

BUILT FORM ORIENTATION

Impact Of Sun Path On Architectural Design

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Abstract : Orientation is the situating of a working in connection to occasional varieties in the sun's way and additionally winning breeze designs. Great orientation can build the vitality effectiveness of your home, making it more agreeable to live in and less expensive to run. Orientation of the building is for the most part used to allude to sun powered, wind and surroundings orientation which is the arranging of working as for sun based access, wind bearing and environment. Albeit any building will have distinctive orientations for its diverse sides, the orientation can allude to a specific room, or to the most vital veneer of the building. BUILT FORM ORIENTATION is the way toward choosing which course a building will confront. The orientation of a building is essential for road bid, style, waste contemplations, and above all vitality utilization. Building orientation enables engineers and planners to exploit the sun's free vitality, which extra minutes will diminish the general vitality utilization of the building. To appropriately situate a building, it is imperative to comprehend the genuine position of the sun and how it will influence the building. The main motto of doing research is for answering the questions like -Why to consider climate while designing and planning? And how can energy efficiency achieved by placement of the buildings? We need to consider climate while designing because there are different climatic conditions at different places, and accordingly we decide if we need cool and warm interiors, windy or non windy interiors, well light or mildly light interiors. Good orientation, combined with other energy efficiency features, can reduce or even eliminate the need for auxiliary heating and cooling, resulting in lower energy bills, reduced greenhouse gas emissions and improved comfort. The statement for doing this research is To study the energy efficient techniques for building planning with respect to orientation and To study the books and case studies on orientation based planning and To study the orientation of the building on behalf of passive heating and cooling or To analyze the impact of orientation based energy efficiency for interior spaces in residential buildings and To give the guidelines and recommendation for residential buildings in cool climate. The scope are we can save energy consumption in buildings we can create comfort zone inside the building without using mechanical support.

Index Terms – Built Form Orientation

INTRODUCTION

Great orientation will facilitate diminish or maybe dispense with the need for helper warming and cooling, transfer regarding lower vitality bills, lessened gas harming substance outflows and increased solace. In a good world, decide a website or home with nice orientation for your environmental condition and provincial conditions and assemble or transform to amplify the site's potential for detached warming and reserved cooling, dynamic the eye on every to suit the atmosphere. For those destinations that aren't during a good world oriented, there are procedures for defeating a little of the difficulties. In hot wet atmospheres and hot dry atmospheres with no winter warming stipulations, shall bar coordinate sun by utilizing trees and adjacent structures to shade every façade year spherical whereas catching and piping cooling breezes. Left: a way to figure sun points (See Shading for a table of scopes from that to calculate sun plots for Australian urban communities.) Right: twelve noon sun position north of the tropic of Capricorn. In each different atmosphere a mix of detached daylight primarily based warming and latent cooling is engaging. The perfect harmony between catching daylight (sunlight primarily based access) and catching cooling breezes is set by warming and cooling wants. North orientation is all things thought of appealing in climates requiring winter warming, in light-weight of the very fact that the position of the sun within the sky empowers you to viably shade northern façades and also the ground shut them in middle year with clear level contraptions, as an example, rooftop, whereas permitting full sun entrance in winter. North-bound dividers and windows get additional sun steam-powered radiation in winter than in summer. As appeared within the chart, the inverse is valid for various bearings — and why, in mingling or warming atmospheres, it's useful to own the additional drawn out dividers of a house Endeavour north to limit introduction to the sun in summer and amplify it in winter. Accomplishing a manageable building needs a dedication from increase the underlying F&OR reports through development enumerating and appointing. Starting selections, as an example the building's space, general massing, and setup considerably influence the building's natural result and vitality execution. Well-defined sufferable objectives can manage the full vary of basic leadership during the arrangement and development method.

