SIGMA COLLEGE OF ARCHITECTURE

Moododu, Anducode Post, Kanyakumari District, Tamilnadu - 629 168
Website : www.sicarch.com E-mail : sigmagroup155@gmail.com
Contact : 04651 - 209 039 Mobile : +919443370072

TECHNICAL NEWSLETTER
VOLUME 05 NOVEMBER 2019

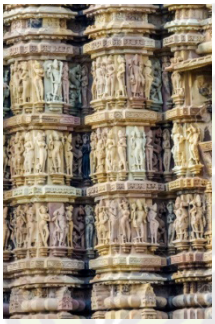
TABLE OF CONTENTS

ART OF INDIAN TEMPLES

Ar. Indira Kolli M.Arch
Principal

Temple is a structure, conducted religious and temple rituals. It's a house for all public. Indian temples are testimonials for Indian science & Architecture. Temples are appearing as an artistic abode. But if you observe, it's more of structurally evolved. Great design thought behind every temple structure. .Design principles were applied very absolutely. Not only art, science and Architecture involved in temple structures. Temples were product of multiple concerns, beliefs, power, culture; customs, life styles, etc.Temples are highly significant in Indian Architecture. It needs to be understand, Temple Architecture, construction techniques, material used, in order to preserve, protect, adopt techniques. There is a need of detailed investigation for Indian temples whose life span is more than 500 to 1000 years and rich in structurally and architecturally.

ART OF INDIAN TEMPLES



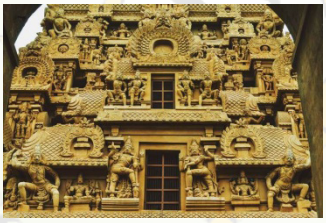
Khajuraho temple

Early temples

Sun temple Konark

Linga Raja temple

Tanjore Temple



Tanjore Temple

Mamalla puram temple

Kailashnath Temple, Ellora

"CULTURAL HARMONY OF PUDUCHERRY"

Preserve the Precious

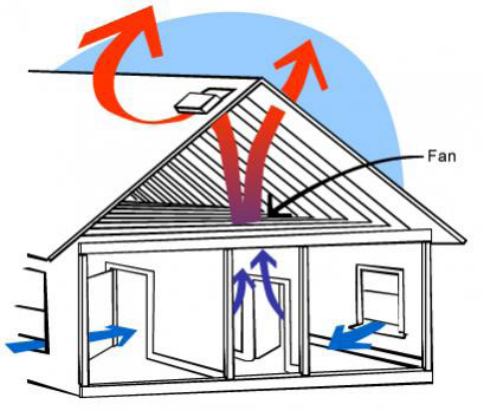
Ar. S.Chinnadurai M.Arch
Head of the department

Puducherry is a union territory town bounded by the southeastern tamilnadu. Puducherry means new settlement. This place attracts more rulers and people because of its natural vibrant resources. People ruled this place had contributed in both tangible and intangible heritage of puducherry.The various people ruled and settled and left their footprints in form of buildings, culture etc. even though different architecture prevailed over same place it's not making any visual hindrance. The beauty of this place, all unique contribution makes a harmony means Cultural built harmony. In recent times all this kind of built heritage is being commercialized because of tourism. It is being a major threat for this cultural built heritage.

Few buildings are renovated with new materials and techniques which are not being harmonious after the renovation. Buildings are the proof for how the people lead their life and cultural reflection. These tangible heritages have to preserve and pass on to future generation to know how enriched values in the culture and glory of the past. To see all those uniqueness people are coming as tourist to enjoy these heritages. In flow of these tourists support the local communities' economy and state economy. So it is preservation is vital role in the growth of the state.

GOOD VENTILATION REQUIREMENTS

Ar. R.Reghu M.Arch (RED)
Assistant Professor



Requirements of ventilation are twofold: (a) for health and (b) for comfort. To meet the first requirement, the quality of air in buildings is maintained above a certain minimum level by replacing indoor air by fresh outdoor air to maintain certain levels of CO2 and oxygen in air and for control of odours or for removal of products of combustion during occupancy. Ventilation to meet this requirement is essentially needed under all climatic conditions, hence it is termed as health ventilation.

