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Orientation and Climatic Consideration in Building

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***Abstract* - An optimization of solar gains reduces the required heating demand, however too high solar gains can lead to overheating issues. Most methods for building energy ratings and building energy. To incorporate shading by fixed elements as an influence on solar gains into those methods, some simplifications are necessary. Shading devices reduce solar radiation transmission into the space by absorbing and reflecting radiation rays. This study investigates the effect of shading and day-lighting controls when applied on fully-glazed facades on the annual energy savings in hot climates. This paper discusses Improve internal temperature of buildings at Hyderabad to reduce energy consumption by designing proper projections according to the need researcher. Furthermore, study also highlights energy crises in our country, hence it is must to reduce the load on energy sources for such purposes and reduce the needs of energy in terms of electricity, gas, and such other fuels.**

Keywords: Reflecting radiation, shading, transmission, highlights, Hyderabad.

I. INTRODUCTION

During the British period Hyderabad's architecture remains unchanged in space planning because that was the outcome of generation's experience, based on Sindh people's needs and climate of the region.

(Georgiou, Love, & Smith, 1999) divided defects in three categories: Technical. Defect caused when the materials or building elements do not meet or reduce their functional performance Electricity plays an important role to reduce the energy cost in a building. There are energy crises in our country, hence it is must to reduce the load on energy sources for such purposes and reduce the needs of energy in terms of electricity, gas, and such other fuels. Climatic design is one of the approaches against stresses of climate.

The research highlighting the exchange of heat in between human body and surrounding is through conduction, convection, radiation and evaporation and the climatic study of Hyderabad with respect to sun.

II. PROBLEM STATEMENT

There have been grave energy crises in developing countries especially during summer season primary due to cooling load requirement of building. Increasing the consumption of energy has led to environmental pollution resulting on global warming and ozone layer depletion. There are different problems associated with the use of air conditioning: Increase in global warming.

Excess solar gain results in high cooling energy consumption in warm, sunny climates, while in cold and temperate climates winter sun entering south-facing windows contribute to passive solar heating. Also, in nearly all climates controlling and diffusing natural illumination could improve day lighting (Prowler, 2014).

Refrigeration and air conditioning related emission represent almost 64% of all chlorofluorocarbons (CFC) and hydro chlorofluorocarbons (HCFC) produced. The energy consumption in cooling system contributes to CO2 emission. Climate variability is expected to lead to crop loss of 10%.

40% with 2% rise in global temperature. According to Intergovernmental Panel on Climate Change, some of prominent environmental effects which are caused by climate change are Effects on ecosystem, Extreme weather events and Effects on food production.

III. RESEARCH METHODOLOGY

The researcher used number of formulas for determining azimuth and altitude the sun's altitude (A) above the horizontal plane and solar azimuth (B) measured from south north line toward the north in horizontal plane can be calculated accurately for any location, date and time of the day by using formulas:

SIN (A) – COS (L). (D) COS (H) +SIN (L) SIN (D)

SIN(A). SIN(L) – SIN(D)

SIN (B) = ----------COS (A). COS (L)

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Where,

A = Altitude of sun
B = Azimuth of sun
L = Latitude angle of the location.
H = Hour angle of sun = (150x number of hours from local solar noon)
D = Solar declination (angle between earth sun line and equatorial plane) see table (1)

The hour of sunrise and sunset and their azimuths can be found directly by the following formulas.

COS (T) =TAN(L). TAN(D) (WHEN A = O)
COS (B) = SIN(D). SEC(L) (WHEN A = O)

The noon altitude of sun may be quickly found for any latitude and any declination by the following formulas.

A = 90 – (L-D) WHEN L>D
A = 90 – (D-L) WHEN L<D.

Data analysis:

Position of Sun: Evaluation of sun's position is describes below

(Azimuth & altitude) By the formulas described under:

Sin A = Sin L sin d + Cos L cos d cos t ---------- (1)

Sin B = Sin t Cos d Sec h

Find azimuth and altitude of sun at 3pm, June8, at Hyderabad's latitude. i.e. 250 23'

Data:

L – 250 23' = 25.380

D = 220 45' = 22.750

(Declamation of sun on 8th June)

t = 3x15 = 450 (1 hour -150)

Put these values in equation (1) for altitude:

Sin (A) =Sin (25.38) Sin (22.75) +Cos (25.38) * cps (22.75)* Cos (45) Sin (A) =0.75491

A Arch Sin (0.75491) =49.1750 = 490a' Altitude of the sun.

Put these values in equation no:2

Sin= (B) Sin (45) Cos (22.75) Sec (49.0175)

Sin (B) = 0.99431

B = Arch Sin(0.99431)

B = 83.88310 = 83053' Azimuth

B = 83053' or 9607' = (180-830.53')

Since azimuth 'B' is incurred from the north meridian, by inspection proper answer is 9607' to the west.

Shadow construction: Required Information:

Angle of Orientation relation to north south axis = C.