Alongside massing, orientation will be the foremost imperative advance in furnishing a operating with inactive heat and visual solace. Orientation got to be chosen besides massing right time within the define procedure, as neither will be genuinely improved while not the opposite. Orientation is measured by the AZ angle of a surface relative to true north. Flourishing orientation rotates the building to attenuate energy hundreds and maximize free energy from the sun and wind.

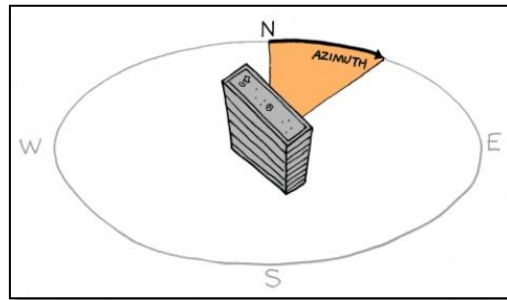


Figure 1 -North light-weight and AZ law

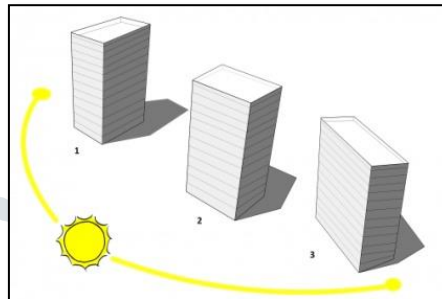


Figure 2 - moment of sun

Likewise with massing for visual solace, structures got to generally be organized east-west as against north-south. This orientation permits you to dependably outfit sunshine and management glare on the gloomy look of the building. It likewise offers you an opportunity to limit glare from the rising or setting sun. On the off probability that the building has set patterns to spice up day lighting, the orientations of those set patterns got to likewise be swollen north and south dividers. With nice building massing, such set patterns will likewise move as their own specific shading to avoid glare. Distinctive appearances of the building get altogether totally different measures of heat from the sun. Likewise with massing, orientation for heat solace is like orientation for day lighting, with many special cases:

First, the live of daylight that's ideal for day lighting is often not ideal for sun steam-powered heat devour. Second, since the sun's heat doesn't originate from all bearings just like the daylight will, dividers endeavour faraway from the sun's manner get no heat increase, despite the very fact that they Third, the sun's heat will be place away by heat mass, that the daylight cannot. this may be useful for west-bound dividers to store heat for the night. With BIM, you'll be able to live the live of episode sun minded radiation that strikes every face of your building, associated envision it by overlaying an examination lattice on the building model.

(Gromyko, international association of certified home inspector)To enhance your arrange, you'll be able to dissect the sun minded radiation on a solitary day (like the middle year solstice) or over varied days (like the full year). to understand the foremost extreme burdens you'll have to stipulate for, you'll have to require a goose at the head daylight primarily based radiation. to urge a way for the way a lot of combination daylight primarily based vitality is accessible for coordinate increase reserved sun steam-powered warming, you'll have to judge the overall sun minded radiation on the building's face. To do natty gritty define for coating and façade, it is important to understand the samples of sun primarily based radiation that influence the building. The incidental image indicates daylight primarily based prevalence radiation for the length of the day and through the time on the 5 uncovered appearances of a solid form shaped building. The vertical hub indicates times of day whereas the amount hub demonstrates times of year, and also the shading demonstrates the live of episode heat. This chart indicates however heat heat devour on the east and west sides of structures modification quickly because the sun travels because the day progressed, whereas northern and southern exposures ar additional steady. In this manner, structures that ar longer than they're wide got to usually be set east-west rather than north-south. This orientation permits you to dependably outfit heat devour, or dependably prevent from it, on the gloomy look of the building. It to boot offers you an opportunity to limit the territory that's prone to faster vitality swings from the rising or setting sun. Sun minded heat devour on the side will be worthy or maybe valuable, since it happens within the morning when the cooler night; but sun primarily based heat devour on the side is sometimes enticing toward the end of associate effectively heat day.

