

# SIGMA COLLEGE OF ARCHITECTURE



Moododu, Anducode Post, Kanyakumari District, Tamilnadu - 629 168

Website : [www.sicarch.com](http://www.sicarch.com) E-mail : [sigmagroup155@gmail.com](mailto:sigmagroup155@gmail.com)

Contact : 04651 - 209 039 Mobile : +919443370072



## Table of contents

<b>“MATERIALISTIC ARCHITECTURE TRENDS IN PRACTICE”</b>	<b>3</b>
<b>CONTROL AND CONSERVE</b> Ar.Chinnadurai.S Head of the department	
<b>HEAT FLOW DUE TO AIR INFILTRATION AND VENTILATION</b>	<b>4</b>
Ar.Anand Godson,M.Arch(IA) Assistant Professor.	
<b>REAL LIFE APPLICATION OF CALCULUS</b>	<b>5</b>
Ms. R.Maria Anushiya M.Sc Assistant Professor	
<b>ANALYSIS FOR EARTHQUAKE RESISTANT STRUCTURES</b>	<b>6</b>
Er. E.M. Jerin Shibu M.E, Assistant Professor	
<b>PERSONAL SPACE IN ARCHITECTURAL CONTEXT</b>	<b>8</b>
AR.T.JOSEPHINE SABENA B.Arch Assistant Professor	
<b>THE TALLEST RESIDENTIAL BUILDING IN MIAMI’S EDGEWATER NEIGHBORHOOD</b>	<b>9</b>
Ar. K. Keerthana B.Arch Assistant Professor	
<b>BJARKE INGELS ON NEW SPIRAL MUSEUM FOR SWISS WATCHMAKER</b>	<b>10</b>
Ar. T.Dinesh Pandian M.Arch Assistant Professor	
<b>TERRY KNIGHT: VISUAL-PHYSICAL DESIGN GRAMMARS</b>	<b>11</b>
Ar. C.M.Shiras M.Arch Associate Professor	
<b>SOLAR PASSIVE HEATING OF NON A/C BUILDINGS</b>	<b>12</b>
Ar.Ashwin prakash, M.Arch, Assistant Professor.	
<b>STRENGTH AND DURABILITY PROPERTIES OF CONCRETE MADE WITH THE PARTIAL REPLACEMENT OF CEMENT BY MARBLE POWDER AND M-SAND BY SILICA SAND</b>	<b>13</b>
Er. Relin Geo. R ME Assistant Professor	

## “MATERIALISTIC ARCHITECTURE TRENDS IN PRACTICE”

CONTROL AND CONSERVE

Ar.Chinnadurai.S  
Head of the department



Due to Westernization, people fond materialistic life style. This way of lifestyle is not good for any civilization and also it looks unnatural. In current architecture practice people suggest some ideas to show their status in the society through their buildings. But they don't know how much environmental impact happening because of that. Due to resources scarcity there should be control on material application on buildings. The material selection should consider the context and material availability from the region.

This kind of Architecture practice and material selection may be increase or contribute to the economic of the country. But we have to understand that all these factors make a huge impact on the planet and planet will reverse back at anytime. Selection of materials based on the context and regional level will always good for the people and environment. Various researches are going on this area. Researchers are coming with new ideas and innovation to stop this conventional approach which will destroy the planet like anything. Good architectural practice and choice of material selection will help to bring a betterment of the quality of space, people and the environment.

## HEAT FLOW DUE TO AIR INFILTRATION AND VENTILATION

Ar.Anand Godson,M.Arch(IA)  
Assistant Professor.

