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MANUSYALAYACANDRIKABHASYAM

AN ENGINEERING COMMENTARY ON

MANUṢYĀLAYACANDRIKA

A. ACHYUTHAN

BALAGOPAL T.S. PRABHU

VĀSTUVIDYĀPRATIṢṬHĀNAM
CALICUT

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जगत्सर्वं शिल्पमेव

1998

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MANUṢYĀLAYACANDRIKĀBHĀṢYAM

AN ENGINEERING COMMENTARY ON *MANUṢYĀLAYACANDRIKA*

OF *TIRUMANGALAT NILAKANṬHAN MUSAT*

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PREFACE

Classical literature available on *Vāstuvidya* deals mainly with temples and other symbolic buildings. But, by far the most numerous constructions made by the *silpins* are residences. The art of designing and building of residences remained a hereditary craft, though the related theories did form part of the classic text. The separation of the craft from the theory relegated house-building as a code of practice to be blindly followed by the artisans. *Manuṣyālayacandrika* was probably the first attempt to elevate the house-building from the level of a craft to that of a science, synthesising the science contained in classical texts with the skills of the *śilpins*.

Manuṣyālayacandrika is written as a thesis on residential architecture in technical *Samskṛt* after referring all the available classic texts. Several translations in Malayalam helped the craftsmen to understand the theory and make ready-reckoner tables for use in the field. No wonder, the text became popular among the *acaryas* as well as artisans for the last 4 centuries. Keen interest on this text has been evinced by many professionals recently.

The uniqueness of *Manuṣyālayacandrika* is that it gives a systematic procedure for planning, designing and constructing houses together with ancillary structures. It was felt that an English version with critical comparisons and commentaries would be of great use to practitioners of the profession all over India.

For this commentary, the original text compiled from palm leaf manuscripts in 1917 by Shri. T. Ganapati Sastri for the Trivandrum Sanskrit Series has been adopted.

Bṛhatsamhita, *Mànasàra* and *Mayamata* have been mainly used for comparison in this critical study. Attempt has been made to relate the content of the text with modern engineering theories and practices so that this book can serve as a text book on the subject in the curriculum of modern architectural and engineering courses.

The guidance given by Shri. Kanippayyur Krishnan Namboodiripad in the preparation of this work is gratefully acknowledged. The discussion with Shri. K.P. Kayalad of Meppayur and Shri. V. Raman Achary of Elamkulam on the construction details have been very helpful in elucidating the contents of the relevant sections. Thanks are due to Ms.M.Sreeja and Ms.Limcy John for the secretarial assistance.

Calicut
13-11-1998

A. Achyuthan,
Balagopal T.S. Prabhu.

INTRODUCTION

Sanskrit studies are generally confined to *Vedas, Itihāsas, Purāṇas, Kāvyas, Nātakas, Alankaraśàstra, Vyakarana, Darśanas* and the like only. It is not well known that Sanskrit has also a vast literature on scientific and technological subjects like astronomy and mathematics, architecture and engineering, medicine, chemistry and botany, music and dance, law and politics etc. Of course, studies of medicine (*Āyurveda*) and astronomy and mathematics (*Jyotiṣa* and *Gaṇita*) were there in the syllabii in ancient and medieval India. And now also they are going on. But they have not been in the main-stream. The result is: Scientists are not aware of the presence of this abundant literature in Sanskrit, and the Sanskritists are not competent to study these and thereby to impart it to the world of scientists. So there should be a conscious effort on the part of both the Scientists and Sanskritists to sit together and explore all the possibilities that this bulk of literature contains.

Now, not many studies on this literature have come out, The History of Hindu Chemistry by P.C. Ray, The History of Hindu Mathematics by Datta and Sing, The Positive Science of Ancient Hindus by B.N. Seal, A Concise History of Science in India edited by D.N. Bose, S.N. Sen and B.V. Subarayappa, A History of the Kerala School of Hindu Astronomy by K.V. Sarma, Founders of Science in Ancient India by Satya Prakas, Science and Society in Ancient India by Debi Prasad Cattopadyaya, Technical Literature in Sanskrit edited by

S. Venkitasubramonia Iyer, Scientific Heritage of India in two volumes (Mathematics and Ayurveda) edited by K.G. Paulose, Observational Astronomy in Ancient India by K.V. Sarma are a few among them. But, a comprehensive and elaborate work like Science and Civilisation in China by Joseph Needham is yet to be produced.

The late Debi Prasad Chattopadhyaya had undertaken such a project. The first two volume of his work, History of Science and Technology in Ancient India have already been published.

As far as architecture is concerned, An Encyclopedia of Hindu Architecture by P.K. Acharya, Indian Architecture (3 volumes) by M.A. Ananthalwar and A. Rea, Elements of Hindu Iconography (2 volumes) by T.A. Gopinatha Rao, Indian Architecture(2 volumes) by Percy B rown, An Architectural Survey of Temples of Kerala by H. Sarkar and Temple Architecture of Kerala by K.V. Soundararajan are among the prominent studies. Famous original works in Sanskrit on architecture and engineering are *Mayamata* by Mayamuni, *Samarāṅgaṇasūtradhāra* and *Yuktikalpataru* both by Bhoja, *Kṛtyākalpataru* by *Lakṣmidhara* and *Mānasāra* by Manasaramuni. Kerala contributed substantially to this branch of knowledge. Sanskrit works like Srikumara's *Śilparatna, Īśānaśivagurudeva's Paddhati., Cennās Nārāyaṇan Nambūdiripād's Tantrasamuccaya*, Sankara's *Sesasamuccaya* and *Tirumangalam Nīlakaṇṭha's Manuṣyālayacandrika,* and works like *Vāstulakṣaṇam Śilpaviṣayam* edited by Ramakrishna Sastri, *Gṛhanirmāṇapaddhati* by Parakkal Krishna Warrier, *Śilpakaumudi* by N.G. Karta, *Viśvakarmīya* edited by V. Chandrasekhara Batta and Balakrishnanachari and *Taccuśāstram Bhāṣa* by S. Balakrishnanasari are some of the contributions of Kerala to architecture and engineering.

Among these, *Tantrasamuccaya* in seven chapters having

243 stanzas is generally considered the most popular treatise of Kerala on building construction. This work has many commentaries in Malayalam and Sanskrit. The authors of all these commentaries are Sanskrit scholars, a good number of them seems to be well-versed in traditional architecture of *Vāstuvidya*. Those who are trained in modern engineering do not appear to study the work with or without the help of these commentaries, presumably because of the stereotyped traditional style of them. In this circumstance, the present Engineering Commentary on *Manuṣyālayacandrika* becomes highly significant. The authors of this valuable commentary, Dr. A. Achyuthan and Dr. Balagopal T.S. Prabhu, teachers of engineering by profession, and founders of *Vāstuvidyā-pratiṣṭhānam,* Calicut have already published A Text Book of *Vāstuvidya* and Design in *Vāstuvidya.* They are competent to write a work of this kind which will, I am sure, spread the message of ancient Indian technology of house construction stored in this well-known Sanskrit treatise among all those who are interested in this discipline irrespective of their belonging to traditional or modern school.

One who goes through this Engineering Commentary on *Manuṣyālayacandrika* can see that the authors have adopted purely technological treatment throughout and not mystic treatment which is commonly seen in traditional works of this kin d. The authors have given stress to the technological aspects because building is primarily a technological process.

Another special feature of this work is a large number of illustrations (more than 100). This undoubtedly enhances the value of this commentary.

The third fact to be noted is that during the commentary the authors have studied many points in the text in comparison

with similar contexts in other treatises on *Vāstuvidya* like *Mayamata* and *Mānasāra*.

The detailed glossary of Sanskrit terms used in the work is given at the end is very much useful especially for those who are only familiar with modern books of architecture and engineering as well as for laymen.

I congratulate the distinguished authors for undertaking this happy but strenuous venture and wish that this Engineering commentary on *Manuṣyālayacandrika* will reach all the deserving hands.

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KALADY,
15-04-98

ABOUT THE TEXT AND ITS AUTHOR

INTRODUCTION

The fountain head of *Vāstuśastra* is the *Sthapatyaveda*, the annexure of *Atharvaveda*. This compilation contained treatments on mathematics, computations, geometry, graphic arts, structural engineering, astronomy, sculptural arts, etc. *Vāstuvidya* is also found described in *purāṇas, śāstras* and *samhitas* of later periods. *Matsyapurāṇa*, for example, contains extensive treatment on architecture and sculpture. *Nātyaśastra* of *Bharata* includes a chapter on the design and construction of theatres. *Padmasamhita* contains elaborate treatment on planning and construction of temples.

A concise but highly authoritative treatment of *Vāstuvidya* is included as part of *Varāhamihira's Bṛhatsamhita* of about 6th century A.D. *Matsyapuraṇa* refers to 18 *Ācāryas* (Master teachers) possibly representing different schools of architecture. However the treatment in *Bṛhatsamhita* is essentially based on the authorities of only three of them viz. *Maya, Viśwakarma*, and *Garga*.

Some of the later compilations on *Vāstuvidya* are (i) *Īśāna-śivagurudevapaddhati*, (ii) *Kāmikāgama* (iii) *Samarāṅkaṇa-sūtradhāra*, (iv) *Mayamata* and (v) *Mānasāra*. The first two are the agamic texts which also deal with architectural aspects. *Samarāṅkaṇasūtradhara*, attributed to *Bhoja*, stands out as a unique compilation dealing exhaustively on town planning, construction of forts, palaces and many mechanical crafts. *Mayamata* and *Mānasāra* are held as standard reference works on *Vāstuvidya* all over India. All these works are comprehensive and masterly compilations in highly technical *Samskṛt*.

The architectural development of India from the classical

period are based on the treatises of *Mayamata* and *Mānasāra*. However, geographical and climatic features of the different regions of the land have necessitated certain amount of variations in details. Such variations are accommodated in regional texts. In Kerala, four such books are accepted as reference works. *Tantrasamuccaya* (*Cennās Nārāyaṇan Nampūdiripād*) and *Śilparatna* (*Śrikumara*) cover the temple architecture and *Vāstuvidya* (*Anon*) and *Manuṣyālayacandrika* (*Tirumangalat Nīlakaṇṭhan Mūsat*) deal with domestic architecture. These four books compiled in 13-16th centuries were preserved as palm leaf manuscripts till the beginning of this century. They remain the veritable resource material on *Vāstuvidya*, as practiced in Malabar coast to this day.

Of these, *Manuṣyālayacandrika* (MC) is the most popular work among the artisans as well as *sthapatis* in Kerala.

DATE OF *MANUṢYĀLAYACANDRIKA*

In the first chapter of the book, the author mentions many works which formed the source material for his work. *Tantrasamuccaya* is one of these works. This shows that MC was written after *Tantrasamuccaya* was compiled. The Kali year of the birth of the author of *Tantrasamuccaya* indicated in the text is 4529 corresponding to 1426 A.D. Also, *Tuncat Eḷuttacchan*, in his work *Harināmakīrtanam*, invokes the blesssings of *Nīlakaṇṭhaguru*. *Eḷuthacchan* lived in the 17th century. Therefore, it can be deduced that *Nīlakaṇṭhan Mūsat* lived between 15th and 17th century AD.

Ullur S. Parameswaran Iyer in his work '*Keralasāhityacaritram*' has reported that *Tirumangalat Nilakaṇṭhan Mūsat*, the author of MC was a disciple of *Kelallur Comātiri*. The *Kali* year given in *Tantrasamgraha* of *Comātiri* is the one corresponding to 1501 AD. R Narayana Panikkar, in his *Bhāṣasahityacaritram*, refers to a verse inscribed on the compound wall of *Trippūnittura Santānagopala* temple which states that the temple was constructed with black granite (*kṛṣṇaśila*) by *Nīlakaṇṭha*. This was around 1565AD. All these show that MC was composed in the 16th century AD.

THE AUTHOR

The author himself indicates that his name is *Nīlakaṇṭha* and the name of his family *Śrīmangala* (*Tirumangala* in Malayalam)

> "***Śrīmanglaspada*** - *sadāśraya* - ***nīlakaṇṭha*** -
> *Premaprakarṣanilayassakalābhivandyaḥ!*
> *Śrīmadgirīndra* - *tanayatanayonghribhājám*
> *Kāmaprado jayati mattamatangajāsyaḥ*.(M.C.ch.1. sl.3.)

In sl.1 of ch.1 of MC. he pays obeisance to the deities of Narasimha and Yadava installed in the *Rājarājamangalam* temple near Tirur, now a municipal town in Malappuram District of Kerala. In M.C. and in Kavyollasa (which is another work of the author), *Nilankaṇṭhan* invokes the deities of several temples which are all in *Prakāśa-viṣaya* (*Veṭṭattunadu*), *Prakāśaviṣaya* is the region around Tirur. *Prakāśa* means light, (*Vettam* in Malayalam) and *Viṣaya* means country, (*natu* in *Malayalam*). Therefore, it can be deduced that *Nīlakaṇṭhan Mūsat* is a native of Tirumangalam near Tirur.

OTHER WORKS OF THE AUTHOR

Nīlakaṇṭhan Mūsat has several other works to his credit. The most important among them are:

1. *Śilpacandrika* which was compiled before *Manuṣyālayacandrika;*
2. *Manuṣyālayalaghucandrika* which is similar to *Vāstulakṣaṇa* of unknown authorship. (Twenty one verses of this are taken from *Manuṣyālayacandrika*);
3. *Mātangalīla* which is a concise treatise on elephants and is based on *Hastyāyurveda* of sage *Palakāpya*;
4. *Vetikkampavidhi* which deals with the ingredients used for making fire works and mixing them to form different types of fire works;

5. *Kāvyollasa* which is an abridged version of *Kavyaprakasa* of Mammata.

MANUṢYĀLAYACANDRIKA

Manuṣyālayacandrika is a unique work dealing exclusively with construction of residential buildings. In the text itself, the author makes it clear that he has referred to all the well-known texts including *āgamas, samhitas* and treatises available at that time. He adopts the procedure followed in *Tantrasamuccaya* written by *Cennās Nāmbūdiripad.* In *Tantrasamuccaya*, all available knowledge on *tantra* (practice) has been condensed. Thus the rituals followed by different schools were unified into a single text. Similarly, while compiling MC, *Nīlakaṇṭhan Mūsat* has studied all available literature and used the knowledge so gained in writing this book. The practices in different parts of the country were critically studied and those which appeared to be appropriate and relevant were compiled. The basic techniques, theories and philosophy of Indian *Vāstuvidya* related to residential buildings (*Manuṣyālaya)* have thus been unified in this text. In this respect, this is not a regional text relevant to the west coast only, but is one containing the knowledge on *gṛhavāstu* all over India.

The text is divided into 7 chapters. The chapter 1 starts with the list of texts referred to by the author. It deals with the guilds of craftsmen and duties of each guild. It also gives rules for selection of Land. In chapter 2, procedure for fixing the cardinal directions and the major reference lines are detailed. This chapter also contains prescriptions on the zoning rules in deciding the locations of the building. It deals extensively with the concept of *Vāstupuruṣamaṇḍala*. The system of measurement used in *Vastuvidya* is described in chapter.3. It also deals with the rules for planning settlements. The architectural formula for orientation, viz. the *yoni* concept and the astrological factors of *āya, vyaya* etc. are also included in this chapter.

The chapter 4 deals with the characteristics of different classes of buildings while chapters 5,6 and 7 describe the details of the different elements of the building. They also give details of location of the different facilities in a house and also of the subsidiary buildings like cattle shed, entrance gate etc. The book is thus a comprehensive treatise on planning, designing and constructing residential buildings.

THE RELEVANCE OF THIS WORK

There are more than a dozen commentaries on *Manuṣyālaya-candrika* written in Malayalam. This shows the popularity and acceptance of the work as a standard one not only among craftsmen but also *ācāryas.* The style and language of these books are such that they can be followed only by those who have some knowledge of *Vástuśástra.* Moreover, illustrations are very rare in these works. Hence an illustrated engineering commentary which gives emphasis to the technological aspects and which can be easily followed by all becomes important. This will specially enable engineers and architects to understand the philosophy, design theories and practices followed in India so as to enable them to integrate this knowledge with modern developments in engineering and architecture. This will definitely pave way for evolving an Indian style which is relevant and appropriate in today's India.

Authors

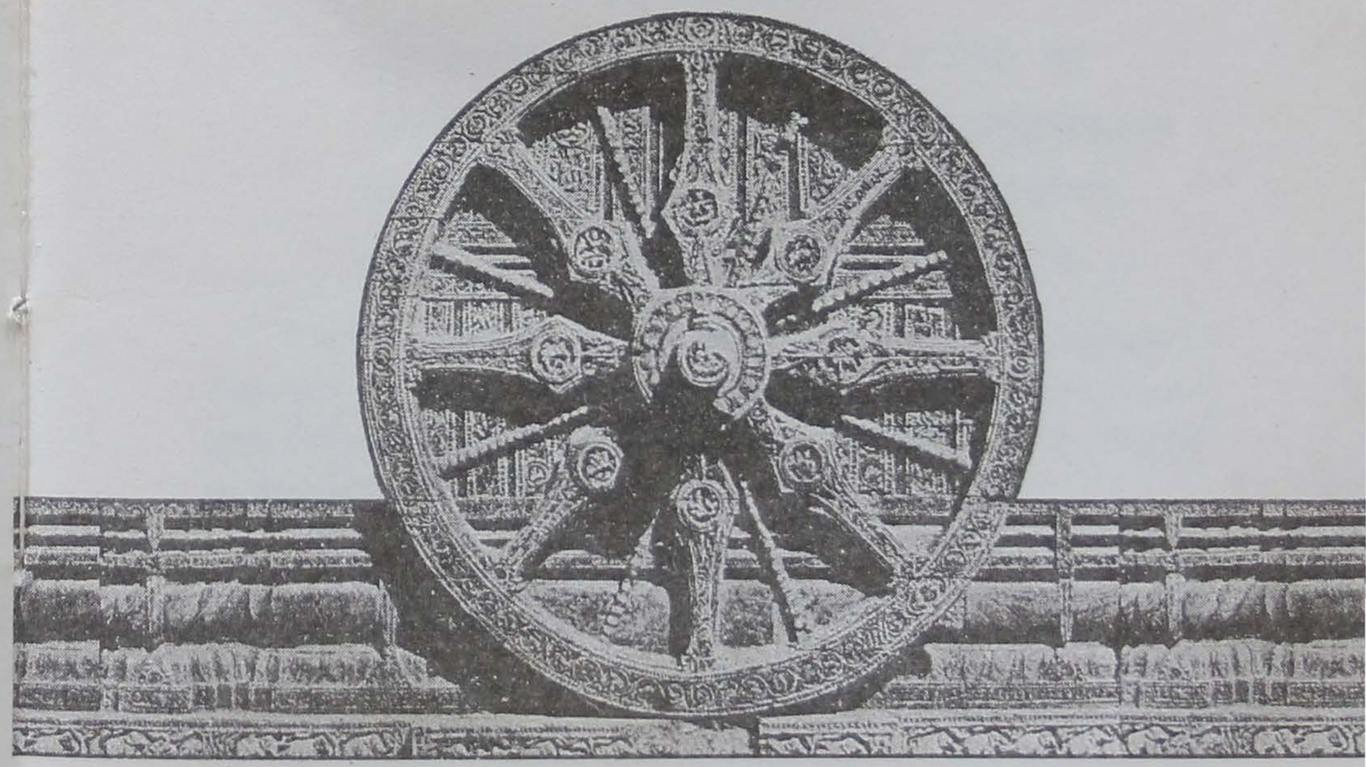
ABBREVIATIONS USED IN REFERENCES

M.M.	-	*Mayamata.*
V.V.	-	*Vāstuvidya.*
K.A.	-	*Kumārāgama.*
M.S.	-	*Mānasāra.*
B.S.	-	*Bṛhatsamhita.*
P.S.	-	*Padamasamhita.*
M.P.	-	*Matsyapurana.*
T.S.(S)	-	*Tantrasamuccayam, Śilpabhagam.*
V.R.	-	*Vasturajavallabham.*
I.S.	-	*Isanasivagurudevapaddhati.*

CONTENTS

1
INVESTIGATION AND SELECTION OF LAND
भूपरीक्षापरिग्रहौ

Invocation; references; classification of śilpins, characteristics of land; location of trees; location of houses near temples.



LIST OF ILLUSTRATIONS

CHAPTER - 1

प्रथमोऽध्याय :

INVESTIGATION AND SELECTION OF LAND

भूपरीक्षापरिग्रहौ

INVOCATION TO DEITIES

Stanza - 1

नृसिंहयादवाकारतेजोद्वितयमद्वयम् ।
राजते नितरां राजराजमङ्गलधामनि ।।

In the *Rajarajamangala* temple, there shines profusely the unified eternal energy *(tejas)* in the twin forms of *Narasimha* and *Yadava* (*Krsna*).

Stanza - 2

श्रीमत्कुण्डपुरे विराजति परक्रोडे च तेजः परं
नावानाम्नि च धाम्नि यच्च नितरां मल्लीविहारालये ।
अश्वत्थारव्यनिके तनेऽपि च पुरे श्रीकेरलाधीश्वरे
संम्भूयैतदुरुप्रकाशविषये चित्ते ममोज्जृम्भताम् ।।

Let the ultimate *tejas* shining profusely at Trikkandiyur, Trprangot, Nava (*Tirunavaya* temple), Mullappalli, Alattur and Srikeralapura together fill my mind, which is engaged in the enlightening topic (of *Vastusastra*).

Stanza - 3

श्रीमङ्गलास्पदसदाश्रयनीलकण्ठ -
प्रेमप्रकर्षनिलयः सकलाभिवन्द्यः।

श्रीमद्गिरीन्द्रतनयातनयोऽङ्घ्रिभाजां
कामप्रदो जयति मत्तमतङ्गजास्यः ।।

Enshrined in *Śrīmangala* (Tirumangala) *kṣetra*, the elephant-faced *Gaṇeśa*, who is the refuge of good people, who is beloved of *Śiva*, who is worshipped by all, who is the son of revered *Párvati* and who grants the wishes of the devotees, remains with glory.

Stanza - 4

तद्देवपादकमलैकसमाश्रयः को-
ऽप्युद्योतमानगुरुवर्यकृपाभियोगात् ।
विद्यापरिश्रमपरो बहुधात्मशुद्ध्या-
मुद्योगवान् भवति बालविबोधने च ।।

One, whose only refuge is the lotus feet of that *deva* (viz. *Gaṇeśa*) and who is engrossed in different fields of knowledge through the kindness of his preceptor (*guru*), becomes engaged in the teaching of children with purity of mind.

Commentary (Stanzas 1, 2, 3 and 4)

In these 4 stanzas, the author invokes the blessings of the presiding deities of the temples in and around his native place. This is a custom followed by all authors of *Samskṛt* texts in the early days.

The author was born at Tirumangalam near Trprangot temple in the present Tirur taluk of Malappuram district of Kerala State. Since he begins the narration with the invocation of the Supreme Being manifested as the twin deities of *Narasimha* and *Kṛṣṇa* at the *Rājarājamangala* (now known as *Rairamangala*) temple, it is to be assumed that those two deities were his *iṣṭadevatas* (beloved Gods). The

temples referred to in the second stanza are all near and around Tirumangala. Different deities like *Śiva*, *Mukunda*, *Hanuman* are worshiped in these temples. The author gives equal reverence to all of them.

Since it is customary to invoke the blessings of *Gaṇeśa* (who clears all obstacles) at the beginning of any auspicious act, the author invokes the presiding deity (*Gaṇeśa*) of Tirumangala (**fig.01.01**). The statement that he is writing the book with purity of mind (*ātmaśudhyā*) indicates that his objective is only to impart knowledge to the children (uninitiated) and not to gain glory, favour or wealth. In one version of the text, the word, '*ātmabudhyā*' is used in place of '*ātmaśudhyā*'. In this case, it can be interpreted that he is writing the book not in obedience to the direction of some patron (as was vogue in those days) but out of his own free will. Both versions mean that he has no selfish motive in writing the book. The book is written in the great and noble Indian tradition of giving knowledge for the welfare of the world without any selfish motive.

OBEISANCE TO PRECEPTORS

Stanza - 5

येषां श्रुतिप्रणयिनी धिषणा यदीय-
सङ्कल्पकल्पिततनुः परमेश्वरोऽपि ।
तेषां महीसुमनसां महनीयभासा-
मुत्तंसये परमुदारपदारविन्दम् ।।

I bow at the extremely holy lotus feet of those people with great minds, whose intellects are engrossed in the *vedas* and according to whose imagination even the Supreme Lord manifests his form.

Commentary

Here the author bows before his preceptors for whom

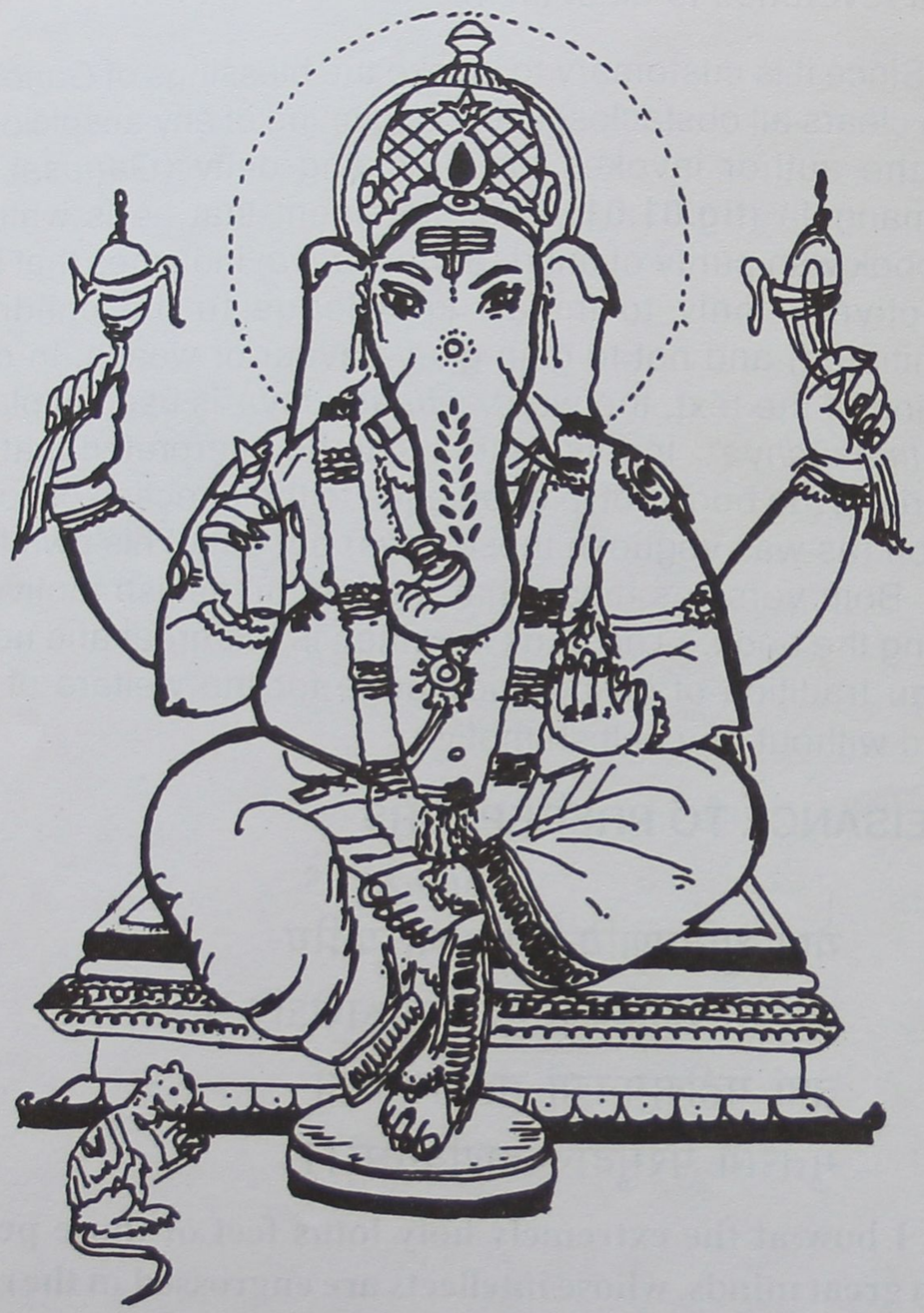


FIG.01.01 *GAṆESA*, THE FAMILY DEITY OF THE AUTHOR

he has great reverance. For, after all, even the Lord, though formless, adopts the forms as perceived by these seers. The belief is that the Lord dwells in the different icons, paintings and all other material and symbolic forms created by great builders based on the meditational chantings (*dhyanaśloka)* of these seers.