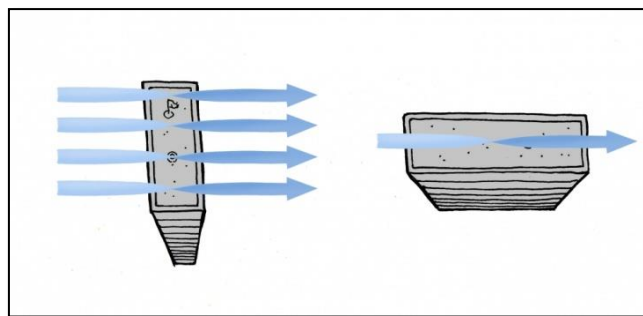


Figure 3 - Air moment and ventilations

Structures got to be organized to expand profits by cooling breezes in sentry climate and sanctuary from unwanted breezes in icy climate. Take a goose at the overarching twists for your website systematically, utilizing a "wind rose" defines, to visualize those winds to take advantage of or dodge. Withal, structures ought not to confront specifically into the breeze to accomplish nice cross-ventilation. Inward areas and auxiliary parts will be supposed to channel air through the operating in varied ways that. Moreover, the predominant breeze headings recorded by climate data might not be the important winning breeze bearings, contingent upon close website obstacles, as an example, trees or totally different structures.

For structures that part a yard and are set in atmospheres wherever cooling is needed, transcription the area forty five degrees from the breeze amplifies twist within the yard and cross ventilation through the building.” (Energy, n.d.) Orientation is that the situating of a operating in affiliation to occasional varieties within the sun's manner and to boot winning breeze styles. Nice orientation will expand the vitality proficiency of your home, creating it additional agreeable to measure in and fewer costly to run.

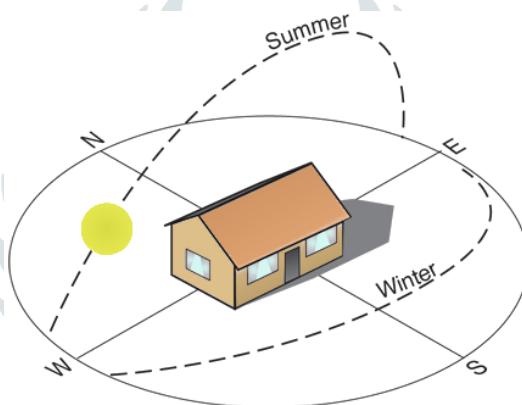


Figure 4 - sun path in summers and winters

PRINCIPLES FOR BETTER ORIENTATION

Great orientation, joined with different vitality effectiveness highlights, will decrease or maybe wipe out the need for assistant warming and cooling, transfer regarding lower vitality bills, lessened gas harming substance discharges and increased solace. It assesses summer and winter varieties within the sun's manner and additionally the bearing and kind of twists, as an example, cooling breezes.

Great orientation will facilitate decrease or maybe dispense with the need for helper warming and cooling, transfer regarding lower vitality bills, diminished gas depleting substance emanations and increased solace.

In a good world, decide a website or home with nice orientation for your environmental condition and provincial conditions and construct or plan to expand the site's potential for latent warming and reserved cooling, dynamic the stress on every to suit the atmosphere. For those destinations that aren't during a good world oriented, there a methodologies for defeating a little of the difficulties.

In hot wet atmospheres and hot dry atmospheres with no winter warming stipulations, expect to ban coordinate sun by utilizing trees and bordering structures to shade every façade year spherical whereas catching and piping cooling breezes.

ORIENTATION / SOUTH FACING WINDOWS (magazine, 2012)

In view of the trends of the sun, passive sun powered systems often have home windows (coating) on the southern confronting aspect* of the working with a purpose to assimilate the sun's warm temperature electricity to heat a operating amid the iciness. With

a specific end purpose to stay cool inside the overdue spring, passive solar orientated houses depend on an association of shading (or a color) to keep the constructing cool. Basically through running thusly, a house can lower its warming and cooling fees through eighty five%. Perceive how the residence expected at the privilege accomplishes net-zero electricity. within the northern half of the globe, with a selected give up aim to confront the solar and accumulate greatest solar powered pick out up, the windows might confront the south. within the southern facet of the equator, however, it's far inverse, with the windows confronting the north maintaining in mind the end purpose to boost solar powered choose up.