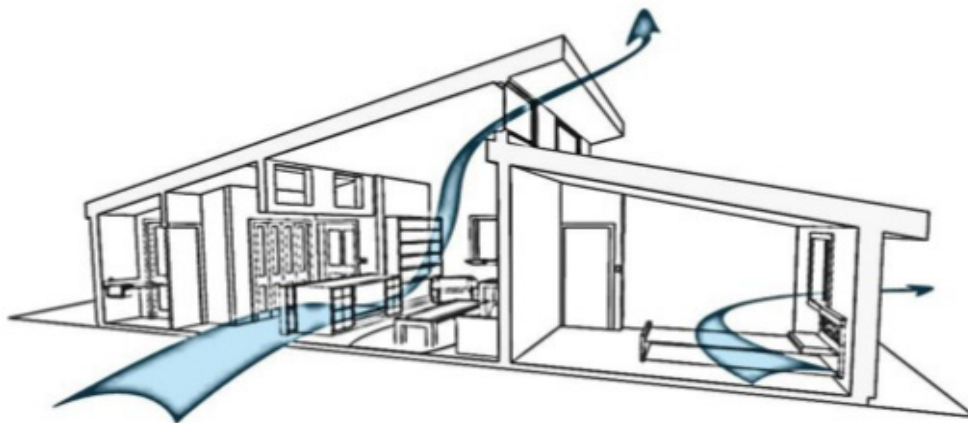
Infiltration refers to the leakage of outside air through door and windows openings, and through cracks and interstices around windows and doors in the living spaces. The leakage takes place due to the following factors.

- 1) Stack effect particularly in tall buildings
- 2) Wind pressure
- 3) Entry and exit of occupant affecting changes of air due to door openings.

It may be noted that there exist equal amount of exfiltration corresponding to every infiltration. Consequently, infiltration means an exchange between the outside and inside air.

These effects have been studied in the literature. Various empirical relations are available to estimating the leakage rate. Leakage rates have also been tabulated for different conditions.

In a building, in addition to maintain of temperature, humidity and air velocity, it is also important to maintain the purity of room air. So it is essential to introduce fresh air or ventilation air into the space. Ventilation air requirements have extensively been investigated and values are tabulated



## NATURAL VENTILATION

Presentation By- Ar. Roopa<sup>3</sup>Chikkalgi



## REAL LIFE APPLICATION OF CALCULUS

Ms. R.Maria Anushiya M.Sc  
Assistant Professor

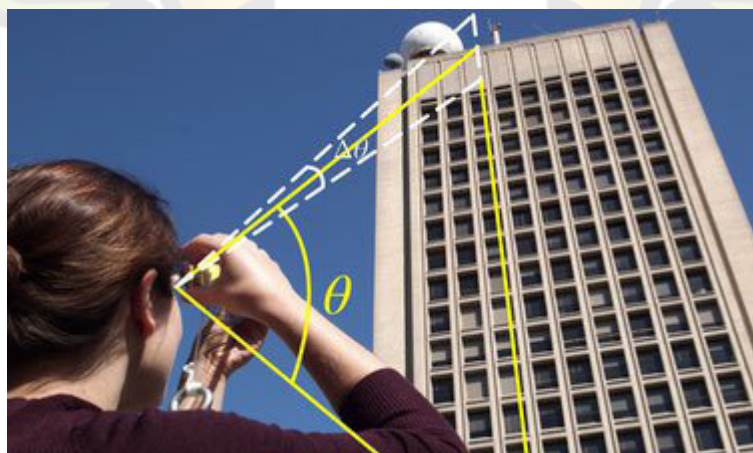
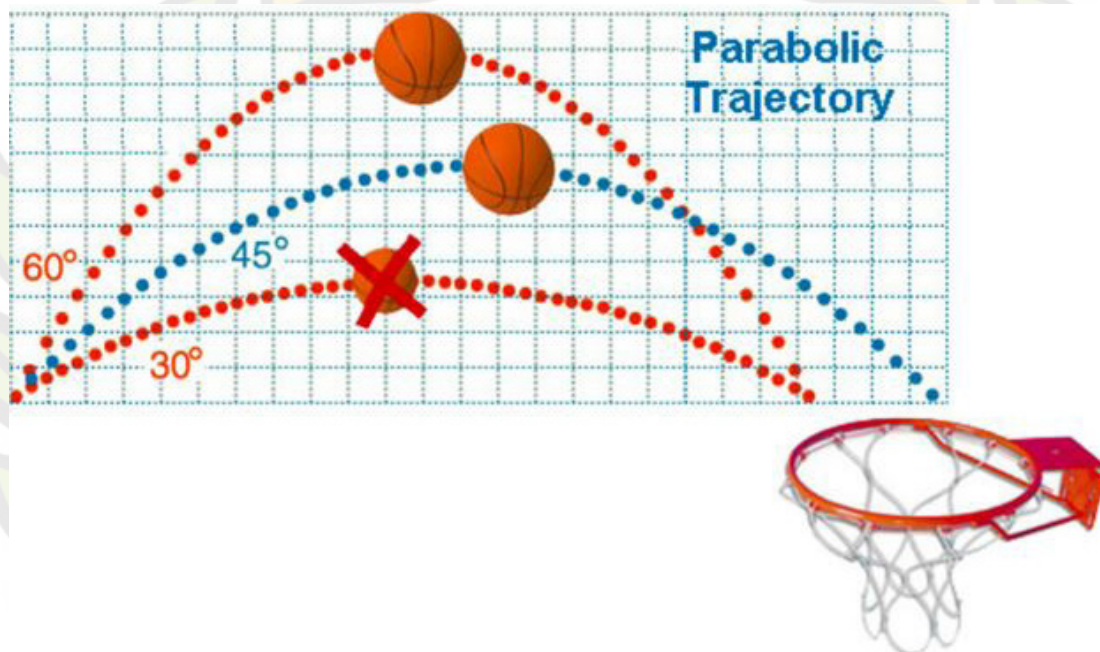
Calculus is the branch of mathematics which helps us understand changes between values that are related by a function. It deals with limits, differentiation and integration of functions of one or more variables. It is used to improve the architecture not only of buildings but also of important infrastructures such as bridges. Calculus can be utilized by architects to express design plan through graphs or drawings.