OBJECTIVE OF THE BOOK

Stanza - 6

निसर्गसंसिद्धसमस्तशिल्प-
प्रावीण्यमाद्यं द्रुहिणं प्रणम्य ।
मया मनुष्यालयचन्द्रिकैषा
विलिख्यते मन्दधियां हिताय ।।

This book, *Manuṣyālayaccandrika* is compiled by me for the use of those uninitiated (in *Vāstuśāstra*), after bowing before the primordial creator *Brahma,* who is naturally endowed with all the skills in building arts.

Commentary

According to Indian thought, *Brahma*, the supreme creator is the primary source of all knowledge. The four vedas - *ṛk*, *yajus, sāma* and *atharva* - originated from *Brahma*. Each of these *vedas* has one *upaveda* as given below.

Veda	*Upaveda*
Ṛgveda	*Āyurveda*, the knowledge of life.
Yajurveda	*Dhanurveda*, the knowledge of weapons and warfare.
Sāmaveda	*Gāndharvaveda*, the knowledge of fine arts and music.
Atharvaveda	*Sthapatyaveda*, the knowledge of building science.

In *Bṛhatsamhita, Varāhamihra* acknowledges that the knowledge of building science has been inherited from *Brahma* through generations of sages (Ref.01.01).

Sthapatyaveda dealt with mathematics (*gaṇita*), material science (*dravyavijñam*), drawing and painting (*citra*), iconography (*śilpaśastra*) and principles of building construction all of which form the basis of *Vástuśāstra*. This has been handed over through the generation of sages like *Garga, Parāśara, Bṛhadratha* and *Viśwakarma. Matsyapurāṇa* mentions 18 *ācāryas*: *Bhṛgu, Atri, Vasiṣtha, Viśwakarma, Maya, Nārada, Nagnajit, Viśālakṣa, Purandara, Brahma, Kumāra, Nandikesa, Śaunaka, Garga, Vāsudeva, Aniruddha, Śukra* and *Bṛhaspati*. This list contains the supreme creator *Brhama*, God heads like *Vāsudeva* and *Kumāra*, great sages like *Bhrgu, Atri* and *Nārada*, preceptors of *devas* (*Bṛhaspati*) as well as *asuras (Śukra*), and the *devaśilpi* (*Viśwakrarma*) as well as *asurasilpi* (*Maya*). This shows that in the evolution of *Vāstuvidya*, all available knowledge, whether it be from *Āryan* sources or from parallel *Dravidian (asura*?) sources, has been absorbed. It also incorporated the noblest philosophical concepts and the highest craftskiils. Some interpreters take that '*druhiṇa*' in this verse means the Supreme Creator *Viśwakarma* who is considered to be self-born and is neither *Brahma, Viṣṇu* nor *Rudra.*(Ref.01.02)

REFERENCES

Stanzas - 7, 8

मयमतयुगलं प्रयोगमञ्ज -
र्यपि च निबन्धनभास्करीययुग्मम् ।
मनुमतगुरुदेवपद्धतिश्री-
हरियजनादिमहागमा जयन्ति ।।
मार्कण्डेययुगं पराशरमुरारिप्रोक्तरत्नावली-
सारान् काश्यपविश्वकर्ममतयुग्माद्यं कुमारागमम् ।

सव्याख्यां हरिसंहितां विवरणाद्यं वास्तुविद्यादिकान्
ट्टष्ट्वा तन्त्रसमुच्चयोक्तमनुसृत्यैवात्र संक्षिप्यते ।।

Two texts on *Mayamāta, Prayogamanjari,* two *Nibandhanās*, two *Bhāskariyas, Manumāta, Īśānasivaguru-devapaddhati, Śrīhariyajanam* and other great *āgamas* are well known (texts of *Vāstuśāstra*). Also referring to the two texts on *Mārkaṇḍeyapurāna,* the essence of *Ratnāvali* of *Parāsara* and *Murāri,* the *Tantra* texts of *Kāśyapa* and *Viswakarma, Kumāragāma, Visnusamhita* with annotation, *Vivarana* and other annotations, *Vāstuvidya* and other (available) texts, it (*Vāstuśāstra*, the building science) is condensed here on the lines of *Tantrasamuccaya.*

Commentary

Though the author has mentioned references to a large number of ancient texts including *āgamas, samhitas* and scientific treatises, he follows the method of *Tantrasa-muccaya* written by Cennas Narayanan Nambudiripad in 1462. In *Tantrasamuccaya*, all available knowledge on *tantra* (practice) has been condensed. *Tantra*, the applied aspects of knowledge sums up the *āgama* (idol worship) rituals. By tradition, the ritualistic compilation in *Saivism* are called *āgamas*, those of *Vaiṣṇavism* are called *samhitas* and those of *Sakti* worship are called *Tantras. Tantrasamuccaya* unified all these into a single text. Similarly, while compiling *Manuṣyālayacandrika*, the author has studied all available literature and used the knowledge gained by such studies in writing this book. The different practices in different parts of the country were studied critically and those which appeared as most appropriate were synthesised. The basic philosophy, theories and techniques of Indian *Vāstuvidya* related to residential buildings have been thus unified in this text. In this respect, this is not a regional text relevant to Kerala alone, but is one containing the wisdom of *gṛhavāstu*

applicable all over India.

The practice of listing the references was not common in ancient Indian texts. But this author has acknowledged all the references

THE ROLE OF *ĀCĀRYAS*

Stanzas - 9,10

मर्त्यो विप्रादिवर्णेष्विह भवनविधानोत्सुको यः स पूर्वं
विप्रं तद्देशसम्बन्धिनमखिलगुणैरन्वितं संवृणीत ।
सोऽयं तद्वर्णयोग्यां क्षितिमथ परिकल्प्यात्र पूजादि कृत्वा
वास्तोः शास्त्रोक्तरीत्या गृहमतिनिपूणैः कारुभिः कारयेत ।।

वेदागमादिविहितान्यवधार्य विप्रैः
कार्यो विधिः सकलदेवनरालयानाम् ।
तद्वाक्यतः सकलधामसु मृच्छिलादे -
रन्योन्यमेलनमुशन्ति हि कारुकृत्यम् ।।

When any person belonging to the *varṇas* starting from *brāhmaṇa (brāhmaṇa, kṣatriya, vaiśya,* and *śūdra)* is desirous of building a house, he must first accept an *ācārya* (learned preceptor), who is associated with the locality and who has all the (required) virtues. Then after selecting the plot suitable for the class of the person who seeks his advice, he (the *ācārya*) should perform the rites of worship (of *vāstu*) and get the building constructed according to the prescriptions in the texts by skilled craftsmen. It is the *ācārya*, who should give the prescriptions of the houses of gods as well as humans, after carefully considering what have been stated in the ancient texts like the *vedas* and the *āgamas*. Constructing the buildings in accordance with his (*ācārya's*) prescriptions by joining the mud, stone etc. is considered as the job of the craftsmen.

Commentary

Any person who wishes to construct a building should take the advice of a noble person, well-versed in the science of building and related topics. The owner being a layman, may not be in a position to properly analyse and balance his requirements and resources and to select skilled craftsmen and building materials. Therefore, the advice and guidance of an *acarya* are necessary in selecting the plot and the team of builders. The *ācārya's* advice will be proper and unbiased because he is endowed with all good qualities.

In the design of buildings, the owner (*yajamāna*), the adviser (*ācārya*) and the master-builder (*sthapati*) have specific roles. The text *Vāstuvidya* (Ref.01.03) compares them to *Viṣnu , Rudra and Brahma* respectively, the trinity of Indian theology.

The *yajamāna* feels the necessity for the building and later arranges the materials and the money for its execution. The *acarya* is the guide who conceives the design suitable to the status (*varṇa*) and requirements of the owner and selects a master-builder (architect-engineer viz. *sthapati)*, who will transform the concept into reality with the help of the craftsmen.

GUILD SYSTEM (*SRENI*) IN BUILDING TRADE

Stanzas - 11, 12

स्थपतिः सूत्रग्राही तक्षकसंज्ञश्च वर्धकिः क्रमशः ।
स्वोचितकर्मणि दक्षा ग्राह्यास्ते कारवश्चतुर्धेति ।।

सर्वशास्त्रविहितक्रियापटुः
सर्वदावहितमानसः शुचिः ।
धार्मिको विगतमत्सरादिको
यः स च स्थपतिरस्तु सत्यवाक् ।।

The four classes of builders viz. *sthapati, sūtragrāhi, takṣaka*, and *vardhaki,* each one adept in his work, are to be selected systematically.

Let the one, who is adept in the techniques prescribed in all texts, whose mind is always calm, who is pure and rightful, who is free from unfair competition and who speaks only truth, be the *sthapati* (architect-engineer).

Commentary (Stanzas 11 and 12)

For the craftsmen engaged in the design and execution of buildings, a four tier classifications is prescribed. Each class had specific and distinct responsibilities and roles. *Sthapati* is the master-builder who makes the design and coordinates the works of the other builders. He should know all the sciences including mathematics, climatology, geography, geology, material science etc. In addition to this, he should be perfect in body and mind, righteous, kind, warm-hearted and free from malice and unfair competition. Only such a person will be able to properly weigh all the aspects impassionately and take proper decisions without bias, and co-ordinate the work of others. Other texts also stresses the important role of *sthapati* (Ref. 01-04,05). He is comparable to the architect-engineer of the present day. The stringent standards of physical, intellectual and moral qualities prescribed for the *sthapati* indicate his key role in the *vāstusthāpana*. His profession is elevated from the mundane level to the realm of *dharma*.

Stanza - 13

जानीयात् स्थापनार्हं स्थपतिमथ गुणैः प्रायशस्तेन तुल्यः
सूत्रग्राही सुतो वा स्थपतिमतिगतिप्रेक्षकः शिष्यको वा ।
स्थूलानां तक्षणात् तक्षक इति कथितः सन्ततं हृष्टचित्तो
दार्वाद्यन्योन्यसंमेलनपटुरुदितो वर्धकिः सावधानः ।।

Know that *sthapati* is the one competent to do *sthāpana* (layout and design). Then either his son who is almost equal to the *sthapati* in all qualities or the desciple who correctly follows the thinking of the *sthapati* is the *sūtragrāhi* (supervisor). *Takṣaka* is so called because he is engaged in reducing and shaping the materials (or construction). He should always have a happy mind. One who is clever and careful in joining together wood etc. is called *vardhaki.*

Commentary

The *sūtragrāhi* is the site-supervisor. He should be able to understand the *sthapati* properly and see that the latter's ideas are transformed into concrete form. He may be the son or a desciple of the *sthapati*. His job is to ensure that the parts of the building are properly joined and aligned and to supervise the work of the craftsmen of the next two classes. *Sūtra* is the thread and *sūtragrāhi* is one who holds the threads for alignment.

Takṣaka is the one who shapes the building materials like stone, wood, metal etc. into forms suitable for building. *Vardhaki* is the joiner who increases (*vṛdh*) by joining together the different materials and parts shaped by the *takṣaka* to form the building.

This system of classification appears to have evolved from the *vedic* times, when timber was the major construction material. Timber work is mainly an assembly process. Probably this is the reason why the building science is called *Taccuśāstra* (*Takṣakaśāstra*) in Kerala. The elements are shaped by *takṣaka*, joined together by *vardhaki*, aligned by *sūtragrāhi* and erected with due regard to the orientation, stability and strength by *sthapati*. This classification was carried forward even when stone become a major building material.

This four tier system can be compared to the system

prevailing now. Modern architect-engineer has taken the place of *sthapati*. The supervisor does the work of *sūtragrāhi*. The technicians who are engaged in masonry (masons), joinery (carpenters and metal workers), concreting etc. are *vardhakis*. The workers who cut, saw, shape, dress and smoothen the materials are *takṣakas*. In the upper tiers, theoretical knowledge is given importance while in the lower layers, practical skills are stressed. The training imparted to each class was according to its functions. *Takṣaka* should be able to write, draw sketches, calculate the dimensions and proportions and should essentially develop technical skill in cutting, dressing, shaping etc. of the materials of construction. *Vardhaki* should have all these skills and should develop the necessary foresight and skill in joinery works. To verify the levels, plumb, dimensions, quality etc. of the individual and joined parts, *sūtragrāhi* should have theoretical and practical knowledge about the construction materials and process. *Sthapati* should have high theoretical knowledge on all technical aspects and also on the prescriptions. Above all, he should be able to understand and interpret the philosophy (*darśana*) of building science. He should also be well-versed in the allied sciences and arts.

Though there is no bar in the vertical movement of *takṣaka* to the level of *sthapati*, this seldom took place because of the high standards of theoretical knowledge demanded by the profession of *sthapati*. But *sūtragrāhi*, the son or desciple, can take the role of *sthapati*, after acquiring knowledge and training.

OWNER'S DUTY TO KEEP *ŚILPINS* SATISFIED

Stanza - 14

विना स्थपत्यादिचतुष्टयेन
गृहादि कर्तुं न च शक्यतेऽस्मात् ।

प्रसादितैस्तैरथ विप्रवर्यः
सुसूक्ष्मधीः कारयतां गृहाणि ।।

Without these foursome beginning with the *sthapati*, it is not possible to construct houses etc. efficiently. Hence intelligent *ācāryas* should get the houses constructed through (satisfied and) happy craftsmen.

Commentary

Since the services of the builders are essential for construction, it is the responsibility of the *acarya*, who advises the owner, to see that the builders are always contended and happy, so that they can turn out good workmanship. On their turn, the builders took their job as *dharma* (devotional duty). Though the levels of creativity, education and work-experience were different for the different classes of workers, theirs was a job of creation (*sargaprakriya*). It is the abstract picture of the needs, aspirations and the background of the owner that is transmitted to the *sthapati* through the *ācārya*. The planning and detailed design call for creativity on the part of the *sthapati*. Converting the concepts into three dimensional buildings require not only skill, but a certain amount of creativity also on the part of the artisans. The act of creativity was considered as a divine *sādhana* in ancient India. Thus, the building is not merely a technical process but goes beyond it to became a divine function. The owner is only a cause (*nimitta*) and the *acarya* a guide for the creative process by the '*śilpins*'. Their job is not merely an employment or profession but a sublime act of worship of *Vāstupuruṣa*, the presiding spirit of the *vāstu*. The building is not merely a material object but a symbol of divine blessing. It was this kind of total dedication that was responsible for the development of the sublime science of *Vāstu* in India.

CALL FOR QUALITY CONTROL

Stanza - 15

लक्षणहीने धामनि वसतामशुभानि सम्भवन्त्येव ।
जन्माद्यवसानान्तं मनसा निश्चित्य कारयेत् तस्मात् ।।

Those who live in houses that are built against the canons will surely meet with ill fate. Hence from the beginning to the end, (building) work should be done deciding every aspect (according to the prescriptions).

Commentary

This indicates the importance of planning before undertaking the construction and of the necessity for strict adherence of the rules. All aspects should be considered and satisfactory solutions worked out while selecting the site, designing the horizontal and vertical compositions and working out the details. This prescription is a stricture for ensuring quality in construction. The bad effects (*aśubhāni*) mentioned here are wastage of materials, time and money and also inconvenience and anxiety. Lack of proper planing and disregard for the prescriptions will lead to these undesirable effects.

LOGIC FLOW IN CONSTRUCTION

Stanza - 16

तत्र क्रमेण बहुधा धरणीपरीक्षा
दिङ्निर्णयादिशुभवीथिपरिग्रहश्च ।
धाम्नां प्रमाणविधिरङ्कणकुट्टिमादी-
न्यङ्गानि बाह्यविधयश्च तथा विधेया : ।।

There (in the matter of building construction), different methods of investigation of the land, fixing the cardinal directions, adopting propitious *vīthi* for the

construction, arriving at the prime dimensions of the building and the yard as well as details and prescriptions for ancillary structures should be done systematically (*krameṇa*).

Commentary

This prescribes that the various steps in the construction should be done systematically. A flow chart can be constructed to guide the process as shown in **fig.01.02**

SELECTION OF LAND

Stanza - 17

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

The land, rich with the presence of cattle, human beings, flowering and fruit-bearing trees and tress extruding milky sap, level, sloping towards east, smooth, producing good sound (while walking or tamping), with water flowing in clockwise direction, causing speedy germination of seeds, well compacted, having perennial source of water and with moderate climate is said to be very good. If the characteristics are opposite (to those mentioned) the land is said to be bad and if they are mixed, it is said to be in between (good and bad).

Commentary

The desirable biotic, terrain, hydrologic, and climatic conditions are enumerated in this stanza.

Of the four classes of *vastu* - land, building, vehicles, furniture (*bhūmi, harmya, yāna, śayana*), the land is very

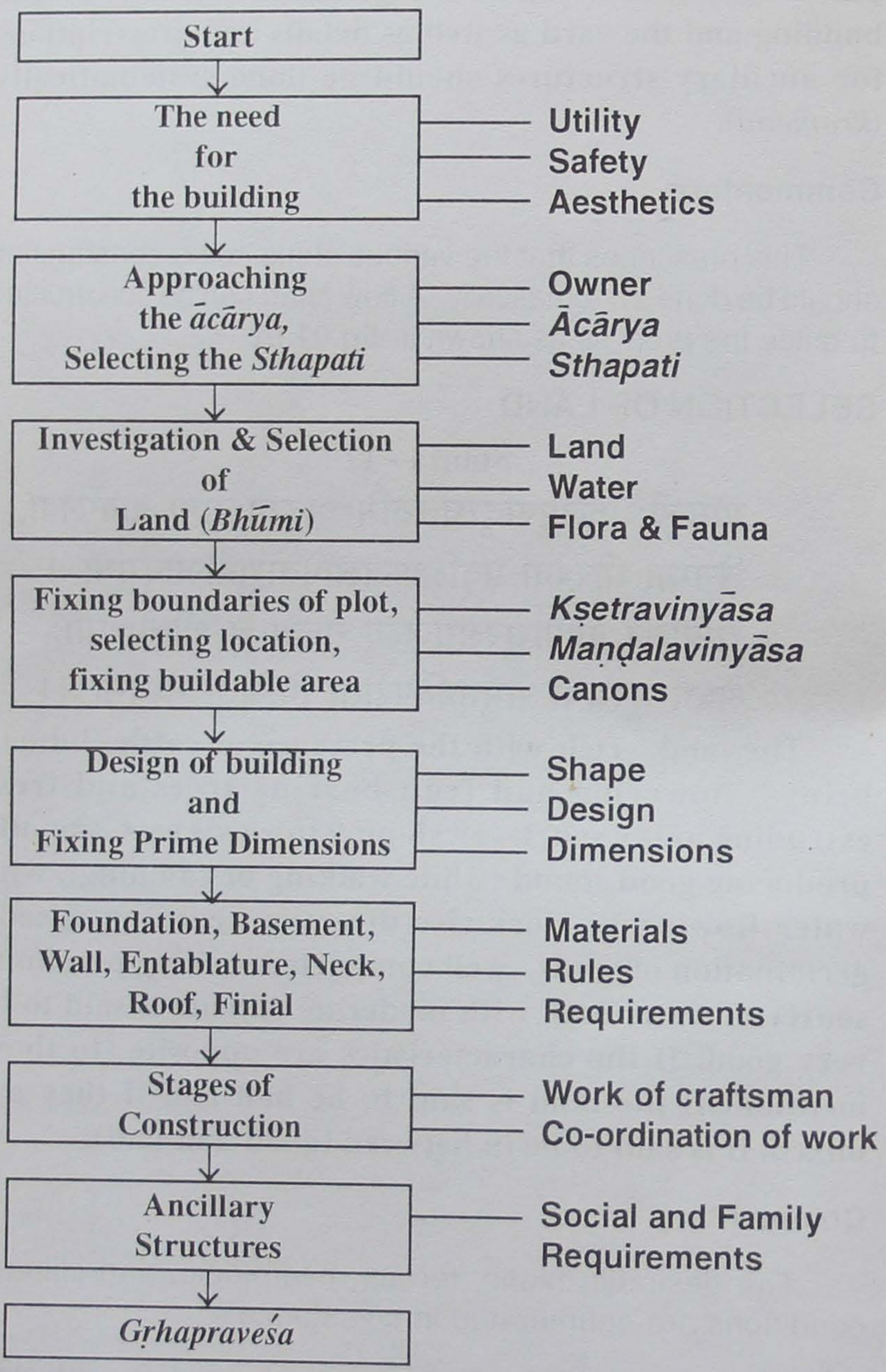


FIG.01.02 CHART SHOWING THE LOGIC FLOW OF CONSTRUCTION

important because it is on this that the other *vāstus* are built. In the text '*Vāstuvidya*', it is prescribed that the investigation of land should be done first and then only the building started (Ref.01.06).

The selection of site is based on climatic considerations, topography, geology (all pertaining to the land), the availability, purity and flow of water (all pertaining to the water) and fertility of soil, medicinal value and abundance of flowering and fruit-bearing trees (all related to the flora). In addition, richness of cattle life (related to the fauna) and the neighbours (related to social interactions) also are to be looked into.

Based on these, *Padmasamhita* classifies the land into four types (Ref.01.07). If the factors related to land, water and flora are good and the land is situated adjoining a sea or river, it is called *bhadra*. Land with favourable conditions, if situated in hilly areas, is called *purna* and if located in the plains is known as *supadma*. If the land - water - flora characteristics are unfavourable with extremes of climate, rocky surface, scarcity of water, wild animals or poisonous plants, the area is classified as *dhumra*.

The land should slope downwards to east. This is probably to ensure that the rising sun is visible from the house. '*Vāstuvidya*' mentions that the east slope and north slope are good (Ref.01.08).

Land with loose soil, filled up ground with voids, rocky surfaces and marshy or wet conditions will not produce good sound when treaded upon or tamped. Hence the prescription that the land should give good sound when one walks over it ensures good ground conditions. This is a quick field test.

Soil which causes quick germination of seeds is good for vegetation. A level ground requires no levelling operations and hence economical.

For testing the consolidation of soil, a pit with one square *hasta* area and one *hasta* depth is dug and then filled up with the excavated soil. Excess soil (*bahupāmsu*) indicates good consolidation. This test is identical to the field density determination used in modern geotechnical engineering practice. Availability of perennial source of potable water was a necessary condition in those times when centralised water supply systems were not in vogue.

SITE TO BE AVOIDED

Stanza - 18

वृत्तार्धेन्दुनिभा त्रिपञ्चरसकोणा शूलशूर्पाकृति-
र्मत्स्यानेकपकूर्मपृष्ठकपिलावक्त्रोपमा मेदिनी।
भस्माङ्गारतुषास्थिकेशचितिवल्मीकादिभिः संयुता
वर्ज्या मध्यनता सगर्भकुहरा विस्रा विदिक्स्थापि च।।

Land with circular, semi-circular, triangular, pentagonal, hexagonal, spear- like and of winnowing basket shapes, formed like the back of fish, elephant and tortoise, appearing like the face of a cow, having presence of ash, cinder, husk, bones, hair, vermins and ant-hill, depressed in the middle, or having cavities, foul-smelling and not-oriented in the cardinal directions, shall be avoided.

Commentary

Odd shapes are not good. A rectangular shapes with south-north dimension greater than west-east dimension is preferred so that a square can be easily marked from it for the site analysis based on *padavinyāsa* or *vīthīvinyāsa* described subsequently.

The analysis of the plot is done generally on the basis of square grids (*pada)* or enveloping squares (*vīthi*). The first method is called *padavinyāsa* and the second one is

known as *vīthivīnyāsa*. For this, the plot should be square. Plots which are not square can be analysed by these methods by taking a convenient square plot in it or, in the case of small plots, by taking the largest square that can be inscribed in the area. Thus it should be taken that the prescriptions with regard to the shape given in this stanza is only a general directive and not a strict condition.

The presence of ash, cinder, bones, hair etc. indicates the probability of the land having been used for sacrificial altars (*yāgabhūmi*) or as burial ground or as dumping ground. Vermins and anthills can cause trouble either due to the attack of vermins and termites or due to bad foundation conditions. Depression in the middle will cause stagnation of water. Cavities will make the foundation weak. Foul smell may be due to decaying of organic matter and indicates an unhealthy filled up area. So sites with all these characteristics are to be avoided (Ref.01.09).

Since the building should face only one of the cardinal directions, the sides of the plot should preferably be along the cardinal directions. Plots with sides oriented to corner directions (*vidik*) are not auspicious.

Thus the detailed prescriptions given in this stanza are practical hints to avoid lands which cause problems in analysing and developing them.

DESIRABLE AND UNDESIRABLE SLOPES OF LAND

Stanza - 19

इन्द्राशादिनतावनी तदितराशाद्युन्नताष्टौ क्रमाद्
र्गोवहन्यान्तकभूतवारिफणभृन्मातङ्गधान्याह्वयाः।
वीथ्योऽत्र क्रमशोऽभिवृद्धिधनहान्यन्तार्थहानिप्रदा
दारिद्र्यात्मजहानिवित्तशुभदास्तादृक्क्षितौ तस्थुषाम्।।

The lands sloping in the eight directions, starting from the one low in east and high in west, are called *govīthi, agnivīthi, yamavīthi, bhūtavīthi, jalavīthi, nāgavīthi, gajavīthi,* and *dhānyavīthi.* To those who occupy such lands, these will give prosperity, loss of wealth, loss of life, loss of property, poverty, loss of children, wealth and welfare in that order.

Stanza - 20

प्रवासदा मध्यनता धरित्री
मध्योन्नता वित्तसुखादिहन्त्री।
वह्न्यादिवाय्वन्तनता धरित्री
प्रायेण दारिद्र्यफलप्रदा स्यात् ।।

The land with central depression will cause out - migration and that with raised middle will cause loss of wealth and happiness. The land sloping (down) towards south-east (*Agni*) corner and to north-west (*Vāyu* corner) will cause poverty.

Stanza - 21

मध्योच्चायां धरित्र्यां प्रथममथ गृहे कल्पिते स्याद् दशाब्दं
वृद्धिः प्रागुन्नतायामपि हुतवहयाम्योन्नतायां शताब्दम् ।
साहस्राब्दं निर्ऋत्युन्नतधरणितले वारुणे स्यात् तदर्धं
शेषास्वर्काष्टषट्काः शरद इह ततः स्वोक्तरूपं फलं स्यात् ।।

If the house is first built on land raised in the middle and in the east, there will be prosperity for ten years. If constructed on land high in south-east or south, there will be progress for 100 years, if the south-west corner is high, the prosperity will be for 1000 years and if the west side is high, there will be progress for 500 years. On other slopes, the prosperity will be for 12, 8 or 6 years. After

these periods, the result will be as mentioned earlier (in stanzas 19 & 20).