Azimuth = B,

Altitude = A of the sun at described time, refer

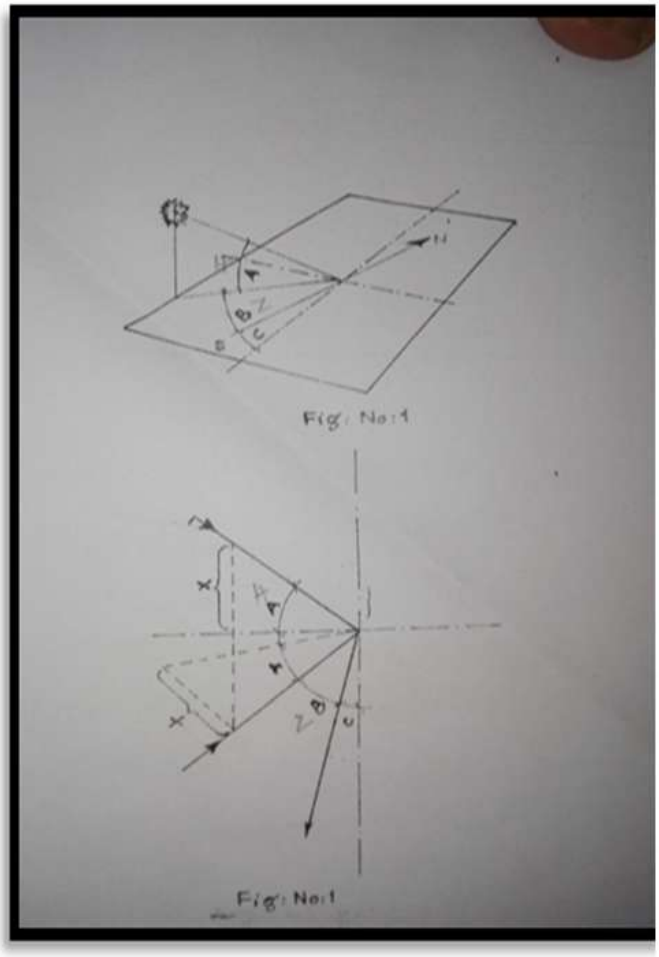

Figure-1: Expresses the Required Information about altitude azimuth to design the projections

(Angle of Orientation relation to north south axis = C, Azimuth = B, Altitude = A of the sun at described time, refer).

Steps:

(Building orientation) Measure distance "X" along this line from elevation plan. Connect the point at distance "X" from elevation plan to center, to construct sun elevation "A" as Use sun plan "B + C" and elevation "A" to construct shadow in plan and elevation in conventional way.

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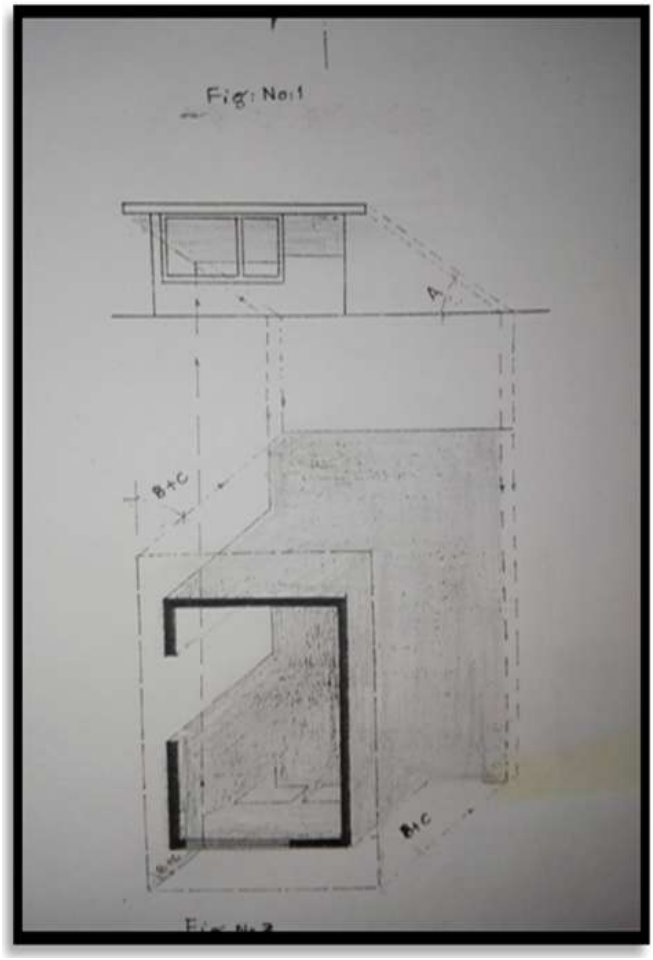

Figure-2: Expresses construction of shadows according to orientation

IV. RESULTS AND DISCUSSIONS

Through the analysis obtained data, it was assessed that following the street pattern and road system must consider the provision of building orientation as most important factor.

The researcher suggests that Designer must consider the various options of rotating the plan of the house in order to get best orientation of the structures. In case where there are constrains and best orientation is not possible the designers must try the shading devices as tools to monitor the sun in the buildings. The designer must add shading devices to monitor the sun rays but same time the shading devices should be designed to add and enhance the elevation and facades of the buildings. The shading devices shall be used to enhance elements and principles of design and make it possible to use the same in practice. Devaluation of property, residents justification, thermal comfort disturbance, decrease workability, dull aesthetic appearance of building, poor performance, increase maintenance cost.

V. CONCLUSION

In the light of studies made so far on orientation of buildings in Hyderabad and substantial add of shading devices in the windows of building. Building becomes worth when orientation is considered especially orientation to sun. The well oriented buildings provide economical and comfortable living thus save not only economy but help in healthy living. Wherever Designers find constrains in orientation of the building shading devices are tools in hands of the designer. The Shading devices not only provide shades against the sun rays but it also help in managing good looking elevations. Shading devices provided rendering provision, adds on in style, color, texture and pattern in facades of the buildings. In addition to the monitoring sun the shading devices also help in protecting building from rains and storm. The Shading devices not only provide shades against the sun rays but it also help in managing good looking elevations.

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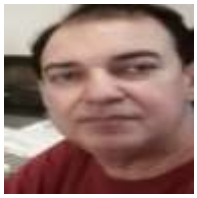

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