In Electrical engineering, it is used to determine the exact length of power cable needed to connect two substations, which are miles away from each other.

For example,

Calculus can be used in basket ball to find the exact arc length of a shot from the shooter's hand to the basket.

In base ball, it can be used to optimize the pitcher's throw to achieve maximum efficiency.



## ANALYSIS FOR EARTHQUAKE RESISTANT STRUCTURES

Er. E.M. Jerin Shibu M.E,  
Assistant Professor

The tall buildings are more flexible than the shorter buildings and they are sensitive to a different frequency range in the earthquake excitation. The earthquake success of tall buildings is reinforced by studies using average properties of earthquake and typical properties of tall buildings and there are no special earthquake hazards that arise simply as a consequence of height. Some of the methods used for the analysis of tall buildings are explained below.

### 1. Equivalent Static Analysis

Equivalent static analysis is a kind of response spectrum of seismic design. It can also be defined as the forces which act on building and it represents the ground motion effect due to earthquake. In this procedure it is considered that the building responds with fundamental mode. For happening this, the building should be shorter and it should not twist significantly when movement of ground occurs. This type of analysis is used for estimating displacements of structures. For structures and individual frames this analysis is best suited. The earthquake load will be assumed as an equivalent force which is static and horizontal and applied to the individual frames.

