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REVIEW ARTICLE

PILLARS [STAMBHA]– THE SUPPORTIVE ELEMENTS OF HINDU TEMPLES

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ABSTRACT

Aeon the experience of Indian *Shilpis* in making of pillars has been profound be it stone, timber or brick. *Pillars (Stambha)* forms an innate part of the Hindu Temple Architecture, thousand years back when these temples were built there were established design principals, testing methods, though no software, calculators and spreadsheets etc were available, still the end results exhibited by these temples are fabulous and are '*Structural Engineering Marvels'.* These pillars played a very prominent and pleasing part in the temple architecture of the time. Tall, slender, free-standing, beam supporting pillars, and pilasters, but these elements are not well defined as in the western classic architecture, and hence it becomes difficult to classify them as they have multifold relations which they have carried from one period to another transforming into new types with minute changes, this can be seen as a result of craftsmanship prevailing at the time at a particular place also the social needs and ruling power were the factors in evolution of the pillars. They were expressions of strength, support, celestial connection and manifestation of arts prevailing at that era. Although they evolved from *Sastraic Mathematical* proportions, they displayed greater freedom of design which the Indian wrought in his own imaginative way, these pillars still stand today as a source of inspiration, promoting diverse studies for designing of pillar in contemporary temples. This paper analyses the *Pillars (Stambha)* as vital element of the Hindu temple and provides more explanation of ancient literature study on pillars, also the rules and regulations which govern the construction of these marvelous element of temple architecture. Further the paper discusses the *Yali [Vyala] Pillars* with respect to elements of space making in temples of *Vijaynagar* era, and how these *Yali Pillars* when treated with extraordinary ornamentations enhanced, beautified and lender unique character to the structure and identified the temples given impression of strength, stability and reliability. The volume of distinct spaces, movements and visual impact created by these pillars in temples gives an idea of the distinct identity of architecture to create a sense of group identities between those who built and those who inhabited or used these structures, such elements embody not just the earth or stone from which they were built, but the people and experiences involved in their construction, holding special place in human memory giving distinct identity to structures of architecture.

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INTRODUCTION

A Stambha or Pillar in architecture and structural engineering is a structural element that transmits through compression, the weight of the structure above to other structural elements below. In other words, a pillar is a compression member. The term pillars applies especially to a large round support (the *shaft* of the pillar) with a capital and a *base* or pedestal and made of stone or appearing to be so. A small wooden or metal support is typically called a post, and supports with a rectangular or other non-round section are usually called piers. "Pillars" refers to such a structural element that also has certain proportional and decorative features. A pillars might also be a decorative element not needed for structural purposes; many pillar are "engaged", that is to say form part of a wall known as pilasters. The Indian temple architecture has tall, slender, free-standing, beam supporting pillars and pilasters, these are not well defined as in the western classic architecture, European architects and visitors accustomed to the *Greek* and *Roman* types of pillars generally condemn the Indian pillar as being overloaded with ornament. But fail to see that in Indian Temple there is nothing more attractive or more important than the Stambha or pillars, which by their position and sculpture produce the most marvelous features and hence it becomes difficult to classify them as they have multifold relations which they have carried from one period to another transforming into new types with minute changes, this can be seen as a result of craftsmanship prevailing at the time at a particular place also the social needs and ruling power were the procurator in evolution of the pillars.

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Indian literature on pillars [STAMBHA]

Pillars are used at various kinds of buildings, like places, pavilions, auxiliary temples, gates, houses and dwelling of lower cast. Indian architecture is attributed to a mythological person *Vishwakarma.* The *Sutras, Puranas, Agamas* contain references to temple architecture and sculpture. The *Agamas* and *Silpa Shastras* have laid down elaborate rules as to the place where temples are to be built, its layout, the kinds of images to be installed, the material with which such images are to be carved, the dimensions and proportions of various kinds of images and the various rituals to be carried daily after the consecration of the image in the temple. There are several books written exclusively on architecture of which *Manasara, Mayamata, Kashyapa Shilpa* and *Agastya Sakaladhikara* are works dedicated to *Dravida Style* of temple architecture*, Rupa Mandana, Prasada Mandana Vastu Shastra, Aparajita Prichchha* and *Samarangan Sutradhara* are works dedicated to *Nagara Style* of temple architecture .