Requirements of Permanent Ventilation

A) Maintenance of Carbon Dioxide Concentration Air within Safe Limits and to Provide Sufficient Oxygen Content in Air for Respiration - It is well known that, in the process of breathing, oxygen is taken in and carbon dioxide is given off. Since an average adult, when seated, gives only about 0.016 8 m3 of carbon dioxide per hour and the concentration of carbon dioxide in atmospheric air is only about 0.04 percent, hence the amount of fresh air required to maintain the concentration of carbon dioxide within safe limits is very small. In rooms, concentration of carbon dioxide rarely exceeds 0.5 to 1 percent and is, therefore, incapable of producing any ill effects.

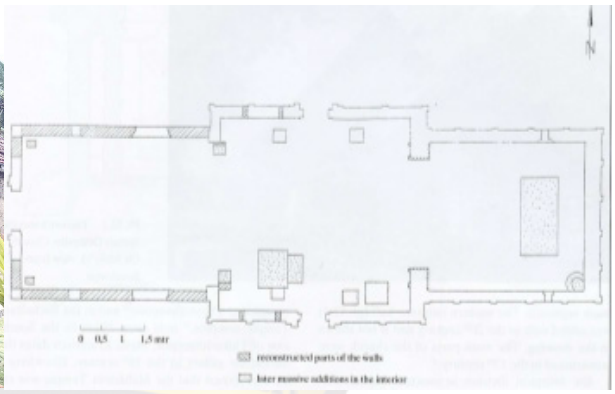
B) Requirements of Comfort Ventilation As the term implies, the purpose of comfort ventilation is to provide satisfactory thermal conditions indoors. Environmental factors like air temperature, humidity and air speed together with some other factors, such as clothing, level of activity, food, etc., have a direct influence upon bodily processes. Maintenance of thermal equilibrium of the body is very essential for securing thermal comfort and for avoiding heat stress. Heat transfer between human body and the environment occurs through conduction, convection, radiation and evaporation; the relative magnitude of each process varying with changes in ambient conditions.

C) Ventilation in non-industrial buildings due to stack effect, unless there is a significant internal load, could be neglected, except in cold regions, and wind action may be assumed to be predominant.

D) In hot humid and warm humid regions, the problem in the design of non-industrial buildings is to provide

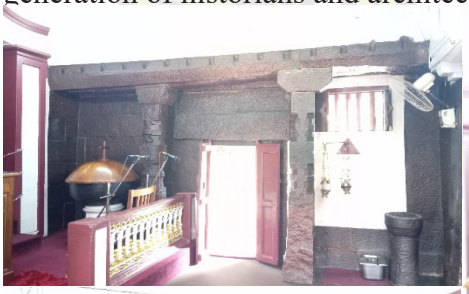
VERNACULAR CHURCH ARCHITECTURE – THIRUVITHANCODE

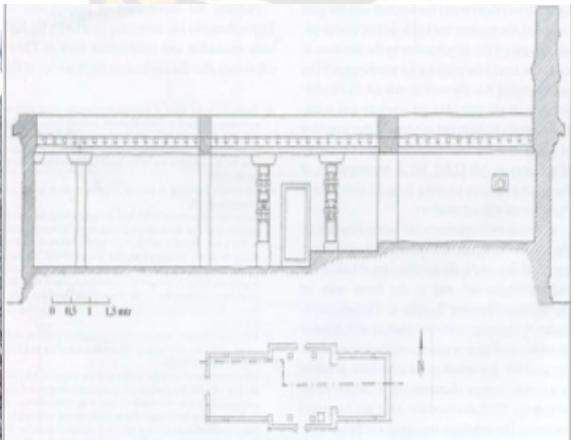
Ar. M.Raghavendran M.Arch
Assistant Professor



The modern day church buildings have a variety of architectural styles and layouts, whereas the traditional churches have a wonderful historical background. The traditional church buildings are often in the shape of a cross and frequently have a tower or a dome. Once Kanyakumari district was a Hindu dominated area where Christianity came in the midst of the great opposition. The Christianity tradition in India attributes its origin to St. Thomas. The origin of Christianity in southern district of TamilNadu began with the arrival of St. Thomas in 52 A.D. It's a well-known fact that the indigenous Indian Christians, known as St. Thomas Christians have a longer history than most of the Christians in European countries. However, the information of their churches on the history of Indian architecture is still hidden. For the study of the cream of architectural design in church building, one turns to Rome, Paris, Florence and other places of Europe. But there are churches in India that were constructed independently from the design pattern of European style.

