BIOMETRIC AND HUMAN COMFORT

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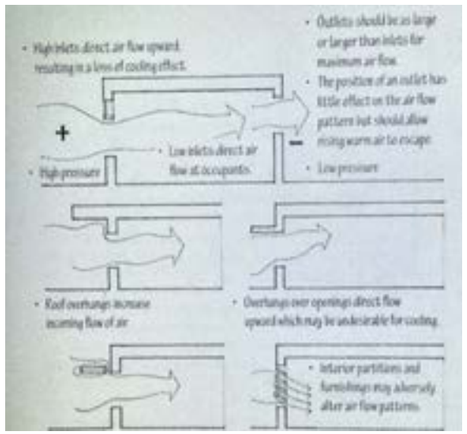
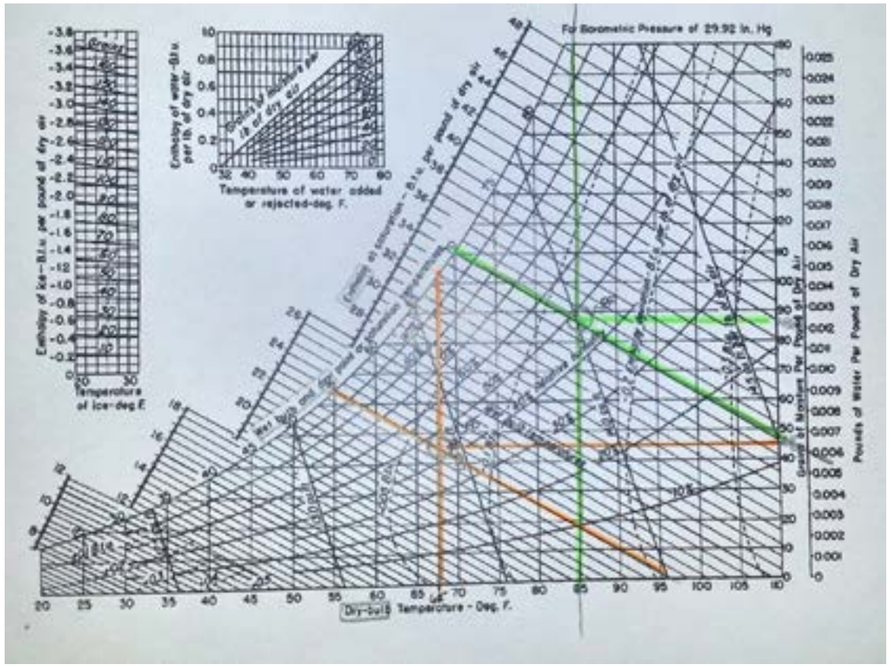
ARCH 1250 Site Planning

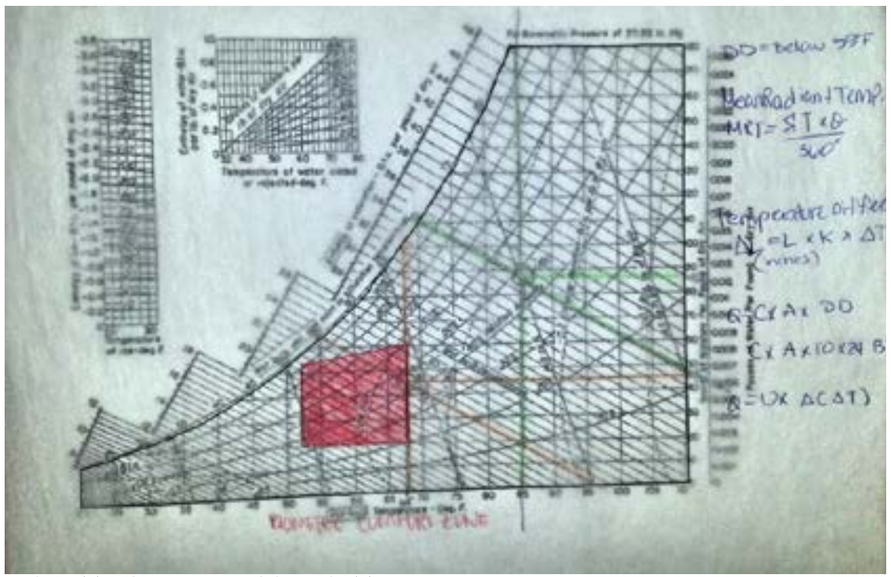
Sources: Building Systems, Dr.Edwards
Building Construction Illustrated, Ching



WIND CIRCULATION



PSYCHROMETRIC CHART



SOLAR RADIATION

BIOMETRIC-HUMAN COMFORT

BIOCLIMATIC AND THERMAL COMFORT RESEARCH

BTU (British Thermal Unit) is used to calculate heat loss.
Methods of Heat Transfer include:

1. Conducting: Transferring through solids (non-directional)
2. Convention
3. Radiation: Infrared (non-visible) or Visible (Transferred through the sun i.e. wavelengths)

BTU is used to determine how to increase one pound of water by one degree.

Absolute humidity (AH) is the weight of water in the air.
To determine the Mean Radiant Temperature (MRT), divide the sum of water temperature times view angles by 360.

Heat Loss and Heat Gain through surfaces also contributes to human comfort levels. The heat flow through a surface depends on 1. It's area, 2. Thickness, 3. Material and 4 the temperature difference across it.
Degree Days (DD) is the number of days the temperature degree falls below 65. The average daily temperature. The change in temperature between the inside and outside.

Human comfort level also changes through the glasshouse effect. That is, when sunlight enters an enclosed space through glass and heats up the object(s) within the space.

Dry Bulb Temperature (DBT): Measured by a calibrated scale, it is the degree of warmth or coldness of an enclosed space.
Wet Bulb Temperature (WBT): Measures the effects of relative humidity and evaporative cooling on the dry bulb temperature. It is always equal to or less than the DBT.

Relative Humidity (RH): The ratio of the amount of water vapor in the air to the amount of water vapor that is can hold.
Thermal energy is heat generated by the movement of tiny particles in an object.
Bioclimatic chart: If the average daily temperature is 59 degrees fahrenheit, the number of DD is 65-59. The average daily temperature, the number of degrees fahrenheit below 65 degrees.

Solar Climate: CC-Cold Climate, TC-Temperate Climate, HH-Hot Humid, HA-Hot Arid Climate
Hot-Humid Climate=southern USA =example New Orleans, Louisiana

ACHIEVING HUMAN COMFORT THROUGH SUSTAINABILITY AND SITE PLANNING
IN A HOT-HUMID CLIMATE

Higher roofs-------hot air rises.
Body of water------provides evaporative cooling effect, but not too much water because the air is already heavily saturated with water/humidity.
Trees----provides shade-----reduces temp by absorbing solar radiation.
Earth is cooler---step down into home
Glazing walls----when want to absorb sunlight
Sun rises in the east and sets in the west. Norther light is best to achieve human thermal comfort.
Punched openings----provide shade
Roofing systems----- terracotta roofs—the clay absorbs moisture from the air, providing a cooling effect.
Structure-----wood swells in humidity------brick is "thirsty" thus will provide a cooler house....
Materials.-----brick, white

grass and trees
more sun in morning areas of house ----sets in evening areas of house
solar panels assist with solar radiation

North facing windows let in soft, diffuse skylight
Over hangs and terraces facing south provide more efficient shading and shorter shadows

"Building form elongated along the east-west axis minimize east and west exposure
reduce solar heat gain"
utilize wind to promote cooling by evaporation
provide solar shading for windows and outdoor spaces
skylights with translucent glazing help access light without gaining too much heat.