Of these the following chapters are dedicated to construction of pillars:

- *The Manasara* – Chapter XV Pillars (*Stambha Lakshana Vidhana*)
- *The Mayamata* – Chapter M,XV (*Pada Pramana Dravya Samgraha)*
- *Kashyapa Shilpa* – Chapeter M,XV (*Stambha Lakshana*)
- *The Shilpa Shastra Of Madana* – Chapter 15,16,17

The experience of Indian *Shilpis* has been great and intense in respect of making of pillars be it of stone, brick or wood, These pillars form an innate part of the Hindu temple architecture these can be seen mainly in the *Pavilions (Mandapas), Corridors* around temples*, Convinent Colonnades* around the *Temple Tank.* We all get astound only by the name of temples which consist 1000 pillars (Minakshi Aman Temple) or the temple of musical pillars (Vithal Temple Hampi), the hanging pillars (Lepakshi Temple) not only this but the ancient temples in India are one of the marvels of the temple architecture were these pillars are seen not only as supportive elements but also for decorative purpose.

Pillars (stambha)

The opening line itself divides the subject of pillars into different heads namely

- Basic Parts of Pillars
- The Measurements (Proportions) Of Pillars
- Classifications (Shapes and Ornamentations)
- Materials And Construction
- Placement (Intercolumniation)
- Rules And Regulations For Pillars

Basic parts of pillar

[1]The basic parts of pillars are:-

•The Beam (Uttara)

The topmost section of the pillars is the beam and these are the structural beams of temple.

•The Bracket (Potikas)

These are the brackets supporting the beams; they provide bearing for the beam and shorten the span between pillars.

•Flat Plate (Phalaka)

It's a flat plate between mandi and the bracket.

•Mandi

It is something like a dish, fluted or petal, these bear brackets than the beam directly and act as a cushion cover to receive imposed loads.

•Head (Ghata)

The capital or head is called as ghata, it is round swollen or ornamented type.

•Neck (Tali)

It is a narrow moulding or series of sub mouldings, is like a collar around neck which supports the capital, its splayed from can make it small version of phalka or mandi.

•Shoulder (Lasuna)

The tali sits on the lasuna,it may be springy shape of an inverted bell, rounded shoulder and a chest type, earlier types lasuna seems like two sections of single element, but later the tatli becomes attach to ghata and lasuna evolves around collar.

•Horizontal Band (Malasthana)/(Mala)

These parts are inseparable, the malasthana is a horizontal band a girdle, the mala another band decorated with swags of pearls, of some other kind of festoon, as if dangling from the firm belt of malasthana, these two elements are carver from single projection block, usually cuboids ,but potentially with any usual shape of cross-section, these can also be seen in form of bells.

•Shaft (Stambha)

Below mala comes the shaft which may stand on a base block most often cuboids, where base block is used the shaft usually is short; it may stand on a moulded base, also used in miniature at the foot of some pilasters.

The measurements (proportions) of pillars

[2]The height of pillars can be measure in two ways:-

- Base As Reference Point
  - When the base is taken as a reference point for the length of pillar, than it may be $1^{1/4}$, $1^{1/2}$,$1^{3/4}$ or 2 times the height of the base, in total there are 12 varieties of heights of pillars, for pilasters (wall pillars) it is either 3,4,5,6 angulas. The diameter of pillar is 2,3,4 times the width of the pilasters.
  - The height of pillars according to kasyapa may be 3 times of base and 6-8 times that of pedestal.
  - The diameter of a pillar may be 1/6,1/7,1/8,1/9,1/10 of its height or 1/2,1/4,1/6 of height of the pilaster.

[1] Hardy, Adam. 2007. The Temple Architecture of India. Great Britain: Wiley. Shweta Vardia 2007-2008 .Master Thesis Building Science of Indian Temple Architecture

[2] K. J. Oijevaar September 2007 Delft University of Technology, The Netherland , The South Indian Hindu Temple Building Design System On The Architecture Of The Silpa Sastra And The Dravida Style

- Floors In Buildings As Reference Points
  - When amount of floor in a building is taken as a reference points for determining the height of the pillar, then the ground floor pillars of twelve storey building are $8^{1/2}$ cubits in height, by subtracting one span for each storey a height of 3 cubits is obtained for the pillars of top storey.
  - The diameter of the ground floor pillar of twelve storey building is 28 digits, by subtracting two digits for each storey 6 digits are obtained for the diameter of the pillars of the top storey.