Commentary

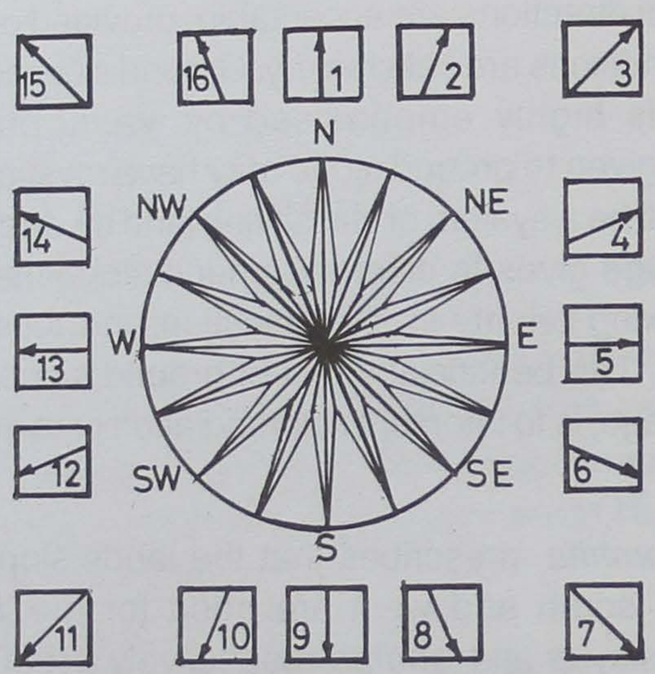
Vāstuvidya also classifies the land into 16 types according to the slope (**fig.01.03**). This may be to indentify the land with different slopes or it may be merely to indicate the directions from a reference point. In *Bṛhatsamhita*, it is stated that slopes in all cardinal directions are acceptable, provided of course the drainage conditions are satisfactory. Ground slope towards east and north is highly emphasised by *vástu* pundits. The importance given to ground slope may have mystical meaning; it may as well be a system of classifying land by different names. The weightage gives to different ground slope may also be a means of fixing priority in site selection and thus a decision making tool. The beneficial effect of ground slope, apart from that of drainage, is to intercept solar radiation or to get protection from it.

Bṛhatsamhita prescribes that the lands sloping towards north, east, south and west are good for the *brāhmaṇas, kṣatriyas, vaiśyas* and *śūdras* respectively.(Ref.01.10). This is practically zoning different classes into definite areas around the central *Bṛahmasthala*, which in villages used to be occupied by a temple. This allows good drainage conditions. This is elaborated further in stanzas 29 and 30 of this chapter.

THE POSITION OF TREES IN THE COMPOUND

Stanza - 22

पूर्वस्यां वकुलो वटश्च शुभदोऽवाच्यां तथोदुम्बर-
श्चिञ्चा चाम्बुपतौ तु पिप्पलतरुः सप्तच्छदोऽपि स्मृतः ।
कौबेर्यां दिशि नागसंज्ञिततरुः प्लक्षश्च संशोभनाः
प्राच्यादौ तु विशेषतः पनसपूगौ केरचूतौ क्रमात् ।।



1.*GAJA* 5. *GO* 9. *YAMA* 13. *JALA*
2. *DĪRGHĀYUS* 6. *APATHA* 10. *ARGALA* 14. *PITĀMAHA*
3. *DHANA* 7. *AGNI* 11. *BHŪTA* 15. *NĀGA*
4. *PUṆYAKṚT* 8. *ROGAKṚT* 12. *ŚMAŚĀNA* 16. *SUPATHA*

FIG.01.03 CLASSIFICATION OF LAND ACCORDING TO SLOPE

Bakula (*Mimusops elengi*) and banyan tree (*Ficus bengalensis*) in the east and *udumbara* (*F. racemosa*) and tamarind (*Tamarindus indica*) in the south will bestow prosperity. In the west, *aśwattha* (*F. religiosa*) and *saptacchada* (*Alstonia scholaris*) and in the north *nāga* (*Mesua nagassarium*) and *plaksa* (*F. microcarpa*) are prescribed. Jack tree (*Artocarpus heterophyllus*), arecanut palm (*Areca catechu*), coconut palm (*Cocos nucifera*) and mango tree (*Mangifera indica*) are especially propitious in the directions of east etc. (east, south, west, north) respectively.

Stanza - 23

अश्चत्थोऽग्निभयं करोति बहुधा प्लक्षः प्रमादप्रदो
न्यग्रोधः परशस्त्रपातमुदरव्याधिं तथोदुम्बरः ।
सम्प्रोक्तप्रतिदिक्स्थितास्त्वपि च ते चान्ये सुवर्णात्मका-
श्छेद्या मन्दिरतस्तरूच्चयुगसीमाभ्यन्तरस्था यदि ।।

When located in positions opposite to what has been mentioned (above), *aśwatha* will cause fire, *plaksa* (will cause) several types of insanity, *banyan* tree (will cause) blow by weapons of enemies, and *udumbara* (will cause) stomach trouble. They (such trees) and the trees which are located at distances from the house less than their heights should be cut, even if they are of gold.

Stanza - 24

स्थाप्या मन्दिरपार्श्वपृष्टदिशि तु श्रीवृक्षबिल्वाभया
व्याधिघ्नामलकीसुरद्रुमपलाशाशोकमालेयकाः।
पुन्नागासनचम्पकाश्च खदिरस्तद्वत् कदल्यादयो
जातीनागलतादयोऽपि सकलाः सर्वत्र संशोभनाः ।।

On the two sides and rear of the building, *śrīvṛkṣa*, (*Gmelina arborea*), *bilwa* (*Aegle marmelos*), *abhaya* (*Terminalia chebula*), *konna* (*Cassia fistula*), Indian gooseberry (*Phyllanthus embilicca*), *deodar* (*Cedrus deodar*), *palāśa* (*Butea frontosa*), *aśoka* (*Saraca asoca*), *sandal* (*Santalum album*), *punnāga* (*Calophyllum inophyllum*), *asana* (*Pterocarpus marsupium*), *campaka* (*Michellia champaka*) and *khadira* (*Acacia cateche*) are propitious. Similarly all varieties of plantains (*Musa* sp.), *jāti* (*Myristica fragrans*), betel (*Piper betel*) etc. are good every where.

Stanza - 25

अन्तःसारास्तु वृक्षाः पनसतरुमुखाः सर्वसाराश्च शाका-
श्चिञ्चाद्यास्तालकेरक्रमुकयवफलाद्या बहिस्सारवृक्षाः ।
निःसाराः शिग्रुसप्तच्छदशुकतरवः किंशुकाद्याश्च कार्या-
स्तेष्वाद्या मध्यभागे बहिरपि च ततः सवसारास्ततोऽन्ये ।।

The trees like jack tree have hardwood in the core (*antassāra*), tamarind, teak etc. have hardwood throughout the cross section, (*sarvasāra*), palm, coconut, areca etc. are strong in the outer section (*bahissāra*), *moringa* (*Moringa oleifera*), *saptacchada*, *sukataru* (*Albizia*), *kiṁśuka* (*Erythrina variegata*) etc. are softwoods (*nissāra*). Out of these, the first ones (hardwood inside) should be planted in the inner circle, *sarvasāras* outside them and the rest outside both.

Stanza - 26

कारस्करारुष्करकण्टकिद्रुश्लेष्मातकाक्षद्रुमपीलुनिम्बाः ।
स्नूहीपिशाचद्रुमहेमदुग्धाः सर्वत्र नेष्टा अपि शिग्रुरन्तः ।।

Kārāskara (*Strychnos nux-vomica*), *aruskara* (*Semecarpus anacardium*), *kantakidruma* (*Flacourta jangomas*), *śleṣmātaka* (*Cordia dichotoma*), *rudrākṣa* (*Elacocarpus sparicus*), *pilu* (*Salvadroa persica*), *nimba* (*Azadiracta indica*), *Snuhi*

(*Euphorbia neriifollia*), *piśācadruma* (?*papaya*, *Carica papaya*), *hemadugdha* (*Argemone mexicana*) are not desirable any where. *Moringa* (*Moringa oleifera*) too is undesirable inside the boundary.

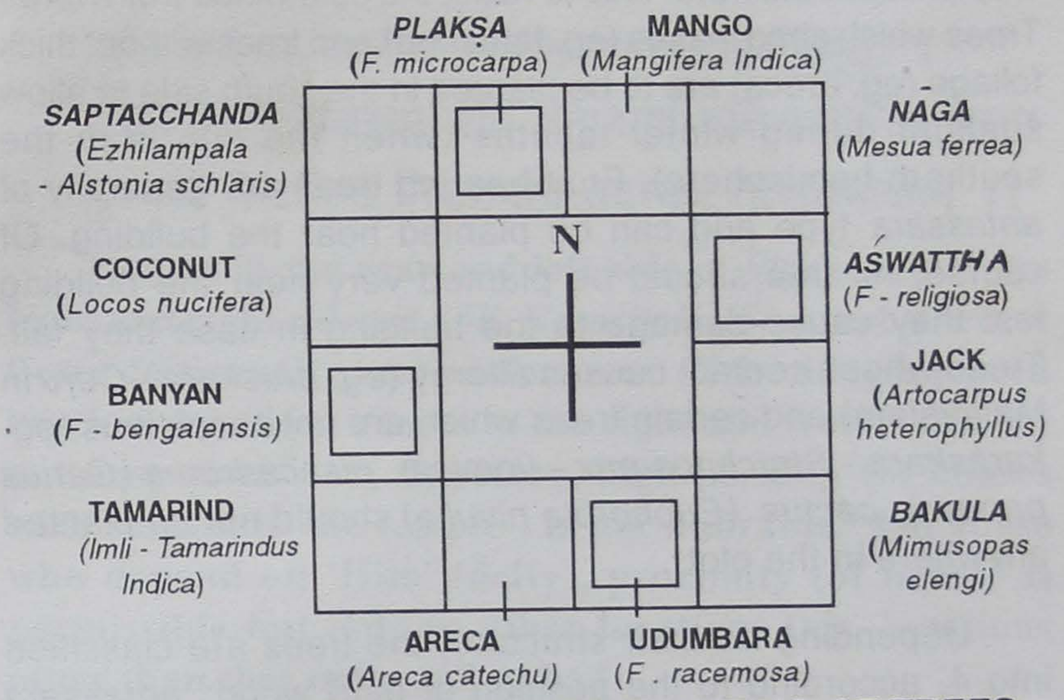


FIG.01.04 RECCOMMENDED PLANTING OF TREES AROUND A HOUSE

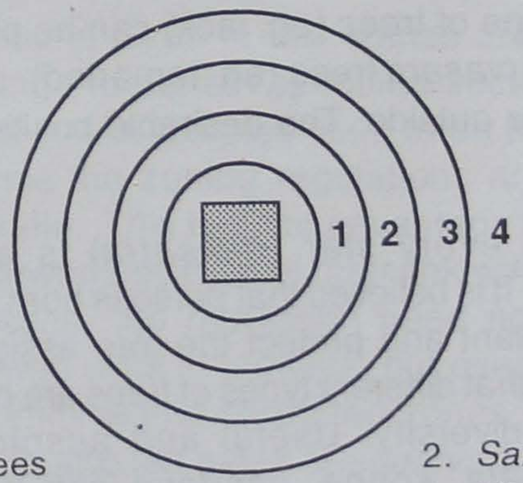


FIG.01.05 RELATIVE LOCATION OF TREES BASED ON THEIR STRUCTURE

Commentary (Stanzas 23,24,25 and 26)

These verses give the desirable and undesirable positions of trees in the compound. The auspicious trees and their positions are given in **fig.01.04**. Trees with thick foliage are to be planted in the north side to resist the cold winds from north. Trees which shed leaves (eg. tamarind) and trees without thick foliage (eg. areca) are to be planted in the south side to allow sunlight during winter months (when the sun is in the southern hemisphere). Fruit-bearing trees are generally of *antassara* type and can be planted near the building. Of course, no tree should be planted very near the building lest they cause damage to the building in case they fall. Trees whose contact causes allergy (eg. *aruskara - Ceru* in Malayalam) and certain trees which are not auspicious (eg. *karaskara - Strychnos nux - vomica*), *pisacadruma* (*Carica papaya*), *cactus* (*Euphorbia nivulia)* should not be planted anywhere in the plot.

Depending on their structure, the trees are classified into 4, according to the position of hard wood: *antassara* (hardwood at core), *bahissara* (hardwood outer side), *sarvasara* (hardwood throughout) and *nissara* (soft wood). *Antassara* type of trees (eg. jack) can be planted nearest to the house *sarvasara* trees (eg. tamarind), outside them and the others far outside. The desirable positions are shown in **figure.01.05**.

In India every star (*naksatra*) is assigned a tree (appendix.1). It is believed that persons born under a particular star should plant and protect the tree assigned to that star. This ensured that different types of trees are protected, thereby ensuring bio-diversity. Useful and auspicious trees like *srivrksa, amala, konna, candana* can be planted on all sides except the front side. Herbs like plantain, jasmine can be planted anywhere because they are seasonal, very useful and will not cause any damage, to the building by their fall.

RESTRICTIONS FOR CONSTRUCTION OF HOUSES NEAR TEMPLES

Stanza - 27

विष्णोः पृष्ठे चे वामे नरभवनमनर्थप्रदं दक्षिणे चा-
प्यग्रे भागे च कालीनरहरिशिवतद्भिन्नसर्वोग्रमूर्तेः ।
आर्यो निम्नस्थलस्थो चदि मनुजगृहं दक्षिणेऽग्रेऽस्य तस्मा-
दुच्चत्वं नेष्टमिष्टं निकटमपि तदन्यत्र तत्पादभाजाम् ।।

Houses in the rear and left side of *Viṣnu* and in the front and right sides of *Kāli*, *Narasimha*, *Śiva* and all other fierce deities will cause misfortunes. If the deity is placed in a low location, houses in the right and front sides are not auspicious and, therefore, high position (of houses with respect to the temple) is not desirable. For those who depend on 'Him' (deity), proximity (of house) is permissible but only in other locations (viz. locations other than that indicated as bad).

Commentary

The prescriptions given in this stanza are probably to restrict the buildings to certain specified sectors. In India, after the 5th century AD, temples used to be the centres of settlements. Hence the zoning regulations are prescribed relative to the temple. This has the advantage that the rules will be strictly followed because of their link with the temple. For obvious reasons, the restriction need not be applied strictly for those who work in temples, but even they should avoid close proximity within restricted zones. The general rule is that the rear and left sides of *saumyamūrttis* (gentle deities) and front and right sides of *ugramūrttis* (fierce deities) are to be avoided. Houses elevated from the location of deities are also not auspicious.

OTHER ZONING RESTRICTIONS

Stanza- 28

व्रीहिक्षेत्रादिदेवालयजलधिनदीतापसागारगोष्ठ-
ग्रामादीनामतीवान्तिकमपकुरूते नैकधा मन्दिरेषु।
देवागारान्नरा़णामतिशुभदमिदं किञ्चिदूनं समं वा
तस्मादभ्युन्नतं च द्वितलविधिरयं नेष्यते तत्समीपे।।

For residences, close proximity to paddy field, mountain, temple, ocean, river, hermitage, cattle-shed etc. is dangerous in several ways. Houses equal to or lower than the height of the (local) temple are very propitious. House taller than that (temple) and two-storied houses are not desirable near it (temple).

Commentary

Building of houses near oceans, mountains, paddy fields and rivers is not safe. The security of the structure and its residents may be the major consideration in placing this restriction. The restriction with regard to temple, hermitages, fields etc. is for protecting such places from the encroachment by men. Proximity to cattle-sheds is not good from sanitary and health considerations. The prohibition against the buildings taller than the near-by temple is understandable for nobody should have the arrogance to go above God.

DESIGNATION OF SITES FOR DIFFERENT CLASSES

Stanza - 29

विप्रादिक्रमतः कुशेषुवनदूर्वाकाशयुक्ता भुव-
स्तुल्यातानवितानसिन्धुररसाब्ध्यंशाधिदीर्घा अपि।
श्वेता पाटलपीतमेचकरुचश्चाज्यासृगन्नासवा-
मोदाः स्वादुकषायतिक्तकटुकास्वादान्विताश्च स्मृताः ।।

Lands which have grass varieties such as *kuśa*, *darbha* (*Imperata bipinnata*), *dūrva* (*Cynodond actylon*), *ākāśa* (*Arundo donax*), length equal to or 1/8, 1/6 or 1/4 more than the width, (with soil having) white, red, yellow and black colour, smells of ghee, blood, cooked rice, alcohol and have sweet, bitter, sour, hot tastes, are good for *brahmanas* and other categories in the order (*brāhmaṇas, kṣatriyas, vaiśyas* and *sūdras*)

Stanza - 30

विप्राणां भूरवागुन्नतधनदनतोदुम्बराढया शुभा स्यात्
प्राङ्निम्ना वारुणोच्चा चलदलसहिता भूः शुभा बाहुजानाम्।
प्रागुच्चाब्धीशनिम्ना वटतरूसहिता भूर्विशां पादजानां
सा सप्लक्षा तथा चेद् यमनतधरणी चान्यथा सर्ववर्ज्या:।।

For *brāhmaṇas*, land which is high in the south and low in the north and having *udumbara* tree is good. Land which is low in the east and high in the west and having *aśwattha* is propitious for *kṣatriyas*. Land which is high in the east and low in the west with *vata* tree is good for *vyśyas*. Same type of land (as that for *vysya*) if low in south is good for *sūdras* if it has *plakṣa* tree. Otherwise, it is to be avoided by all.

Commentary

Classification of land for the 4 categories of people is shown in **table.01.01**. The classification is based on the habits and work of the different classes. Perhaps this was a broad system of designation of land into 4 types based on the shape, soil type and vegetation conveniently categorised as *brāhmaṇa's* land, *kṣatriya's* land etc. The nomenclature was only an aid for prioritising. Later it came to be adopted for the four *varṇas* into which Indian society was divided. This however, served as a way of zoning of land for different

varnas (see also the commentary on stanza 21 of this chapter). It may be viewed as a reservation which will not be encroached by others. *Ksatriyas* may require land for *kalari* (training) and hence have land longer than that for *brahmana*. *Vaisyas* require land for drying and storing grains etc. and *sudras* may require land for farming, work sheds etc. Hence these two categories get larger plots. The prescriptions also ensured that one social group will not displace another from its habitat, by power or money.

TABLE.01.01

CLASSIFICATION OF LAND ACCORDING *VARNAS*

Charactertistic	*Brahmanas*	*Ksatriyas*	*Vysyas*	*Sudras*
Herb	*Kusa*	*Dharbha*	*Durva*	*Akasa*
Length to Width ratio	1	1 1/8	1 1/6	1 1/4
Colour of soil	White	Red	Yellow	Black
Smell of soil	Ghee	Blood	Cooked rice	Alcohol
Taste of soil	Sweet	Bitter	Sour	Hot
Ground sloping down to	North	East	West	South

OMENICAL TESTS OF SITE SELECTION

Stanza - 31

सङ्कीर्णरूपा वसुधात्र वर्णौर्गन्धै रसैश्चाखिलवर्जनीया ।
एनामनालक्षितवर्णचिह्नां नक्तं परीक्षेत निमित्ततश्च।।

If the characteristics of colour, smell, taste are mixed, such a land should be avoided by all. Land with unknown characteristics should be tested with omens in the night.

Stanza - 32

क्ष्मां खात्वामघटं निधाय भृतधान्यं वर्धमानं मुखे
कृत्वा सिच्य घृतं निशासु सितरक्ता पीतकृष्णा दशा ।
विप्रादिक्रमतः प्रदीप्य विधिवन्नीते मुहूर्ते ज्वलेद्
वर्तिर्यस्य धरास्य तासु सकलास्विद्धासु सर्वोचिता ।।

After excavating a pit (1 *hasta* square and 1 *hasta* deep), place a raw earthen vessel filled with grains and cover it with another earthen vessel. Pour ghee and with chanting of hymns, light wicks of white, red, yellow and black colours respectively pointing to the four cardinal directions starting with east (in clockwise direction). The land is suitable for that category whose wick continues to burn after some time. If all wicks burn, it is suitable for all.

Stanza - 33

भूगर्ते जलपूरितेऽत्र विधिवद् द्रोणादिपुष्पं क्षिपेत्
प्रादक्षिण्यगतिः शुभं सुमनसां यद्यन्यथा निन्दितम् ।
पुष्पो दिक्ष्वथ संस्थिते सति शुभं कोणेषु चेन्निन्दितं
ज्ञात्वेत्यादिशुभाशुभान्यथ समीकुर्यात् क्षमां सूक्ष्मधीः ।।

In the pit filled with water place flowers like *droṇa*. If the flowers travel clockwise, it is propitious; it they travel anti clock wise, it is not good. If the flower settles at any cardinal direction, it is good, but if it settles in the angular direction, it is not good. Knowing these good and bad omens, the wise one should level the ground.

Commentary (Stanzas 31,32 and 33)

The stanzas show that much importance was attached to selection of the site. For the selection of land, three processes are prescribed: reconnaisance, investigations and

examining the omens. It has been mentioned in stanza 18 that odd shapes are not desirable. Undulated ground and ground with central mount or depression are also not good because these may cause stagnation of water, additional expenses in levelling etc.

Investigation of the herbs and trees will indicate the fertility of the soil. The time required for germination of seeds will show moisture content and the extent of pests. The presence of rodents, reptiles, birds etc. in the site also will give an indication regarding its suitability. *Sthapathi*, who should be well versed in all *sastras* should be able to judge the quality of land from these observations. Similarly, the *sthapati* is expected to walk around in the site to find out whether there are cavities in the soil.

The test for finding out consolidation has been mentioned in stanza - 19. Similarly permeability is tested by filling the excavated pit (of 1 *hasta* cube) with water and observing the decrease in water level after the *sthapati* walks 100 steps backwards and returns to the pit.

The examination of the omens is done in addition to the elaborate reconnaisance and investigations. This may be due to fact that in those days, when all aspects could not be fully investigated and rationally assessed, recourse to omens was necessary to assure oneself with the correctness of what one is doing. It may however be noted that the omenical tests were given only low importance as compared to observation and investigations. There are many anomalies in the omenical tests. The colours of the wicks for example do not match with the directions of ground slopes recommended for the four *varṇas*. The white coloured wick recommended for brahmins is placed pointing east directions, which is recommended for *kṣatriyas* and so on. The flower test is to be analysied for motion (clockwise and anticlockwise), and also for its final position. This position

is also not related to any particular *varṇa*. All these indicate that omenical tests were a later addition to the science of site selection.

It has also been stated by *Varāhamihira* in *Bṛhatsamihita* that if the owner likes a site, then the investigations can be, dispensed with and the site accepted (Ref.01.11). This means that the owner's intuition and also his belief that the particular site is suitable for achieving his wishes are of paramount importance. Moreover, even a site with undesirable characteristics can be made better by levelling operations and landscaping including planting suitable trees and herbs. Therefore, *Varāhamihira* may be taken as a guide in the present day context in the mattter of selection and development of the site for building.

REFERENCES

01.01 वस्तुज्ञानमथातः कमलभवान्मुनिपरम्परायातं
क्रियतेधुना मयेदं .... । **B.S., LIII - 1**

01.02 न च ब्रह्मा न विष्णुश्च न च रुद्रश्च तारकाः ।
सर्वशून्ये निरालंबे स्वयंभूर्विश्वकर्मणे ॥ **M. P.**

01.03 ब्रह्मैव स्थपतिः साक्षात्
यजमानः स्वयं हरिः ।
आचार्यो भगवान् रुद्रः
.... **V.V., XV -18**

01.04 स्थपतिः स्थापनार्हः स्यात्
सर्वशास्त्रविशारदः ।
....
वास्तुविद्याब्धिपारगः । **M. M., V-15 to 18**

01.05 स्थपतिः सर्वशास्त्रज्ञः .... । M.S., II - 12

01.06 पूर्वं भूमिं परीक्षेत
पश्च्वाद्वास्तुं समारभेत् । V.V., II - 1

01.07 सुपद्मा भद्रका पूर्णा धूम्रा चेतिश्चतुर्विधा ।
भूमिस्तुलक्षणं तासां क्रमेणोपदिशामि ते ॥ P. S., I - 22

01.08 पूर्वप्लवा वृद्धिकारी
उत्तरा धनदा स्मृता ॥ V.V., II - 3

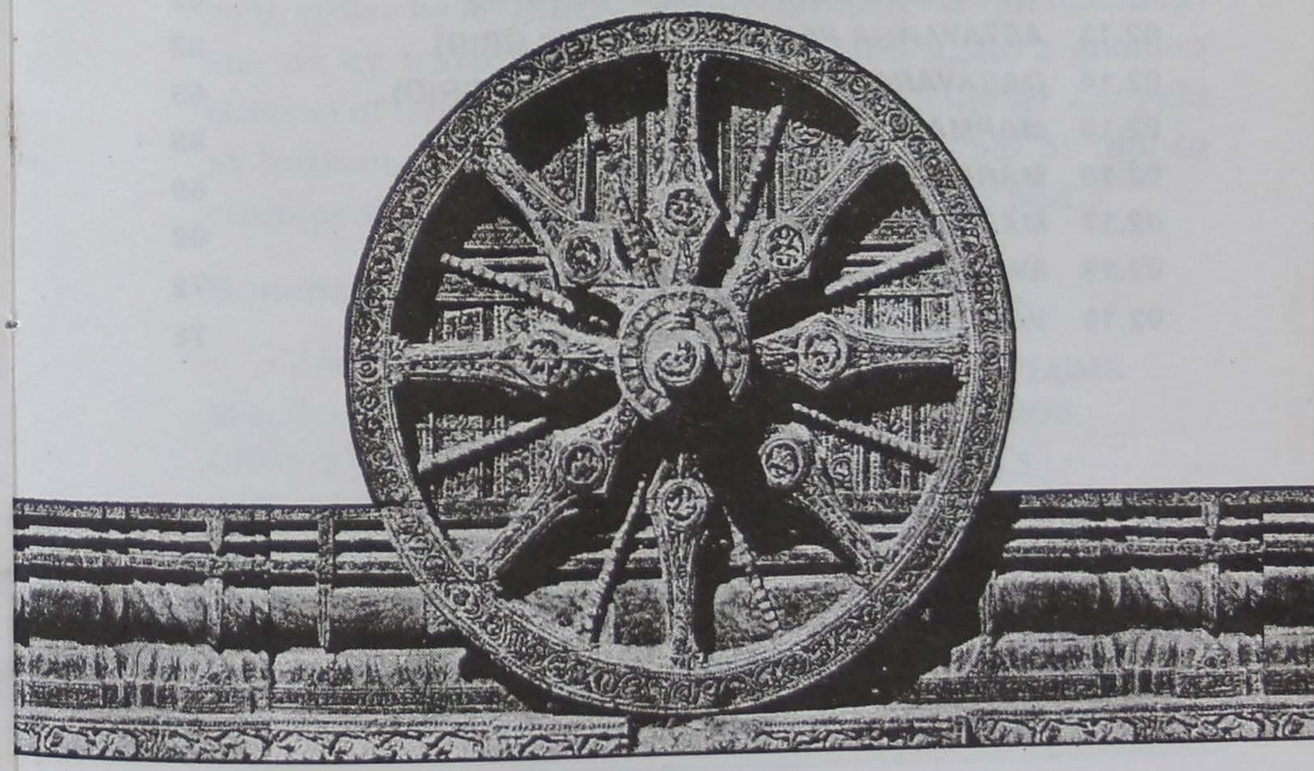
01.09 निष्कपाला निरुपला कृमिवल्मीकवर्जिता ।
अस्थिवर्ज्यानसुषिरा तनुवालुकसंयुता ॥
....
बहुप्रवेशमार्गं च मार्गविद्धं च गर्हितम् ।
M.M., II -10 - 18

01.10 उदगादिप्लवमिष्टं विप्रादीनां प्रदक्षिणेनैव ।
विप्रः सर्वत्र वसेदनुवर्णमथेष्टमन्येषाम् ॥
B.S., LIII - 61

01.11 तत्तस्य भवति शुभं यस्य च यस्मिन् मनोरमते ।
B.S., LIII.65

2
ANALYSIS OF SITE
वास्तुविन्यासविधिः

Determining cardinal directions; divisions of plot; vithīvinyāsa; vulnerable points; padavinyāsa; Vāstupuruṣasankalpa; deities in the cells.