SEASONAL WINDOW CONSIDERATIONS

WINTER

The chart to one facet shows how the sun is convey down inside the iciness, even as it is considerably higher within the mid 12 months. (See the operating at Zion countryside Park.) During the day, the low iciness solar can radiate via home windows are to permit heat energy to be assimilated into the building's warm mass. While windows allow warmth right into a operating to be ingested, their thin and easy nature moreover enables warmth to get away from a building. With a specific end purpose to protect this from going on in frosty atmospheres, it is cautioned that the glass sheets are elevated (twofold coating) or even tripled. A included window covering or thick color can likewise be applied to help guard the home windows and assist preserve the warmth inside the running after the sun goes down.

SUMMER

Within the mid year, as temperatures rise, a passive solar powered constructing utilizes its warm mass to help preserve the building cool. With the purpose for this to show up, the mid 12 months solar is saved from attaining the warm mass of the building. The late spring solar manner helps in this process via voyaging high in the past due spring sky, therefore a legitimate shade or different kind of framework is predicted to color or cowl the dowager, within the mid yr so the solar warmth energy is blocker or maintained a strategic distance from whilst it's far wanted to have the building cooler than the out of doors temperature. A legitimately designed coloration shields the warmth and energy from being assimilated into the residence within the past due spring. (within the photograph on the extraordinarily fine of this publish, you may likewise see that the color is maintaining the high summer sun from going into the house.

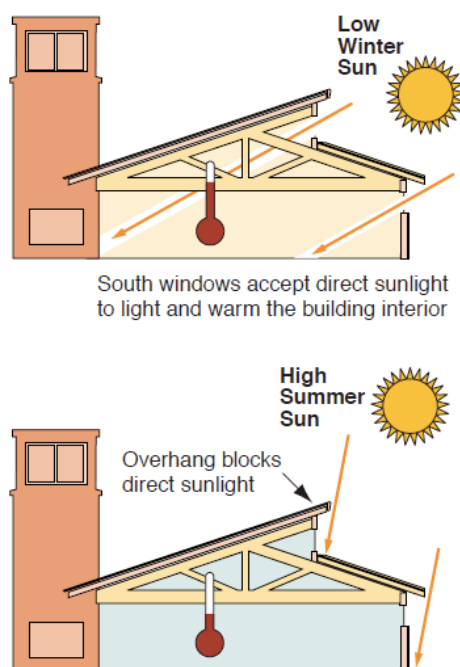


Figure 5 - summer winter sun effect

SOUTH-BOUND WINDOWS AND ORIENTATION (G.Z. Brown and Mark DeKay, n.d.)

It is flawless to have the windows (sun based covering) inside 5 degrees of veritable south. Regardless, windows that are inside 15 degrees of authentic south are said to work almost as well. As the degree qualification from bona fide south develops, the general potential sun arranged effectiveness of the structure lessens. Put another way, the more important the degree assortment from veritable south, will lessen the measure of the building's sun fuelled get. As needs be, greater measures of supplementary vitality may be relied upon to warm the working in the winter. As the building's glass (covering) faces more toward the southwest, more vitality may be required for summer cooling. Southern going up against windows (southern sun based covering) are a urgent section