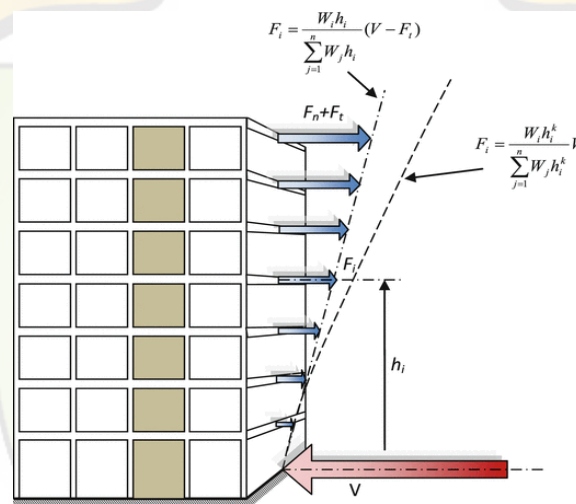


Fig 1: Equivalent Static Analysis of a building

### 2. Response Spectrum Analysis:

Response spectrum analysis is a kind of statistical analysis which is linear-dynamic. It measures the mode of vibration and indicates the maximum seismic response of elastic structure. It depends on the theory of structural dynamics and derived from basic principles. This analysis gives acuteness into dynamic behaviour with the help of velocity, acceleration, displacement, measurement as a structural period function for a given damping level and time history. As Response spectrum analysis relates type selection of structure to dynamic performance, this is very useful for decision-making in design.

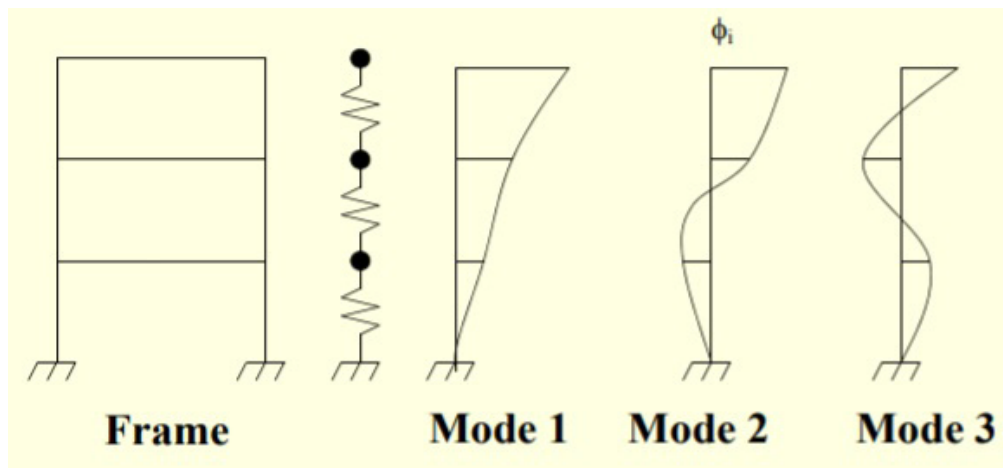


Fig 2: Natural Modes of vibration of uniform three-story shear building

### 3. Linear Dynamic Analysis:

For lower seismic effects, static analysis procedure is appropriate but for higher seismic effects, higher buildings, buildings with irregularities or non-orthogonal systems, dynamic analysis procedure is used. In this process of linear dynamic analysis, the structure is analysed as a multiple degree of freedom system with viscous damping matrix and elastic stiffness matrix. Time history analysis and modal special analysis are used when analysing the seismic effects. But in these cases, the displacements and internal forces are calculated with the help of linear elastic analysis. Higher modes are considered in the linear dynamic analysis and this gives an advantage over the linear static analysis. Even so these are depends on linear elastic response and thus the application of it reduces with increment in non-linear behaviour.