St. Mary's Syrian Orthodox Church is situated at Thiruvithancode in kanyakumari district and 30 kms east of Trivandrum. The Church is known by other names such as Arapally (meaning 'royal church' in English). This is the first Christian church of kanyakumari district and still familiar among Christian followers. Reflects the unique vernacular church architectural style differing from the conventional style, as it borrows certain design elements such as pillars, basement, upper wall mouldings and roof from those of local Hindu temple architectural style. Due to its special design pattern, it stands out of most of the churches around the district. These rare variety of churches must be conserved and should be listed as heritage monuments, so that it can deliver much of cultural and historial relevance to future generation of historians and architects.





ACQI MODEL

Mr. P.S.Stem Edilber M.Sc, M.Phil
Assistant Professor

Model definition:

We will first define some notation. Let A be a set of origin airports and H be a set of airport types. For instance, the set of airport types might include large hub, medium hub, small hub, non-hub, Essential Air Service, and international airports.

Then the Airport Connectivity Quality Index (ACQI) score for an airport $a \in$ A is

$$ACQI_a = \sum_{h \in H} f_{a,h} d_{a,h} w_h + \propto \sum_{h' \in H} d'_{a,h'} w_{h'}$$

In words, the connectivity score can be represented as

$ACQI_a$ = (Quality of nonstop service) + Scaling Factor * (Quality of connecting service)

Selecting parameters for the ACQI Model:

The ACQI model is a function of two parameters: the w_h terms, which reflect the relative quality of a destination airport, and α, which weights the importance of one-stop versus non-stop service. The values of these parameters can change the analytical results of the model, so sensitivity analysis will be important to any outputs of the ACQI model.

The weighting terms w_h were computed using average enplanements at each AAI airport hub type as a proxy for the economic, social, cultural, and political importance of each destination. The values were calculated by finding the average 2015 enplanement levels for each airport type, and then computing a ratio of each type's average enplanement level to the large hub average enplanement level. This method resulted in the following weights:

Airport Type	Weight w_h
Large Hub	1.0
Medium Hub	0.09
Small Hub	0.08
Non-Hub/Essential Air Service	0.01
International	1.0

w_h Weighting terms for the ACQI model

From these weights, we can observe that on average, a medium hub airport enplaned 9 % of the passengers in 2015 of an average large hub airport. Similarly, a small hub airport enplaned about 8% of the passengers of a large hub airport in 2015, on average. Note that international destinations were assigned a weight of 1.0 to reflect the importance that international service plays in Tamil Nadu air transportation system.

The scaling factor α was selected based on the literature regarding the Quality Service Index (QSI), a model used by airlines to compute market share based on quality path. Used in predicting which of many itineraries a customer will select based on each itinerary's attributes, the QSI model has historically assumed a discounting factor for one stop or connecting service as compared to nonstop service between two airports. That is a connecting itinerary is seen as less valuable to a potential passenger than a non-stop itinerary.

ALEGRA LOUNGE – DUBAI

Ar. K.Keerthana B.Arch
Assistant Professor

Alegra is a building, lounge, and bar within the heart of urban center at intervals the shadow of the Burj Khalifa, the world's tallest building.

The space is dominated by a high-resolution LED screen mounted within a long broken crease in the ceiling plane. This crease is repeated exponentially utilizing trapezoidal 'faceted' ceiling and wall planes of beveled black glass. Each of these panels is backlit to form an energetic lightscape that unites the room.

The warm tones of the gold foil embossed leather and therefore the deeply tufted dinning ottomans lend a chic and sensual comfort to the interior.

In counterpoint to the deluxe upholstery square measure the glinty reflections that ricochet and sparkle round the space bouncing from one plane of black glass to a different.