for a latent sun arranged plan and building. Since the southern side of the building is the side that will conceivably get sunshine for the term of the day, most detached sun arranged structures will feature glass instructing the southern side. Southern standing up to glass empowers the sun's vitality to be ingested and appropriated through the building's warm mass. You may hear people implying glass as covering. Covering is the support configuration word normally used for southern defying glass that can trade the sun's vitality. Another preferred standpoint of having windows on the south side is that it empowers regular light to bathe the house for the term of the day. This point of view can in like manner cut down vitality utilize all through the house since it restrains the use of fake light. These components can be used further reinforcing one's favorable luck, dependent upon the site region and depending upon the specific traits that you require inside the house. While southern facing windows (covering) are a fundamental fragment of uninvolved sun controlled outline, mind must be taken to secure them in the winter after the sun goes down, and furthermore shade them in the mid year. Word that in view that the earth is a circle, contingent upon where you're discovered, the sun will interface really uniquely in assessment to in different spots. as an example, the brink of the late spring and winter sun might be specific. Assuming, nonetheless, you're located inside the southern hemisphere, with a particular stop intention to assemble a passive or dynamic solar based totally domestic, the building need to be arranged closer to the north. Here are relatively extra facts approximately sun orientated working in the southern half of the globe. Massing and orientation are important on account that building tallness and profundity anticipate a gigantic part in the shape's capability to successfully pull out of doors air through concerned areas. the massing and orientation pages talk about a way to advance them for passive ventilation. extra or much less, top floors and rooftops are provided to more breeze than carry down flooring, and structures with skinny profiles searching into the manner of triumphing breezes are maximum convenient to ventilate. atria and open-design spaces likewise help wind air flow be more viable.

CROSS VENTILATION (G.Z. Brown and Mark DeKay, n.d.)

Even as putting ventilation openings, you're putting bays and retailers to advance the manner air complete the constructing. Windows or vents placed on inverse facets of the building supply not unusual breezes a pathway thru the structure. That is called go-ventilation. Move-air flow is by way of and huge the exceptional sort of wind ventilation It is by and large best not to put openings precisely opposite each other in a space. While this gives powerful ventilation, it can make a few sections of the room be all around cooled and ventilated while different parts are definitely not. Putting openings opposite, yet not straightforwardly inverse, each different makes the room's air blend, better disseminating the cooling and new air.