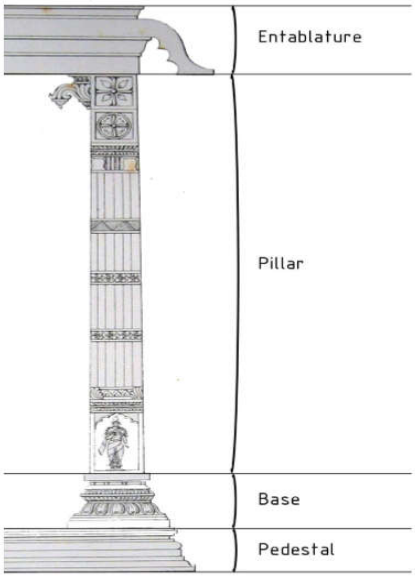

Fig.1. Basic parts of the pillar

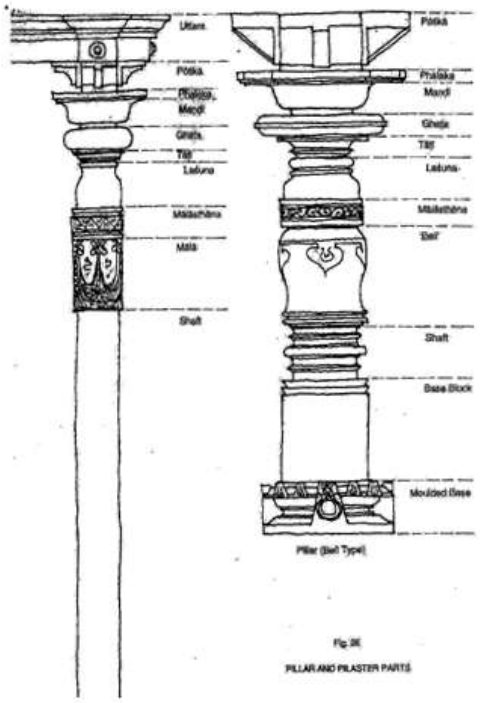

Fig.2. Parts of the pillarl and pilaster

The minor pillars should be proportionate to the main pillars. A main pillar with one minor pillar (upapada) is called Eka-Kanta, with two minor pillars Dvikanta and with three minor pillars Tri-Kanta, with four Bramha-Kanta, with five Siva-Kanta, with six Skanda-Kanta and with eight Vishnu-kanta.

Classification of pillars (shape and ornamentation)

[3]The pillars are classified according to SHAPE under following heads:-

1. *Chaturasa Stambha* or square pillar called as *Brahma-Kanta*, its is noticeable in *Abhisheka Mantapas* and in those facing the sanctums in temples.
2. *Dirgha Stambha* or rectangular pillar called *Vishnu Kanta,* this is usually installed in hundred or thousand-pillared mantapas in temples.
3. *Vartula stambha* or circular pillar called *Rudra-Kanta*; this kind may be put up in temples as well as in houses and other buildings.
4. *Panchakona Stambha* or the pentagon-shape pillar called *Siva –Kanta.* These pillars are generally seen in *Siva* temples.
5. *Shatkona Stambha* or hexagon-faced pillar called as *Skandha-Ratna.*
6. *Ashtakona Stambha* or the octagon-faced pillars called *Vasukona Stambha.*
7. *Dwadasakakona Stambha* or the twelve faced pillar called *Vasukona Stambha.*
8. *Shodasakona Stambha* or the sixteen faced pillars called *Padma Kanta Or Purnachandra-Kanta.*
9. *Chitra Stambha* or fully ornamented pillars.

Fig.3. Pillars with different shape at the base

The classification of pillars according to Ornamentation

[4]A pillar has been classified as ordinary and ornamental, it had carved representation of leaves, lotus flowers, pigeons, parrots etc.

1. *Kumbha Stambha* - where pot shaped projection could be seen at some portion of pillar whether base, middle or at the top.
2. Second variety there are two pillars joined together one

[3] M.A Anthalwar And Alexander Rea. Indian Architecture (Volume I Architectonics). Indian Book Gallery.

