOSTATS TO PROVIDE INCREASED AIR FLOW AT TEMPERATURE INTERVALS OF 5-10 DEGREES FAHRENHEIT. WHEN TEMPERATURE REACHES 75°-85°F ALL FANS SHOULD BE ON. FOR EXAMPLE: AT 65° THE SMALL EXHAUST FAN SHOULD START; AT 75° ONE LARGE EXHAUST FAN SHOULD START; AT 85° THE SECOND LARGE FAN SHOULD START. AN ADDITIONAL 5°-10°F SHOULD CAUSE THE WATER PUMP TO START FOR EVAPORATIVE COOLING. THE PROCESS IS REVERSED AT THE END OF THE DAY. TO SAVE ENERGY, SET THE COOLING PUMP TO COME ON AND GO OFF BEFORE THE LAST FAN.
4. LID/VEILS - IN ADDITION TO FAN CONTROL THE DISCHARGE SIDE OF EXHAUST FANS SHOULD HAVE LID/VEILS WHICH OPEN AND CLOSE WHEN THE FAN STARTS AND STOPS TO PREVENT SHORT CIRCUITING OF VENTILATING AIR AND BACKDRAFTS.

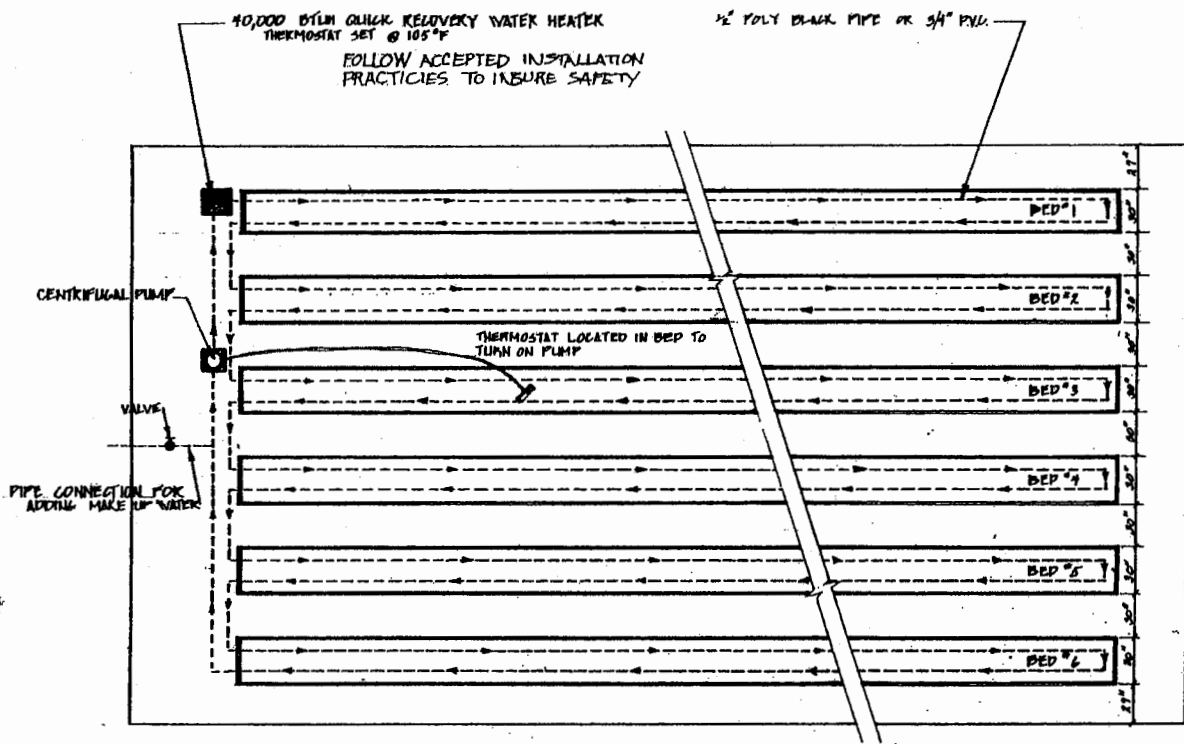
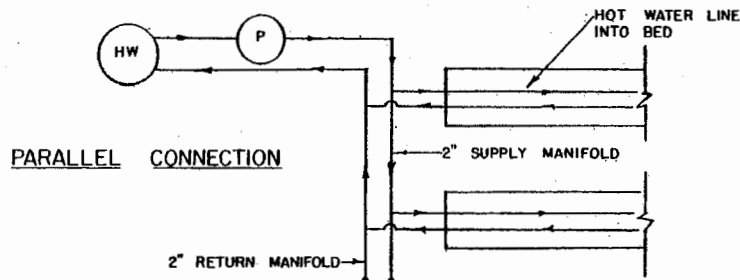


