Vaasthu Sasthra and Disaster Management

(Er S. D. Suresh Lal, www.keralaengineer.com)

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1 Introduction

In India, recently we face disasters one by one. Apart from Earthquakes, some different kind of disasters that are new (unknown) to the world is also happening in our soil. The newspapers are regularly reporting sudden drying of the wells, colour rains, settlement of buildings, colour change of the well water etc. At last we have faced killer Tsunami waves in the different parts of our coastal areas.

As technocrats, we can find many explanations to the same phenomena. Explanations are not sufficient for the sufferings of the victims. These natural calamities will repeat again unexpectedly at any place. Tsunami is new to us. We should think seriously about these killer waves as we have a very long beach and the population depending sea for their daily lively hood is more. In Kerala, the fisherman folk and other tourist locations are mainly based on beaches and the population density per kilometer is the highest compared to any other State in India.

2 Reasons of Natural Disasters (Looking from different angles)

Let us have a look on the reasons for this Earthquake or the Tsunami caused by Earthquakes from some other interesting angles.

2.1 The scientific reasoning by the Geologists

- 2.1.1 Tectonic plate theory – ie. faulty zones in the classified 8 tectonic plates on the earth and its movements. (Those tectonic plates are Tessibean, American, African, Indian, Pacific, South East Asian, Philippines and Antarctic)
- Volcanic inner stress inside the earth
- Huge dam projects in the site

2.2 Some interesting factors related to natural disasters

- Reckless exploitation of the natural resources leads to natural calamities. (A meaningful saying by elder generations)
- Slaughtering of the cattle (BIS Theory & Einstein Pain Waves)[*1]
- Influence of celestial planets [*2]
- Greedy exploitation of limited fossil fuels.
- Horoscope of the region and the zodiac position of the solar eclipse[*2]
- The slope of the plot affects damage of the building. Buildings in North sloped lands were not damaged. (Anand Nagar, Jabalpur Earth Quake 22-5-1997),

2.3 Astro Vaastu Indications

Kalpam & Jyotisham are two interlinked disciplines of Vaastu sastra. The oldest reference available is Brihadsahmita written by Varahamihira in the 6th century AD who lived in Ujjaini. In the slokas of Earthquake criterion he classifies 4 directional sections with signified constellations seven on each section and explains their impact accordingly as under in brief.

2.3.1 Symptoms of Vayukone (North West)

- Seven Stars in the constellation are Utram, Atham, Choti, Chithira, Punartam, Makayiram, & Aswati and this occurs from the North West with strong winds and it is disastrous.

2.3.2 Symptoms of Ishanam (North East)

- Stars in the constellation are Abhijith, Thiruvonam, Avittam, Rohini, Thrikketta, Uthradom and Anizham causing torrential downpour followed by ailments in the digestive system and diarrhoea.

2.3.3 Symptoms of Nirruti (South West)

- Constellation of Revathi, Pooradom, Tiruvatira, Moolam, Uthrattathi, and chathayam, Makam causing quakes from South west causing annhilation of sea shore and river banks along the side of the water bodies.

2.3.4 Symptoms of Agnikone (South East)

- Pooyam, Karthika, Visakhom, Bharani, Makam, Pooradom and Pooram causes dispersal of clouds, destruction of dams, lakes, pools and other water resourses, resulting in political unrest, fire accidents, droughts etc.

Remarkable studies were not conducted in this subject in detail later. The occurred natural disasters were evaluated through the eyes of the modern science only. Some scientists did some researches and got good promising results.[*3]

3 The Essence of Vaasthu Vidya

3.1 Vaasthu, Vaasthu Vidya and Vaasthu Sasthra

'Vaastu' is a word originated from Sanskrit word 'vas' means place to dwell. Thus we can say 'Vaastu' is the dwelling place for the living and non living. All living creatures, the dead and deities come under this category. As per our ancient beliefs, this Earth is not meant for man only. Human beings are one among the millions.

'Vaasthu Vidya' is the study of effective utilization of the natural resources and dwelling place in harmony with the nature. The balance between the different systems is to be kept holistic and the needy exploitation of the resources were permitted not the greedy exploitation.
Vaasthu Sasthra is a set dos and don'ts in Vaasthu Vidya. This is just like Bye Laws or instructions. As an ordinary person you can accept the same in your daily life or reject it. As a more knowledgeable person in Vaastu Vidya, you have the authority to change it according to the need of the community (client), time and place.

3.2 Origin of Vaastu Vidya

Vaastu Vidya is believed to be originated from 'Brahma', the supreme creator.[*4]
The oldest literature on this was Stapatya veda, an upaveda of Atharva Veda, (1700 BC) which contain a lot of technical matter in Sanskrit. After that Puranas, Agamas, Niruttas etc came. Later on Varahamihira compiled a lot of other subjects including Vaastu Vidya in his famous work, Brihad samhita (6th century AD).