[4] Prasanna Kumar Acharya Indian Architecture according to Mansara-Silpasastra . Oriental Books Reprint Corporation.

square shape and other circular standing together closely uniting at towards top.

3. *Valaya stambha* - in this surface carved out into rows of chains measuring the whole length of the pillar.
4. *Bahu Patta Stambha* – the pillar has plans ranging from 6-16 in accordance to magnitude and style.
5. *Gopura Stambha* – miniature small *gopuras* carved on the surface of the pillar.
6. *Vaji Stambha* – it is a long pillar attach to stone images of horse or elephant supporting entablatures at the top.
7. *Yali Stambha* – carvings of *Yali* can be seen on these pillars.
8. *Ekamukha Stambha* – the *bodhika* at top has only one face at top.
9. *Dwinukha Stambha* –here *bodhika* has two faces on top
10. *Trimukha Stambha* – has three faces and erected at the centre of big Mandapas where the *ustava* deity is placed.
11. *Chaturmukha Stambha* –it has four faces.
12. *Padma Stambha* – *padma* or *lotus* can be seen in carvings at the top.

fig 4, First three pillars of Hindu orders

fig 5 , Pillar 4-6 of Hindu order

fig 6, Pillar 7,of Hindu order

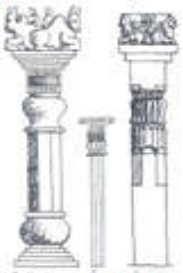

fig 7, a,b,c Bell Type Pillars

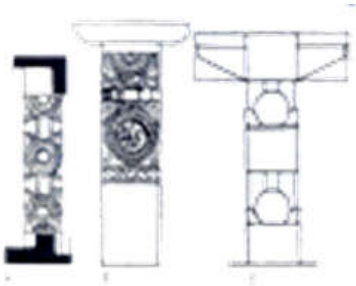

fig 8 ,a,b,c Roundels Type Pillars

fig 9, a,b,c,d Cushion Pillars

fig 10,Ghata –Pallava Pillars

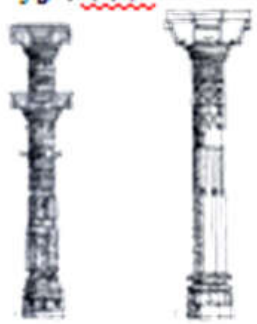

fig 11, a,b Bharana Pillars

All above pillars are seen in temples very few of them such as *Valaya Stambha, Bahu Patta Stambha* and *Padma Stambha* are put in places like theaters, courts, mutts, and chattrams, no stone pillars to be used in dwelling homes. The *Kasyapa Shilpa* states that ornamented pillars can only be placed in temples of *Vishnu, Siva, Subramanya, Lakshmi, Saraswati*, and *Parvati.*they should not be erected in small temples or shrins of *Ganapati, Garuda, Hanuman, Kali, Iyanar* and other minor deties, here ordinary pillars should be build, the othe suitable places are *Brahmoutsava, Vasantotsava, Abhisheka, Kalyana* and *Vahanamantapas.*

Classification according to MOULDINGS

The Indian text classifies pillars largely on basis of their cross sections; this is theoretically reminiscent but architecturally unhelpful, these are constantly evolving and endlessly subjected to variations, permutations and cross-fertilization, with boundaries as fluid as those of kingdoms. These pillars are composed of indenting parts arranged in vertical sequence with other elements of temple and are always in dialogue with it, these in respect with evolution of moulds can be classified as below.