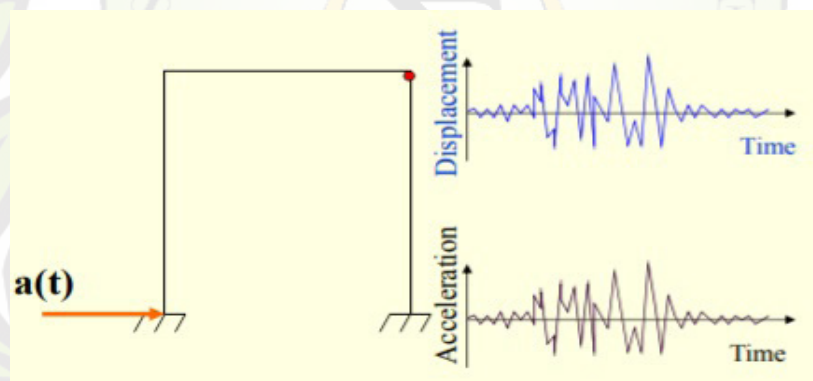


Fig 3: Linear Dynamic Analysis graph

## PERSONAL SPACE IN ARCHITECTURAL CONTEXT

AR.T.JOSEPHINE SABENA B.Arch  
Assistant Professor

Privacy in general is the right of individuals, groups, organization, and institutions to determine for themselves when, how and to what extent information about them is communicated to others. In a public space, there is no restriction of communication, while isolated spaces completely constrain all types of communication. In between there are intermediate levels of privacy. Space privacy is considered one of the most important types of overall privacy. People deal with the concept of space privacy with special concerns, they feel discomfort, anger and anxiety when their space privacy is exposed beyond their desires.

“According to environmental psychology, each person is realized and perceived through an invisible shelter or a series of shelters surrounding his body. The personal protective spheres, by which privacy is controlled, it may vary from person to person and from culture to culture and they also differ from period to period as society and social bonds which are continually transformed and reconstructed by themselves. Hall which defines four such spheres; they are intimate, personal, private and public. “According to the degrees of proximity, there are four categories of privacy with specific consideration for each intimate distance of eighteen inches or less.

In its close phase (6 inches or less) intimate distance lends itself primarily to nonverbal communication. This is distance is usually reserved for very close friends and family. Personal distance from 1 1/2 to 4 feet can be thought Heba-Talla Hamdy Mahmoud/ Interior architecture elements affect human psychology and behavior of as a small protective sphere or bubble that an organism maintains between itself and others. Social distance ranges from 4 to 12 feet, it's a psychological distance, one at which the animal apparently begins to feel anxious when he exceeds its limits. Public distance is the largest of the zones and it exists only in human relationships. At the close phase (12 to 25 feet), a more formal style of language and a louder voice is required”





## THE TALLEST RESIDENTIAL BUILDING IN MIAMI'S EDGEWATER NEIGHBORHOOD

Ar. K. Keerthana B.Arch  
Assistant Professor



Designed by Arquitectonica, Miami's most anticipated landmark dubbed Elysee has topped-off construction at fifty seven stories.

Upon its completion in 2020, the 649-foot-tall glass tower can become the tallest residential building within the Edgewater district.

Courtesy of Two Roads Development

Two Roads Development's Elysee tower is a 100-unit luxury structure on the city district in Downtown Miami.

Conceived by Bernardo Fort-Brescia of Arquitectonica, the tower's style consists of a "three-tiered façade that grows larger because it ascends into the sky, making a daring, telescoping silhouette providing direct 180-degree water and town views from each residence".

With a telescoping form, the building is found on the waterfront at 788 NE twenty third Street on Biscayne Bay.

Courtesy of Two Roads Development- We are terribly excited to be one step nearer to hospitable residents to their new home at Elysee, Once complete, Elysee are going to be a retreat within the center of one of the most desirable parts of Miami.

"As we have a tendency to move full steam ahead towards completion next year, we have a tendency to still have a restricted choice of premium units accessible for consumers seeking primary or secondary residences in one of Miami's fastest-growing luxury neighborhoods." -- philosopher Boren, Managing Partner of 2 Roads Development.

## BJARKE INGELS ON NEW SPIRAL MUSEUM FOR SWISS WATCHMAKER

Ar. T.Dinesh Pandian M.Arch  
Assistant Professor



The new museum by huge for Swiss luxury watchmaker- Audemars Piguet is ready to receptive the general public next could.

As featured in WSJ.Magazine, the project was designed as Associate in nursing extension to their headquarters in le Brassus, close to le Chenit.

Conceived as a helical glass marquee within the landscape, the look can take guests on a narrative journey through the company's 139-year history.

Bjarke Ingels Group's style for Audemars Piguet aims to channel nation watch brand's gift of workmanship.

The project includes gallery areas for a deposit, work areas and a guest house.

The new Musée artist's workroom Audemars Piguet has 2 sloping spirals that coil around themselves sort of a watch spring.