The linear semiconductor diode chandeliers by Il Pezzo Mancante further reinforce the flicker of the area.

Their 20 foot long ribbon of golden graffiti and crystal candles provide a sparkling canopy to the main bar.

WORLD'S LARGEST URBAN FARM

Ar. Dinesh Pandian M.Arch
Assistant Professor

The world's largest urban farm is about to open next year within the Paris neighborhood of LE Marais. The six-story, 150,000-square-foot garden aims to grow over 2,000 pounds of fruits and vegetables every day. Twenty gardeners can tend to 30 totally different styles of plants to provide vegetables for the community. Called Agripolis, the project uses aeroponic farming therefore the plants absorb water and nutrients via mist. Agripolis will run without the use of pesticides or soil. It is a part of the larger Parisculteurs project that has committed to planting 250 acres of vegetation across the capital. "Our up to date manufacture are attending to be accustomed feed the inhabitants across the southwest of the city—either directly, through veg box schemes, or via shops, hotels, and canteens—thereby helping reduce food miles," says Pascal Hardy, founding father of urban-farming company Agripolis. Accompanying the urban farm are going to brand new rooftop restaurant run by group le Perchoir.

DRAMATICALLY TWISTED TIMBER WEAVES PAVILION

Ar. K.Ashwin Prakash M.Arch
Assistant Professor

In Tallinn, Estonia, a team of designers have merged traditional craftsmanship with digital modeling to create Steampunk, a sculptural pavilion that uses steam-bent hardwood and computer-aided design. The spectacular artwork uses the laborious process of steam bending timber by hand, rather than by robotic production, to call attention to the merits of traditional craftsmanship absent in machine building.

Gwyllim Jahn, Fologram's Cameron Newnham, Soomeen Hahm Design and Igor Pantic designed the Steampunk pavilion with the help of digital models that were rendered as holographic overlays during construction. Instead of translating their designs into CNC code for robotic production, the team decided to use a hybrid approach and build the pavilion by hand with the help of a holographic guide.

Using standardized 100-by-10-millimeter timber boards, the construction team bagged, steamed and then bent each strip over an adaptable formwork while using the holographic model as a reference. The twisted pieces of timber were then assembled to create the appearance of a woven 3D knot measuring roughly eight meters wide and 4.6 meters in height. The pavilion has four distinct spaces framing views towards the old city of Tallinn as well as the Architecture Museum.

NATURE TO SPACE: ARCHITECTURE THROUGH PERCEPTION

Ar. T.Josephine Sabena B.Arch
Assistant Professor

Architects commonly attempt a depiction of organic forms when their works are mostly inspired by nature, regardless of the building site. When aiming for affinity between structures and natural scenery have conceived spatial operations by applying a phenomenological approach, in which they realize perceptions from nature through architectural aspects such as protection, views, and orientation.

This method acknowledges a relationship between place and space, where intentions towards tangible facts then become design statements. Although spaces resulting from such a process may present an effective response to the environment, they can also offer further outcomes beyond the realm of form. The hypothesis is that, in addition to recognizing a bond between architecture and nature, it is also plausible to associate such perceptions with the inner ambient of buildings, by analyzing features such as daylight.

The sustainability pursuit results in the need for a new approach to the relationship between architecture and nature. The elements of the natural world, so far desired mainly due to their aesthetics, have now become useful elements, necessary for gaining energy, saving water, and improving air quality. However, they have not lost their aesthetic meaning. Natural elements have gained a new role of shaping development and public spaces and addressing new, unified perception of architectural space.