1. *Bell Type Pillar* – it is identified by its bell or tassel like capital, ornamented with petal like grooves or leaves, they can be seen supporting heraldic animals, single or multiple. Above the bell capital is form of bearing block or abacus, sometimes inverted, stepped piled resembling platform with ribbed cushion encased in box like base, with these pillar types the pots at base first appeared similar in profile to bell capital but inverted.
2. *Block And Roundels* - in these pillars roundels are carved on the faces of square block, the surface on either side is treated as leafy ears or tongues, hanging down or growing up, roundels also metamorphose into *gavakshas* and *ogival* i.e moonstone or pepal leaf like motifs.
3. *Cushion Pillars* – this pillars constant feature is the cushion capital*(ghata,'pot'),*assimilated to the *amlakha,* the ribbed crowning member, where it is grooved or combined with *kumudas* shape, here the *ghata* is surmounted by a bearing plate *(phalka)* over a dish or lotus molding *(pali or padma)* normally carrying bracket *(potika),*in this type, the *ghata* sits over member termed lasuna, acting as a neck and shoulder, which in turn sits over a chest block, typically a belt *(the malasthana)* with dangling pearl swags *(mala).*
4. *Ghata-Pallava Pillar* – these pillars are define by their brimming vase capital, the purna-ghata (brimming vase) or ghata-pallava (sprouting vase),these appears at the foot and head of these pillars, it can be one two or three capitals- since pillars can have several heads, or it can be at the chest. This kind of pillar represents a different type from cushion category, as the sequence part is more fluid and extendable, in this the waists and necking may be polygonal but does not varies in cross section as the cushion pillars.
5. *Bharana pillars* – this pillar has a cushion *ghata* with *phalaka* over it with its usual dish, the cushion and dish are generally ribbed and the capital-abacus assemblage termed *barana* or *bharani* when ribs are tighter, the cushion tends to atrophy and sometime only the abacus and dish remains., here the cross sections can be easily varied between pillars or within single one.

Also pillars were built for FUNCTIONAL purpose that include the below ones

Dhvaja-Stambha (Flag-Staff)- In ancient literature it is said that a building (prasada) without a flag would be in vain. The purpose of the flag is to indicate the insignia of the deity or of the characteristic vehicle of the icon that is within the sanctum. Ancient texts mentioned that when the flag was hoisted in front of the temple; Gods as well as manes used to be delighted. The text also assigns Vishnu (protector) to the top, Brahma (creator) to the middle and Shiva (destroyer) to the bottom of the Flag-staff. Hosting the flag suggests setting out to conquer. The devotee coming into the temple would have firm resolve to conquer his own baser nature. To look at the flag would be a reminder for him in this regard. The Sanskrit word for the flag or banner dhvaja strictly means whatever that is raised above. Whatever raises man to a higher level of understanding and activities is a dhvaja. It is a call that God is high and above. The characteristic animal and the insignia of the icon on the banner give a direction to the devotee's desire and will. When the devotee sees the banner and bows before it, he resolves to rise higher. The benefit of the flag-mast is here said to be "obtainment of all hat is desired". The canonical texts favor wooden or bamboo poles. In course of time, the wooden pole was covered with copper, brass or even with silver.

Dipa-Stambha (Light Staff)- It is a multi layered lamp made of stone or metal, placed axially next to Dhvajastambha

Canton Pillars - Pillars supporting the corners of *garbhagriha* and *antarala* are known as canton pillars. The canton pillars are prominently seen in the rock-cut cave architecture.

Materials and construction

The materials used for the construction of the pillars may either be stone, wood or brick; but it is stated that they should never be made of metal, copper or bronze though however metallic plates may be used at some intervals of length for ornamentation and for carving of images of deities and other figures. The long description of the collection of wood is given in *mansara* which seems to indicate the frequent use of wood in that time to build pillars, stone pillars are also mentioned but pillars made of bricks are not seen to be dealt. Stone, brick and wood were used for making different parts of pillars. the square base of stone pillar to be made by stone and wooden by wood, but when the pillar is made of single material it is called as suddha (pure) when made of two materials *misra* (mixed) and all three then called as samkirna (amalgamated). The kinds of wood that can be utilized for construction of pillars are *Teak-Wood, Sandal-Wood, Nut-Wood, Chembuli Wild Tura, Black Margossa* etc.the stone used should be of a blackish white color and must be strong and should produce a metallic sound when struck, strong stone via, sandstone, basalt, marble was given first choice. The local availability of stone around site often decided the selection of material for construction work; the carvings were done on hard stone with fine grain size marble. These pillars were placed on massive foundation plinth block *Adhisthana* to withstand the entire load of the roof except the central dome; the pillars were made of single piece of stone away from the site and then transported and placed at the desired destination. In very few cases it can be seen that pillar are made of two or more pieces and glued together using organic resins, molten lead or metal bands in between. pillars verticality was a critical issue, as in olden days there were no

means to lift heavy loads, this job was done by tem of skilled and expert men with help of simple plumb bob suspended on all four sides from top of pillar capital and in few weeks time. On sloping sites the skilled men used circular/ rounded pebbles (looking like potatoes) from the river bed to transport the heavy object on the slopes, the pebbles serve as a ball bearing to roll the objects, in some cases circular wooden logs were too used. also animal such as elephants, bulls were used to pull materials to distance places. This era was unaware of concept of rigid beam-pillars joints, push over analysis, plastic analysis etc, to sustain large loads the artist had to adopt to large number of pillar which lead to pillarsar spaces with restricted sight. The pillars had brackets or corbels to place the beams on them, these [5]corbels were sized such that bearing stresses were never a problem.

