

# A Comparative Study of Ancient Civil Engineering Indian Culture with Modern Civil Era

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**Abstract:** *The purpose of this research is to demystify ancient Indian architect & civil culture. It will help to co-relate modern civil culture to ancient Indian civil culture to evolve Indian civil culture more efficiently. The research methodology adopted was primary the conversation with villagers and elders of the town and visitation to the monk, scholars and historians. We referred books on ancient history and articles by historians. The duration of my research was Aug 2015 to Jan 2016 in Maro, Devarbija, Boramdev By understanding books on ancient history, Articles and elders & scholar of village and other evidence which all are already available it is clear that there is always a deep influence of Indian culture and tradition on Indian civil & architect . By which Indian civil has sparked eith rich customs and traditions. Modern civil can be more efficiently applied by understanding our Indian traditions because they are always related to science and for welfare of human being. By studying ancient techniques and vastu we can easily understand different facts of science.*

**Keywords:** Ancient Indian culture, modern civil culture, ancient history, Indian traditions

## 1. Introduction

From the Stone Age to the modern age we have come to know that the human being is reflective, curious and inventor Means explorer. In modern civil engineering science has done never to be forgotten progresses and made dreams come true which was beyond of our imaginations. At present science has uncovered secrets. Even everything is before us but it seems that there is body but not the spirit. There is an adage “Old is Gold”. Today after uncovering secrets, using modern machines we could not rise civil engineering to the point where our ancestor had left. Despite of reaching to the highest point in the field of architecture still we found ourselves speechless watching the ancient structures. So many question rises even about the gratefulness or in the context of firmness or strength or in the context of lively instantiation. As the law is incomplete without evidence in the same way our memory is incomplete without history. History means our past.

## 2. Analysis

Science has accepted that the human DNA is continue from one to another human being that’s why human is curious and the ancient architecture is a sign which proves that we had knowledge of science and architecture . But in which form? In ancient time the same science was linked to culture, society, civilization and religion by our ancestor. It won’t be hyperbolically to call them “Arya”.

For example:

- In Indians our elders always told us not to sleep with our head in south direction. Whereas dead body is kept in that way. Now the science behind this is that the earth acts as a magnet.
- in villages elders advised children not to go near ficus and banyan tree sometimes elder scares kids saying ghost are

there, but science says these trees produces Co2 at night which is not good for health

- It is told to Indians that keep your face in north direction. now scientific reason behind this is that magnetic waves flow from north to south direction. this magnetic energy activates the brain cells and increase the memory power.

So our tradition and science both mean same to protect human beings and to ameliorate but their way is different our ancestor selected the way so we Indians and all the peoples of our community of different classes even if they are illiterate or literate, rich or poor, can easily understand and that was our culture but now we think it is limitation or obstacle for us .

It is well acknowledged that we were familiar to science just time is changed and the same thing is in front of us in new form

Our ancient saint and scholars were able to measure the distance between the sun and earth which is written in the “hanuman chalisa” as जुग सहस्र जोजन पर भानु (jug sahastr jojan par bhanu)[1] which is proven right by “Nasa” and whole world then accepted

The concept of zero, square roots, cube roots, values of  $\pi$  were known to Indians. A book “vimanashastram” shows the procedures to make an aeroplane .some other facts are:

- The iron pillar of delhi is famous Indian place it has 99% resistance to corrosion and almost 1600-1700 years old. A study concluded that a corrosion-resistance agent iron hydrogen phosphate was applied on it which shows advanced chemical knowledge of our ancestors.[2]
- Harappa and mohanjo-daro are best examples of this architecture and mature urban civilization. in Harappa civilization the underground drainage system was from

small to big sewer then to channel and then channel to river. It has also a remarkable town planning system. better system than this has never seen till today [3]

- Now we have done so many researches and brought so many relevant facts .example- how many gallons of water is needed for a village but the problem of drainage is still there. We know that we are surrounded by population and pollution and other problems but I believe that before science these all problems are negligible.
- Ancient fort and huge bath and bawadiya etc. are very attractive .one of the most beautiful example of patterns in architecture it is chand bauri well in rajasthan which is 100 feet below the earth level.[4] mughals have done changes in architecture, the use of marbles shows that we had good knowledge of geology too.
- Jagganath temple: the shadow of the main dome is not visible whatever be the time it shows architecture feat. Also the sudarshan chakra on the top seems always facing you. Irrespective of wherever you stand. When you enter the temple by singhdwara after first step you cannot here any sound of ocean but when you exit it can be clearly heard.[5]
- The narayan pal Vishnu mandir of chitrkut, bastar was completely built only in a day.its structure and arts are also built in a shorter period of time of a day.
- The konark sun temple is one of the unesco heritage site. The main attraction of the temple is its twelve pairs of wheels located at the base of the temple. These wheels are not ordinary wheels but tell time as well the spokes of the wheels create a sundial. One can calculate the precise time of the day by just looking at the shadow cast by these spokes.
- Kailash temple of Alora caves is carved from a massive rock structure. The whole rock is cut by manpower.
- Now these facts prove that our ancestors had knowledge of civil and science in fact their technology was highly advanced than of the modern.