LIST OF ILLUSTRATIONS

CHAPTER - 2
अथ द्वितीयोऽध्यायः
ANALYSIS OF SITE
वास्तुविन्यासविधिः

LEVELLING THE GROUND

Stanza - 1

यन्त्रेणावनतादिना च निपुणो यद्वाम्बुसम्पूरणे-
नोरविं चारु समीकरोत्वथ दृढं शङ्कुं करार्धायतम् ।
मूले द्व्यंङ्गुलविस्तृतः क्रमवशादग्रे तदर्धोन्मित-
व्यासं वृत्ततरं सरोजमुकुलाकाराग्रमाकल्पयेत् ।।

Let one, well-versed in the techniques, level the ground well, either by levelling equipments like A - frame (*avanata*) etc. or by water level. Then he should make a gnomon (*śanku*) of length equal to half *hasta* and diameter 2 *angula* at bottom, gradually tapering to one *angula* at top, in circular shape, with its top shaped like a lotus bud.

Commentary

After choosing the site, the *sthapati* should offer prayer to God with inclamations of *svasti* and *jaya* (Ref. 02.01). Then the site should be levelled and the directions marked.

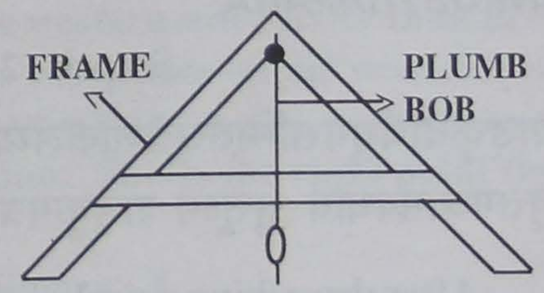


FIG.02.01
***AVANATA* FOR LEVELLING**

The first half of this stanza describes the levelling operation (*samīkaraṇa*) using instruments or water line. The common levelling instrument used is the A-frame (*avanata*) (**fig.02.01**). The texts describe in detail the procedure for making the A frame. The A frame should be calibrated with reference to the water level in a pit. For this a pit is filled with water and two poles are fixed in the pit such that their tops are in level with the still water level. The two-inclined limbs of the frame are placed on these poles such that the vertex is at top. Then from the vertex a cord with a plumb bob is suspended. The line where the cord touches the base is marked by a chisel.

Either the entire land is levelled or at least an area of 1 *daṇḍa* square (2.88m x 2.88m) should be levelled in the middle of the plot for *śankusthāpana* (*tanmadhye daṇḍamātram vā*). The gnomon described in this stanza is for demarkating the centre of the plot and for use in determining the cardinal directions as described in the subsequent stanzas. The height of 1/2 *hasta* prescribed is the height above ground. The actual length should be more than this for fixing in the ground. *Mayamata* describes that *sanku* may be of ivory, sandal wood, *khadira* wood (*Acacia catechu*), *śami* wood (*Propsopis julisflora*) or *śāka* (*Tectona gramdis*) wood (Ref.02.02). This only means that strong material should be used.

ŚANKUSTHĀPANA

Stanza - 2

शङ्कुदीर्घयुगसम्मितसूत्रेणाकलय्य परिवृत्य सुवृत्तम् ।
वृत्तमध्यमवधार्य सुसूक्ष्मं शङ्कुमत्र सुदृढं निवेशयेत् ।।

After describing a circle with a radius equal to twice the length of the gnomon and correctly observing the centre of the circle, here the gnomon has to be fixed firmly.

Commentary

The fixing of the gnomon (*śanku*) is called *śankusthāpana*. As this is the first act to be done in the construction, it is considered as important. Moreover fixing the gnomon is necessary in determining directions, which is basic to proper orientation of building. Therefore auspicious time is selected for *śankusthāpana*. The fixing of the gnomon and marking the cardinal directions are to be done either by the *sthapati* himself or by his disciple. *Mayamata* recomends the morning time in *śuklapakṣa* of *uttarāyana* (Dec.23 to June 22)(Ref.02.03) for this act.

FIXING THE CARDINAL DIRECTIONS

Stanza - 3

शङ्कुच्छायाग्रभागे त्ववहितहृदयो वृत्तलग्नेऽङ्कयित्वा
प्राह्नान्ते पश्चिमस्यां (मायां?) दिशि तदितरदिश्येवमेवापराह्ने ।
पाश्चात्येऽन्येद्युरप्यङ्कनमपि च विधायाङ्कयोरेतयोर-
प्यन्तर्भागत्रिभागे नयतु गतदिनोङ्कं तदेवेह सूक्ष्माम् ।।

With a calm mind, the intersections of the shadows of the top of the gnomon with the circle should be marked on the west side in the morning and similarly on the east side in the evening. Then next day also, the intersection should be marked on the western side. After that, divide the distance between the two points on the west side into 3 parts and mark the one-third point nearest to the previous day's intersection. This is the right point there (i.e. west).

Stanza - 4

पूर्वापरेद्युः प्रभवाङ्कयुग्ममेवं सुसूक्ष्मं परिकल्पितं यत् ।
तदङ्कयुग्माहितसूत्रमेव पूर्वापराशाप्रभवं सुसूक्ष्मम् ।।

Thus what have been decided on the previous and next days, the line joining these two points will correctly generate the east and west directions.

Stanza - 5

एवं क्षेत्रस्य मध्ये सुविहितमिह यद् ब्रह्मसूत्रं तदाहु-
स्तन्मध्येऽन्योन्यमन्तर्गतमथ रचयेद् वृत्तयुग्मं च धीमान् ।
तद्योगात् तिर्यगुद्यज्झषजठरसुषुम्नाध्वना सूत्रमेकं
याम्योदग्गामि सूक्ष्मं रचयतु यमसूत्रं तदित्यामनन्ति ।।

Here the line marked thus in the middle of the site (*kṣetra*) is called *Brahmasūtra*. In its middle, two circles intersecting each other should be constructed. Through the centre line of fish-shaped figure obtained from the intersection of the circles, a cord should be stretched in the south-north directions. This is known as *Yamasūtra*.

Commentary (Stanza 3,4 and 5)

The procedure for marking the cardinal directions described in stanzas 3 and 4 is shown in **fig. 02.02**. After levelling the ground, a gnomon (*śanku*) of height (above the ground) half *hasta* (36cm) is driven into the ground (A). With P as centre and one *hasta* radius, a circle is described on the ground. The points where the shadows of the tip of the pole touch the circle in the forenoon and in the afternoon are marked. The line joining these two points (W_1,E_1) gives the approximate W-E directions. Due to the declination of the sun (*uttarāyana* and *dakṣiṇāyana*), the shadows of the tip of the pole do not fall on the same points next day. In order to get the correct direction, the point where the shadow of the tip of the pole touches the circle next day morning (W_2) is also noted. If the sun is in *uttarāyana*, this point will be to the south of the precious days' point and if the sun is in *dakṣiṇāyana* this point will be to the north of the last day's

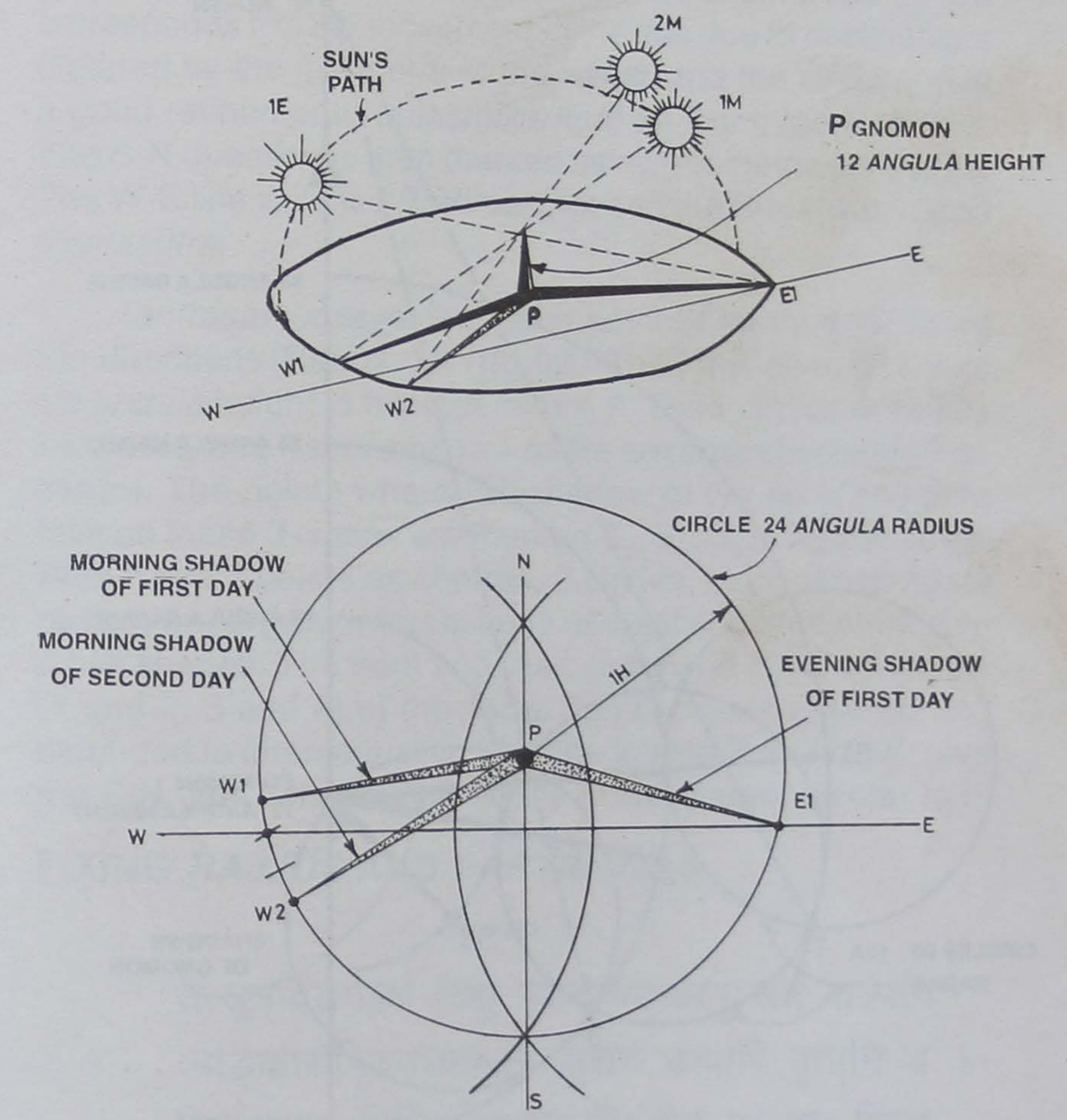


FIG.02.02 FIXING CARDINAL DIRECTIONS BY SUN-SHADOW METHOD

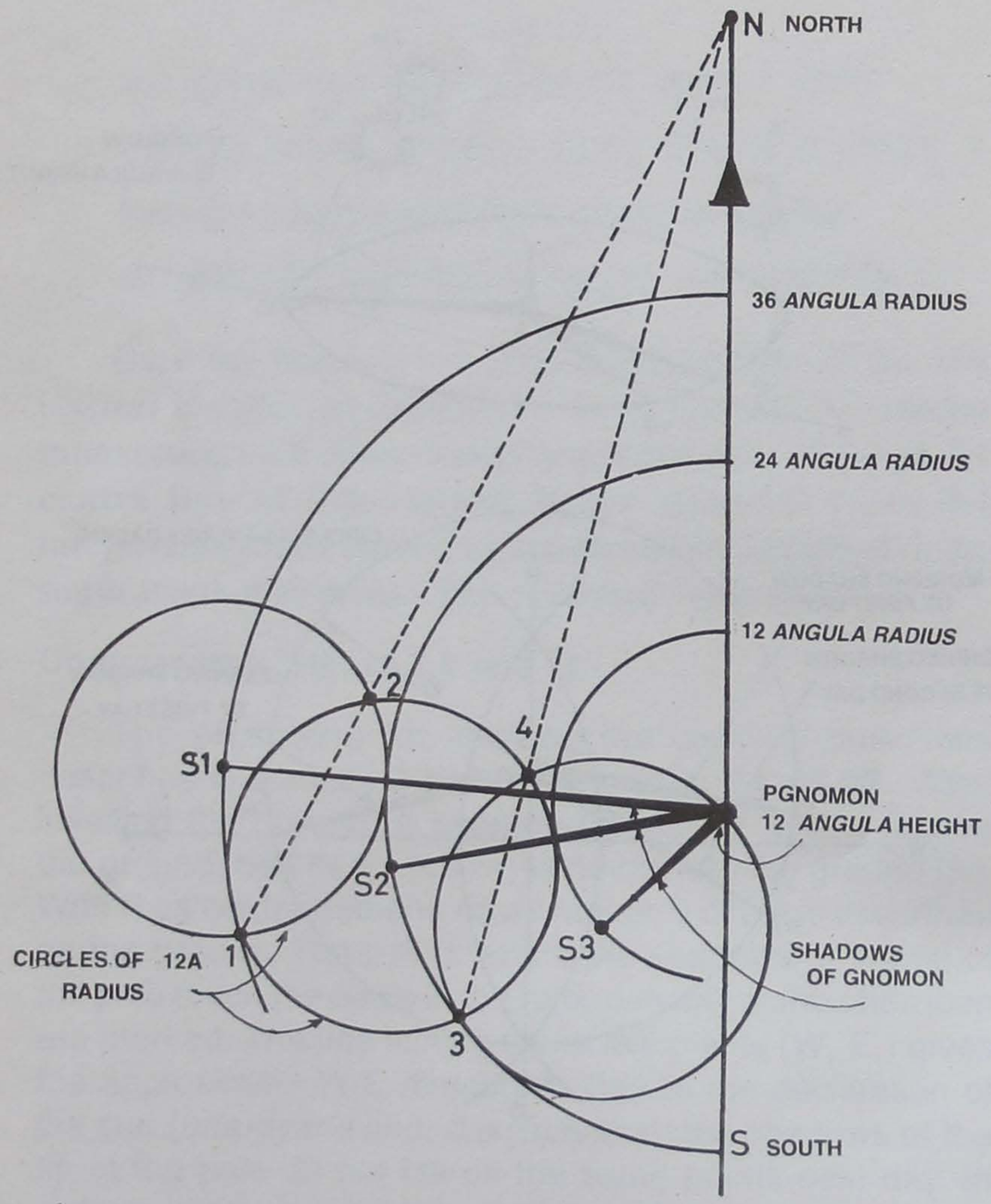


FIG.02.03 FIXING CARDINAL DIRECTIONS BY ALTERNATING METHOD

point. In either case, the distance between W_1 and W_2 is divided into 3 parts and the point W_3 nearer to W_2 at a distance equal to one-third of the distance W_1W_2 is joined to E_1 to get the W-E direction. The shift of the point by 1/3 corresponds to 120° movement of the sun due to declinations dictated by the geometry of the *sanku* and the circle and is a good refinemennt (*sūkṣmīkaraṇa*) on fixing the E-W line. The S-N direction is then marked using geometric principles. The W-E line is called *Brahmasūtra* and the S-N line is called *Yamasūtra.*

Tantrasamuccaya describes another method for fixing the directions (Ref.02.04) (**fig.02.03**). In this also, a pole of 12 *angula* height is fixed at centre P. Then circles of radius 1/2 *hasta*, one *hasta* and 1 1/2 *hasta* are described with P as centre. The points where the shadow of the tip of the pole falls on these 3 circles are marked S_1, S_2, S_3 in figure 02.03. With these 3 points as centres, 3 circles, each of half *hasta* radius, are drawn. Intersections of adjacent circles will give 2 fish shapes. The front and rear, *(agra* and *puccha),* points (1 and 2; 3 and 4) of the same fish figures are joined and extended to intersect at N. The line joining P and N will give the S-N direction the W-E line is drawn perpendicular to it.

FIXING *RAJJUS* AND *PARYANTA*

Stanza - 6

तत्सूत्रद्वितयेऽथ दिक्षु चतसृष्वङ्कान् समं कल्पयि -
त्वाङ्कारोपितमध्यकानि सुसमं चत्वारि वृत्तानि च ।
सिध्यन्त्यत्र विदिक्षु वृत्तयुगलीयोगेन मत्स्याः शिवा-
ग्न्यग्रास्तद्गतसूत्रयुग्ममपि चात्राब्ध्यश्रमाकल्पयेत् ।।

Then mark points at equal distances from the centre on the four sides on these two lines (*sūtras*). With these points as centres, draw four circles of same diameter. Here through the intersection of the four circles, there

will be 4 fish shapes in the corners with their front (*agra*) points in N-E (*Śiva*) and S-E (*Agni*) corners. Here through these (fish figures), two (diagonal) lines are to be drawn. Also the square (*abdhyaśra*) (should be completed).

Commentary

The lines inclined at 45° to the *Brahmasūtra* and *Yamasūtra* are called *rajjus*. Literally *rajju* means rope and *sutra* means cord. The use of *rajjus* will be described subsequently. The major diagonals are called *karṇas*. This stanza describes the method of drawing the diagonals.

The four cardinal directions (*dik*) and the four corner directions (*vidik)* are each assigned to a specific regent (*Lokapāla*) as shown in **figure 02.04**. It has been stated earlier that square plots are desirable for constructing buildings. If the site is not square, a square of the desired dimensions should be demarkated with the *Brahmasūtra* and *Yamasūtra* as the co- ordinate axes. This is the building plot (*vāstukṣetra*). The major lines of this *Vāstumaṇḍala* are shown in **fig.02.05.**

The *rajjus* are the diagonals including *karṇasūtra* and *mṛtyusūtra* (see fig.02.05). As already stated, *rajju* literally means a rope and *sūtra* means cord. Here the square site is defined with reference to the two axes, the *Brahmasūtra* and the *Yamasūtra*. The point of intersection of the axes is the origin or focus (*Brahmanābhi*). The square is marked by lines parallel to the axes at equal distances from the origin. The bounding lines of the square are called *paryantasūtra*. The diagonals are called *karṇasūtras* and indicate the corner directions. The circle inscribed in the square is called *naga* (snake) *sūtra*. The four sides of square inscribed in the circle are called *śūlasūtras*.

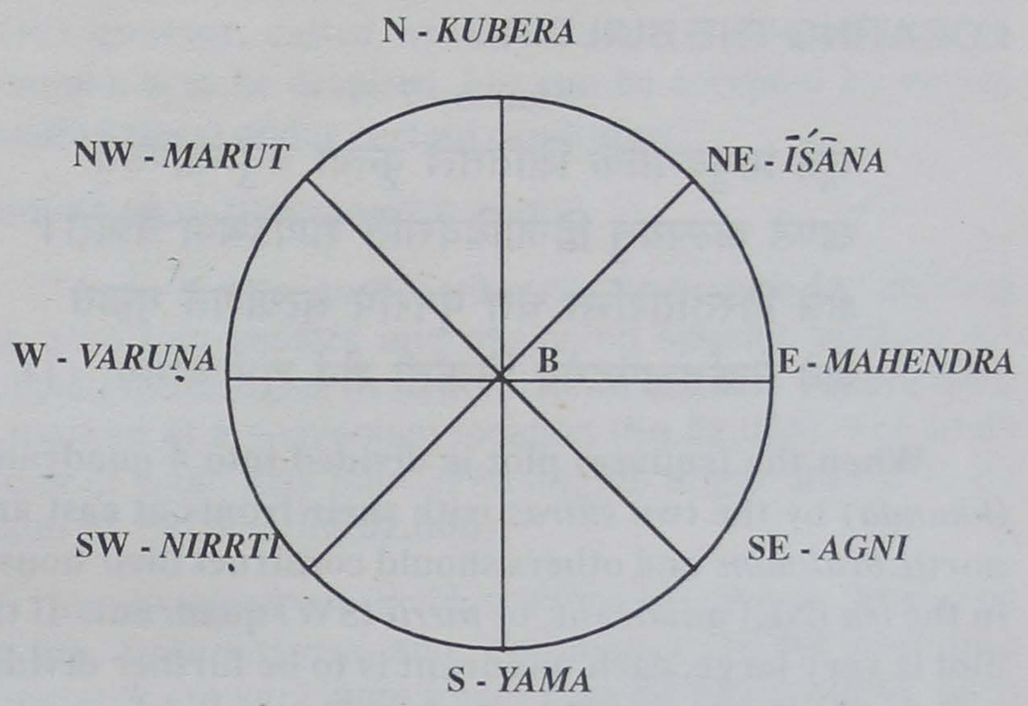
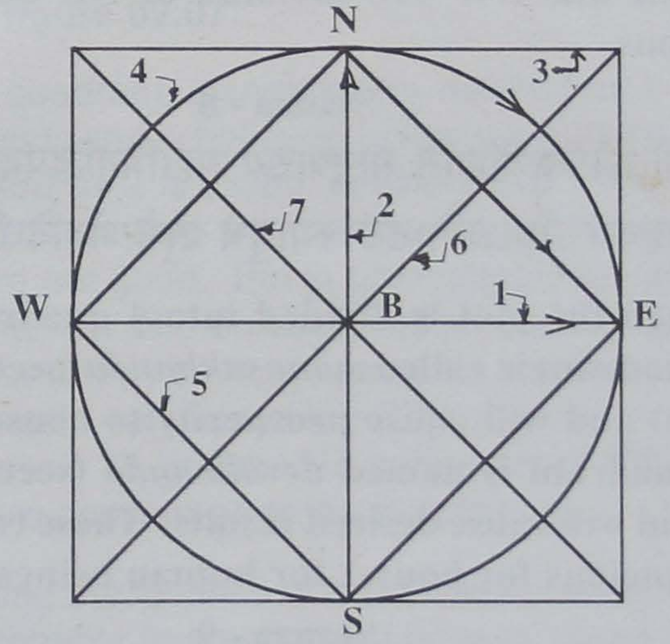


FIG.02.04 REGENTS OF EIGHT DIRECTIONS



B - *BRAHMANĀBHI* (1) *BRAHMASŪTRA* (2) *YAMASŪTRA*
(3) *PARYANTASŪTRA* (4) *NĀGASŪTRA* (5) *ŚŪLYASŪTRA*
(6) *KARṆASŪTRA* (7) *MṚTYUSŪTRA*

FIG.02.05 IMPORTANT REFERENCE LINES OF *MANDALA*

DIVIDING THE AREA INTO SECTORS FOR LOCATING THE BUILDING

Stanza - 7

सूत्रे प्रागुदगग्रके क्षितितले कृत्वा चतु:खण्डिते
खण्डे कल्पयतु द्विजादिवसतिं शार्वेऽथवा नैर्ऋते।
क्षेत्रे विस्तृतिरस्ति चेत् पुनरपि श्रुत्यंशिते गृह्यते
शैवे नैर्ऋतखण्डमेव निर्ऋतौ शैवं शुभं चोभयो :।।

When the (square) plot is divided into 4 quadrants (*khaṇḍa*) by the two *sūtras* with their fronts at east and north, *brahmins* and others should construct their houses in the *īśa* (NE) quadrant, or *nirṛti* (SW) quadrant. If the plot is very large, each quadrant is to be further divided into 4 sub-divisions and both the NE sub-division of SW quadrant and SW sub-division of NE quadrants are auspicious.

Stanza - 8

धात्रीतलेऽब्ध्यंशिनि मानुषाख्यं गृहाभिवृद्धिप्रदमैशखण्डम्।
देवाह्वयं नैर्ऋतमिष्टदं स्यादुभे शुभे गेहविधौ नराणाम् ।।

When the plot is divided into 4 quadrants, the *isa* (NE) quadrant is called *mānuṣakhaṇḍa* (sector related to humans) and will cause prosperity to house. The *nirṛti* (SW) quadrant is named *devakhaṇḍa* (sector related to gods) and will cause desired results. These two quadrants are auspicious for houses for human beings.

Stanza - 9

आग्नेयखण्डं यमसंज्ञितं स्यान्मृतिप्रदं चाखिलवर्ज्यमेतत् ।
वायव्यमप्यासुरसंज्ञितत्वान्निन्द्यं विशां क्वापि च गृह्यते तत्

The *āgneya* (SE) quadrant, called *yamakhaṇḍa* (sector

related to god of death), will cause death and the *vayavya*, (NW) quarter, called *asurakhanda* (sector related to demons), is to be despised, but can be accepted by *vysyas* (trading class) under certain conditions.

Commentary (Stanzas 7,8 and 9)

These 3 stanzas describe the procedure for dividing the area into sectors and assigning specific sectors for building the houses. In large plots, a suitable square area is marked at a convenient location (**fig.02.06a**). For small areas of width less than 32*hasta*, the entire area is to be taken as the plot (**fig.02.06b**).

Larger areas are divided into 4 quadrants (*khandas*) by the *Brahmasutra* and *Yamasutra*. If the resulting quadrants are very large (more than 64 *hasta* width), each quadrants is to be sub-divided again into 4 units (*upakhanda*) as shown in **figure 02.07**.

The NE quadrant, *isanakhanda*, marked as 1 is called *manusyakhanda* and is believed to bestow welfare. The SW quarter marked as 2 is called *devakhanda*. These two are auspicious for putting up houses while the other two quadrants are not good. But in unavoidable situations, the NW sector marked as 3 be accepted for putting up houses. The SE sector marked 4 is not good for houses. When the sectors are again subdivided the (SW subsector of the NE quardant marked 12 and the NE subsector of SW quadrant marked 21 are considered to be auspicious).

Restricting the location of buildings in certain specified sectors is probably to stagger the houses about the street in order to avoid crowding and to provide ventilation and privacy (**fig.02.08**).

Brhatsamhita summarises the dimensions of plots (Ref.02.05). These are shown in **table 02.01.**

DESIRABLE SIZES OF PLOTS FOR DIFFERENT CLASSES OF PEOPLE

Class	Width of the plot in *Hasta*	Width to length ratio
Brahmana	32 28 24 20 16	1:1 1/10
Kṣatriya	28 24 20 16	1:1 1/8
Vaiśya	24 20 16	1: 1 1/6
Sūdra	20 16	1: 1 1/4
Caṇḍāla	16	1: 1 1/2

When plots of less than 32 *hasta* width are divided into 4 *khandas*, the individual *khaṇḍas* will be less than 16 *hasta* in width. Hence such plots are considered as small plots (*alpakṣetra*) and the entire plot is taken as house plot (*gṛhamaṇḍala*). In such cases, the centre of the house (*grhanabhi)* marked G should be in the auspicious sector (*Īśāna*, *Nirṛti*, or *Vāyu*) (**fig.02.09**).

SQUARING THE SITE

Stanza - 10

भूपादिवर्णनियमेन यमोदगाया-
मोपेतमध्यचतुरश्रमहीतले तु ।
कर्णाध्वना निर्ऋतिमारुतकोणमूल -
शैवानलाग्रभवसूत्रयुगं हि रज्जुः ।।

In the sites suitable for *kṣatriyas* etc., after making the site square by leaving the elongations (*āyāma*) at the south and north ends, two lines have to be assumed with their rear ends (*mūla*) at *nirṛti* (SW) corner and *vāyu* (NW) corner and their front ends (*agra*) at *īśāna* (NW) and *agni* (SE) corners. These lines are called *rajjus*.