APPLICATION OF SYMMETRY

Ms. R.Maria Anushiya M.Sc
Assistant Professor

Symmetry means that has same lines and shapes. For two objects to be symmetrical, they must be the same shapes and size with one object having a different orientation from the first.
There are three types of symmetry:

Radial symmetry
Bilateral symmetry
Spherical symmetry

Radial symmetry:

Radial symmetry means that a cone or disk shape is symmetrical around a central axis.
Example: Star fish , jellyfish, and bicycle wheel

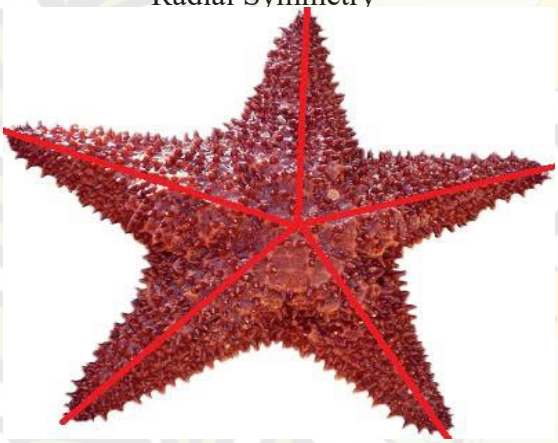
Bilateral symmetry:

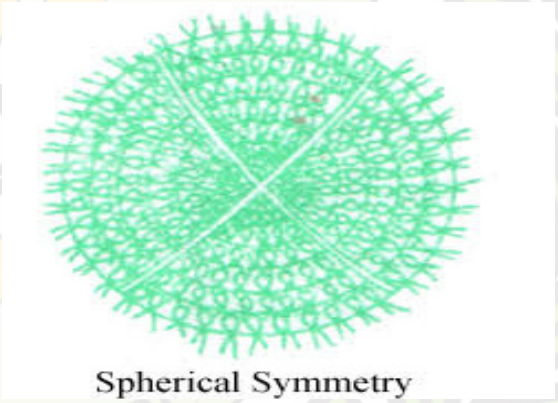
A shape has bilateral symmetry when it is the same on both sides of a line down the middle.
Example: Insects, spider, snail, Tajmahal

Spherical symmetry:

Everything is the same in all directions
Example: Alga volvox

Radial Symmetry





Spherical Symmetry

Bilateral Symmetry

STREETS - A MULTI UTILITY SPACE FOR KULALAR ACTIVITIES

Ar. N.Nishya M.Arch
Assistant Professor

Kulalar community is an occupation based community who works with clay to make pottery. Daily activities of People working with pottery have different activities. Their activities include sand preparation, Pottery Making, Drying, Beating and baking. All these activities can be seen in their built environment. They use their streets to do their activates like, drying the sand, women sits on their veranda and do beating, the end of their locality spaces are used as storage of raw materials. The map below shows the reflection.

LANDSCAPE SOLUTIONS FOR POLLUTION ARISING IN TEXTILE INDUSTRY

Ar. M.Priyadarshini M.Arch
Assistant Professor

A bioswale is a landscaping feature that acts as a filtration system for surface runoff water. Bioswales are environmentally friendly alternatives to storm water sewer systems that simply drain unfiltered runoff water into our rivers and streams. Usually found close to parking spaces and roadsides, bioswales filter silt and pollutants like trash, bacterium and harmful chemicals.

Land Reclamation:

Land reclamation, referred to as land fill, is that the method of creating new land from ocean, riverbeds, or lake beds. The land reclaimed called as reclamation ground or land fill.

Topsoil – Reconstruction:

To get rid of the lifeless top soil layer and fill with the nutrient filled soil to enhance soil fertility

Revegetation:

Revegetation is that the method of replanting and reconstruction the soil of disturbed land. This could be a natural process produced by plant colonization and succession, manmade rewilding projects, accelerated method designed to repair injury to a landscape because of conflagration, mining, flood, or different cause.

Bio remediation:

Treat contaminated media, together with water, soil and subterraneous material, by fixing environmental conditions to stimulate growth of microorganisms and degrade the target pollutants. Biological treatment could be a similar approach used to treat wastes together with effluent, industrial waste and solid waste.

Constructed wetlands:

Artificial wetland to treat municipal or industrial effluent, greywater or stormwater runoff. It may even be designed for land reclamation after mining, or as a mitigation step for natural areas lost to development

Phyto irrigation and reduce footprint:

To increase the land irrigation capacity by increasing the green open space. Terrace garden and other green footprint.