COOLING SYSTEM SECTION
SCALE: 1/4" = 1'

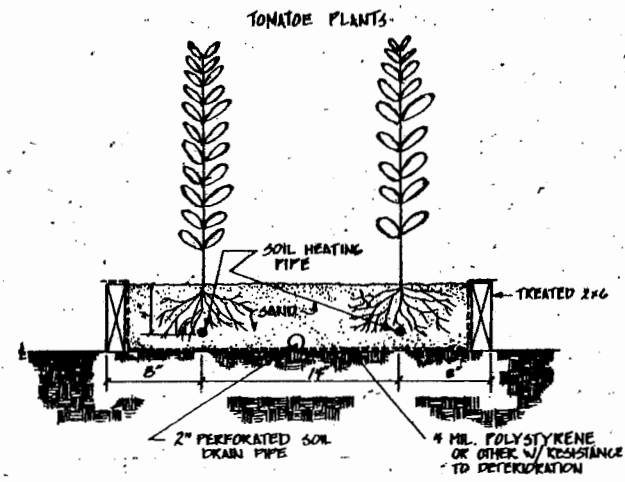


COMMERCIAL GREENHOUSE

ENGINEER B. Branch	SCALE As Shown
DRAWN BY W.A. Parrott	SHEET 4 OF 5
TRACED BY W.A. Parrott	DATE REVIEWED 11-30-99 NO. 48-03



PLAN (HEATING SYSTEM)
SCALE 3/16" = 1'-0"



HEATING BED SECTION
SCALE 1/8" = 1"

NOTE: COMMERCIAL SYSTEMS ARE AVAILABLE FROM SEVERAL MANUFACTURERS

NOTES:

1. WARM WATER CAN BE CIRCULATED THROUGH P.V.C. PIPE IN BED MEDIA OR UNDER POTS, PLANT BAGS, OR FLATS ON FLOOR OR BENCH TO HEAT ROOT ZONE OF PLANTS. THIS RESULTS IN HEATING ENERGY SAVINGS IF AIR OR SPACE HEATING IS REDUCED. SOME GROWERS USE ONLY BED HEATING. SOME GROWERS REPORT DECREASED ROOTING TIME FOR CUTTINGS WITH BED OR ROOT ZONE HEATING.
2. MOST INSTALLATIONS HAVE USED 3/4" PVC PIPE (CPVC IS NOT NECESSARY FOR TEMPERATURES LESS THAN 105°F). FLOW REQUIREMENTS ARE MINIMAL. 1/2" PVC WOULD PROBABLY BE ADEQUATE. LARGER MASS OF HEATED WATER INCREASES HEAT STORAGE POTENTIAL. BLACK POLY HOSE USED IN DRIP IRRIGATION SYSTEMS MAY BE ADEQUATE. AIR BLEED RISER SHOULD BE LOCATED IN LINE TO VENT AIR BUBBLES DURING START-UP.
3. LOCATE SOIL THERMOSTAT TO TURN ON PUMP FOR CIRCULATION THROUGH WATER HEATER AND BEDS WHEN BED TEMPERATURES DROP. THERMOSTAT IN WATER HEATER WILL TURN ON HEATER AS NECESSARY TO MAINTAIN WATER TEMPERATURE.
4. SERIES CONNECTION USES FEWER FITTINGS BUT WILL HAVE LESS UNIFORM HEATING.
5. PARALLEL CONNECTION GIVES MORE UNIFORM HEAT DISTRIBUTION. BEST FOR LARGER AREAS.



COMMERCIAL GREENHOUSE	
ENGINEER J.W.B.	SCALE AS SHOWN
DRAWN BY W.A.P.	SHEET 5 OF 5
TRACED BY W.A.P.	DATE REVIEWED 11-30-86 NO. 48-03

Disclaimer

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