Commentary

In Stanza 29 of chapter 1, it has been prescribed that

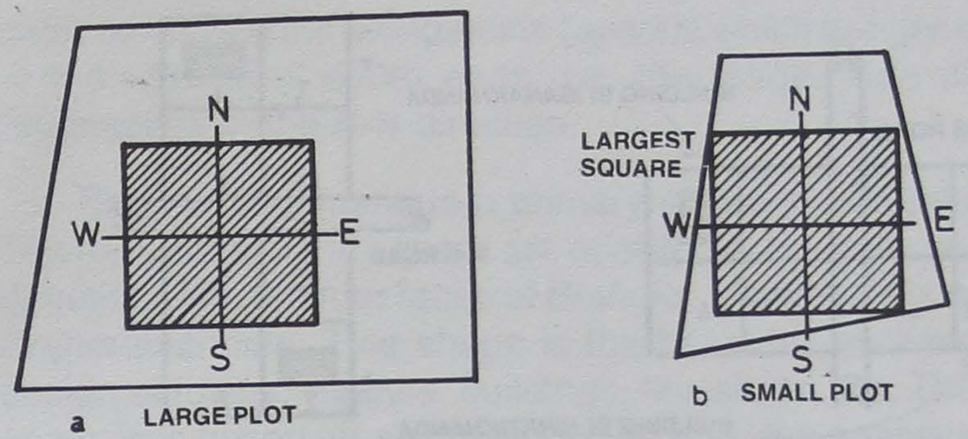


FIG.02.06 FIXING *VĀSTUKṢETRA*

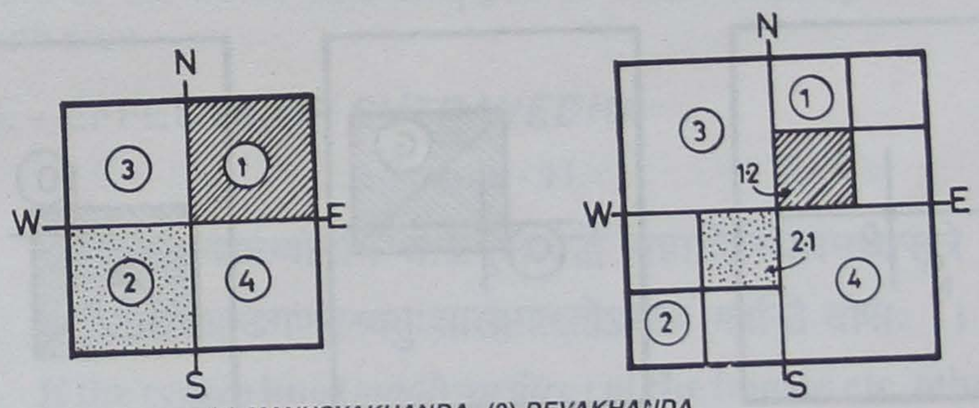


FIG.02.07 DIVIDING *KṢETRA* INTO *KHANḌAS* (SECTORS) AND *UPAKHANḌAS* (SUB-SECTORS)

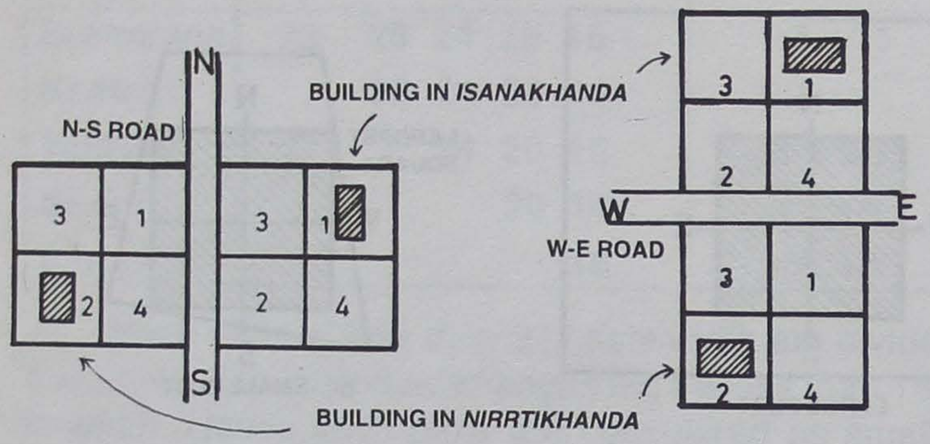


FIG.02.08 STAGGERING BUILDING LOCATIONS BY RESTRICTING TO SPECIFIED SECTORS.

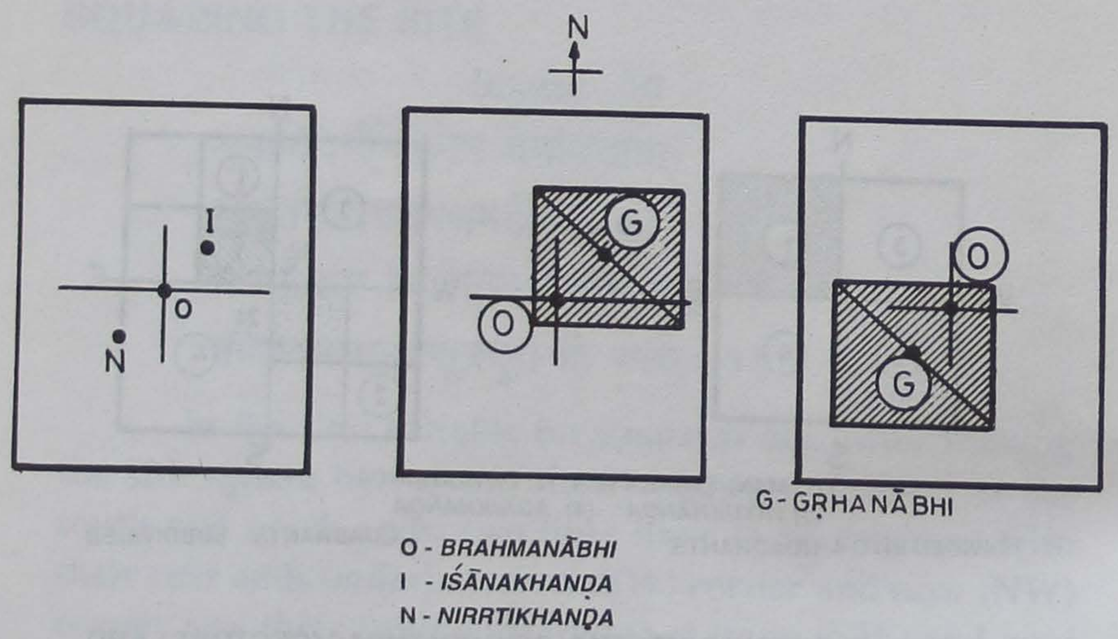


FIG.02.09 PROCEDURE FOR LOCATING BUILDINGS IN SMALL PLOTS

the length to width ratio should be 1 1/8, 1 1/6 and 1 1/4 for *kṣatriyas, vysyas* and *sudras* respectively. From these rectangles, a square area has to be taken as the *vāstuksetra* (site) by leaving the elongations (*ayama*) which are generally in the north and south ends, i.e, the longer side of the rectangle is in the S-N direction.

Square (*caturasra*) is a primary shape in *Vāstusastra*. The four sides of the square are oriented in the four cardinal directions like the four faces of *Brahma*. Hence this is called *Brahmamandala*. This shape is the basis for evolving the design of towns, villages, buildings, fire-altars, etc. The site analysis is based on a square *ksetra*. After the analysis, the deductions can be transferred to other shapes.

In olden times, the portions of land left out at the south end is used as ground for cremating the dead and that on the northern side used for disposing the placenta after a child's birth. It is believed that the god of birth (*Soma*) keeps guard in the north side and god of death (*Yama*) on the south side.

ILL - EFFECTS OF *SUTRAVEDHA*

Stanza - 11

सूत्रस्य रज्ज्वोरपि चाग्रमूलैर्विद्धे गृहादिस्थितमध्यसूत्रे ।
हीनायतिप्राङ्गणतश्चतुःशालागारतोऽन्यत्र भवन्ति दोषाः ।।

If the centre line (*madhyasūtra*) of the houses etc. other than that of a square-shaped *catussala* (buildings with central courtyards) passes through the front of rear ends of the *sūtras* and *rajjus*, inauspicious results will occur.

Commentary

The *Brahmanabhi* is considered as centre of *maṇḍala* and the segments of *sūtras* or *rajjus* on the sides are called rear and front ends. The passing of the centre-line of the

building through the rear or front ends of the two *sutras* and two *rajjus* is called *vedha* (crossing). It is prescribed that when the buildings are designed, *vedha* should be avoided. This is for marking the two sets of lines (*sūtras* and *rajjus*) without confusion or difficultly during the construction and during subsequent works of repair, alteration or addition. In the case of square *catuśśāla,* with square *ankana* and symmetry on both axis, built in the *vāstukhaṇḍa*, this is not possible. It is impossible to design the corner houses (*vidikśālas)* without their diagonal axes passing through the ends of the *rajjus.* It is also not possible to align the side houses *(dikśālas*) without their centre lines coinciding with the centre lines of the *ankaṇa* (central courtyard). However, such *vedha* could be still avoided by shifting the centre of the building (*gṛhanābhi*) marginally from the *brahmanābhi* along *brahma-sūtra* and *yamasūtra*. This shift is called *gamana.*

Vedha should not occur not only for the main house, but also for cowshed, gate house, well, etc. The centre line of columns and that of the wall plates also should not be vitiated by *vedhadoṣa.*

Stanza - 12

प्रागादि क्रमशः स्याद् वेधफलं पतिवियोगकुष्ठरुजौ ।
रिपुपीडात्मजधनहान्यनिलरुजः स्वकुलधान्यहान्याद्या : ।।

The results of *vedha* in the east side etc. (east, southeast, south, southwest, west, northwest, north and north east) are separation from spouse, leprosy, harm from enemies, death of children, loss of wealth, rheumatism, destruction of family and loss of grains, in that order

Commentary

The ill effects of *vedha* are highlighted to emphasise the importance of avoiding *vedha*. In case of *vedha* in east end, the ill-effect is separation from the spouse. The bad-

effects when the *vedha* occurs in the other 7 ends are given in the clockwise order from SE to NE. The objective appears to be the creation of the fright in the mind of the builder/ owner, so that he will be taking all care to avoid *vedha.* Clearly the *vedha* rule has a vital technological significance.

THE WIDTH / THICKNESS OF *SUTRA*

Stanza - 13

क्षेत्रस्यैशादिखण्डे नवकृतिपदसम्भिन्नवास्त्वङ्गकोष्ठे -
ष्वेकस्यार्कांशितः स्याद् वितातिरिह महासूत्ररज्ज्वोः प्रसिद्धा ।
तत्तद्दिग्वर्गकाष्ठैर्विहितशतपदेष्वेककोष्ठे भभागो
विस्तारं सूत्ररज्ज्वोरहिकृतिपदभिन्नेष्वथैकाष्टिभागः ।।

When the *īśakhaṇḍa* etc.of the *kṣetra* is divided into 9x9 grid, the width of the *sūtra* and *rajjus* is taken as 1/12 of the division (*pada*). Similarly, in a 10x10 division, the width of the *sūtra* and *rajju* is 1/8 of one of the 100 divisions and when divided into 8x8 grid, it will be 1/16 of a division.

Commentary

The square plot (*maṇḍala*) is divided into a grid of several cells (*padas*) for specifying the locations. A *maṇḍala* of one single cell is called *sakalamaṇḍala* and that of 2x2 cells is called *pecakamaṇḍala.* A *maṇḍala* of 9 (3x3) cells with one central cell and 8 outer cells is called *pīṭha.* Similarly, grids of up to 1024 (32x32) cells *(indrakānta*) are described in *Mayamata* (Ref.02.06) The central point (*Brahmanābhi*) can, similarly, be considered as a null grid of 0x0 cells. Generally grids smaller than 7x7 divisions are adopted for altars, seats etc. and grids larger than 11x11 are used for temples and settlements. The grids recommended for house are:

7 x 7	*sthāṇḍila maṇḍala*
8 x 8	*maṇḍūka maṇḍala*
9 x 9	*paramāśāyika maṇḍala*
10x10	*āsana maṇḍala*
11x 11	*sthānīya maṇḍala*

Out of these, the 8x8, 9x9 and 10x10 grids are most commonly used for designing buildings all over the land. For these three grids, the width of the *sūtra* and *rajju* (grid lines and diagonal lines) is taken as 1/16, 1/12 and 1/8 of the width of a cell width respectively.

Specifying the width of the grid lines and diagonal lines is necessary to avoid *sūtravedha* described in stanzas 11 and in several subsequent stanzas. *Vedhadoṣa* is assumed to be absent when the centre line of buildings as described in stanza 11 and the constructions to be described later are outside the specified width of the *sūtra*.

Stanza - 14

समस्तगेहाङ्गणकूपवापीद्वारादिमध्यस्थितसूत्रवेध : ।
मिथः समस्तेष्वपि वर्जनीयो रज्ज्वोश्च कोणालयकर्णयोश्च ।।

In all houses, the *vedha* between each other of the centre lines of houses, cowshed, ancillary buildings, courtyard, well, tank, door, etc. and between the *rajjus* and the *karṇasūtras* of corner houses should be avoided.

Commentary

This stanza is really an elaboration of what has already been stated in stanza 11. The avoidance of *vedhadoṣa* should be observed not only between the cardinal *sūtras* and the centre line of the *śālas* of the house but also between the centre lines of different buildings and ancillary structures. Similarly the *karṇasūtra* (diagonal axis) of the corner houses and the diagonal lines of *maṇḍala* (*rajjus*) should not be vitiated by *vedhadoṣa i.e* they should not coincide.

Vāstuvidya says that *vedha* of the centre lines of houses cause destruction of the race (Ref.02.07)

The rule of *sūtravedha* is an important one in the design of *vastu*. As the reference lines (*sūtras*) are drawn through the central part of the plot (*maṇḍala* or *kṣetra*) and that of the building (*vāstu* or *harmya*), the relative dispositions of these points (*brahmanābhi* and *gṛhanābhi*) gain importance in the design.

MODULE FOR DECIDING THE WIDTH OF *VITHI*

Stanza - 15

वींथीविस्तृतिकल्पनासु बहुधा दण्डो भवेन्मेदिनी-
विस्ताराद् गृहकर्तृपूरुषसमोत्सेधोऽत्र तालो मतः ।
तालैस्तैर्दशनन्दवारणमितैर्दण्डस्त्रिधा तेषु तद् -
वीथीविस्तृतिमेकतो वितनुयाद् यद्यस्ति भूविस्तृतिः ।।

The *danda* (module) for deciding the width of *vithi* is of different kinds according to the size of the area. Here the height (*kaya*) of the person constructing the house is accepted as the unit (*tala*). The *danda* will be of three types, 10, 9 or 8 times this unit. If the plot has large area, the width of the *vithi* should be taken to be one of these *dandas*.

Commentary

The analysis of the site by concentric enveloping regions (*vīthīvinyāsa*) is presented here, as distinct from the analysis of site by grids (*padavinyāsa*). In *vīthīvinyāsa*, the *vāstu-maṇḍala* is considered as a symbolic representation of the cosmos. The central region, called *Brahmasthāna*, is the terrestrial space. It is surrounded by eight envelopes (*vīthis or avṛttis*) as explained in the next stanza. The width of the *vīthi* is one *daṇḍa*, which is a proportionate measurement or module. The width will depend upon the size of the plot.

The unit for deciding the *daṇḍa* is the height of the owner. For large plots, the *daṇḍa* can be 8,9 or 10 times this unit.

THE ARRANGEMENT OF *VITHIS*

Stanza - 16

नन्दद्वन्द्वपुटेन वा वृतितया बाह्यादिमध्यान्तिमा
वीथ्यः स्यु : परितः पिशाचदिविषद्वित्ताधिभूदण्डिनाम्।
नागाम्ब्वग्निविनायकद्रुहिणनाम्नां चासु निन्द्याः स्मृता :
पैशाचाग्न्यहिदण्डिनां गृहविधौ वीथ्यश्चतुर्दिक्ष्वपि ।।

When (the site is) divided into 18x18 grid, there are 9 enveloping paths (around its central point). From the outer path to the centre, the paths are those of *Piśāca*, *Deva, Kubera, Yama, Nāga, Jala, Agni, Gaṇeśa* and *Brahman*. Here the *vithis* of *Piśáca, Agni, Nága* and *Yama* in all four directions are bad for locating houses.

Commentary

In plots of width ranging from 32 *hasta* to 128 *hasta*, the *gṛhamaṇḍala* is obtained by dividing the area into 4 quadrants and selecting the NE and/or SW quadrants and if the area is larger, further subdividing the NE and SW quadrants and selecting the SW sector of the NE quadrant and /or NE sector of the SW quadrant. For plots of width less than 32 H, the whole *kṣetra* becomes *gṛhamaṇḍala*.

For plots of width of more than 128 H, planning is done by considering the whole plot to consist of 9 concentric enveloping paths (*avṛtti or vīthi*). The plot can be considered to be divided into an 18x18 grid (*karṇāṣṭakamaṇḍala)*. This is generally done for large temples and palace complexes. The innermost region consisting of 4 cells around the *Brahmanābhi* is called *Brahmavithi*. The expanding envelopes from the innermost one are called *Gaṇeśavīthi,*

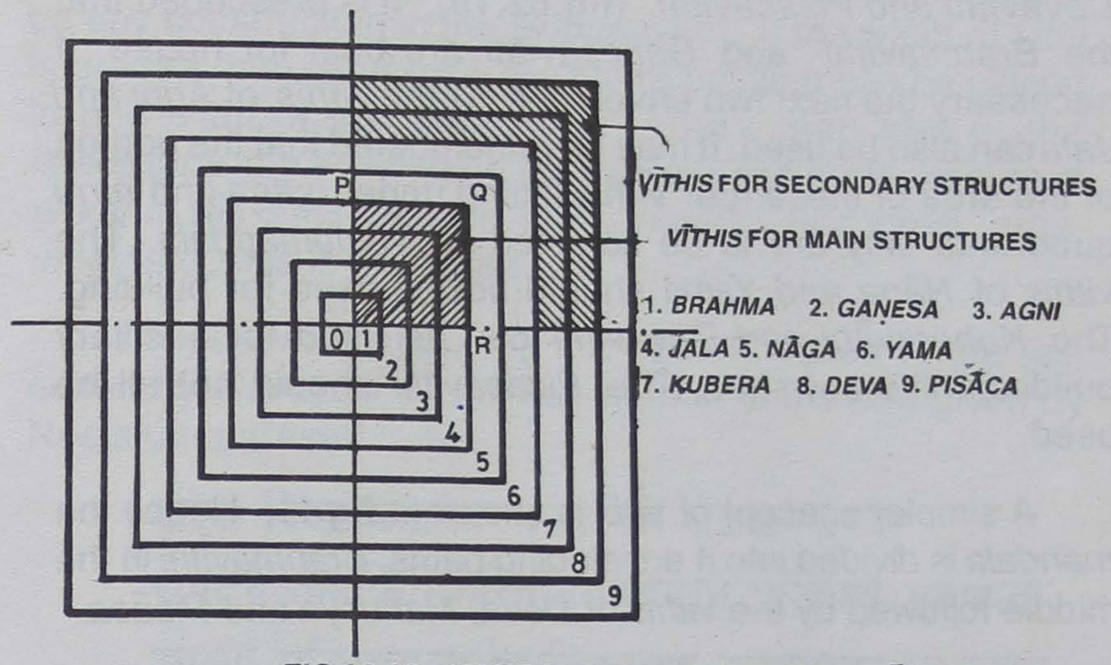


FIG.02.10 *MANḌALA* ANALYSED AS 9 *VĪTHIS*

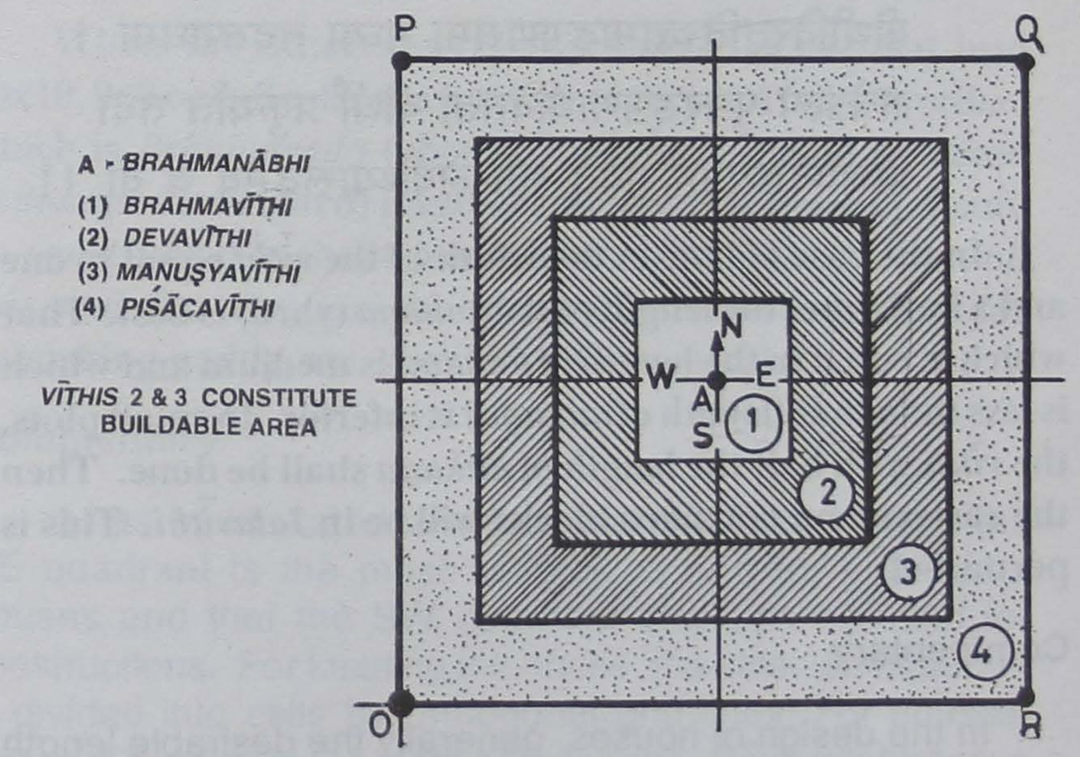


FIG.02.11 *MANḌALA* ANALYSES AS 4 *VĪTHIS*

Agnivīthi, Jalavīthi, Nāgavīthi, Yamavīthi, Kuberavīthi, Devavīthi and Piśācavīthi. (**fig.02.10**). It is prescribed that the *Brahmavīthi* and *Gaṇeśavīthi* are best for house. If necessary the next two envelopes viz the *vīthis* of *Agni and Jala* can also be used. It may be remembered that the portion of the area of these four *vithis* falling under *Īśāna* and *nirrti* quadrants only are to be selected as *vāstumaṇḍala.* The *vithis* of *Nāga and Yama* should not be used for building. The *Kuberavīthi and Devavīthi* can be used for ancillary buildings like cowshed. The *Piśācavīthi* should not all be used.

A simpler concept of *vīthi* is shown in **fig.11**. Hence the *maṇḍala* is divided into 4 enveloping paths. *Brahmavīthi* in the middle followed by the *vithis* of *Deva*, *Manuṣya* and *Piśāca.*

Stanza - 17

यावत् कल्पितमङ्गणं गृहविधौ स्वार्धान्विता तावती
वीथीविस्तृतिरुत्तमाङ्गणसमा मध्या तदल्पाधमा ।
क्षेत्रेऽल्पे पुनरङ्गणार्धविततां वीथीं प्रकुर्यात् तदा
प्राच्योदीच्यगृहं भवेत् सलिलवीथ्यारूढमेवं च वा ।।

In the case of houses the width of the *vīthi* equal to one and a half times the length of the *ankaṇa* (yard) is best. That which is equal to the length of *ankaṇa* is medium and which is less than that (length of *ankaṇa*) is inferior. In small plots, the *vīthi* with half the length of *ankaṇa* shall be done. Then the eastern and northern blocks will be in *Jalavīthi*. This is permitted.

Commentary

In the design of houses, generally the desirable length of the house (*iṣṭadīrgha*) is taken as an important factor in the design. For a single rectangular house (*ekaśāla*), this will be the same as that of the length of the yard

(*ankaṇadīrgha*). In planning the buildings, there should not be any construction in the *Brahmavīthi.* If the width of *vīthi* is greater than *iṣṭadīrgha,* the entire building can be placed in one *vīthi*. If the *vīthi* width is less than half of the *istadurgha,* the building on the eastern and northern side of *ankana* will encroach on the *Jalavīthi*. For small *grha-maṇḍalas,* this is permitted.

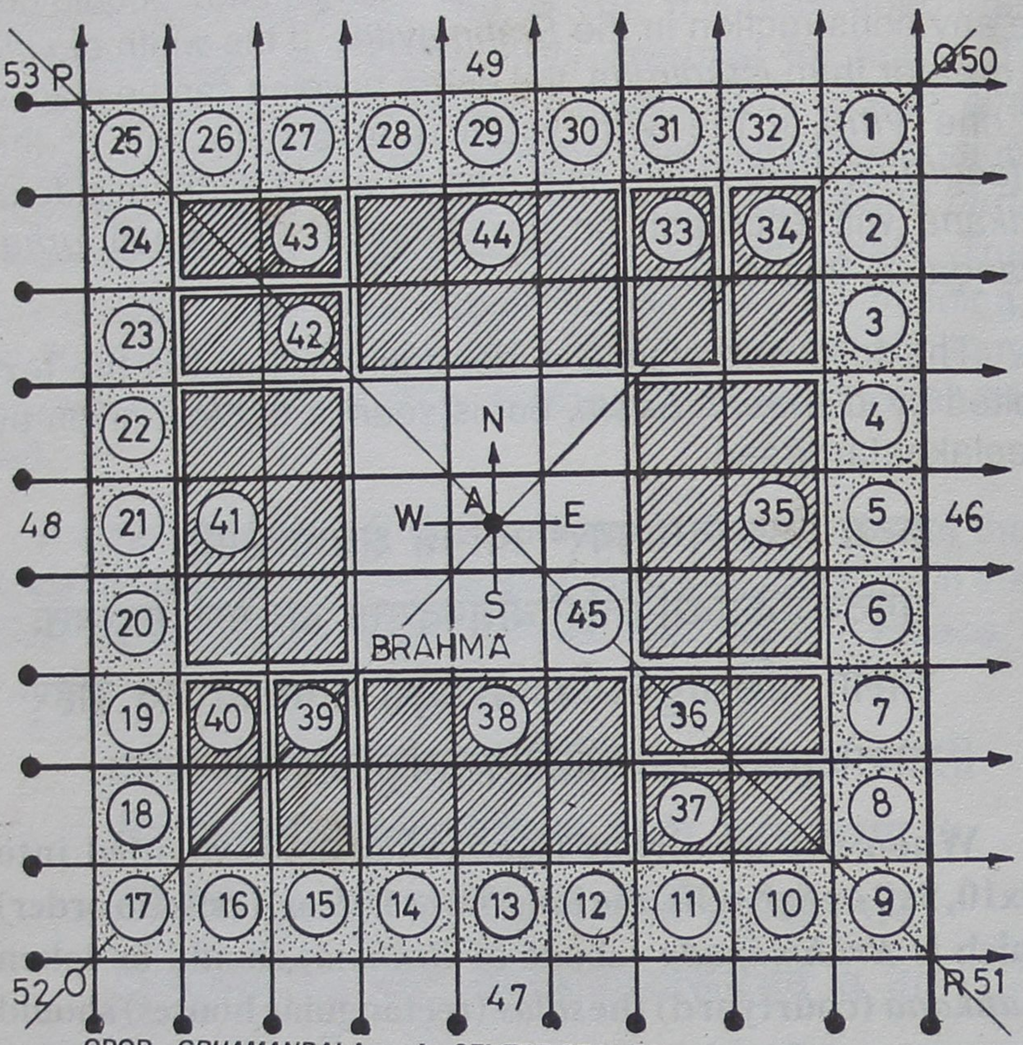
The following stanza is not seen included in the text edited by *Ganapati Śāstri*, but is seen in the text given by Neelakantan Asari.

कृत्वा दिङ्नवनागवर्गपदभिन्ने क्षेत्रखण्डेपदै-
राष्ट्यङ्काब्धिमितैर्विधातृपदयुक्तं प्राङ्गणं मद्ध्यतः
शालाः पङ्क्तियुजार्यकादिकजुषा तत्बाह्यतस्तत् बहिर्-
गोष्ठोलूखलवेश्मकादिविलसत्पंक्त्यावृतं कल्पयेत्.

When the quadrant (*kṣetrakhaṇḍa*) is divided into 10x10, 9x9 or 8x8 cells, the innermost 16,9 or 4 cells (in order) which is *Brahmapada* (abode of *Brahma*) should be taken as *ankaṇa* (courtyard) the *śālas* (rectangular houses) should be constructed in the two envelopes of *Āryaka*, etc. beyond this and the ancillary buildings like cowshed, shed for dehusking paddy, etc. should be done outside.