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

Er. R. Relin Geo M.E.
Assistant Professor

Durability test was carried out on the 150x150x150 mm Concrete cube. Total 12 cubes are casted and demoulded after 24 hours and at the ends of 28 days of normal curing period tested. The specimens were taken out from the curing tank and initial weight was taken. 5% of sodium sulfate (Na2SO4) by weight of water was added with water as per earlier investigators. The concentration of the solution was maintained throughout this period by changing the solution periodically. The specimens were taken out from the sulfate solution after 28 days of continuous soaking. The surface of the Cube were cleaned, weighed & then tested in the compressive testing machine under the uniform rate of loading of 120 kg/cm2/min.

The concrete cubes of size 150mm were cast and cured for a period of 28 days. After 28 days curing of specimens, cube surfaces were cleaned using standard preliminary surface cleaning process and weighed. The identified specimens were immersed in prescribed acid solution. The solution was checked periodically. After the prescribed duration, the specimens were removed from the solution. Using weight loss method, percentage weight loss was determined. The durability test result is shown in fig 1.

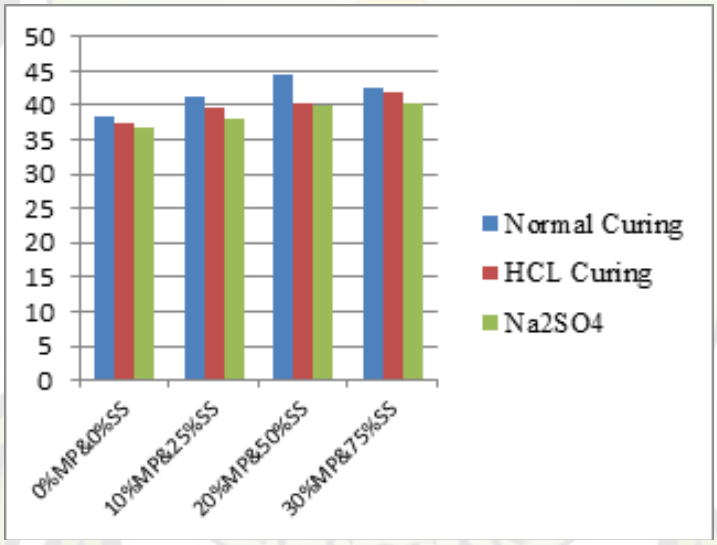


Fig 1: Durability Test Results

DESIGN CONSIDERATION FOR HOT DRY CLIMATE ON ROOFS AND WALLS

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

The characteristic features of hot dry climate are that it is hot ‘during summer, cool to very cold during winter and warm humid during monsoon season. Maximum day time summer temperature goes as high as 45°C and relative humidity as low up to 20 percent. Exclusion of sun during day time is require;. Sunlight penetration is desirable during winter, adequate provision for air change and comfort ventilation in monsoon period is required.

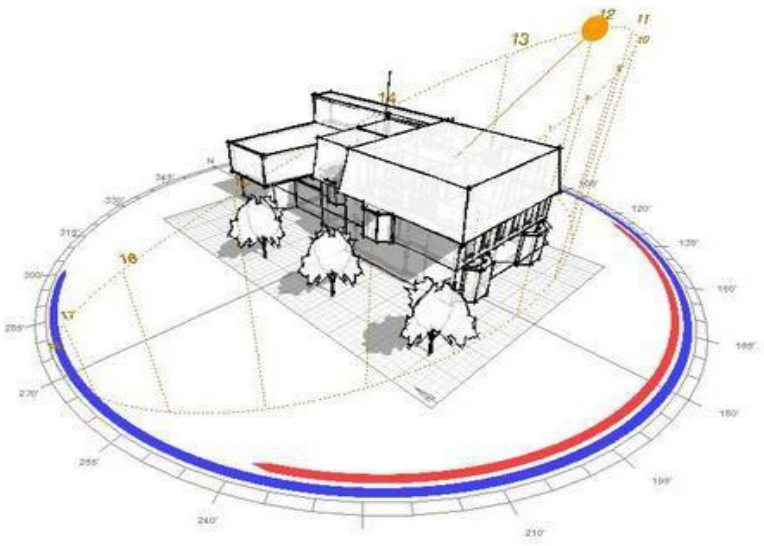
EXTERNAL WALLS -These should be constructed of bricks or similar locally available materials. The thickness of external wall should not be less than 22..5 cm. The building materials used should satisfy the requirements of strength, water absorption and durability as prescribed in relevant Indian Standards. Cavity walls, ho!low block, etc, can also be used. The empty air space can be filled with loose insulating materials to improve the thermal performance.