Mayamata, Manasara, Samarakankana Sutradahara, Kashyapa silpa sasthram, Manasollasa, Prayoga Manjari, Vaasthu ratnavalai, etc.

In Kerala we follow 'Manushyalaya Chandika' (16th century AD) for Griha Vaasthu (Prayojaka Vaastu/ functional Vaastu) and Tantra samuchayam (15th century AD) for temple Vaastu (Praasada Vaastu/ Symbolic Vaastu)

3.3 Classification of Vaastu

According to mayamata, there are four types of Vaastu.

Bhoomi (Mother Earth)
Harmya (Buildings) – prayojaka & Prasada Vaastu
Yaana (Carts, chariots, vehicles etc)
Sayana (Furniture and interior items)

Among these four items we are more concerned about Bhoomi Vaasthu & Harmya Vaastu. When the interrelationship of these becomes unscientific, the natural disasters occur.

3.3.1 Bhoomi Vaastu

This is the primal Vaastu. Only in Earth living beings can survive. No other planet in the universe is found supporting life so far. So our Mother Earth (Prithvi) is the biggest known Vaastu. Let us have a close look at this ..

- In ancient classics of all civilizations consider Earth as mother (Prithvi). She cares all of us like her children with all facilities and resources.
- "Mata Bhoomi: putro aham prithvya" (Atharva veda (12.1.12) (meaning: Mother Earth, I am your son)
- She is the ultimate bearer of loads of all structures.
- Earth is water as well as fire inside it. Atharva veda (12.1.19). Fire means geothermal energy and the inner side of the Earth is molten due to high temperature.
- It emits many radiations. [*5]
- Earth is represented as a Cow (Kamadhenu) in the Vedas.
- The Earth's axis is tilted by 23.5degrees to get NE Cosmic radiations.
- Even though it rotates at a very high speed and moving around the sun, the inhabitants do not feel it.

3.3.2 Vaastu Purusha Mandalam (Vaasthu kshetram)

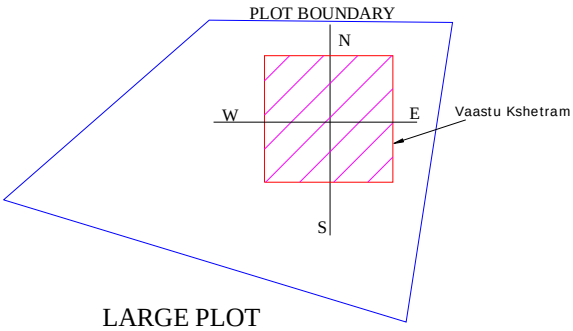
This links the Bhoomi Vaastu to the Harmya Vaastu. It has got multi dimensional importance in planning, designing and constructing houses as well as in disaster resistance point of view. (That we will come across in detail later)

Any plot with a square or rectangular boundary can be considered as a Vaastu Purusha Mandalam. Its center of gravity is known as the Brahma Nabhi. The Vaastu Purusha Mandalam is under the control of 45 dieties and they are sitting over the Vaastu purushan, who was a destructive and gigantic demon. Since these deities are sitting on the plot, thus it must be compacted.

There are four Veedhis (please refer Fig. 3)

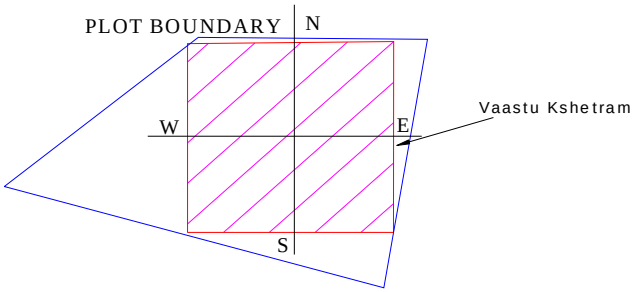
A) Pishacha Veedhi (outer 1/9th)
B) Manushya Veedhi
C) Deva Veedhi
D) Brahma Veedhi

Normally Residential buildings are not permitted in the outer most and the innermost Veedhis. Ie. Pishacha veedhi & Brahma Veedhi



LARGE PLOT

Fig 1. Vaasthu Purusha Mandalam in a Big Plot. The required area is earmarked for Development



SMALL PLOT

Fig 2. Vaasthu Purusha Mandalam in a Small Plot. The biggest Square available in the plot is considered.