We were known to the building construction and modern techniques which were used with some other names or forms and are as follows

### Soil Testing

Purvam bhumirn parikseta pascata vastu prakalpayet  
Translated as – First test the earth (site); after that plan the construction.

Valmikena samayukta bhumirasthiganaistu ya II  
Randhranvita ca bhurvarjya gatighesca samanvita II  
Translated as – Land with anthills, skeletons, full of pits and craters should be avoided.

Varnagandharasakaradisabdas parsanairapi I  
Pariksyaiya yathayogyam grhniyad dravyamuttamam II  
Translated as – After examining the color, smell, taste, shape, sound and touch (of the soil) buy the best material as found suitable.

Yavattatra jalarn drstarn khanettavattu bhutale II  
Translated as – Till water is seen there, (one) should dig the ground.

Ratnirnatramadhe garte pariksyia khatapurane II  
Adhike sriyamapnoti nyune hanirn same samam II  
Translated as – It (soil) should be tested by digging a pit of 1 arm length and refilling it (with the same soil). If (soil is)

more, one will beget prosperity; if short, one will beget loss; if equal, it is normal.[6]

### Making of Bricks

(Istakasangrahanam)

Usaram pandurarn krsnacikkanarn tarnrapullakarn II  
Mrdascatasrastasveva grhniyat tamrapullakam I  
Translated as – Salty, off-white, black and smooth, red and granulated, these are the four kinds of clay.

Asarkarasmarnulasthilotarn satanuvulukam II  
Ekavamam sukhasparsamistarn lostestakadisii I  
Translated as – Clay suitable for making bricks and tiles must be free from gravel, pebbles, roots and bones and must be soft to touch.

Mrtkhandarn purayedagre janudaghne jale tatah u  
Alodya mardayet padbhyarn catvarirnsat punah  
Translated as – Then fill the clods of clay in knee-deep water; then having mixed, pound with the feet forty times repeatedly.

Ksiradrumakadarnbamrabhayaksa -tvagjalairapi II  
Triphalambubhirasiktva mardayenmasamatrakam  
Translated as – After soaking in the sap of fig, kadamba, mango, abhaya and aksha and also in the water of myrobalan for three months, pound (the clay)

Catupaftcaalatabhirmatraistaddhidvigul)ayatai:III  
Vyasarhardhatribhagaikatlvra madhye parespare I  
Istaka bahusah sosyah samadagdha punasca tah II  
Translated as – These (bricks) are in four, five, six and eight unit (widths) and twice that in length. Their depth in the middle and in the two ends (is) one fourth or one-third the width. Again these bricks should normally be dried and baked.

Ekadvitricaturmasarnatityaiva vicaksanah I  
Jale praksipya yatnena jaladuddhrtaya tat punah II  
Translated as – The experts, only after one, two, three or four months, again throwing (the baked bricks) in water, and extracting (them) from the water with effort, (will put the brick)[7]

### Mortar

Paficamsarn masayusarn syannavastarnsarn gudarn dadhi II  
Ajyam dvyarnsam tu saptarnsarn kslram carma sadarnsakam I

Translated as – There should be 5 parts extract of beans, nine and eight parts molasses\* and curd\* (respectively). Clarified butter (ghee) 2 parts, 7 parts milk, hide (extract) 6 parts.

\*Molasses - A thick treacle that drains from sugar

\*Curd - Milk thickened or coagulated by acid  
Traiphalarh dasabhogarn syannalikerarn yugarnsakam II  
Ksaudramekarnsakam tryarnsarn kadallphalamisyate I  
Translated as – There should be 10 parts of myrobalan\*. Coconut two parts, honey one part. Three parts plantain are desired.

\*Myrobalan - The astringent fruit of certain Indian mountain species of Terminalia (combretaceae): a variety of Plum  
Labdhe curne dasarnse tu yufijItavyarh subandhanam II  
Sarvesamadhikarn sastarn gudarn ca dadhi dugdhakam I  
Translated as – In the powder (thus) obtained, 1/10<sup>th</sup> lime should be added. Larger quantity than others of molasses, curd and milk is best.