UNEXPOSED WALLS -These should be constructed of suitable building materials and their thickness should not be less than 11.15 cm. Precast concrete panels, hollow blocks and lightweight cellular concrete blocks can also be used.

PARTITION WALLS-These should be constructed of brick or other suitable materials. Structural and noise reduction requirements should be given due consideration.

FLAT ROOF- It should be of 10 cm RCC or reinforced brick cement (RBC) over which 7.5 cm thick mud phuska or cinder or any other equivalent insulting material is laid. It should be waterproofed with 7.5 cm of lime concrete or 5.9 cm of brick tiles or with 2 layers of tarfelt according to relevant Indian Standard.

SLOPED ROOF - It may be of either 6.0 mm asbestos cement sheets or of thatch or brick tile according to Indian Standards. In the former type roof, false-ceiling should be provided to improve thermal performance. For false ceiling, 2.5 cm of wood-wool board or other equivalent insulating materials should be used.



SEISMIC RETROFITTING TECHNIQUES

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

Earthquake creates great devastation in terms of life, money and failures of structures. Seismic Retrofitting Techniques are required for concrete constructions which are vulnerable to damage and failures by seismic forces. It is of utmost importance for historic monuments, areas prone to severe earthquakes and tall or expensive structures. In the past thirty years, moderate to severe earthquakes occurs around the world every year. Such events lead to damage to the concrete structures as well as failures. Thus the aim is to focus on a few specific procedures which may improve the practice for the evaluation of seismic vulnerability of existing reinforced concrete buildings. Retrofitting proves to be a better economic consideration and immediate shelter to problems rather than replacement of building.

Retrofitting Techniques

Adding New Shear Wall

Shear wall frequently used for retrofitting of non ductile reinforced concrete frame buildings. Shear wall is a structural member used to resist lateral forces i.e. parallel to the plane of the wall. For slender walls where the bending deformation is more, shear wall resists the loads due to cantilever action. The added elements can be either cast-in-place or precast reinforced concrete. New elements preferably be placed at the exterior of the building.It is not preferred in the interior of the structure to avoid interior mouldings.

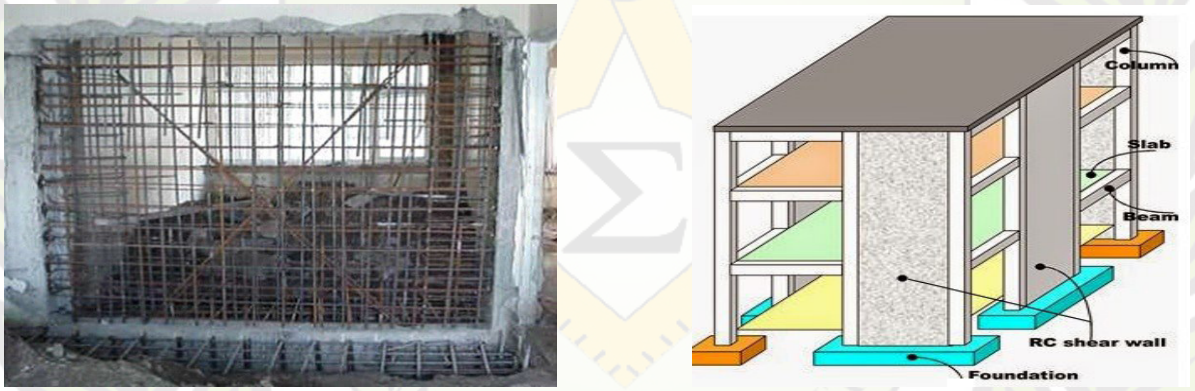


Figure 1: Additional Shear Wall

Adding Steel Bracings

Providing steel bracings is an effective solution when large openings are required. Potential advantages are due to higher strength and stiffness, opening for natural light can be provided, amount of work is less since foundation cost may be minimized and adds much less weight to the existing structure. Braced frames are a very common form of construction, being economic to construct and simple to analyse, provides stability and resistance to lateral loads.