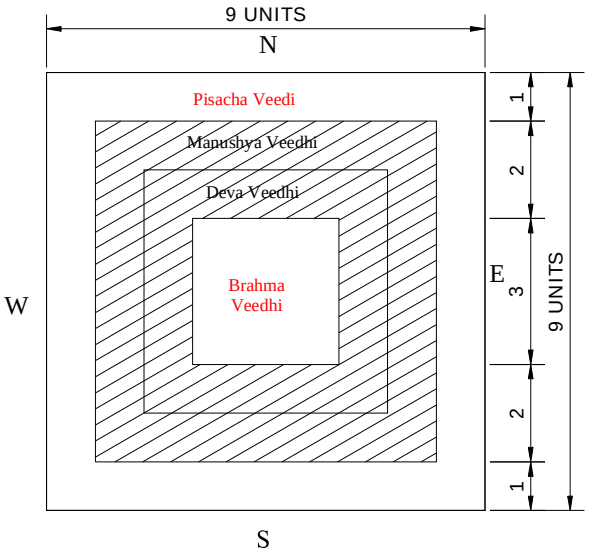
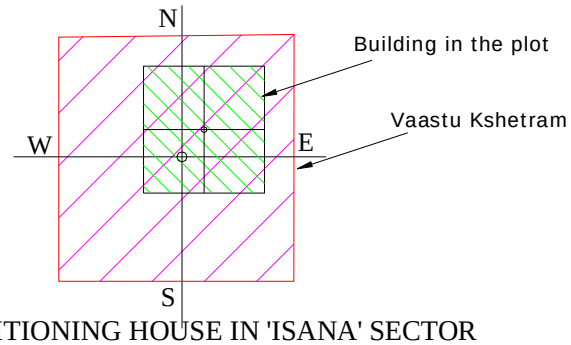
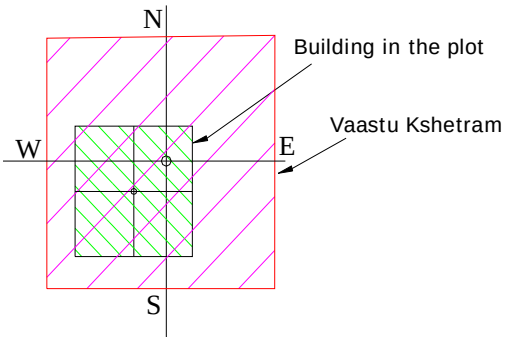


Fig.3 The shaded area can be used for construction (Approx 50% coverage)



POSITIONING HOUSE IN 'ISANA' SECTOR

Fig.4 The Building is placed on the NE (Isana) segment of the plot. (Building can face either South or West)



POSITIONING HOUSE IN 'NIRRTI' SECTOR

Fig.5 The Building is placed on the SW (Nirrti) segment of the plot. (Building can face either North or East)

Fig.6 Vaasthu Purushan in a Square plot
Head faces the North East and

4 Vaasthu Sasthra and Disaster Resistant Buildings

4.1 Approach

Vaastu Sasthra believes in 'Prevention is better than cure'. The preventive measures are very simple and must be followed while constructing the houses. All Vaastu principles are not important in Disaster prone areas. But our approach towards mother Earth should change. Gaia Movement (of James Lovelock, a British environmentalist), Bau biology (originated in Germany 30 years ago) etc in the western countries have taken a lot of ideas from our culture.

4.1.1 The most important Vaastu principle

In Manushyalaya Chandrika, there is a famous sloka which is very much relevant now.

व्रीहिक्षेत्रादिदेवालयजलधिनदीतापसागारगोष्ठ
ग्रामादिनामतीवान्तिकमपकुरुते नैकधा मन्दिरेषु
देवागारान्नराणामतिशुभदमिदं किञ्चिदूनं समं वा
तस्मादभ्युन्नतं च द्वितलविधिरयं नेष्यते तत्समीपे

(Chapter 1, Sloka 28)

(For residences, close proximity to paddy fields, mountain, temple, ocean, river, hermitage, cattle sheds etc is dangerous in several ways. Houses taller than the temples is not auspicious)

In Brihadsamhita, it is stated that the minimum distance between the houses and the ocean should be 1000 dand. (Dand is a unit in Vaasthu Sasthra equivalent to 2.88 m). Whatever technology we apply to construct houses very near to the oceans, they will not sustain in heavy Tsunami Killer waves. Distance is the only criterion, that tsunamis can't defeat.

4.1.2 Plot Selection

For selecting plots also, Vaastu Sasthra has got very elegant rules.