As Bjarke Ingels aforesaid, "When I initial visited, I saw a watch they decision a montre mystérieuse, wherever you couldn't perceive what was holding the minute dial in situ."

For the deposit, the team created Associate in Nursing expertise that, «feels sort of a nice brass spring is hovering over your head. It's what's missing that creates it.»

The helical type responds to the program needs, and also the form creates the narrative path through the building that explores contiguousness.

## TERRY KNIGHT: VISUAL-PHYSICAL DESIGN GRAMMARS

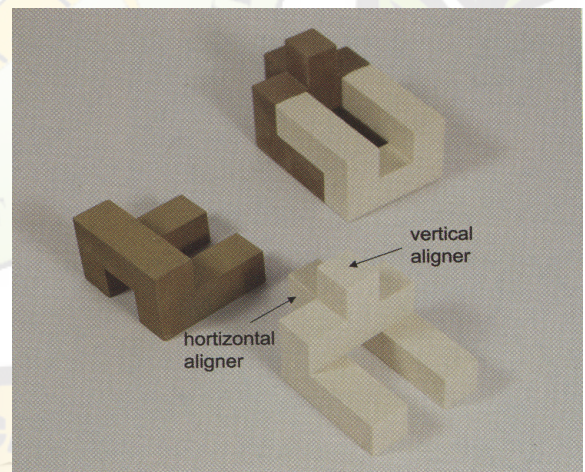
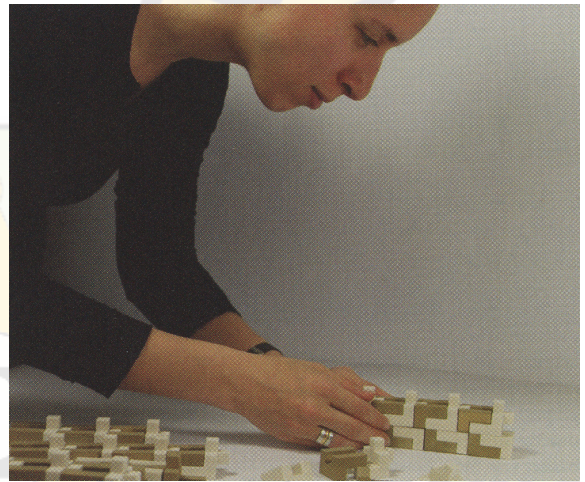
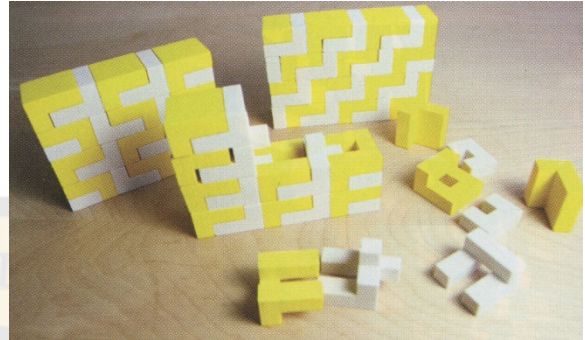
Ar. C.M. Shiras M.Arch  
Associate Professor

The objective of this project is the development of new kinds of low-cost, high-quality, mass customizable building assembly systems that provide visually rich design variations for housing and other small structures. The building systems are intended to be tailored for particular cultures and communities by incorporating local, vernacular, decorative design into the assembly design.

Two complementary areas of computational design are brought together in this work: shape grammars and digital fabrication. The visual, aesthetic aspects of the research are explored through shape grammars. The physical design and manufacturing aspects are explored through advanced digital design and fabrication technologies, and, in particular, they build on recent work on mono-material, interlocking, component-based assemblies with parts that can be fabricated with CNC machines and assembled easily by hand. The long-term objective is development of visual physical design grammars with rules that generate complete CAD/CAM data for fabrication of full-scale components for assembly design variations.