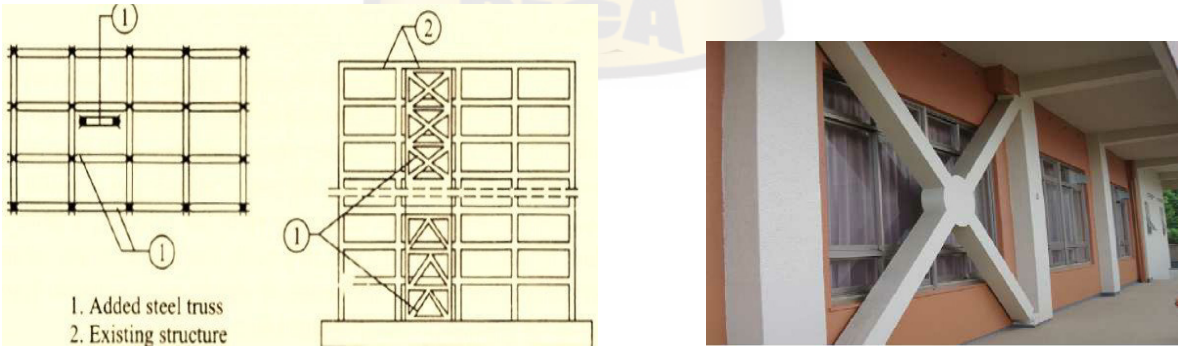


Figure 2: RC Building retrofitted by steel bracing

Jacketing

Jacketing is the process whereby a section of an existing structural member is restored to original dimensions or increased in size by encasement using suitable materials. A steel reinforcement cage or composite material wrap can be constructed around the damaged section onto which **shotcrete** or cast-in- place concrete is used. This is the most popular method for strengthening of building columns and beams. Purpose of jacketing is to increase concrete confinement, to increase shear strength and also to increase flexural strength.

Figure 3: Column & Beam Jacketing

Wall Thickening

The existing walls of a building are added certain thickness by adding bricks, concrete and steel aligned at certain places as reinforcement, such that the weight of wall increases and it can bear more vertical and horizontal loads, and also its designed under special conditions that the transverse loads does not cause sudden failure of the wall.

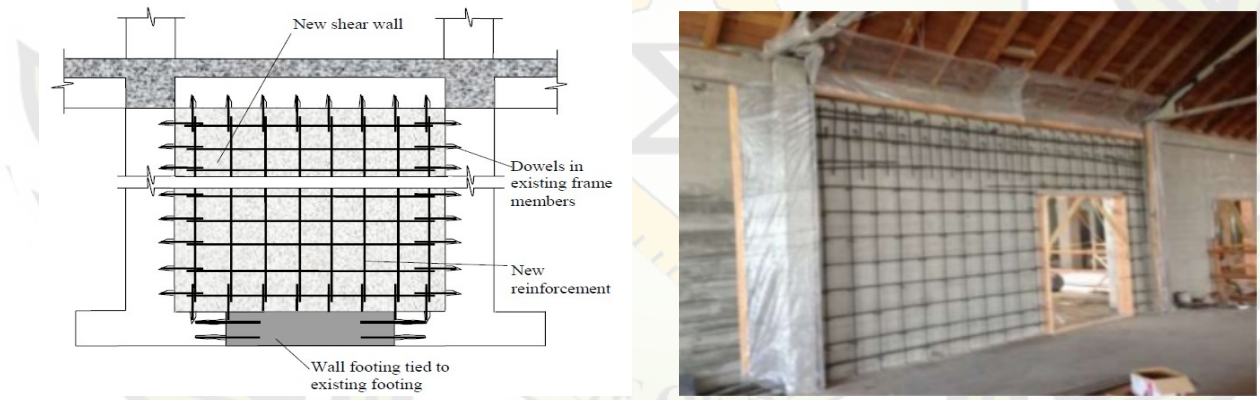


Figure 4: Wall Thickening

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

sigmagroup155@gmail.com