Curnadvaryarnsam karalarn madhughrtakadallnalikeram ca masarn

Suktostoyarn ca dugdharh dadhigudasahitarn traiphalarh tat krarnena I

Translated as – In two parts of lime, (add) karaka, honey, clarified butter, plantain, coconut and bean. When dry (add) water, milk, curd, myrobalan along with molasses gradually. Labdhe curne satarnsesmsakamidamadhuna canuvrddhirn prakuryadetad bandharh

drsatsadsramiti kathitarh tantravidbhirnununindrah II

Translated as – Now in the powder (thus) obtained, grow one in hundred parts. It (the compound) is said by leading thinkers who know the technology as rocklike.[8]

### Assembling Pillars

Starnbhasandhayah Mesayuddharn trikhandam ca saubhadram

cardhapanikam I Mahavrttarn ca paficaite stambhanam sandhayah smrtah II

Assembly of Pillars: It is said that there are five types of assemblies suitable for pillars; these are Mesayuddha, Trikhandam, Saubhadra, Ardhanani and Mahavrtta.

Svavyasakarnamadyardhadvigunam va tadayatam I

Tryarnsaikam madhyarnasikham mesayuddharn prakIrtitam II

When there is a central tenon\* (with a width) a third (that of the pillar) and a length twice or two and half time its width, this is Mesayuddha (mortise\* and tenon) assembly.

\*Tenon - The projection at the end of a piece of wood etc.

\*Mortise - A hole to receive a tenon.

Svastyakarnam trikhandam syat satriciili trikhandakarn I

Parsve catuhsikhopetam saubhadramiti sarnjfiitam II

Translated as – In the Trikhandam assembly, there are three mortises and three tenons arranged as a Swastika, The assembly called Saubhadra comprises four peripheral tenons. Ardham chitva tu mule Sgre canyonyabhinivesanat I Ardhanaritari prokto grhitaghanamanatah

Translated as – An assembly is called Ardhanani (scarf joint) when half the lower and half the upper pieces are cut to size according to the thickness chosen (for the pillar).

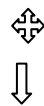
Ardhavrttasikharn madhye tanmahavrttarnucyate

Vrttakrtisu padesu prayunjita vicaksanah II

Translated as – When there is a semicircular section tenon at the centre, the assembly is called Mahavrtta, the well advised man employs this for circular section pillars.[9]

In Modern civil engineering there is a step for construction:-

1. Survey
  2. Design
  3. Estimate
  4. Construction
  5. Structure
  6. Super structure
- ↓
- Vastu
- ↓
- 4 House Home



Someone has greatly said “मेरा एक काम कर दे मेरे मकान को घर कर दे”

### वास्तु (Vastu)

From the early decades in our hindu religious texts by considering the laws of magnetic flow, direction, air effect, gravitation, the vastu shastra formed. And was acknowledged that by following these vastu shastra human

life can become more peaceful and meaningful. The science of Vastu aims at controlling the flow of these energies in a building by selecting proper Directions, Alignments and Orientations

Indian tradition and culture if has any significant contribution in architecture that is Vastu. which is linked to knowledge vastu is a vedic science and is derived from the word vasati which means gruha or a palace of dwelling it is essentially a science of structure of and applicable to houses, industries, hospital, etc. vastu science dates back to the ancient vedic times. Vastu basically consider the five elements, viz fire, water, air, earth and sky. As per vastu shastra the eight directions of the universe are presided over by eight deities. This deities have their own influence on the prospects of inmates. these are shown in figure (A).[10]

According to a survey 65% of buildings are rearrange with the principles of vastu after construction.