If successful, the results of this research will lead to new solutions for economical, easily manufactured housing, which is especially critical in developing countries and for post-disaster environments. These new housing solutions will not only provide shelter, but will also support important cultural values through the integration of familiar visual design features. The use of inexpensive, portable digital design and fabrication technologies will allow local communities to be active participants in the design and construction of their homes.

Beyond the specific context of housing, visual-physical grammars have the potential to positively affect design and manufacture of artifacts at many scales, and in many domains, particularly for artifacts where visual aesthetics need to be considered jointly with physical or material requirements and design customization or variation is important.



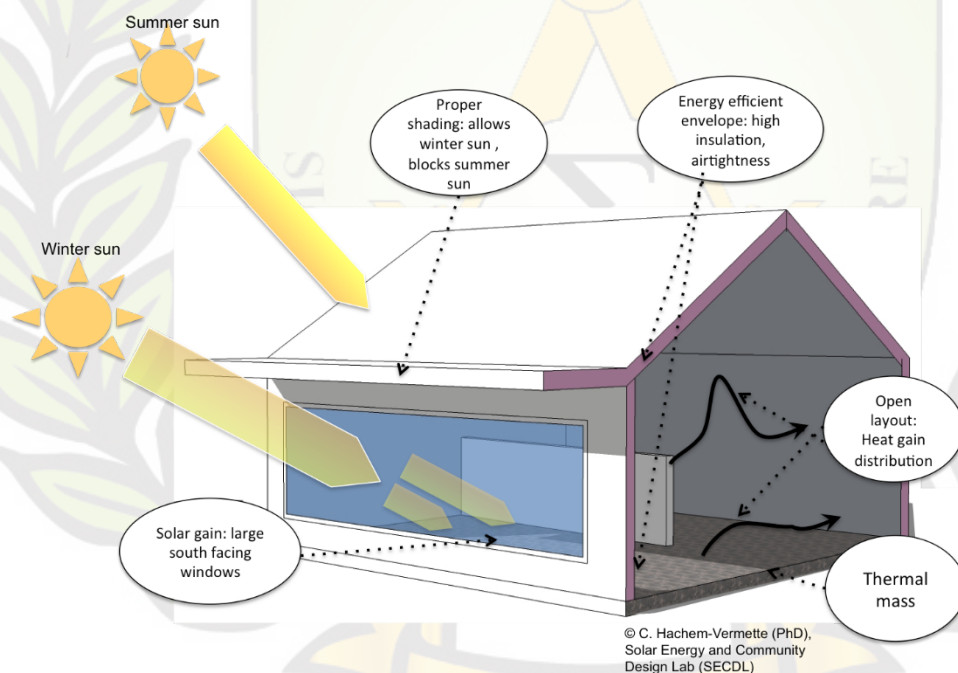
## SOLAR PASSIVE HEATING OF NON A/C BUILDINGS

Ar.Ashwin prakash, M.Arch,  
Assistant Professor.

Although solar active heating of buildings is inherently more capable of regulation and control but complex in operation and expensive in use. On the other hand, a passive solar heating system has no separate collector elements and collectors are incorporated into the structure of the envelop of the building. All thermal transfer processes, then, take place by natural convection and or conduction and radiation. Evidently, a building always performs a natural solar collector system to some extent.

Therefore, prior to an active solar heating system is considered for a building, all possible solar passive concepts in a building should be employed to reduce the thermal load to a minimum. There exists a number of such solar heating concepts, eg Tromb wall. The air entering the spaces between the wall and the glass gets heated and returns to the living space. The heat input thus obtained can be controlled by adjusting the flow of air by means of the shutter. The heat conducts through the wall and is transferred to the inside air by convection all the time. One of the major problem in such system is however, rather large heat losses from the walls outside surface particularly during off- sunshine hours.

This technical achievement employs the salt latent of fusion to store large quantities of heat in a relatively small spaces. The use of salt hydrates has other technical advantage in solar heating system. Heat losses are minimized and the efficiency of collection is improved significantly in comparison with other methods.