Commentary

It has been stated earlier in stanzas 8 and 9 that the NE quadrant is the most auspicious one for putting up houses and that the SW quadrant also can be used for constructions. For locating the house, the selected quadrant is divided into cells by orthogonal grid lines. For houses, 9x9 grid division is the most popular one. *Rājavallabha* says "Of all divisions of *vāstu*, 9x9 is the most well-known" (Ref.04.08) For the 9x9 grid, the innermost 9 cells are taken as the abode of *Brahma (Brahmapada)* **fig.02.12**. For 8x8



OPQR - *GṚHAMAṆḌALA* A - CENTRE OF YARD

PADADEVATAS IN OUTER CELLS

1. *ĪŚĀNA*	9. AGNI	17. NIRṚTI	25. *VĀYU*
2. *PARJANYA*	10. *PŪṢA*	18. *DWĀRAPĀLA*	26. *NĀGA*
3. *JAYANṬA*	11. *VITATHA*	19. *SUGRĪVA*	27. *MUKHYA*
4. *INDRA*	12. *GṚHAKṢATA*	20. *PUṢPADANTA*	28. *BHALLĀTA*
5. *ĀDITYA*	13. *YAMA*	21. *VARUṆA*	29. *SOMA*
6. *SATYAKA*	14. *GANDHARVA*	22. *ASURA*	30. *ARGA*
7. *BHṚSA*	15. *BHṄGA*	23. *SOṢA*	31. *ADITI*
8. *ANTARĪKṢA*	16. *MṚGA*	24. *ROGA*	32. *DITI*

PADAVETAS IN INNER CELLS

33. *ĀPA*	36. *SAVITA*	39. *INDRA*	42. *RUDRA*	45. *BRAHMA*
34. *ĀPAVATSA*	37. *SAVITṚ*	40. *INDRAJIT*	43. *RUDRAJIT*	
35. *ĀRYAKA*	38. *VIVASWĀN*	41. *MITRAKA*	44. *BHUBHṚT*	

DEVATAS IN THE OUTER REGIONS

46. *SARVASKANDA*	47. *ĀRYAMA*	48. *JṚMBHAKA*	49. *PILIPINCAKA*
50. *PĀPARĀKṢASI*	51. *CARAKI*	52. *VITARI*	53. *PŪTANIKA*

FIG.02.12 *NAVAVARGA* (9X9) *PADAVINYASA* SHOWING BUILDABLE AREA AND *PADADEVATAS*

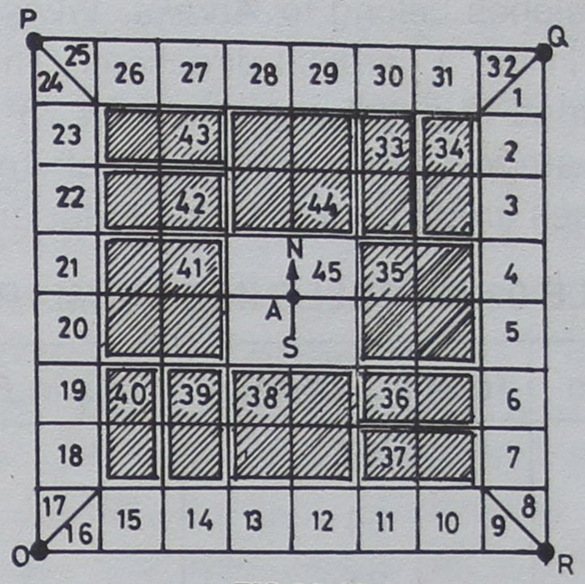


FIG.02.13
ASTAVARGA* (8X8) *PADAVINYASA

Note: For names of padadevatas, see figure **02.12**

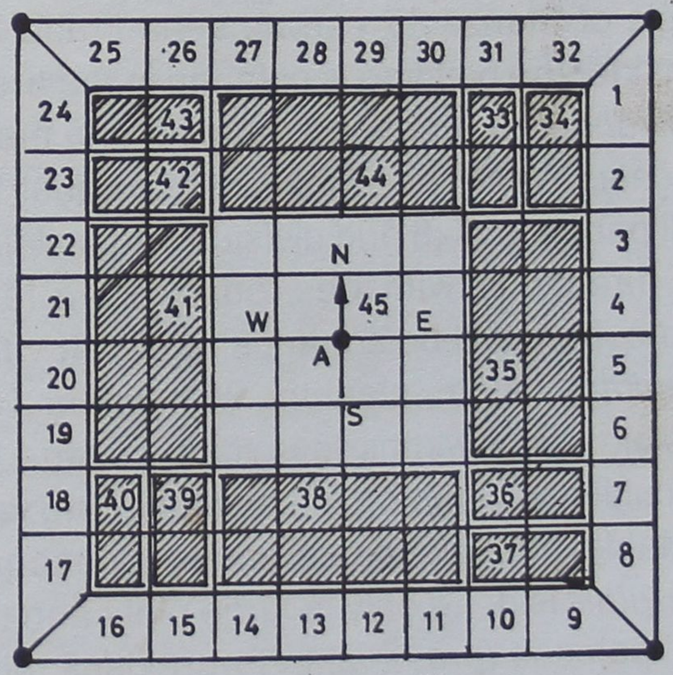


FIG.02.14
DASAVARGA* (10X10) *PADAVINYASA

and 10x10 grids the innermost 4 cells and 16 cells are respectively taken as *Brahmapada* (**fig.02.13, 02.14**). The next two envelopes belong to *Āryaka, Vivaswān, Mitraka,* and *Bhūbhṛt* in the 4 cardinal directions (These positions will be explained in detail in stanzas 24,25 and 26). The main houses are to be built in the cells of *Áryaka* etc. The ancillary houses are to be built in the outer envelope.

TABLE 02.02 CELLS IN *BRAHMAPADA*

Division into	Total no. of cells	Cells in *Brahmapada*
7 x 7	49	1
8 x 8	64	4
9 x 9	81	9
10x10	100	16
11x11	121	25

The logic of Stanza 17 can be seen in the light of the above. Consider the building is planned in the area covered by *vīthis* of *Brahma, Gaṇeśa, Agni* and *Jala,* in the NE sector of the *maṇḍala.* When the *vīthi* width is equal to *ankaṇa* length, it will permit an 8x8 grid division and building of *salas* in cardinal directions with desired *ankaṇa* length. The buildable area here will be square shaped. If *vīthi* width is 1 1/2 times *ankaṇa* length, planning with 9x9 or 10x10 grids will be possible. *Vīthi* widths less than *ankaṇa* length will provide difficulties in planning houses following *vastu* rules, as the buildable area becomes small. Consequently the division into *vīthis* is done only in large plots and that too for temples and palaces *(prasādas).* For houses, division into quadrants and sub-quadrants is the method used. Since the portion of the *vīthis* coming in the NE and SW quadrants alone can be used, both procedures converge into one.

Stanza - 18

क्षेत्रेऽत्यल्पे तु मध्येऽङ्गणमपि च कृतान्तात्मभूसूत्रयोगात्
किञ्चिन्नीत्वा स्वगत्यापि च भवनचतुष्कं कृतं दृश्यते च ।
अत्यल्पा एव वीथ्यो ह्यशुभशुभफलान्येवमेवाल्परूपा -
ण्यस्मादीशादिखण्डाद्यधिगतनववीथीविधिर्नेष्यतेऽत्र ।।

In some situations, in small sites, the courtyard (*ankaṇa*) is seen in the centre and the house is seen shifted from the intersection of *Brahmasūtra* and *Yamasūtra* with shifts (*gamana*) prescribed for each (*śāla*). The *vithis* are very narrow (*atyalpa*) and similarly the good and bad effects also are small (*alpa*). Hence the division into *īśākhaṇḍa*, etc. and *piśācavīthi* etc. is not considered necessary here.

Commentary

For small sites, it is not possible to divide them into 4 quadrants, because the resulting quadrants will be small. For example, if the width of the site is 32 H, the width of the quadrant will be equal to 16H. When divided into, say, 8x8 grid, the width of each cell (*pada*) will be 2H. Since the building has to be restricted to 2 *pada*, the width of the buildable area will be 4H. Assuming that the thickness of the wall is 8A (24cm), and allowing for the thickness of *sūtra* as given in stanza 13, the maximum width of the room will be 3H 8A (240cm). This is the minimum width of habitable rooms according to the National Building Code 1983. If the site is less than 32H width, such subdivisions are not possible as the width of room will be smaller than this value. The rule of *alpaksetra* is applicable in such cases.

The practice followed in small plots is to see that the *Brahmanābhi* (centre of *mandala*) and *gṛhanābhi* (centre of building) do not coincide as explained earlier under stanza 9 of chapter. The *gṛhanābhi* is shifted to the north east or south-west side of *Brahmanābhi.*

In the case of *catuśśālas*, the *Brahmapada* will be made the *ankaṇa* and the *dikśālas* will be made in the two enveloping set of *padas* covered by 12 *ādityas*. The centre line of these *śālas* will be given *gamana* prescribed for each *śāla*.

Here the author uses the word *"dṛśyate" ("is seen")*. This indicates that this practice of not dividing into quadrants or *vithis* " is seen in some places, but it is not exactly according to the canons and is based only on practice. This means that such divisions are not insisted in small plots (*alpakṣetras*) but is mandatory for large house plots and for villages and towns.

FIXING THE BOUNDARY OF THE PLOT

Stanza - 19

यावत् प्राङ्गणदैर्ध्यमानममुनैकात्यर्धवीथीततं
तेनाष्टादशभूमिमानमिति वा क्षेत्राप्तिरन्तः क्रमात्।
मर्यादानियमप्रहीणमनुजागारेऽपि तत्प्राङ्गणा-
देवं क्षेत्रमितिं करोतु च पुनर्वप्रान्तमौचित्यतः ।।

The width of *vīthi* will be 1 1/2 times the length of the courtyard (*aṅkaṇa*) and the width of the site will be 18 times the width of the *vīthi*. (Thus) from inside, the extent of site is fixed. In boundless house-sites the extent of the site can be fixed from the length of the *aṅkaṇa*. Then the compound wall should be constructed suitably.

Commentary

In what is known as *istadirghavidhi, istadirgha* (the desired length) is generally taken as the length of the yard (*ankana*). *Iṣṭadīrgha* is taken as the standard for fixing the dimensions of the elements of the building (width, perimeter, height, etc.). In large sites and boundless sites, the *vīthi* should have its width equal to 1 1/2 times the width of *aṅkaṇa*, as discussed under Stanza 17. Since there are 9 *vīthis*, the

site should have a width of 18 *vīthis*. In sites with fixed boundaries, the procedure is to fix the cardinal directions (*dignirṇaya)*, square the plot (*caturaśrīkaraṇa*), fix the *vithis* and decide the location the building. This is called *alpakṣetraniyama* (rule for small plots) in which the width of the building and length of *aṅkaṇa* are decided from the width of the site. The procedure of fixing the boundaries of the site from the length of the yard stated in this stanza is for large plots. Both these processes are allowed, depending on the situation.

SENSITIVE POINTS OF THE *MANDALA*

Stanza - 20

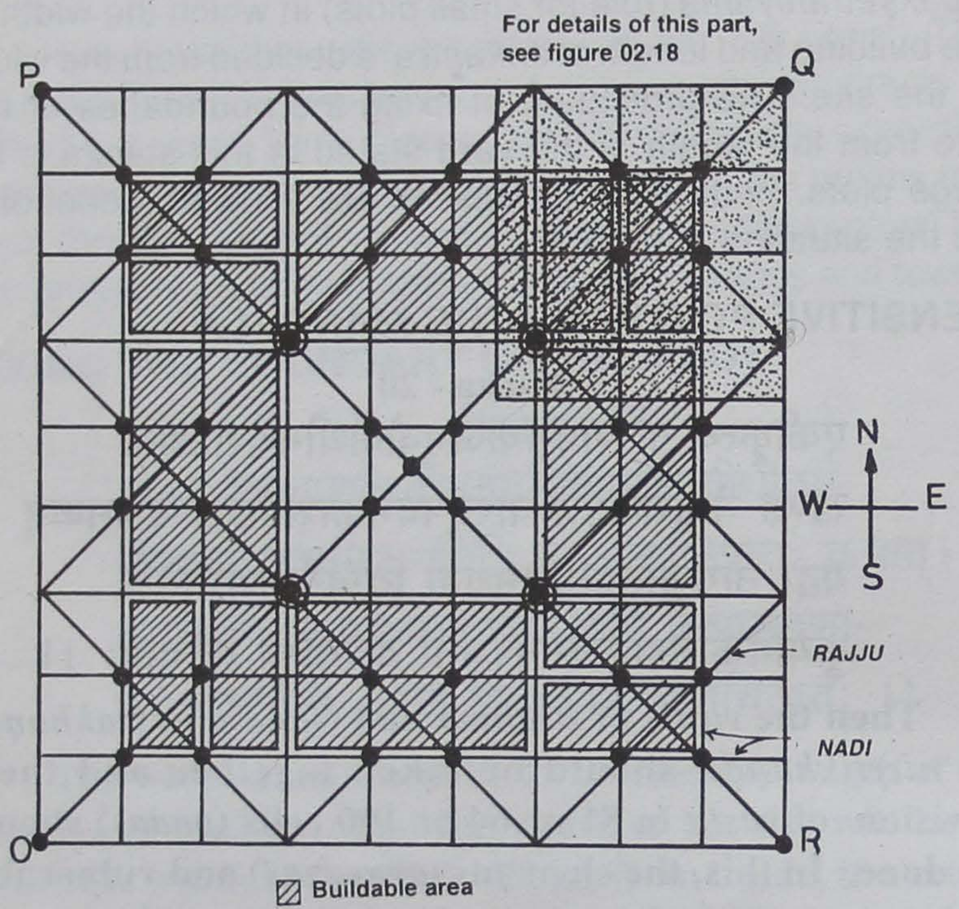
एकीकृत्य गणेशपङ्कजभुवोर्वीथीमथैशेऽथवा
खण्डे नैर्ऋतकेऽत्र वास्तुपदमेकाशीतिखण्डात्मकम् ।
यद्वा नागकृतिप्रभिन्नमथवा दिग्वर्गखण्डोदितं
कुर्यादेकमिहाङ्गमर्मरचनां वास्तोश्च तद्देवताः ।।

Then the *vithis* of *Brahma* and *Gaṇeśa* in *īśakhaṇḍa* or *nirṛtikhaṇḍa* should be taken together and there division of *vastu* in 81 or 64 or 100 cells (*padas*) should be done. In this, the elements (*avayavas*) and vulnerable points (*marmas*) of the *vastu* should be located.

Stanza - 21

नाड्यः प्रागुदगग्रगा दशदशैकाशीतिकोष्ठे शिवा -
ग्न्यग्राः पञ्च पृथङ्नवोर्मिगुणकोष्ठस्थास्तथा रज्जव : ।
मर्माण्यष्टरसाशुगाब्धिगुणसङ्ख्यानैरकोष्ठस्थितैस् -
सूत्रैर्योगसमुद्भवानि तु शतं वर्ज्यानि कुड्यादिषु ।।

In the 81 cells grid, there will be ten orthogonal lines (*nādis*) with ends in east and ten with ends in north directions. Similarly, there will be 5 separate diagonal lines (*rajjus*), with ends in N-E as well as S-E directions

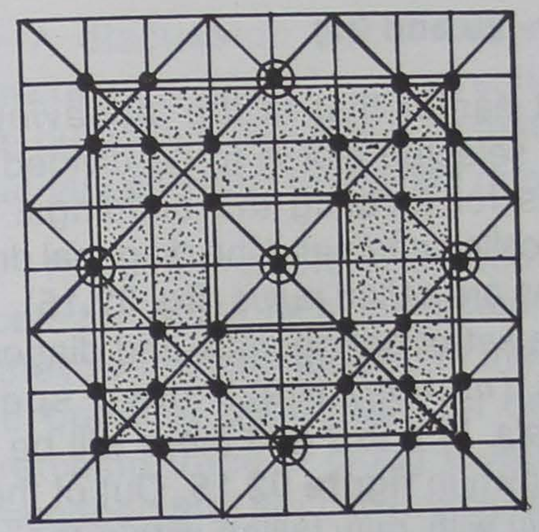


▨ Buildable area

┼ *NĀDISANDHI*	48	× *RAJJUSANDHI*	9
⌜ *MARMĀNTA*	4	⊬ *RAJJUMARMASANDHI*	8
✶ *MARMA*	36	✹ *MAHĀMARMA*	4

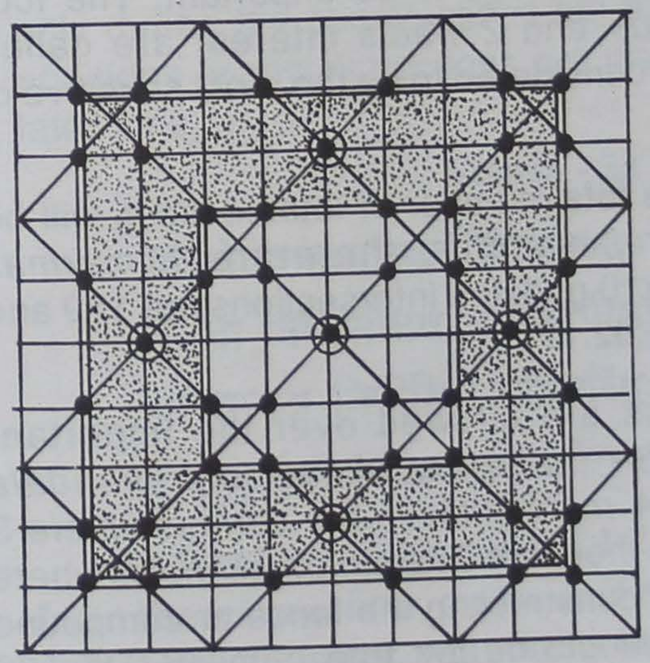
TOTAL - 109

FIG.02.15 *MARMAS* OF 9X9 GRID



⊢	*NADISANDHI*	20
┼	*NADISANDHI*	16
×	*RAJJUSANDHI*	8
⌜	*MARMANTA*	4
⊬	*RAJJU-MARMA*	8
✶	*MARMA*	40
✹	*MAHAMARAMA*	5
	TOTAL	89

FIG.02.16 *MARMAS* OF 8X8 GRID



⊢	*NADISANDHI*	28
┼	*NADISANDHI*	36
×	*RAJJUSANDHI*	8
⌜	*MARMANTA*	4
⊬	*RAJJU-MARMA*	8
✶	*MARMA*	40
✹	*MAHAMARAMA*	5
	TOTAL	129

FIG.02.17 *MARMAS* OF 10X10 GRID

through 9,6 and 3 cells. Excluding the centre of the cell, 100 sensitive points, which are the intersection of 8,6,5 or 4 lines, should be avoided for building walls, etc.

Commentary (Stanzas - 20 and 21)

It has been stated earlier that in the *padavinyāsa* method of analysis, the selected plot is to be divided into 8x8, 9x9 or 10x10 cells for locating the buildings. The orthogonal grid lines are called *nādis* and the diagonal drawn through their intersections are called *rajjus* (**fig. 02.15**). The intersection points of the set of orthogonals and diagonals are vulnerable points (*marma)* which have special importance in the *maṇḍala.* In a 9x9 grid there will be 109 intersection points as shown in **figure 02.15**. Out of these, the 9 intersections of *rajju* with *rajju* falling within the cells are not considered as *marmas*. Leaving these there are 100 *marmas*. The intersections of orthogonals *(nādisandhi*, 48 in number) are not considered to be important. The four points where 2 *rajjus* and 2 *nadis* interest are called *mahāmarma* and are considered to be the most sensitive of all the *marmas.*

For 8x8 grid, the total number of intersections will be 89 and leaving 8 *rajjusandhis,* there are 81 *marmas* (**fig.02.16**). For a 10x10 grid, the intersections are 129 and *marmas* are 121. (**fig.02.17**).

No constructions are allowed over the important *marmas*. In the outer periphery of the 9x9 *mandala* (**fig.02.15**) there are 4 *marmāntas* in the corners where 3 *sutras* converge. Also there are 8 *rajjumarmasandhis* where 5 *sūtras* meet. While constructing the fence or compound wall, these *marmas* should be left free. Similarly, the 36 *marmas* and 4 *mahāmarams* also should be avoided. If it is not possible to avoid any construction at the *marmas*, it has to be shifted by a distance equal to 1/2 the thickness of the *sūtra,* which has already been stated to be equal to 1/16,

1/12 and 1/8 of the width of the cell for the 8x8, 9x9 and 10x10 grid divisions respectively (Stanza -13). This is illustrated in **figure 02.18**.

A discussion about the rationale for the above prescriptions (called *marmavedhavidhi*) will be useful here. The purpose of the rule is to restrict the building within the *maṇḍala* and also to provide reference points for later use.

The *marmas* are reference points which help one to locate the positions of the different elements of the building. If they are clearly located in the *maṇḍala*, the locations of the building elements can be accurately decided by stretching threads along these points. That is why it is prescribed that the constructions should be shifted at least by half the width of thread on either side of the *marmas.* The *marmas* are thus similar to the bench marks that are fixed in modern constructions. The *marmas* are useful not only during the constructions but also when alterations or additions or reconstructions are made to the building at a later time.

Stanza - 22

प्राग्वोदक्पदभास्करांशदलमात्रं मर्मसूत्रस्थितैर् -
नीत्वा विन्यसनान्न मर्मपरिपीडा स्तम्भकुड्यदिषु ।
वास्तुन्यत्र निपीडिते महिषसिंहानेकपानां शिरो
हैमं कूर्मवराहयोश्च निखनेत् तच्छान्तये शान्तिकृत् ।।

By locating with a shift of 1/24 of the (width of) *pada* from the *marmasūtra*, on the east or north side, the *marma* defect due to pillar, wall etc. will not arise. Here, if the *marma* defect occurs, the person doing the *śāntikarma* should place gold icons of the heads of bison, lion, elephant, tortoise and boar for obviating the *marma* defect.

See the shaded portion of figure 02.15, page 68.

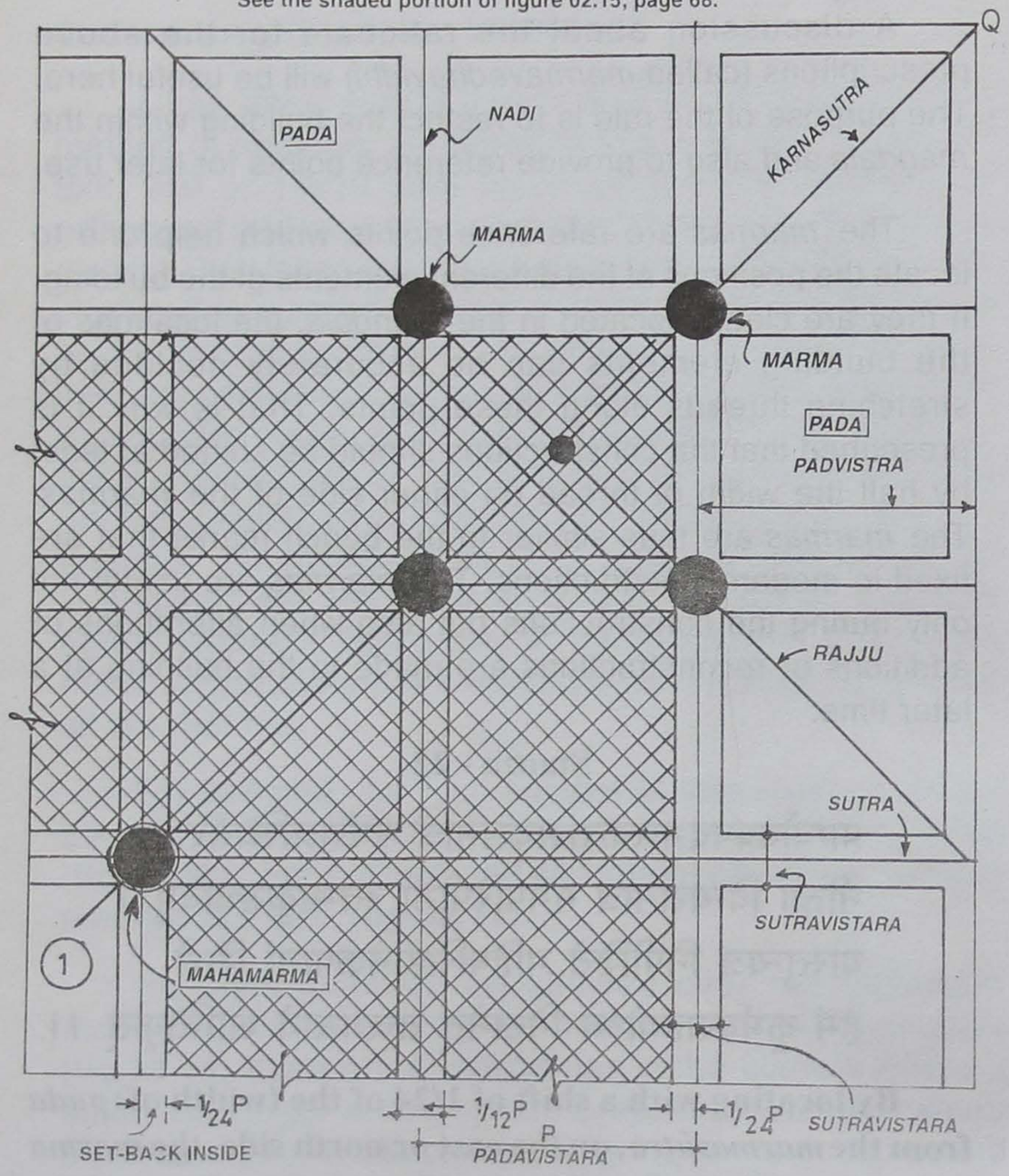


FIG.02.18 AVOIDING *MARMAVEDHA* ILLUSTRTED

Commentary

This stanza describes the methods for avoiding the defect due to *marmavedha*. As stated in the commentary on stanzas 20 and 21, a gap of half the width of the *sutra* should be left between the *marma* and the constructions on all sides. For the 9x9 grid. The width of the *sūtra* is prescribed as 1/12 of the width of the cell and, therefore, the shift should be 1/24 the cell width. If however, *marmavedha* cannot be avoided, then gold icons of animals should be placed at the *marma* point by the person performing the *Vāstupūja*, the traditional rites to propitiate the presiding deity of the *maṇḍala*. This act may appear to be superstitious, but locating gold icons may be a way to identify the point at a later time when reconstruction, remodelling or additions have to be carried out. This also confirms that the prescription for leaving *marmas* free is a method of locating and identifying the important reference points in the grid.

POSITIONS OF *VĀSTUDEVATAS*

Stanza - 23

एकाशीतिपदे प्रकल्प्य नवकं मध्येऽस्य बाह्यावृतौ
षट्कं दिक्षु विदिक्षु युग्मयुगलं चैकैकशस्तद्बहिः ।
चत्वारिंशदथैषु पञ्च च विरिञ्चाद्याः पदेषु स्थिता
बाह्येऽष्टावपदस्थितास्त्र्यधिकपञ्चाशत् स्युरेवं सुरा : ।।

Taking 81 cells, there are nine in the middle, six each in the cardinal directions and 2 each in the corners of the outer envelope, and one each in the next outer envelope making a total of 45 positions with *Brahman* etc. in these (45) *padas* and eight gods positioned outside the *padas*, there are 53 gods (*padadevatas*).