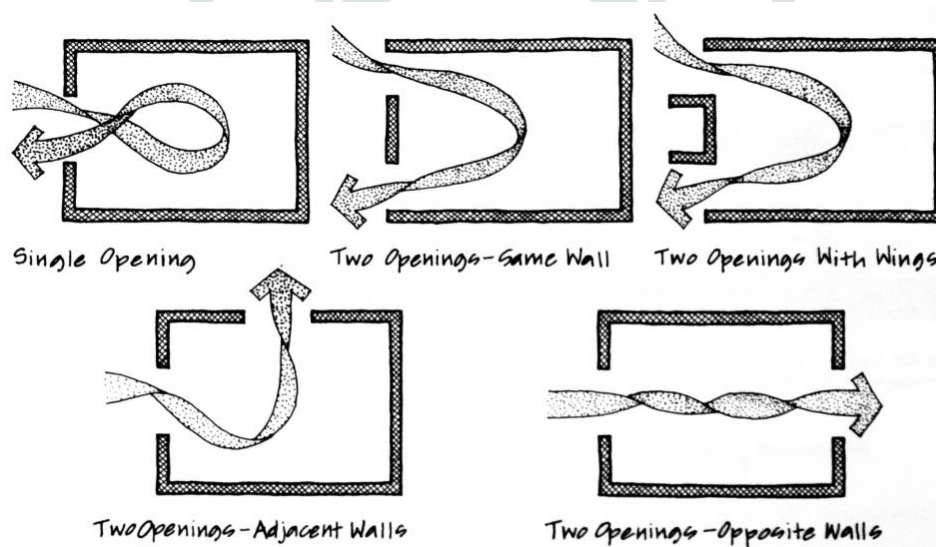


Figure 6 - Cross-ventilation is more effective

SOLAR CHIMNEYS

A sunlight based fireplace utilizes the sun's warmth to give cooling, utilizing the stack impact. Sun based warmth pick up warms a segment of air, which at that point rises, pulling new outside air through the building. They are additionally called warm fireplaces, thermo siphons. The most straight forward sun oriented fireplace is simply a stack painted dark. Numerous toilets in parks utilize such stacks to give passive ventilation. Sun powered smokestacks require their fumes higher than rooftop level, and need liberal sun introduction. They are for the most part best for atmospheres with a ton of sun and little breeze; atmospheres with more breeze on hot days can generally get more ventilation utilizing the breeze itself. Progressed sun based fireplaces can include Trobe dividers or different methods for retaining and putting away warmth in the smokestack to augment the sun's impact, and keep it working after dusk. Dissimilar to a Trobe divider, sunlight based smokestacks are by and large best when protected from possessed spaces, so they don't exchange the sun's warmth to those spaces however just give cooling. Warm fireplaces can likewise be joined with methods for cooling the approaching air, for example, evaporative cooling or geothermal cooling. Sun based fireplaces can likewise be utilized for warming, much like a Trobe divider is. On the off chance that the best outside vents are shut, the warmed air isn't depleted out the best; in the meantime, if high inside vents are opened to give the warmed air access to involved spaces, it will give convective air warming.



Figure 7 - solar chimney

TECHNIQUES OF APPLYING PASSIVE HEATING AND COOLING TECHNIQUES

Sun development from high point in summer to low edge in winter. Orientation for passive warming is tied in with utilizing the sun as a wellspring of free home warming by giving winter a chance to sun in and keeping undesirable summer sun out — attractive in the lion's share of Australian homes. It should be possible without hardly lifting a finger on northern heights by utilizing even shading gadgets to reject high edge summer sun and concede low edge winter sun. Sunlight based access' is the term used to portray the measure of helpful daylight striking glass in the living spaces of a home. The coveted measure of sunlight based access fluctuates with atmosphere. (Willrath, n.d.)The sun is a wellspring of free home warming. Initially, set up genuine or sunlight based north for your area. This is valuable in all atmospheres whether you are empowering or barring sunlight based access. Simply utilize maps and road indexes, or utilize a compass to set up attractive north and after that discover genuine or sun based north by including or subtracting the 'attractive variety' for your range utilizing the guide beneath. Sun based north strays essentially from attractive north all through Australia. Consider while situating a home. All references to north in this guide are to sunlight based north, not attractive north. Exact orientation isn't as basic the same number of individuals think. While perfect orientation (in many atmospheres) is sun oriented north, orientations of up to 20° west of north and 30° east of north still permit great passive sun control. As can be seen from the outline beneath, great sunlight based orientation is conceivable on generally locales. Varieties in orientation towards east and west can have focal points in a few atmospheres and for a few exercises. For instance, in frosty atmospheres, orientations west of north increment sun powered picks up toward the evening when they are most alluring for night comfort, yet east of north can warm the house more in the mornings, enhancing daytime comfort for the individuals who are at home at that point. In hotter atmospheres, orientations east of north can permit better catch of cooling breezes. Poor orientation and absence of suitable shading can bar winter sun and cause overheating in summer by permitting low point east or west sun to strike glass surfaces at more straightforward edges, lessening reflection and expanding sunlight based increases, west sun to strike glass surfaces at more straightforward edges, lessening reflection and expanding sunlight based increases.

PASSIVE SOLAR DESIGN PRINCIPLES

Air development makes a cooling impact on our bodies by expanding the vanishing of sweat. Drafts increment the impression of feeling cool. Air development of 0.5m/s (scarcely enough to move a sheet of paper) makes a cooling impact proportional to a 3°C drop in temperature (see Design for atmosphere; Passive cooling). Keep away from convection drafts by designing floor designs and outfitting formats with the goal that cool air spilling out of windows and outside dividers towards radiators or warm mass sources is coordinated through activity territories, for example, passages and stairs. Make draft free niches for sitting, eating and dozing. Utilize roof fans to circle warm air equitably in rooms and drive it down from the roof to living ranges. For low roofs, utilize fans with reversible cutting edge heading to limit drafts