गोमर्त्यैः फलपुष्पदुग्धतरुभिश्चाढ्या समा प्राक्प्लवा
स्निग्धा धीररवा प्रदक्षिणजलोपेताशुबीजोद्गमा
सम्प्रोक्ता बहुपांसुरक्षयजला तुल्या च शीतोष्णयोः
श्रेष्ठा भूरधमा समुक्तविपरीता मिश्रिता मध्यमा

Manushyala Chandrika, Chapter 1, Sloka 17

(The land with the presence of a lot of cattle and humans with abundant presence of flowering and fruit bearing plants and milky sap trees, level land, sloping towards East, Smooth, producing good sound while walking, water flowing in the clock wise direction, causing speedy germination of the seeds, well compacted, having perennial water and with moderate climate is said to be very good (Uttama) If they are opposite, it is very Bad (Adhama) and some of them are positive, then the plot is good (Madhyama))

The East sloping of the Land, the compacted nature of the plot and the good sound while walking over it etc makes a good land which is suitable for erecting a building.

Mayamatam says that the ground should be free from potsherds, worms, ants and bones. It should be free from holes and is covered with white sand. It must be free from Charcoal, stumps, cavities and husks. Such a site is very good for house construction.[*6]
We know that the Holes, charcoal, ash, cavities and husks weaken the foundation which is not good for earth quake resistance point of view.

4.1.3 The right approach

We know that the 90% of the disaster prone houses are being constructed in these areas. Mostly low income group or other poor people live there. For Example, the fisherman folk prefer to live very close to the sea. A lot of poor people live on the canal Banks or river banks. Now in Kerala the only cheaper land available is the paddy field filled and leveled plots. All these activities, in other terms destroy the equilibrium of the nature. This will attract more and more natural calamities and disasters. Excessive industrial pumping of the sub surface water resources (eg. Plachimada)

4.1.4 Kerala in General

In Kerala the housing scenario is much better than any other state. According to the 2001 census, there are 93.56 lakhs buildins in Kerala.

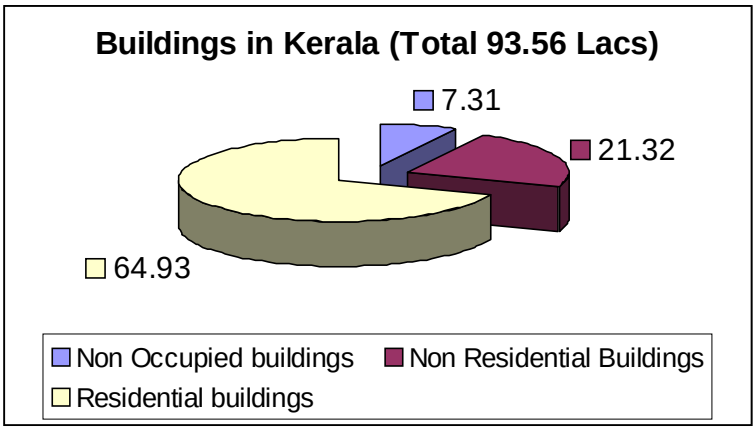


Fig. 7

Among the 64.93 Lacs residential buildings, 8 % (5.33 Lacs) are decayed or inhabitable. About 80% of these houses are situated in risky areas where disasters will occur at any time. Disaster resistant houses are to be introduced from this level. If any disaster occur thousands of people dies. Better we start an action plan with the help of Local self-government bodies and NGOs. Then wide campaign must be made among the middle class group for altering their houses to withstand natural disasters. Some standard designs and guidelines may be published for their option. These buildings can be very easily altered according to Vaasthu Principles and strengthening works as per modern engineering.

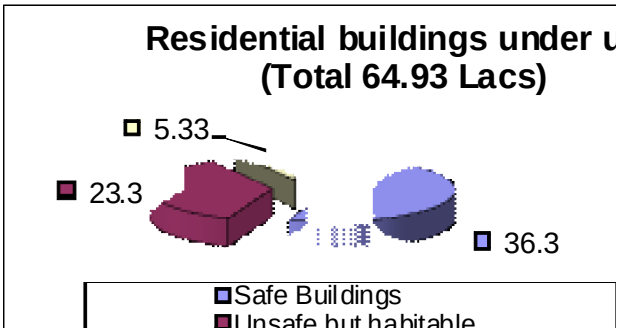


Fig. 8

4.2 Vaastu Principles of Design

Vaastu Principles are unknowing helping to prepare a Disaster free building. It mainly focuses on the Shape of the building, location of the structural members/elements in the building and the distribution of the building mass in the building to reduce the impacts of disasters.