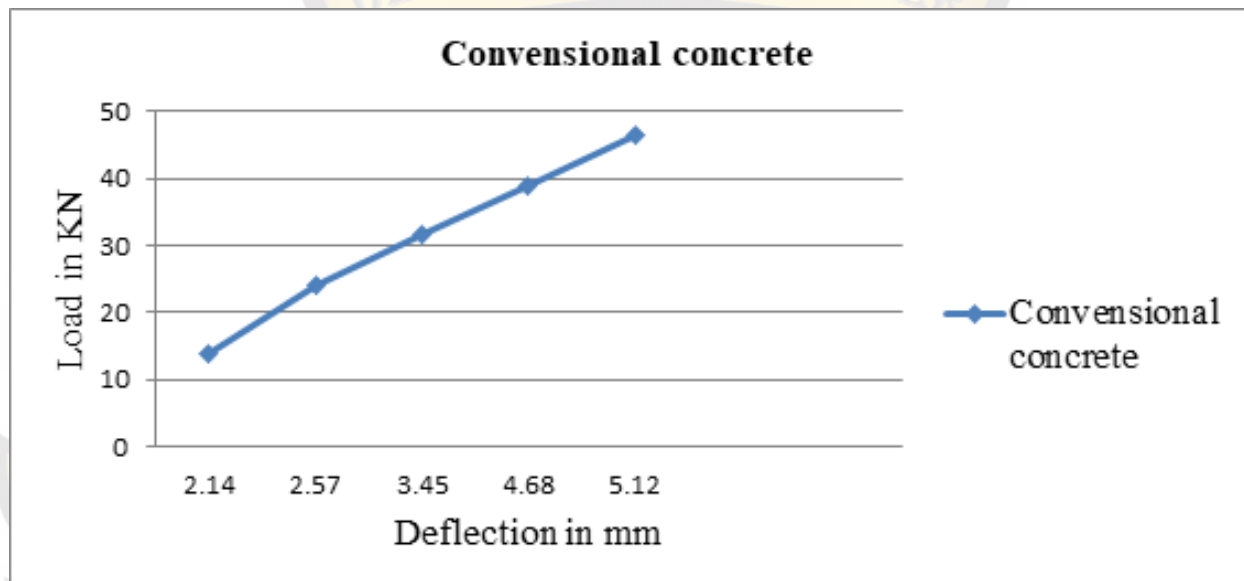


## STRENGTH AND DURABILITY PROPERTIES OF CONCRETE MADE WITH THE PARTIAL REPLACEMENT OF CEMENT BY MARBLE POWDER AND M-SAND BY SILICA SAND

Er. Relin Geo. R ME  
Assistant Professor

The deflection of beam is checked for the conventional mix (M1) and the mix made by 20% marble powder and 75% silica sand (M2). M2 shows the higher ultimate load than M1. The beam's deflection until the initiation of cracks increased and was proportional to load. On comparing the percentage variation of load at first crack and ultimate crack between the conventional concrete beam and the other beams it is found out that for M2 showed a increase of 26 % and 14.6%.

The Load Vs Mid span deflection of reinforced beam is the major criteria to study the flexural behaviour of beam. Load Vs Deflection behaviour for different percentage is shown in fig 1.



**Fig.1 Load Vs Deflection curve for Conventional concrete**

The maximum deflection obtained is 5.12mm due to the applied load of 46.5 kN for the conventional beam and for the beam made by 20% of marble powder and 75% of silica sand shows the deflection upto 4.43mm due to the applied load of 54.5. The deflection is reduced 1.5% for the mix M2.



**Prof. Dr. T. James Wilson**  
B.E., M.I. Mar. Tech., MISTE, MBA., Ph.D.  
CHAIRMAN

9443370072, 9750976611, 9443370058,  
8012561000, 9750976622

 +91- 9443370072

 Sigma college of architecture

 [www.sicarch.com](http://www.sicarch.com)

 [sigmagroup155@gmail.com](mailto:sigmagroup155@gmail.com)