Placement of pillar in temples

Pillar when in row must be in straight line, for these two different approaches are used they are as follows:-

A.Intercolumniation may be 2, 3, 4 or 5 of the diameter; it is measured in three ways

1. From the inner extremity of the base of the pillar to that of another.
2. From the centre of the two pillars.
3. From the outer extremities of the pillars including two bases.

B.The second approach to intercolumniation is not relative to the building. In this approach the intercolumniation consists of 9 different possibilities. These are defined by 2 or 4 cubits, where each time 6 digits can be added. The architect can chose all of the 9 possibilities. There seems to be no fixed intercolumniation it has been left to the architect who are required to be particularly careful with regard to beauty and utility, also the disposition of the pillars has to be regular, because otherwise it is believed to bring destruction upon the building and upon its site

Rules and regulations for pillars

The literature gives certain rules and regulating the number of pillars in several structures they are as follows:-

- The shape of pillars need not necessarily be same as that of the pedestal; the latter may be square shape while the pillar shaft may be circular. Nor necessary to be uniform in height.
- The second floor may have the same number of pillars as first floor, but be more.
- While the pillar is been sculptured children's, maidens, old jealous person, sick or otherwise decrepit men should not approach the spot.[6]
- The sculpture works may be executed either laying the pillar flat on ground or keeping it over a height and they should be preceded with *pradakshina* or clockwise directions.
- After completion of pillars, they are anointed with sandal, flowers and other auspicious tokens and the deities are evoked and elaborated ceremonials are performed to them, so as to seek blessings of god and consequence endure for long time of pillar.
- Height of structure should be proportionate to the interspaces given between the pillars.

Table no 1.

Number of Pillar	Placed
4,8,12	*Mantapas* built in front of sanctums of *Parivara Devatas* and *Prakaras* of temples.
28	*Mantapas* for birthday celebration of gods and deities.
64 – 96	*Yatrika mantapas* or halls constructed for accommodation of pilgrims and guests in temple.
24	*Armory Hall, Kalyana Mahal*
16,24,32,48 or 64	*Raja Sabha Mantapa* or *Darbar Hall*
16-48	*Council Chamber*
4,8,16,or 32	*Jalamadhya Mantapa*
108 – 1008	*Divya Mantapa* for *Bramhotsava* for *Vishnu* in any of his ten avtaras for *Achyuta ,Lakshmi, Narayana, Siva* or *Subramanya.*
28 – 100	*Sadharan Mantapa* used for festivals of deities.
4- 28	*Kshudra Mantapa*

DISCUSSION

In Indian temple architecture pillars are constantly evolving and endlessly subjected to variations, permutation and cross-fertilization, with evolution of different kingdoms, the ancient text provides us with the knowledge of construction of these pillars, but still many construction details and joinery seems to be not dealt in these texts regarding stone structure. Also placement of pillars in the temples are not well defined, halls and pavilions of as many as 1008 numbers of pillar have been constructed in ancient temple architecture without give perfect details of its intercolumner spacing and grid to be followed. Hence study of other relevant sources is the need for this subject, thousand years back, when these temples were built, with the established Design principles, testing methods, though no software, calculators, and spreadsheets etc. were available. Still the end results exhibited by these temples are fabulous these pillars are really 'Structural Engineering Marvels' These features of the pillars still stand today as examples for promoting diverse studies and source of inspiration for designing of pillars of contemporary temples.

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[5] In description of the intercolumniation the Mansara and the Mayamatam differs. The Mansara explains it as something relative to the rest of the building while Mayamatam uses non relative approach. Which of the two has been used more ,or which architect should chose ,is not known.

[6] The rules and regulations to be followed can be seen in text of Mansara in respected chapters related to pillars construction.

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