4.2.1 Shape of the Building

4.2.1.1 Square shapes

Vaasthu Sasthra prefers square shapes near square shapes (Rectangles) for the plan of the building. Perfect square is used for temples only. The classification of rectangles according to length to width ratio is as follows

Samatata	Padadhika	Ardhadhika	Padona
1:1 to 1:1.25	1:1.25 to1:1.50	1:1.50 to 1:1.75	1:1.75 to 1:2
1:2 to 1:2.25	1:2.25 to 1:2.50	1:2.50 to 1:2.75	1:2.75 to 1:3
1:2 to 1:3.25	1:3.25 to 1:3.50	1:3.50 to 1:3.75	1:3.75 to 1:4

(It is safer to use 1:1 to 1:1.75 shapes for efficient buildings, Padonna measurements are never used)

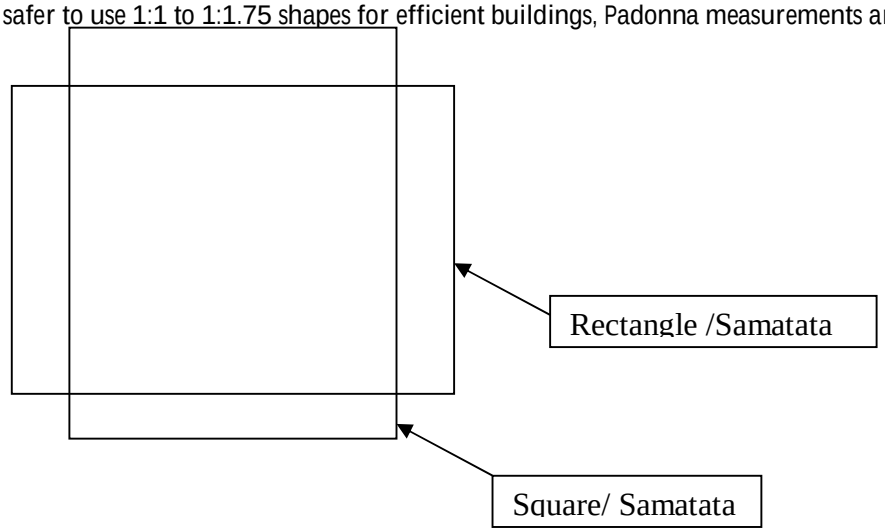
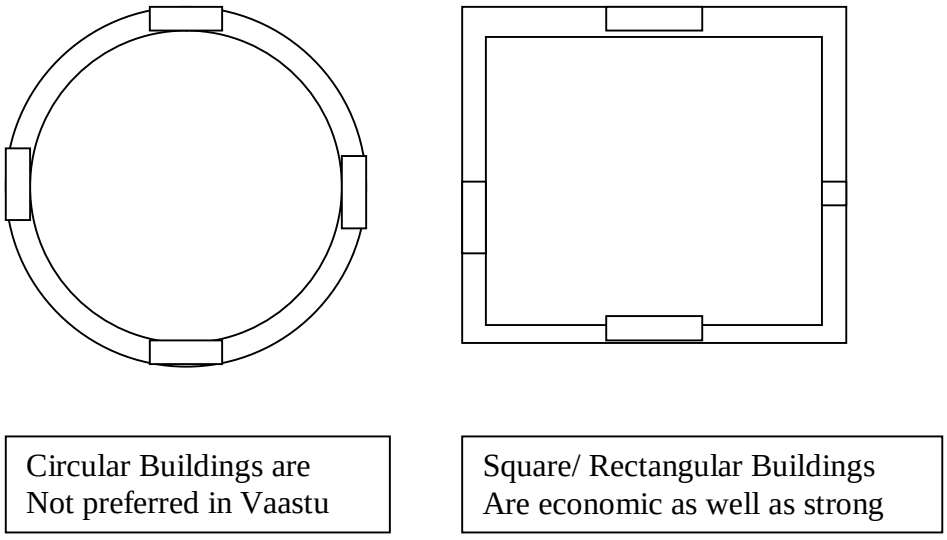


Fig. 9

4.2.1.2 Why square shapes are preferred ?

Rectangular shapes in the First category of Padadhika measurements (ie. 1:1.1 to 1:1.25) are earth quake resistant shapes. (Perfect square ie. 1:1 will not be preferred by Vaastu experts)

Circles and squares are the two basic but efficient shapes we can choose as the plan shape of our building. These shapes can give you more area for the least perimeter. So it is economic also. But, circular buildings on the other hand act as a single wall and if some repairing is required, it cannot be done easily. More over Circular shapes are not meant for living objects. Window and door opening reduces the shell strength also.