Stanzas 24, 25 and 26

ईशाद्यं बाहिरावृतिस्थपदकेष्वीशानपर्जन्यका -
वैन्द्रीन्द्रौ रविसत्यकौ भृशरवगव्यादांस्तथा पूषण :।
भुयो वै वितथं गृहक्षतयमौ गन्धर्वभृङ्गौ मृगं
पित्राख्यान् प्रतिहारपालमपि सुग्रीवं क्रमात् कल्पयेत् ।।

भुयः पुष्पादिदन्तं वरुणमसुरशोषाख्यरोगानिलाहीन्
मुख्यं भल्लाटमिन्द्वर्गलमदितिदिती चेति बाह्यावृतौ स्युः ।
ईशाद्यावापवत्सार्यकसवितृकसावित्रसंज्ञौ विवस्वा -
निन्द्राख्यश्चेन्द्रजिन्मित्रकशिवशिवजिद्भूभृतोऽन्तर्कृतौ स्युः ।।

ब्रह्मा मध्यपदेऽथ शर्वसहितः स्कन्दोऽर्यमाजृम्भकः
प्रागादौ पिलिपिञ्छकश्च चरकीशादौ विदार्याह्वया :।
भूयःपुतनिका च पापपदपूर्वा राक्षसी बाह्यत -
श्चैतेऽष्टावपदस्थिताश्च परितो देवग्रहास्तद्बहि : ।।

In the outer envelope, starting from the *Īśāna* (NE) corner, *Īśāna, Parjanya, Jayanta, Indra, Ravi, Satyaka, Bhṛśa, Antarīkṣa,* (in the eastern side) *Agni, Pūṣa, Vitatha, Gṛhakṣata, Yama, Gandharva, Bhṛnga, Mṛga,* (in the southern side) *Nirṛti, Dwārapāla, Sugrīva, Puṣpadanta, Varuṇa, Asura, Soṣa, Roga,* (in the western side) *Vāyu, Nāga, Mukhya, Bhallāta, Indu, Argala, Aditi* and *Diti* (in the northern side) should be considered thus in outer envelope. In the middle envelope from the N-E corner, there will be (12 *adityas* namely) *Āpa, Āpavatsa, Āryaka, Savitṛ, Savitra, Vivaswān, Indra, Indrajit, Mitraka, Śiva, Śivajit* and *Bhūbhṛt.* Then in the central portion will be *Brahma.* And outside of the *maṇḍala* starting from east, *Sarvaskanda, Āryama, Jṛmbhaka, Pilipinchaka* (in the *diks*)

and starting from NE corner *Caraki, Vidari, Putanika, Pāpa'rākṣasi* (in the *vidiks*) - these eight gods will be outside the cells. And outside that will be *Devagrahas.*

Commentary (Stanzas 23,24,25 ,and 26)

The 81 *padas* of the 9x9 grids are divided into 45 locations for *padadevatas* (gods) (**fig.02.12**). There will one god in each of these 45 locations and there will be 8 gods outside the *maṇḍala*. Thus there will be 53 gods presiding over the *maṇḍala*. The names of these gods are indicated in the figure. Far outside, there will be planets related to gods (*devagrahas*).

Vāstumaṇḍala is conceived as the symbolic form of the cosmos. The central region (terrestrial space or lithosphere where there is creation of life) is the *Brahmasthāna*. It is surrounded by an envelope of 12 suns, representing the suns in 12 constellation (*rasis*). This region of energy represents the habitable region. Beyond the solar space is the stellar space divided into 32 constellations and protected by the 8 wardens of the 8 directions. Beyond this stellar space is the unknown region of demons.

The position of the gods in the 8x8 and 10x10 grids are similar as shown in **figures 02.13** and **02.14.**

THE CONCEPT OF *VASTUPURUSA*

Stanza - 27

आसिद् दैत्यः प्रदृप्तो निजभुजबलवीर्यादिनाक्रान्तकाष्ठा-
निष्ठो द्वेष्टा सुराणां स तु युधि पतितो विद्धगात्रो धरित्र्याम् ।
व्याप्तः सर्वत्र पश्चाद् बहुतरपरिवृत्त्यैव पृथवीं विमथ्नन्
मर्त्या दुःस्था मुनीन्द्रास्त्वपि च मखभुजस्तावदेवं बभूवु : ।।

There was a haughty demon who subdued all the world by his strength, valour etc. and became the enemy of gods.

He was exhausted in battle and was made to fall on the ground. Then filling everywhere and circling several times, he agitated the earth. Then the humans became sad. So also the sages and gods became sad.

Stanza - 28

सर्वव्याप्तेऽप्यमुष्मिन्नतनु तनुघटाभ्यन्तरे व्योम यद्वत्
तद्वन्नित्यं विशेषान्नगरपुरमहीक्षेत्रखण्डाङ्गणादौ ।।
उत्ताने नैर्ऋताशाविनिहितचरणे यावदीशान्तशीर्षे
जाते तावन्निषेदुः स्थिरमिह विबुधास्तस्य देहे क्षणेन ।।

He lay flat face upwards (*utthāna*) with his legs in *Nirṛti* (SW) corner and head in *Īśāna* (NE) corner, always filling everywhere especially cities, towns, land, quadrants of plots (*kṣetrakhaṇḍas*), yard, etc. like the *ākāśa* in small as well as in large pots. Then suddenly the gods permanently occupied on his body.

Commentary (Stanza 27 and 28)

The concept of a *Vāstupurusa* forming part of every *vāstu* forms one of the basic concepts in *Vāstuśāstra*. Every *vāstu*, whether large like cities and villages or small rooms and seats (*pīṭha*) is pictured as a field in which the *Vāstupuruṣa* is lying flat with face upwards.

The posture of *Vāstupuruṣa* is described in stanza 28 as face upwards (*utthāna*). The myth of *Vāstupuruṣa* given in some texts like *Bṛhatsamhita*, however, describes the posture as face downwards. (Ref.02.09). The face-up position is adopted by the author of *Manuṣyālayacandrika*, perhaps, owing to the fact that ritualistic offerings of *yajamāna* are made to any deity only in face-up posture. The positions of *padadevatas* in both concepts (face-up and face-down) remind the same in the *mandala*. This further shows that the figure of *Vāstupuruṣa* was a later addition

and has only symbolic value.

Mythologically, *Śukra* the *guru* of the *asura* started a sacrificial fire to destroy the *devas*. During the rites, a drop of perspiration of *Śukra* fell in the fire and *Vāstupuruṣa*, a fire - spitting demon emerged from it. This demon started detroying the devas. The devas approached *Śiva* for help. The fire from the third eye of *Śiva* chased *Śukra* and his protege. Frightened, *Śukra* reduced his form and entered, *Śiva's* stomach through his ear. *Śiva* ordered *Śukra* to come out, but *Śukra* wanted a boon which would guarantee the security of his protege. This was granted. *Vāstupuruṣa* promised not to cause any further destruction. The gods occupied several parts of his body.

Some people see the birth of earth in the story. The sacrificial fire is compared to the sun and the fire-spitting *Vāstupuruṣa* is compared to the earth separating from the sun. The hot earth was cooled down in time and conditions were created for the formation and sustenance of life on earth. These favourable conditions have to be preserved for the continuation of life. Symbolically this is achieved by offering *pujas* to *Vāstupuruṣa*.

Whatever be the myth, the concept in *Vāstuvidya* is that *Vāstupuruṣa* is held fast to a field defined by the square *maṇḍala* with his feet in the *Nirṛti* (SW) corner, head in *Iśāna* (NE) corner, knees and elbows in the *Agni* (SE) and *Vāyu* (NE) corners. The gods occupied the various limbs of the prostrate body. The superimposition of the figure of *Vāstupuruṣa* on the *Vāstumaṇḍala* with the *padadevatas* on different parts of the body makes it easy to identify the *padas* (**fig.02.19**). For example the SE corner is the position of *Agni* and one *pada* south of NW corner is the *pada* of *Parjanya*. The regions are named after the *devatas* occupying them. This is like naming the wards of a town. The *padadevatas* fulfill the function of identifying the cells.

Note: Names of padadevatas indicated by the serial numbers (1) to (45) are given in figure 02.12, page 62.

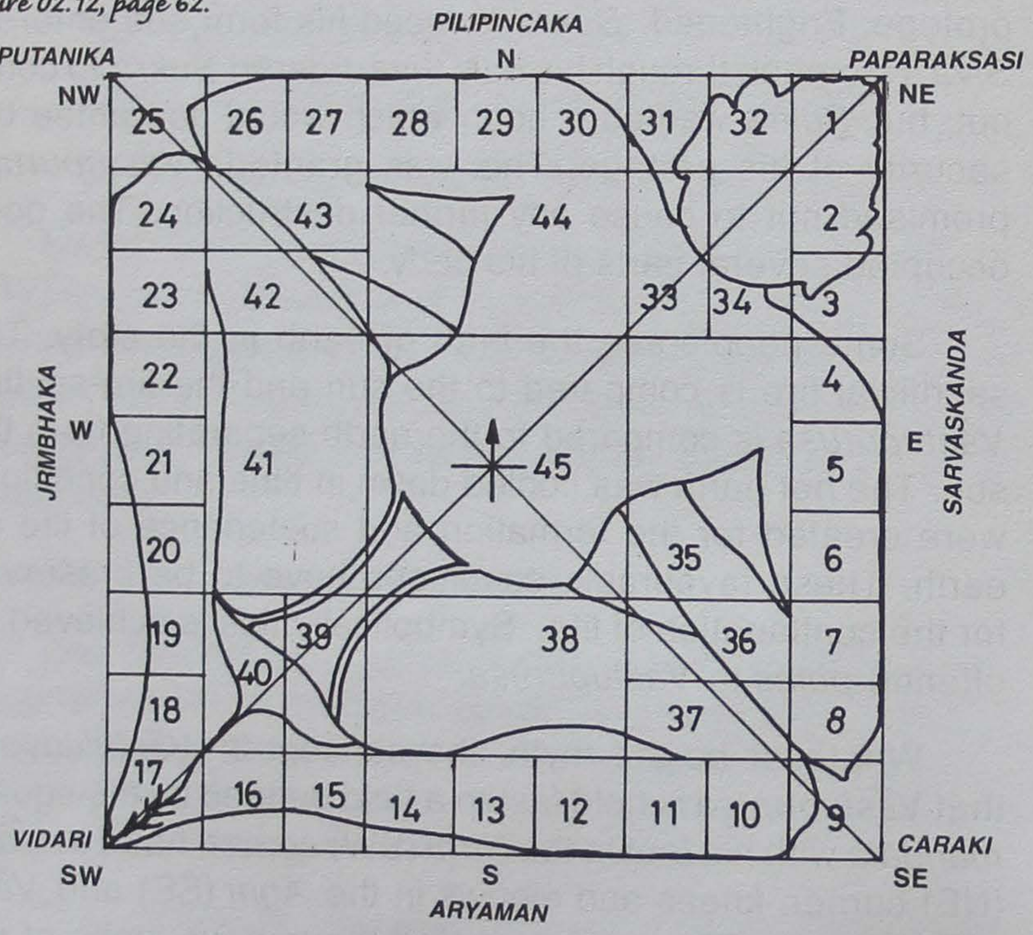


FIG.02.19 *VASTUPURUSAMANDALA*

The concepts can also be said to indicate symbolically the creation of a built environment from the nature. From a purely technical point of view, *Vāstupurusamaṇḍala* is a graphic model for design purposes. The planning begins by defining the boundaries and giving shape to a form. This is followed by dividing the form into sectors, which are identified by the *padadevatas*. Further analysis and design start from this definition of form.

Since every *pada* is presided over by a deity, all the acts done in that *pada* are done in the presence of the deity. Therefore, it is implied that these acts are done with devotion and commitment.

POSITION OF *PADADEVATAS*

Stanzas 29, 30 and 31

मूर्ध्नीशोऽस्य तु संस्थितो नयनयोः पर्जन्यकश्चादिति -
श्चापतद्वदने तथा गलतले तस्यापवत्साह्वयः ।
वामश्रोत्रगतो जयन्त इतरत्रास्यादिति : संस्थिता
वामांसे स्थितवानमर्त्यपतिरप्यंसेऽर्गलो दक्षिणे ।।
अर्कादयो वामभुजस्थिताः स्यश्चन्द्रादयो दक्षिणहस्तगाश्च ।
वामप्रकोष्ठे सविता च सावित्रोऽन्यत्र रुद्रः शिवजित् प्रकोष्ठे।।

महिधरार्यौ कुचयोर्विवस्वान् मित्रश्च कुक्षौ द्रुहिणोऽथ नाभौ ।
इन्द्रोऽस्य मेढ्रेऽण्डयुगे तु तज्जित् पादद्वये तस्य परे प्रविष्टा : ।।

On his head, *Īśa* is stationed. *Parjanya* and *Diti*, are located on his eyes. *Āpa, Āpavatsa, Jayanta*, *Aditi* and *Indra* are situated on his face, neck, right ear, left ear and left shoulder. *Argala* is on his right shoulder.

***Arka* etc are on the left arm and *Candra* etc are on the right arm. *Savitṛ* and *Savitra* are situated on the left**

forearm and *Siva* and *Sivajith* are on the right forearm.

Also located are *Mahidhara* and *Arya* on the breasts, *Vivaswam* and *Mitra* on the adomen, *Brahma* on the navel, *Indra* on the penis, *Indrajit* on the scrotum and other gods on two feet.

Commentary

The significance of allotting specific locations for the different gods(Ref.02.10) has been explained earlier.

Stanza - 32

ता देवता वास्तुशरीरसंस्थाः सन्तर्पितास्त्विष्टफलप्रदाः स्युः ।
ताश्चेदनिष्टा विपरीतदाः स्युस्तस्माद् विदध्यादिह वास्तुपूजाम् ।।

If these gods, positioned on the body of *vāstu*, are made satisfied through worships, they will cause desirable results. If they are not pleased they will give undesirable results. Therefore, worship of *Vāstu* (*Vāstupūja*) should be done.

Commentary

Vāstupūja (Ref.02.11) consists of certain rites in the worship of the gods. Since the gods are all on the body of *Vāstupuruṣa*, worship of gods is also worship of *Vāstupuruṣa*.

As stated earlier, the rites of *Vāstupūja* can be considered to be symbolic acts to keep the presiding deities of the *mandala* viz the elements of nature, in balance for the sustenance of the *Vāstu*.

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02.01 आकारवर्णशब्दादि गुणोपेतं भुवःस्थलं ।
सगृह्य स्थपतिः प्राज्ञो दत्वा देवबलिं पुनः ॥
स्वस्ति वाचकघोषेण जयशब्दादि मंगळैः ।
M.M., IV - 1 to 2

02.02 दन्तं वै चन्दनं चैव खदिरः कदरः शमी ।
शाकश्च तिन्द्रुकश्चैव शङ्कुवृक्षा उदीरिताः ॥
M.M., VI -6

02.03 वक्ष्येटहं दिक्परिछेदं शङ्कुनार्क्कोदये सति ।
उत्तरायनमासे तु शुक्लपक्षे शूभोदये ॥
प्रशस्तवारनक्षत्रे विमले सूर्यमण्डले ।
गृहीतवास्तुमद्ध्येतु समं कृत्वा भुवस्थलम् ॥
M.M.,VI.1-2

02.04 साक्षे शङ्कुमिनांगुलं समतले कृत्वा पृथक्कालज ।
च्छायाग्रारचितत्रिबिन्दुपरिवृत्योत्पाद्य मत्स्यद्वयमम् ॥
ततसौषुम्नसिरोत्थसूत्रयुगयोगाच्छङ्कुमूलान्तिमम् ।
सुत्रं न्यस्य सुसाधयेद्यमधनेशाशे ततश्चेतरे ॥
T.S. (S) I - 21

02.05 चातुर्वर्ण्यव्यासो द्वात्रिंशत् सा.चतुश्चचतुर्हीना ।
आषोडशादिति परं न्यूनतरमतीव हीनानाम् ॥
सदशांशं विप्राणां क्षत्रस्याष्टांशसंयुतं दैर्घ्यम् ।
षड्भागयुतं वैश्यस्य भवति शूद्रस्य पादयुतम् ॥
B.S., LVIII,12-13

02.06 सकलं पेचकं पीठं महापीठमतः परमम् ॥
--- --- ---- --- --- --- --- --- --- --- ---
इन्द्रकान्तपदं चैव द्वात्रिंशत्कथितानिवै ॥
M.M., VII - 1 to 7

02.07 वेधं तु गृहमद्ध्यानां गोत्रनाशकरं त्यजेत् ।

V.V., VI - 3

02.08 सर्व वास्तुविभागेषु विज्ञेयान्नवका -- V.R.

02.09 किमपि किल भूतमभवद्रुन्धानं रोदसि शरीरेण ।
तदमरगणेन सहसा विनिगृह्याथोमुखं न्यस्तम् ॥

B.S.,LIII-2

02.10 ------- महीतलं ॥
स्वीकृत्य शिल्पकुशलो बलिंदत्वायथाविधि ।
पुण्याहं वाचयेत् पश्चात्तूर्यमंगळनिस्वनैः ॥
गच्छन्तुसर्वभुतानि राक्षसा देवता अपि ।
आत्मात् स्थानान्तरं यायात् कुर्यात्पृथ्वीपरिग्रहम् ॥

M.S., VI- 1 to 3

02.11 देवानां स्वपदस्थानां बलिकर्म विधीयते ।
सामान्याहत्यमार्गेण बह्मादीनां यथाक्रमम् ॥

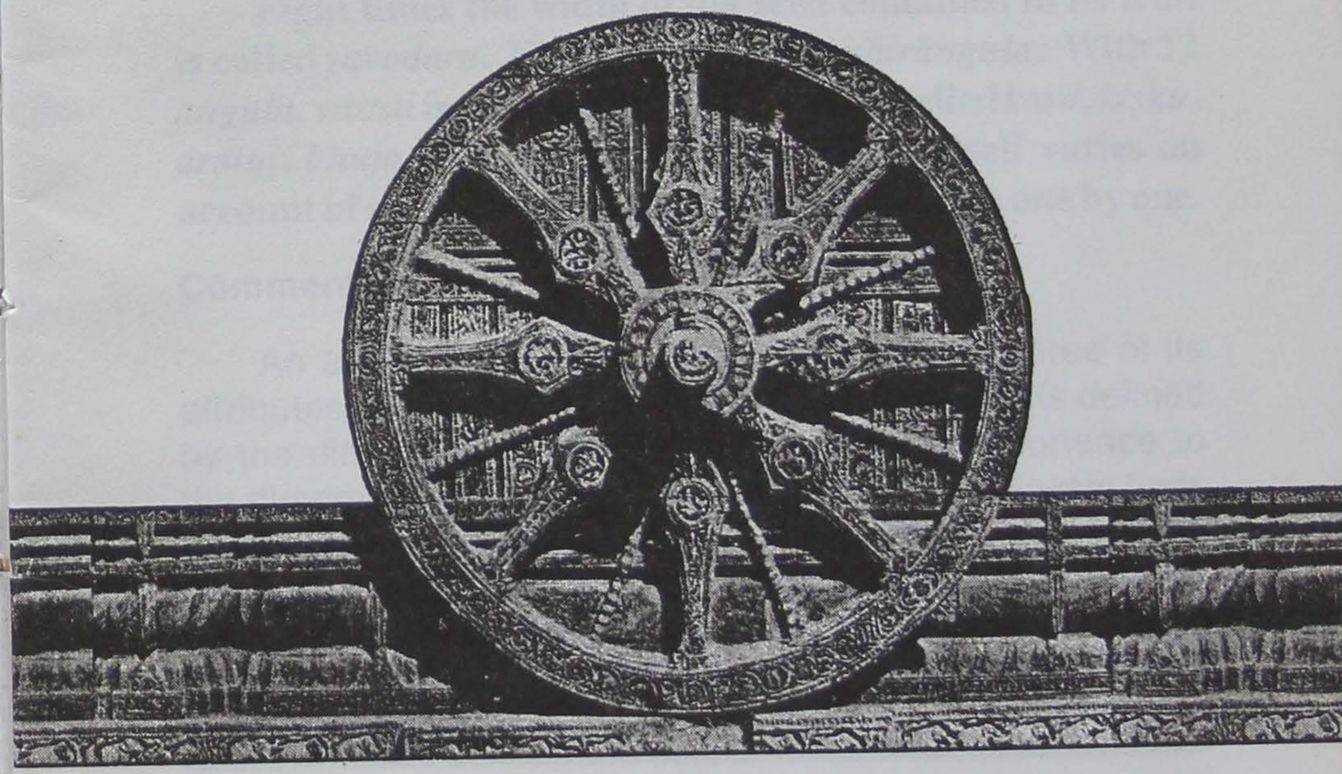
M.M., VIII - 1

3

DIMENSIONAL & ORIENTATION SYSTEMS & *AYADI* COMPUTATIONS

मानभेदयोन्यादिनिर्णयः

Basic dimensional system; systems based on grain size and on human proportions; characteristics of settlements; proportional system of measurement used in temples; yoni; āyadi ṣadvarga.



LIST OF ILLUSTRATIONS

CHAPTER - 3
अथतृतीयोऽध्यायः

DIMENSIONAL & ORIENTATION SYSTEMS AND *ĀYĀDI* COMPUTATIONS
मानभेदयोन्यादिनिर्णयः

BASIC UNITS AND SCALES

Stanza - 1

शिम्बिस्थाष्टतिलैर्यवोदरमिति प्राहुस्तदष्टोन्मितं
मात्राख्याङ्गुलमङ्गुलैरिनमितैः प्रोक्ता वितस्तिस्ततः ।
तद्द्वन्द्वं करकिष्कवरत्निभुजदोर्मुष्ट्यादिसंज्ञं तत-
स्त्वेकैकाङ्गुलबृद्धितोऽङ्गुलविशेषादप्यथो भिद्यते ।।

Eight times the width of *tila* seed contained in its fruit is called *yavodara*. Eight times that is *mātrāngula*. With 12 *angula*, *vitasti* is mentioned. Twice that is called *kara*, *kiṣku*, *aratni*, *bhuja*, *dos*, *muṣṭi*, etc. That (*kara*) itself varies on account of specific *angulas* by increasing *angula* one by one.

Commentary

An artefact (*vāstu*) is defined primarily by three of its attributes, viz, size, shape and orientation. Size is defined by the dimensions. *Vāstuvidya* gives great importance to the dimensions of *vāstu*. The title of one of the classic texts of *Vāstuvidya*, viz. *Mānasāra*, exemplifies this. *Māna* means 'dimension' and *sara* means 'essence'. Hence, *Mānasāra* means essence of dimensions. *Vāstuvidya* (Ref.03.01) and *Mayamata* (Ref.03.02) say that all artefacts are known by their dimensions.

In *Vāstuvidya*, two systems of units are used for direct measurements of length, one based on the grain size viz. *yavamāna* (*yava* means barley grain and *māna* means measurement) and the other based on human figure viz. *manuṣyapramāṇa* (anthropometric measurement). Being an agricultural community, the grain size was universally adopted in ancient India as the unit of measurement. Though six different grains viz. *yava, raktaśāli, śwetaśāli, mahāśāli, saugandhi and gamaśāli* were used, in due course *yava* was universally accepted as the standard grain for measurements. The average width of *yava* is 3.75 mm and is equal to eight times the width of gingely (*tila*) seed. According to this text, *tila* is the standard unit and *yava* is the derived unit. Three successive bisections of *yava* gives *tila*. The octal division is continued to the smallest measurement called *paramāṇu* as given in **table 03.01**.

TABLE 03.01 OCTAL DIVISIONS OF *YAVA*

8 *paramāṇu*	=	1 *trasareṇu*
8 *trasareṇu*	=	1 *likṣa or romagra*
8 *likṣa*	=	1 *yūka*
8 *yūka*	=	1 *tila*
8 *tila*	=	1 *yava*

Paramāṇu is described as equal to the size of the minute floating particles seen when sun's rays creep into a dark space through a crevice. The text *Vāstuvidya* describes *paramāṇu* as that which can be seen only by sages (Ref.03.03) and takes it as the standard unit and the other units as derived units. The smallest practical unit is *tila* which is equal to the width of a chisel mark on wood and is generally accepted as the tolerance in carpentry joints.

Yava is connected to the anthropometric system (*manuṣyapramāṇa*) by the relation given in **table 03.02.**

TABLE 03.02 OCTAL DIVISIONS OF *VYAMA*

8 *yava*	=	1 *angula*
8 *angula*	=	1 *pada*
8 *pada*	=	1 *vyāma*

Angula corresponds to the length of the central phalanx of the middle finger and is equal to 1/64 of *vyāma*, which is the arm stretch or span of a perfect man (**fig.03.01**). This is called *mātrāngula*. Since the anthropometric measurement will vary widely from race to race, *angula* is standardised in relation to *yava*, as 8 times the width of *yava*. This measurement is called *mānāngula* (standard *angula*).

The single pace of man is equal to his arm length from the shoulder to the tip of his middle finger. This is called *kara, aratni, bhuja, dos* and *hasta*. In Kerala, this is called simply as the measuring scale, *kol*. This is equal to 24 *angula*, i.e. 3/8 *vyāma*. Half this length, viz. 12 *angula, is vitasti*. Another derived unit is *parva* which is equal to 3 *angula* i.e. 1/8 *hasta*.(**fig.03.02**).

Though the standard *hasta* is 24 *angula*, different lengths are used for *hasta* as described in subsequent stanzas.

VARIATIONS IN *HASTA* SCALE

Stanza - 2

मात्राख्याङ्गुलिपञ्चविंशतिमितं मानं विमाने स्मृतं
प्राजापत्यकसंज्ञितं सुरगृहे तेनापि मेयं क्वचित् ।
एतैरेव वराङ्गुलैः परिमितं षड्विंशतिप्रोन्मितै-
र्मानं क्वापि समस्तधाम्नि विहितं नाम्ना धनुर्मुष्टिकम् ॥

The measure with 25 *mātrāngula* is called *prajāpatya* and is used in *vimāna* and in some places in temples. The measure made with 26 of these *angulas*, called *dhanurmuṣṭi* is used for all types of building in some places.