Studios are likewise a powerful methods for bringing warm energy into houses by methods for conduction through a common mass divider in the back of a sunroom or by utilizing vents that permit the air between the sunroom and living space to be traded by characteristic convection. A block smokestack between a sunroom and the family room can likewise go about as extra warm mass. A south-bound home having a joined center can in the sweltering summer months, utilization of blinds, window ornaments or shades to obstruct the daylight and keep the working from overheating. Be that as it may, and additionally substantial south-bound windows and high efficiency windows, present day passive sunlight based warm designs utilize structures with high (R-20) levels of divider protection and water/air proof development to keep the warmth in, when it is frosty outside and keep the inside cool when it is hot outside. With the warmth contained, regularly a straightforward roof fan is all that is required for the warmth to be disseminated around the building. (Energy, n.d.)

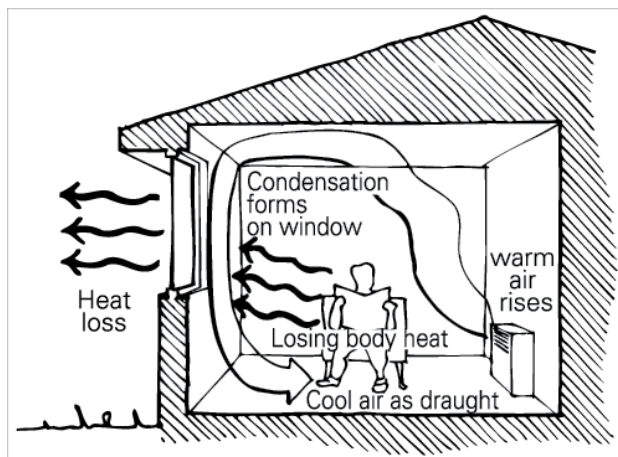


Figure 8 - Adverse effects of draughts.

PRINCIPLES OF VASTU

THE THREE PRINCIPLES OF MAHARISHI VASTU ARCHITECTURE

RIGHT ORIENTATION OR DIRECTION

Maharishi Vastu Architecture stipulates that the passage to the home should confront east, on the grounds that the energy from the sun is the best and most crucial when rising, in this way conveying most noteworthy advantages to the wellbeing and imperativeness of the family. Southern doorways are foreboding. As indicated by Maharishi Vastu Architecture, a southern passage way (a passage that faces south) is ominous and meddles with the help of Natural Law, conveying negative impacts to the occupants of the building. Maharishi Vastu design prescribes avoiding utilizing any southern passageways to your home or office.



Figure 9 - Orientation of Houses

ORIENTATION AFFECTS HUMAN BRAIN FUNCTIONING

Logical examinations demonstrate that the neurons in our cerebrum really fire distinctively relying upon what heading we are confronting. There are likewise "put neurons" in the cerebrum that flag our body's orientation in a room or condition. Therefore, the way we confront impacts cerebrum and body working. The antiquated learning of Maharishi Vastu Architecture goes considerably further. It portrays how our spatial orientation impacts our psyches and bodies. When we live or work in structures with inappropriate orientation or extent, the terminating examples of the neurons are reset in the wrong way. This can add to uneasiness, sickness, absence of imagination, disappointment in family and expert life, hostile to social conduct, and even criminal propensities. Specifically, Maharishi Vastu Architecture unmistakably expresses that our mind capacities ideally when our home is situated toward the east, the heading of the morning sun