Circular Buildings are Not preferred in Vaastu	Square/ Rectangular Buildings Are economic as well as strong

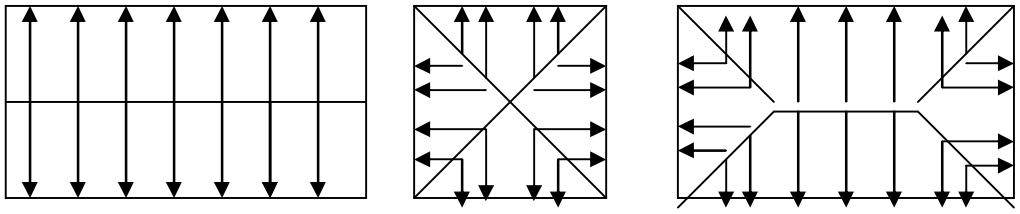
Fig. 10

Square type buildings transfer the loads directly to the soil evenly and effectively. They are the strongest buildings against earth quake which produces strong lateral movements. The corners act as rigid vertical members. Abnormal loads passing through the building is equally shared by the outer walls. Thus the overall strength of the building increases

4.2.1.3 Economic slab design

As already mentioned, Vaastu Sasthra proposes a nearly square shape to Length twice the size of breadth.

As per the Indian Standard Code of Practice for Plain and Reinforced concrete(IS 456) says: the load on the short walls is nil if the slabs length is more than two times the width. If the ratio is less than 2 (ie. length is less than 2 times the width), the load is taken by smaller walls also. The Fig.11 gives the details.



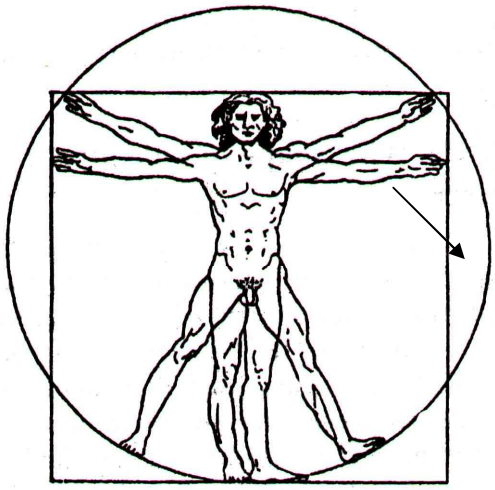
L > 2B | L =B | L=1.50

Fig. 11

When the load is transferred by a wall, it becomes more stable. Otherwise walls cracks near the corners. (Note the last picture represents the typical Kerala Tiled roof or thatched roof.)

For those buildings whose plan is regular shapes, the behavior of the structure is predictable considering the torsional behavior and the stress concentration in case of destructive forces play a role.
Long rectangular or square pipe like buildings are good, but the different grouped vibrations may be unpredictable. If the structure is having L, T, F, M, Y shapes in plan, the tort ional behavior and the stress concentration in the building of the building is unpredictable. Therefore these the buildings as not supported by Vaastu Sasthra.

4.2.1.4 Vaastu and measurement system



Vitruvian Man
Leonardo da Vinci

Fig. 12

This picture illustrates the height and breadth of the human being perfectly fits in a square shaped plot and building. A plot or building which is considered as a living object in Vaastu, is in perfect harmony with the size of the occupant when approaching the square shape. Great Philosopher in China , Lao Tse (BC 571) declared in his classic, 'The book of Tao ' that Square is the best.'
The measurement system in Vaastu is based on the human body (anthropometrics)
One Hastam (1 kole = 72 cm)

4.2.1.5 Vaasthu - Fundamental Units

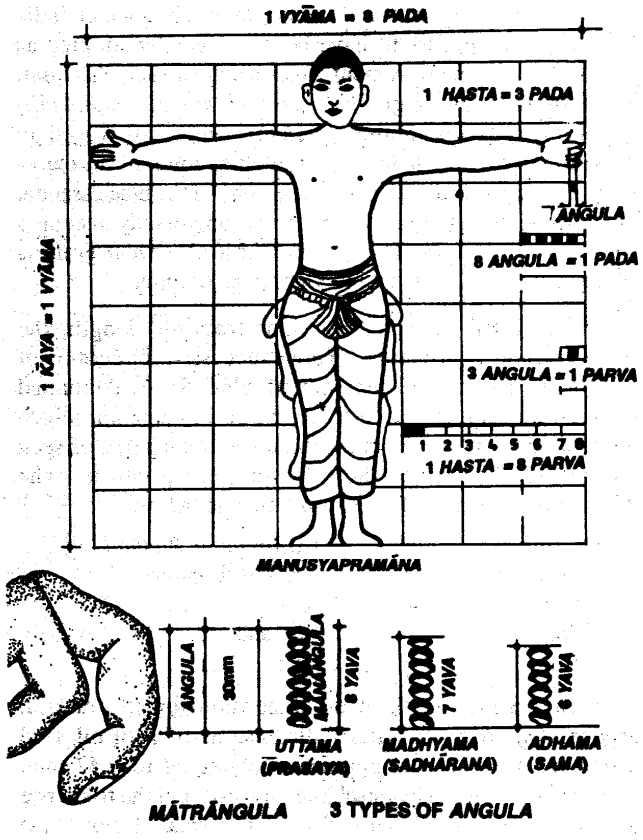


Fig. 13

4.2.2 Location of structural elements

Location of the structural elements such as beams, columns, structural walls are to be designed to take maximum load.