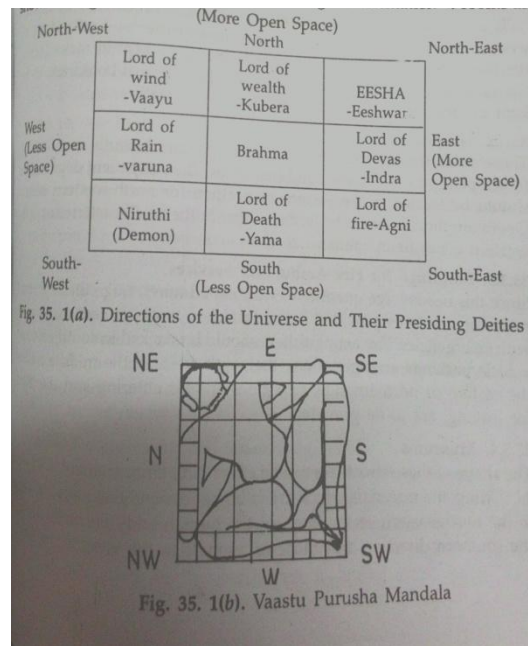


Fig. 35. 1(b). Vastu Purusha Mandala

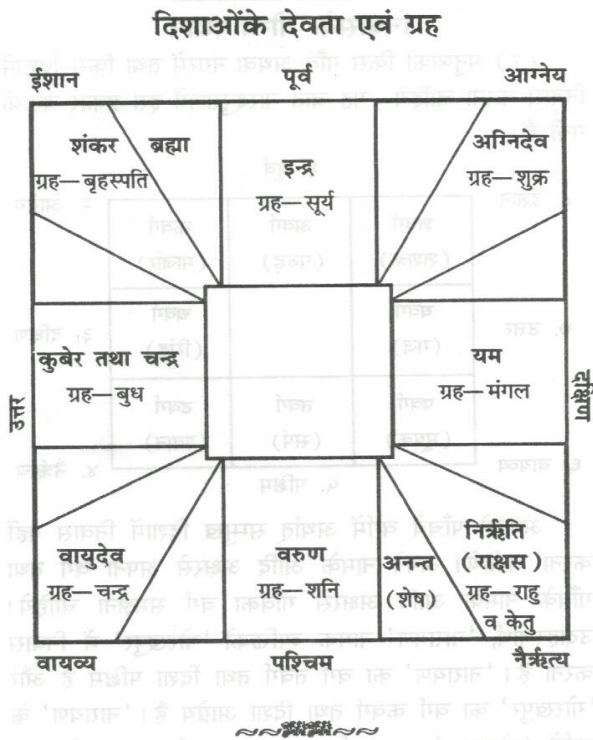
Figure A: S. Seetharaman “construction Planning”

### 3. Vastu Facts:

- Older buildings in India had their kitchens in the East or North Easterly direction as well as a kitchen window opening out in the East direction. This arrangement is practiced even today in modern construction.
- The reasoning behind this is as follows. As with most kitchens cooking produces a lot of smoke that needs to be let out from the home and a window is the simplest form of doing so. The blowing wind takes out the acrid smoke through the window leaving the home fresh and healthy.
- Furthermore, the kitchen is the key room of the house that starts buzzing with activity at the break of dawn. As the day’s food gets preparation gets underway, the sun also rises in tandem in the East. Opening the windows lets the sun’s early morning rays grace the food being made and enriches it with nutrients and vitamins.
- Vastu recommends that a house’s bedroom be placed in the South East side. The deeper explanation is that since the bedroom is a place where we spent a lot of time in our house, it needs to be fresh and ensured plenty of air

circulation and the South East winds make sure there is plenty of freshly circulated air if the bedroom is placed in this direction. A room with good circulation improves intimacy and resolves any marital problems that couples have.

- The reason for temple or pooja ghar is in north-east direction is for easy access of vitamin-D by sunrays and good effect of magnetic energy.
- The earth is rotating and rolling towards the North-East direction, hence keeping heavy weight at that direction would strain its moment. **So North, North East Corner, East and the center** are the places in the Forward direction of the Movement (like the handle bar of a motorbike). Keeping any heavy weight in these places will obstruct the movement and create discomforts. **Avoiding** heavy weight in these areas make the life peaceful and prosperous[11]



**Figure:** B Rajendra Kumar Dhawan “Bhavan Bhaskar”  
Geeta- press, Gorakhpur

Orientation is important for building construction .the orientation of the house should be such that the effects of sun rays in midhours should be minimum. Because at that time the radioactivity of sun rays are at higher levels which is not good for health.

## 4. Result and Discussion

In 4<sup>th</sup> semester when I made my first drawing and shown to my father .then he made me to understand vastu .now a days we are making drawing with our own desire means there is no difference between an educated engineer and an 20 years old labour. We have to bring the difference we have to become an engineer who create or construct a home not just a house with a roof and walls. The culture and tradition made by our ancestors that science which is seen by

us today in different way, if we understood our known knowledge and tradition then we will remain disciplined and the science which we are trying to understand will come into our behavior with ease if we understand the fact and secrets then the modern civil will be more brightened which will more better and pleasant.

## 5. Conclusion

The study of ancient civil, architecture, structure and culture and its combination with modern civil will lead to sparkle the modernity. Today we need to make a home not just a house. We have to accept the fact that our elders identified our DNA and present a frame work in which we can mold easily. if we want to understand science then we need to understand Indian tradition because our tradition our customs and practice is our science.

By understanding Ancient and old techniques vastu etc. we can easily understand the facts of science. Otherwise the distance measured by our ancestors and nasa’s Distance won’t be almost equal. *“Many of the advances in the sciences that we consider today to have been made in Europe were in fact made in India centuries ago.”*

- Grant Duffs (British Historian)

“Whatever sphere of human mind you may select for your special study, whether it be language, or religion, or mythology or philosophy, whether it be laws or customs, primitive art or primitive science, every where you have to go to India. Whether you like it or not because some of the most valuable and most instructive materials in the history of man are treasured up in India and in India only”

- Max Muller [12]

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