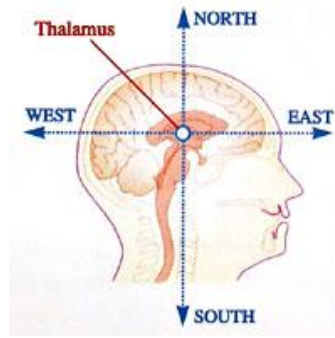


Figure 10 - orientation

AUSPICIOUS AND INAUSPICIOUS DIRECTIONS FOR HOUSES

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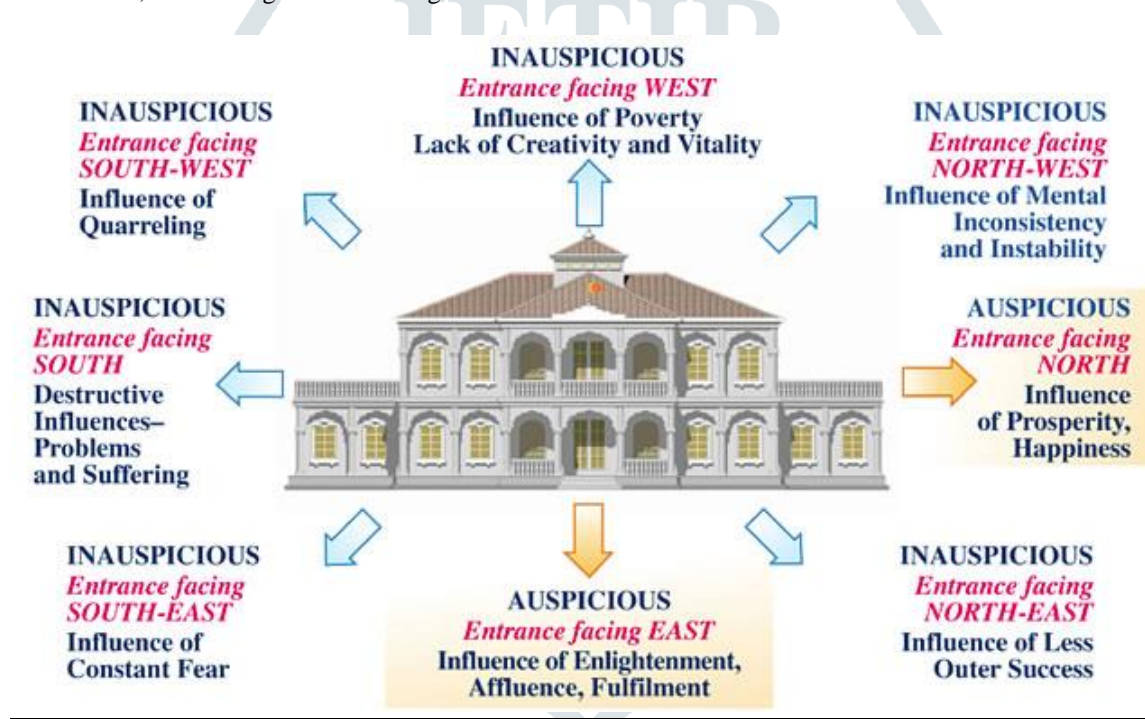


Figure 11 – directions

CONCLUSION

In this examination building zones with a shifting orientation and extent of coating to the aggregate divider territory have been broke down. The examination has permitted the investigation of the impact of indoor temperature settings on the warmth picks up or warm misfortunes through building structures. Warm examinations have been completed by receiving a lumped warm system demonstrates. The principle perceptions of this transient warm examination are featured cry: x keeping in mind the end goal to enhance the design of a building zone the extent of coating to the aggregate divider region ought to be considered. As the coating region expands the warmth pick up or warm misfortune is additionally appeared to increment. It is additionally uncovered that a comparative conduct can be watched for a practically equivalent to building zone having an alternate extent of fenestration. x The impact of coating depends basically on the orientation of a building zone. Among the dissected building zone typologies, south situated building zones are portrayed by the most elevated warmth picks up. Then again, the most astounding warmth misfortunes are watched for north arranged building zones. x The outcomes from this examination recommend that the choice of indoor temperature settings influence the happening heat picks up or warm misfortunes. The outcomes uncovered that an expansion/diminish in the indoor temperature settings prompts an abatement/increment of the warmth stream.

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