As per Vaastu Sasthra, the following points are very important.

The center area (Brahma Nabhi)if kept free (Chatussala Model) or open .Loads are more to the outer sides than the center.

The outer perimeter shall also kept open to have sufficient air passage and distance from the neighborhood (Pls refer Fig 3)

Important load bearing members are to be erected in the outer walls uniformly so that they act as uniformly as a single member. The important points Brahma nabhi, and the Mahamarmas shall be exluded

4.2.3 Distribution of building mass

Distribution of the building mass is very important as far earth quake forces are concerned. Vaastu principles are governing this are

The mass of the building shall more at the bottom and reducing towards vertically.

Uniform Mass distribution about the Vertical axes increases the strength of the structure.

Light weight Roofs are the best for the Earth quake resistance.

4.2.3.1 Wall construction

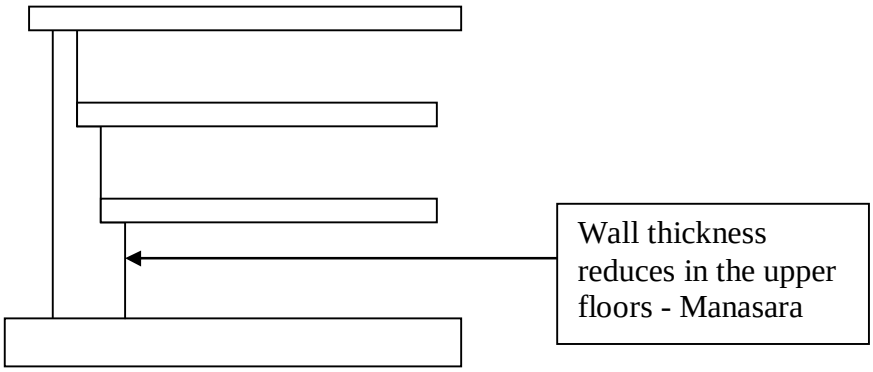


Fig. 14. More Weight at the bottom

The walls must be bulky in the lower floors and lighter in the upper floors.

4.2.3.2 Slab construction/ Room Height

The roof heights must be reduced in the upper floors ie, reduce room height in the upper floors. This reduces the lateral moment of the building in the direction of the Earth quake. This is primarily done to reduce the height as well as weight in the upper floors.

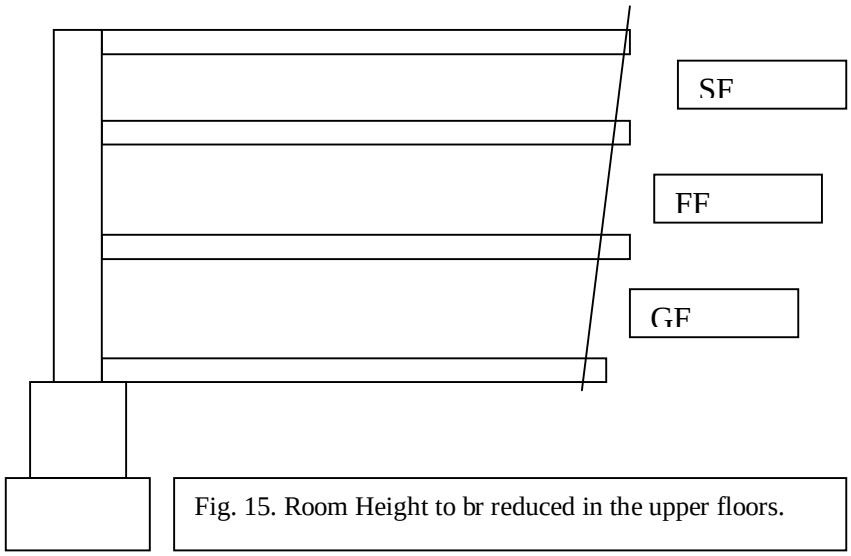


Fig. 15. Room Height to br reduced in the upper floors.

4.3 Practical aspects of Vaastu Sasthra

4.3.1 Recommendations for a Disaster Resistant Building

- The plan shape of the building should be nearly square or rectangular (L <= 2B)
- For Long buildings and irregular shaped buildings introduce the seismic joints above the specified length. Seismic joints can be planned to coincide with the expansion joints.
- Lower floors shall be massive compared to the upper floors. The traditional Verandah all around the old fashion houses is an example.
- Lesser room height in the upper floors. If the height is more the chance of damage is more.
- Slope the surrounding land towards North east or North or east.
- Auspicious measurements shall be used for the room design, overall perimeter design etc.
- The minimum distance from the sea or other natural disasters prone areas shall be 1000 *dand*. (ie 2.88 Km)
- Fancy shaped buildings causes more accidents compared to other.
- Avoid heavy over hangings and cantilevering floors

- Avoid slender columns and thin wall elements . This increases lateral instability.
- Symmetrically arranged buildings offer more strength.
- To attain more resistance increase the stiffness and reduce the Mass of the structure.

4.3.2 Disaster resistance in Traditional Kerala Buildings ?

Traditional Kerala Buildings if modified, can resist most of the quakes.
A traditional old common building with small modifications is the apt solution for disaster resistant buildings without spending much money and resources. 40 % of the buildings in Kerala can be called better safer buildings than most of the pucca RCC buildings. Lintel bands, Vertical ties , rooftop bands, Steel pipe truss work and the Bamboo mat Corrugated sheets (BMCS) with J bolts is the best solution for risk free roof.

Please refer Fig.8. The houses of the middle class can be converted to Earth quake resistant without much effort.

Bamboo is a very easily available building material; in Kerala forest region. It is also known as the 'Iron Bars of the Nature'. Bamboo Mat Corrugated Roofing Sheets are very cheap as well as environmental friendly.

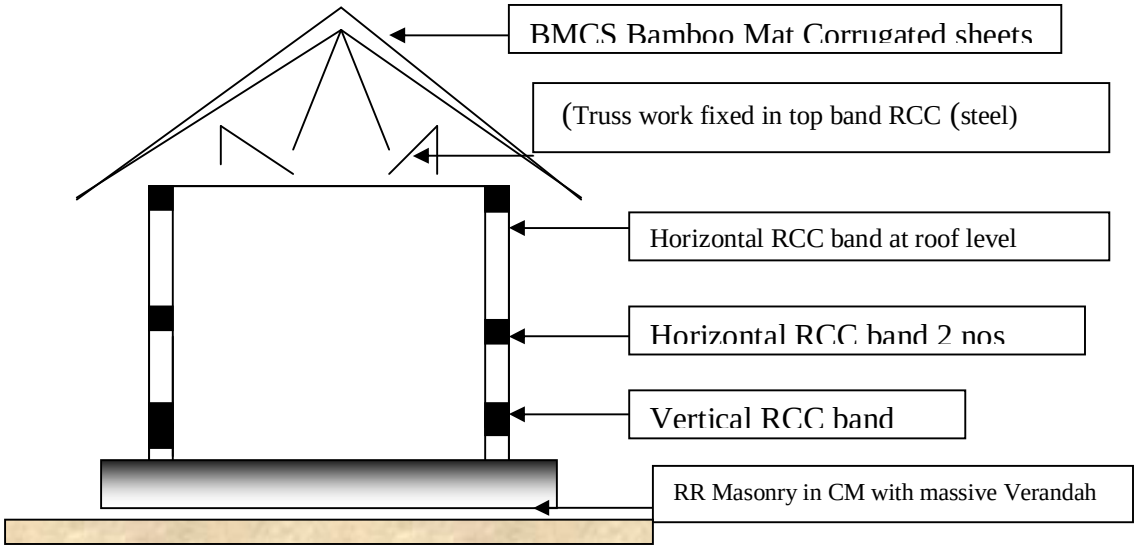


Fig 16 Section of a Typical Building

5 REFERENCES

1"Understanding Earthquakes
A Plea to Stop Animal Slaughter, Via Science Now!"

A New Approach by M M Bajaj, Ibrahim and Vijayraj Singh; *H. B. Prakashan, Indore;*

http://www.european-vegetarian.org/evu/english/news/news981/earthquakes.html

2. Tom Schek published an article after study of 134 Quakes in the scientific journal "Naturi" in the year 1959, holding Uranus and Neptune responsible for that. According to John Gribin and Stephen Flagman, the imbalance of the the sun and other planets disturbs the equilibrium of the Earth, which results in Earth Quakes. Harlon T. Strelson of Harvard University wrote the specific position of moon was responsible for about 2000 earthquakes, he studied. This may be due to the influence of a sun or other planes on some specific tectonic plate on the earth.

3. Dr. S. K. Kelkar, Sri. Ganesh Tamrakar, Vijnan Bharati Pradeepika, Earth quake special, Vol3, No-1. 1997.

4 .Brihad samhita (53.1)

5. Earth emits many radiations. Apart from magnetic forces, Hartmann Lines , Currie Lines and Lay Lines are some among them which are normally not felt by us. They run Horizontally, vertically and diagonally in a grid form and emits vertical radiation lines. Some of them are dangerous to human lives if we are continuously passes though our body. (Ref: Bau Biology principles)

6. Mayamatam, (3.7b- 10a)