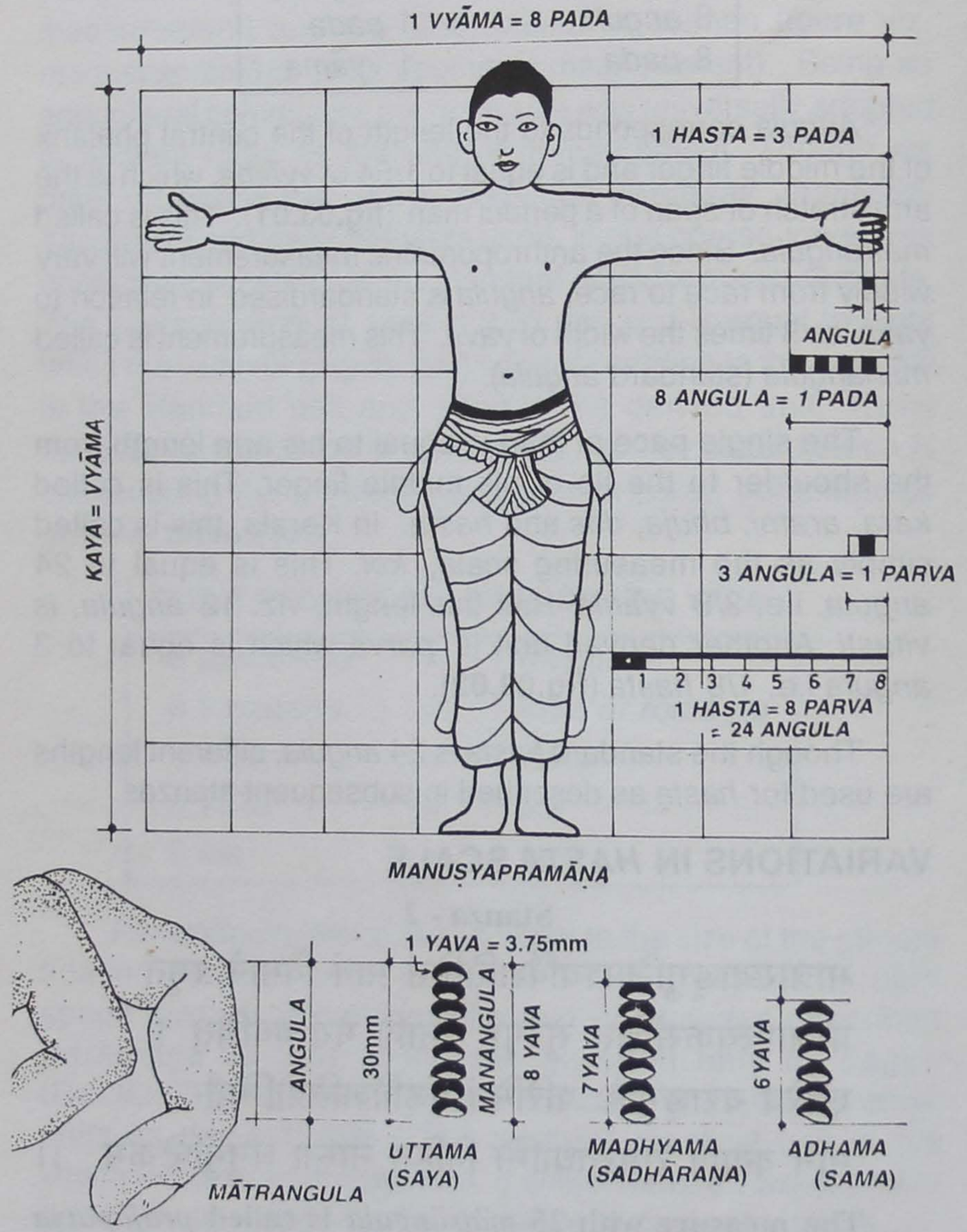


FIG. 03.01 BASIS OF ANTHROPOMETRIC DIMENSIONAL SYSTEM

Stanza - 3

सम्प्रोक्ताङ्गुलिसप्तविंशतिमितं मानं यदुक्तं बुधै-
र्नाम्ना तत्तु धनुर्ग्रहं यदमुना ग्रामादिकं मीयते ।
रथ्याद्योपवनादिसम्मितिविधौ वापीतटाकादिके
चेष्टं तत्र धनुर्ग्रहं त्वथ धनुर्मुष्टिश्च तत्रेष्यते ।।

The measure, referred by learned people to be of 27 of the said *angulas*, is called *dhanurgraha*. By this, villages etc. are measured. This *dhanurgraha* is prescribed in the measurement of streets, gardens etc. and of tanks, lakes etc. Then, *dhanurmuṣṭi* is also desirable there (for all these measurements)

Stanza - 4

अष्टाविंशतिसंमिताङ्गुलिमितं प्राच्याख्यमानं भवेद्
वैदेहं नवविंशतिप्रतिमितैर्मात्राङ्गुलैः सम्मितम् ।
स्यात् त्रिंशत्प्रवराङ्गुलीपरिमितं वैपुल्यमेकाङ्गुली-
युक्तं तत्तु भवेत् प्रकीर्णमिति दोर्मानप्रभेदोऽष्टधा ।।

The measure with 28 *angulas* is called *prācya*. The measure made with 29 *mātrāngula* is *vaideha*. The measure limited by 30 *angula* is *vaipulya*. With one *angula* added, this itself becomes *prakīrṇa*. Thus, there are 8 types of *hasta*.

Stanza - 5

भूसुरकार्ये निलये धनुर्ग्रहं च प्रकीर्णं च ।
वैपुल्यधनुर्मुष्टी भूपानां मानसाधने योज्ये ।।

***Dhanurgraha* and *prakīrṇa* are to be used in the houses of *brāhmaṇas*, *vaipulya* and *dhanurmuṣṭi* in the measurements related to kings.**

FIG. 03.02
OCTAL DIVISIONS OF *HASTA*

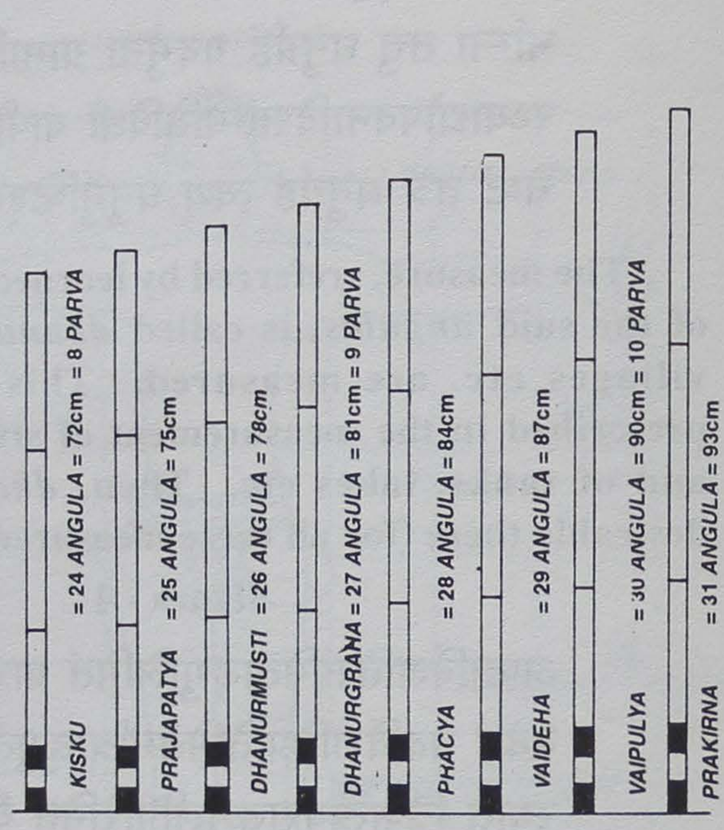


FIG. 03.03 VARIATIONS IN *HASTA* MEASUREMENTS

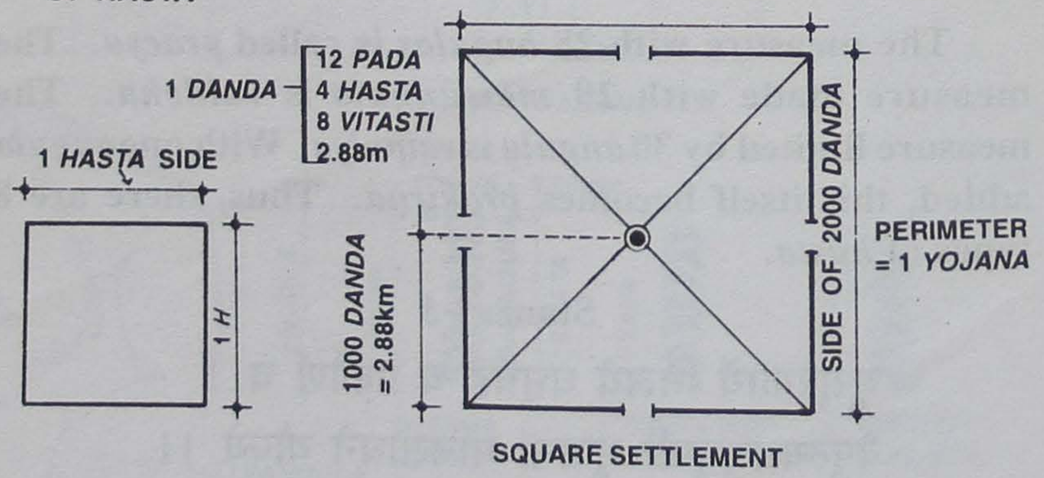


FIG. 03.04 UNITS FOR LARGE MEASUREMENTS

Stanza - 6

प्राजापत्यं च वैदेहं वैश्यानां सम्मतं भवेत् ।
किष्कुः प्राच्यं च शूद्राणां किष्कुः सर्वत्र संमतः ।।

***Prajāpatya* and *vaideha* are agreeable for *vaisyas* (trading class) and *kiṣku* and *prācya* for *sūdras* (working class). *Kiṣku* is agreeable everywhere.**

Commentary (Stanzas 2, 3, 4, 5 and 6)

These five stanzas describe 8 different lengths for *hasta* (**fig.03.03**) and the situations where they are employed. In the early days, each ethnic group might have adopted measuring standards based on the arm length of that group. Later, these different lengths were quantified in terms of the standard *angula* and prescribed for different purposes. (**table 03.03**). But *kiṣku* equal to 24 *angulas* is universally used for all purposes and generally adopted as the acceptable standard everywhere.

TABLE 03.03 DIFFERENT TYPES OF *HASTA* AND THEIR USES

Name of *hasta*	Length		Uses
	angula	cm	
Kiṣku	24	72	Standard *hasta*, applicable everywhere.
Prajāpatya	25	75	Temples, houses of *vaisyas* aeroplanes,
Dhanurmuṣṭi	26	78	All houses, streets, gardens, tanks, lakes
Dhanurgraha	27	81	Villages, streets, gardens, tanks, lakes, houses of *brāhmaṇas*.
Prācya	28	84	Houses of *sudras*
Vaideha	29	87	Houses of *vaiśyas'*
Vaipulya	30	90	Houses of kings (*kṣatriyas)*
Prakīrṇa	31	93	Houses of *brāhmaṇas*

USES OF DIFFERENT SCALES

Stanza - 7

स्वस्वोक्तमानादुपरि प्रदिष्टं सर्वं न चेष्टं क्षितिपादिकानाम् ।
अधःस्थमानं सकलं क्रमेण वैश्यक्षितीशद्विजवर्णयोग्यम् ।।

For kings etc. (*kṣatriya, vyśya and śūdra*) the standards prescribed for those above are not desired in place of that prescribed for each of them. For *vaiśyas*, *kṣatriyas* and *brahmins*, all that are prescribed for the lower classes are acceptable.

Commentary

This prescription restricting the use of different types of *hasta* is to standardise the units for the people of different status and for different uses. As stated earlier, *kiṣku* (24 *angula*) is taken as the standard and can be used by all in all situations.

In certain parts of India, the standard *hasta* is not of 24 *angula* length. For example, in certain parts of Tamilnadu, *pada* is taken to mean the 'foot' used in *British* system. Therefore, *hasta* will be 90cm (*vaipulya*). This has no basis as the British system came to India long after the traditional system was standardised. Even the *angula* measurement varies as stated in stanza 9. Therefore, the standard generally followed in each region, is to be ascertained before assessing or undertaking any work in that region.

Stanza - 8

सुरालये समस्तान्यप्यभीष्टानि यथेप्सितम् ।
मानानि श्रेष्ठमध्याधमाङ्गुलोत्थानि च क्वचित् ।।

In temples, all (*hastas*) are good when (used) suitably. In some places, the measurements arising out of superior (*śreṣṭha*), medium (*madhyama*) and small (*adhama*) *angulas* also are used.

Commentary

This states that for temples, all the different *hastas* can be used. This is understandable because, as in a *yāgaśāla*, the shrine is to be built from the measurements of the *yajamāna* or the *sthapaka*. Generally for temples, a suitable *hasta* is chosen and adopted as the standard for all measurements. In several temples (eg. in Kerala, *Panniyur* temple near Kuttipuram, *Pārthasārathi* temple at Aranmula and *Śrīpadmanābha* temple at Thiruvananthapuram) this standard *hasta* is sculptured on the *adhiṣṭhāna* of *garbha-grha or namaskāramandapa* or on *stambha* for comparison and later reference. The classification of *angulas* into superior (*uttama or śreṣṭha*), medium *(madhyama*) and small (*adhama)* is explained in the subsequent two stanzas.

UTTAMA, MADHYAMA AND *ADHAMA ANGULAS*

Stanza - 9

यवोदरैरष्टभिरुन्मितं यन्मात्राङ्गुलं तत् कथितं वरिष्ठम् ।
क्रमेण सप्तांशयवोदरैर्यत् तन्मथ्यमं चाधमसंज्ञितं च ।।

The *matrangula* made up of 8 *yava* width is said to be superior. That which are made up of 7 and 6 *yava* width are respectively medium and small.

Stanza - 10

षाष्टिकशाल्युदरैरप्यष्टाद्यङ्गैर्वराङ्गुलाद्यं वा ।
तच्छाल्यायतजलधिः सार्धत्रितयं त्रिसंमितैर्वापि ।।

By eight, seven and six times the width of paddy (*śāli*), there will be the superior etc. (superior, medium and small) *angulas*. By 4, 3 1/2 and 3 times the length of the same *śāli* also, there will be superior etc. *angulas*.

Commentary (Stanzas 9 and 10)

It was explained earlier in the commentary on the stanza

1 of this chapter that six different types of grains were used as standard and that *yava* is the commonly adopted standard. While relating *yava* or *śāli* with *angula*, one problem encountered is that, though the size of a particular grain was more or less constant, the measurement of human body varied widely, especially with different ethnic races. Therefore, a statistical classification of people into 3 groups was used to relate *yava* with *angula*. The *angula* measurements of these 3 classes of people were equated to 8, 7 and 6 times the width of *yava* (*yavodara*) and were called superior (*uttama*), medium (*madhyama*) and small (*adhama*) respectively. When paddy (*śāli*) is taken as the basis, the three measure of the *angula* were taken as equal to either 8,7 and 6 times the width of the śāli or 4, 3 1/2 and 3 times the length of the *śāli*. However *uttamangula* of 8 *yava* width is commonly adopted as the standard measure *(mānāngula*). It is taken as equal to 3.75mm.

Stanza - 11

नवधेत्युदिताङ्गुलिप्रभेदान्
नवधा तत्र कराः स्युरुत्तमाद्याः ।
अथ तेऽङ्गुलिवृद्धितोऽष्टधोक्तैः
करभेदैः सहिता द्विसप्ततिः स्युः ।।

From the 9 different *angulas* described thus, the superior etc. *hasta* will be 9 types. Then by the eight type of hasta described with increments in *agulas* they will become 72 types .

Commentary

Eight different *hastas* have been described in stanzas 4, 5 and 6 of this chapter with lengths of 24, 25, 26, 27, 28, 29, 30 and 31 *angulas*. Each of these can be further subdivided into 9 types as described in the preceding 2 stanzas. Thus altogether, there are 72 variations of *hasta.*

RECOMMENDATION ON THE USE OF SCALE

Stanza - 12

आदौ चतुर्विंशतिसंमितैर्यो मात्राङ्गुलैरुक्तकरः स एव ।
सर्वत्र पूज्यो मतभेदतोऽन्ये सर्वेऽपि च क्वापि यथार्हमिष्टाः ।।

That *hasta*, which was established earlier as being made of 24 *mātrāngulas*, is respected everywhere. All the others are differing opinions (beliefs) and are liked in some places on the basis of their suitability.

Commentary

This stresses the universal acceptability of *kiṣku* (of 24 *uttamāngula*). The text *Vāstuvidya* also states that for all *vastus, kiṣku* is the most popular cubit. (Ref.03.04). *Mānāsara* also recommends *hasta* of 24 *angula* for all artefacts (Ref.03.05).

UNITS FOR MEASURING ARTEFACTS OF DIFFERENT SIZES

Stanza - 13

हस्तेनैव गृहाद्यमुक्तमुदितं कुत्रापि मात्राङ्गुलै-
रत्यावश्यकतो यवैरपि परीणाहं च गत्यादि च ।
मानुष्येषु तु बाह्यगेहगतिनिष्ठादौ चतुर्हस्तको
दण्डो यष्टिरिति स्मृतोऽष्टगुणितो दण्डोऽत्र रज्जुर्भवेत् ।।

The houses etc. are described by *hasta* measurement. Some cases are described by *mātrāngulas*. When absolutely necessary, the perimeter and shift (*gamana*) can be described by *yava*. But in the shift of the outer buildings and the boundaries of (houses of) humans, *daṇḍa* of 4 *hasta* is used. This is known as *yaṣti*. Eight times *daṇḍa* becomes *rajju*.

Commentary

This specifies the units to be used for measuring

different artefacts. For large artefacts, large units are used and for small artefacts, small units are employed. For the houses, it is said that *hasta* is the unit employed. Elsewhere (*'kutrāpi'*) *angula* is used. The word 'elsewhere' *('kutrāpi')* has been interpreted differently. One interpretation is that in some regions, *angula* also is used for houses (Ref:03.06). Others interpret that 'elsewhere' means "in the case of other artefacts like the doors, seats, etc". According to them, for houses, *hasta* is the only standard unit. The former interpretation is not logical as evidenced from the remaining part of this stanza. It is said that when the perimeter and the shift of centre line (*gamana*) cannot be measured by *hasta* and *angula* (i.e. when these are very small as in the case of icons and decorative works), they are to be measured in *yava* units.

For making long measurements, *daṇḍa* equalling 4 *hastas*, is to be used as the unit. *Daṇḍa* literally means a measuring stick, and it is standardised as 4 *hasta* long. It is the perimeter of the square of 1 *hasta* side (**fig.03.04**). The standard length of *daṇḍa* is 2.88m which is comparable to the length of the ranging rod now used in land survey. Eight times *daṇḍa* is *rajju* (which literally means rope). Thus, it can be seen that the unit to be adopted for measuring a *vāstu* depends on its overall dimensions, i.e. for larger lengths, larger units are used and for small lengths small units are employed. (**Table. 03.04**). This is further explained in the next stanza. It is also natural in the octal system that the sub-units are 1/8th of main unit.

The size of the settlements are measured in *yojana*, which is equal to 1000 *rajju* or 8000 *daṇḍa*. A *yojana* is thus the perimeter of a square with each of its sides equal to 2000 *daṇḍa*. Therefore, in a square settlement of 1 *yojana* perimeter, the distance from the gateways to the centre of the settlement will be 1000 *daṇḍa*. **(fig.03.04)**. Incidentally, this is the distance that can be covered by a man walking for 1 *nādika* (1/60 of a day = 24 minutes) and is therefore,

referred to as *nadika* (linear measurement).

TABLE. 03.04

UNITS FOR MEASURING DIFFERENT *VASTUS*

Vastu	**Unit**	**Octal sub unit for measu rement**
Fine details, carvings, etc	*Yava*	*Tila*
Icons, *pitha* etc.	*Angula*	*Yava*
Building elements	*Hasta*	*Parva*
Building plan	*Vyama*	*Pada*
Building plot	*Danda*	*Vitasti*
Measurement of land	*Rajju*	*Danda*

Stanza - 14

तालाद्यैः प्रतिमादिकं खलु यवैर्मेयं च भूषादिकं
वस्त्रप्रावरणांशुकादि परिमेयं स्याद् वितस्त्या तथा ।
शस्त्राद्यं तदनामिकाङ्गुलियुगेनैवं च तद्व्यासतो
मुष्ट्या याज्ञिकभाजनादि यजमानस्यान्यदङ्घ्र्यादिना (म् ?) ॥

***Icons* etc. are to measured by *tala* etc. Ornaments are to be measured by *yava*. The measurement of silk, coverings, dress etc. are to be done by *vitasti*. Weapons etc can be measured by twice the width of their (of persons using the weapon) ring fingers and also can be measured by its (of ring finger) diameter. The vessels for sacrificial rite (*yaga*) are to be measured by the fist (*musti*) and others by the foot etc of the master (*yajamana*).**

Commentary

Two methods of measurements are used in *Vastusastra*. One is the direct or absolute method using *yavamana* and/or *purusapramana* as explained already. The other is the

proportionate method. *Tālamāna* is one such proportionate scale, while *dandamana* is another one.

In the *tālamāna*, all measurements are made in proportion to the *tāla,* which is the length of the palm including the fingers. (**fig.03.05**). This is equal to the length of the face. The measurements of the various other parts of the body are reckoned as ratios of *tāla.* The total height is taken as 5,6,7,8,9 or 10 times the length of face (one *tāla*) depending upon the nature of the figure depicted. For example, for noble men and gods, the total height is taken as 8, 9 or 10 *tala* (*aṣṭatāla, navatāla, daśatāla*), adolescents are represented in *saptatāla* (7 *tala)* and *ṣadtāla (6 tala),* and children are shown in *pancatāla* (5 *tala).* Thus *Viṣnu, Brahma, Durga* etc are sculptured in *daśatāla,* lesser gods in *navatāla*, ordinary men and demons in *aṣṭatāla, Subrahamaṇya* (as *Kumāra)* in *ṣaptatāla* or *ṣadtāla* and *Gaṇeśa* in *pancatāla.* Women are generally depected in slender proportions.

One-twelfth of one *tāla* is one *tālāngula* and one-eighth of that is one *tālayava.* In the *tāla* method, for icons of any size, the measurements of the different parts of the body are divided in fixed proportion of the prescribed heights. Fine details are marked in *tālāngula* and *tálayava* and sculptured. Thus the idol of any particular deity, large or small, will have the same proportions for their parts. Proportions are also fixed for seat, crown, weapons, etc. The *daṇḍamāna* has been explained under the stanzas 21 and 22 of this chapter.

CHARACTERISTICS OF SETTLEMENTS

Stanza - 15

द्विजभवनादिबहुत्वाद् ग्रामाद्याः सम्भवन्ति बहुभेदा : ।
उत्तममध्याधमतो मानविशेषैश्च सम्भवेदेषाम् ।।

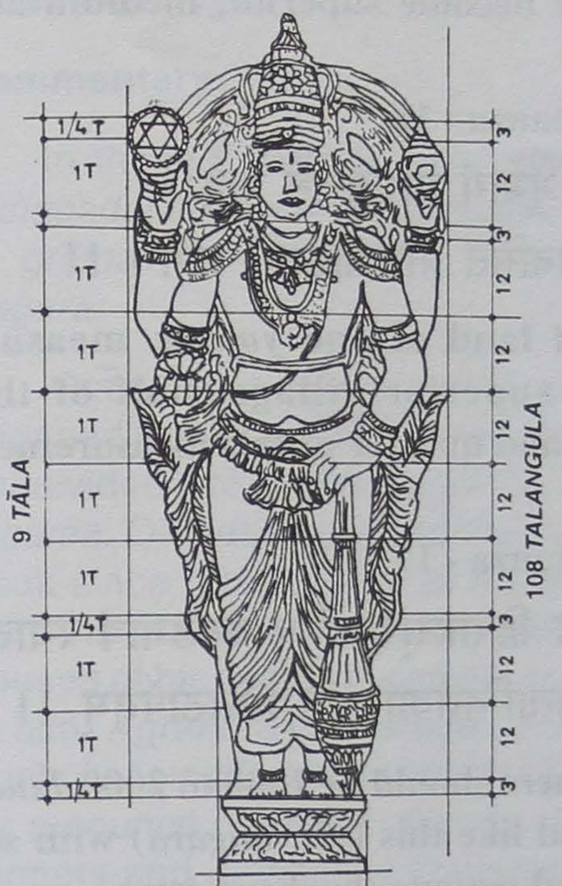


FIG. 03.05 PROPORTIONS IN *NAVATĀLA*

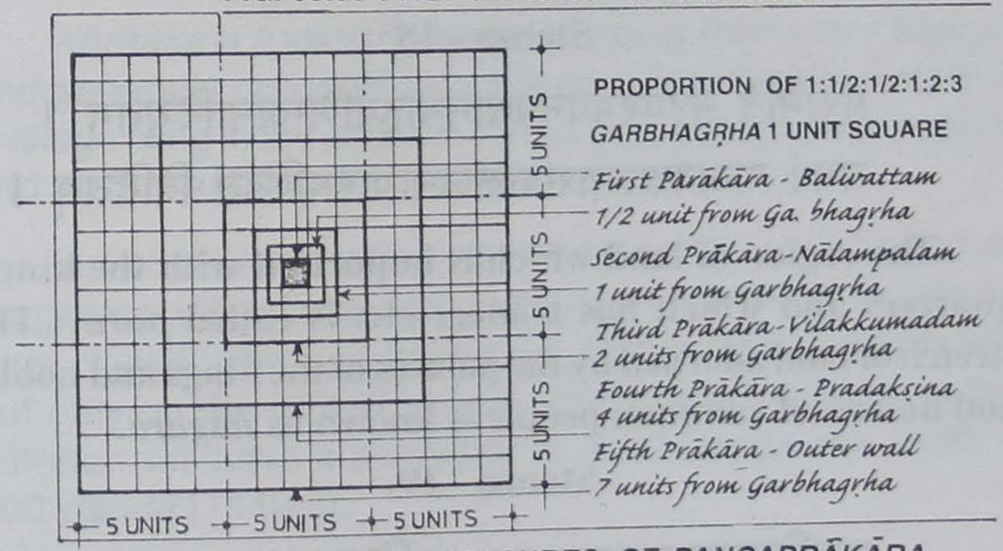


FIG. 03.06 PROPORTIONATE MEASURES OF *PANCAPRĀKĀRA*

Based on the number of houses of *brahmins* etc, many different types of villages occur. By their different measurements also, they become superior, medium and small.

Stanza - 16

योजनमितचतुरश्रं भूभागं ग्राममुत्तमं प्राहुः।
मध्यममर्धप्रमितं पादमितं प्रायशोऽधमं ग्रामम् ।।

A square region of land of one *yojana* measure (perimeter) is said as superior village, half of this measurement is medium and quarter of this measurement is mostly small.

Stanza - 17

नगरस्य सहस्रादि द्विसहस्रान्तं च दण्डमानं स्यात्
पत्तनसंज्ञं तद्वत् पोतान्वितवारि(नि)धितटोपेतम् ।।

For *nagara* (town), there should be 1000 to 2000 *danda* width. The region of land like this (viz. *nagara*) with sea shore having ships is called *pattana* (harbour town).

Stanza - 18

पुरमिति नरवरभवनप्रधानमाहुर्वणिग्जनादियुतम् ।
नगरं राजवरालयसकलजनागारमण्डितं विदितम् ।।

The region of land which is important with the king's quarters and which has traders etc. is called *pura*. The stretch of land adorned by the palaces of the kings and nobles and houses of common people is known as *nagara*.

Stanza - 19

एकविप्रवरागारतत्कुटुम्बसमन्वितम्।
एकभोगं भवेद् ग्रामं तद्भृत्यायतनावृतम् ।।

A village with the house of one noble *brahmin* along with his family surrounded by the houses of his servants is called *ekabhoga*.

Commentary

In these 5 stanzas, the specifications for settlements (*janapada*) are given. *Arthaśāstra* classifies settlements into (i) *grāma* (ii) *khetaka* (iii) *kharvātaka* (4) *durga* and (v) *nagara*.

Grāma is a village settlement with several families engaged mainly in agriculture and/or crafts. *Grāma* is further subdivided into *ekabhogagrāma, agrahāra, vidambaka,* and *nigama*. Of these only *ekabhogagrāma* is described in this book since it is the typical Kerala village of ancient times with the house of a brahmin landlord surrounded by the houses of his servants and dependants who owe allegiance to him. *Agrahāra* is a village generally located around or in front of a temple, mostly occupied by brahmins and governed by a council of senior citizens. *Vidambaka* is occupied by farmers and *nigama* by craftsmen.

Khetaka is a village located far away from other villages and generally occupied by tribal groups while *kharvataka* is a village lying in the caravan routes between towns or nations and mainly serving the needs of the travellers.

An *uttamagrāma* has a perimeter of 1 *yojana, madhya-magrama* 1/2 *yojana* and *adhamagrāma* 1/4 of a *yojana*. This classifications is based not on the type of settlement but only on the size of *grāma*. The smallest village by this criterion will have a perimeter of 2000 *daṇḍa* or a width of 500 *daṇḍa* (1440m).

A *durga* is a fort located at any strategic point like hill tops *(giridurga* - mountain fort) and islands (*jaladurga* - water fort). *Nagara* (town) is occupied by a large number of people

of different classes. It is described that *nagara* will have width between 1000 *daṇḍa* (2.88km) and 2000 *daṇḍa* (5.76km). This may appear to be contradictory to what has been stated in stanza 16, where the perimeter of *uttamagrāma* is specified as 1 *yojana* (23 km) and that of a *madhyama grāma* is 1/2 *yojana*. The sizes of the *madhyama* and *uttama grāma* are the same as that of *nagara*. This is due to the fact that the towns were concentrated settlements whereas the villages were extensive settlements. The size does not indicate the population.

A harbour town is *pattana* and a commercial town is *pura*. In *Arthaśāstra*, a harbour town is called *droṇimukha*. A town which is the headquarters of a state and where the rulers and different classes of people live is called *nagara*. Some texts (*Arthaśāstra* for example) call this *rājadhāni*.

Stanza - 20

ग्रामाद्यखिलं द्विजभवनादिबहुत्वादनेकधा ज्ञेयम् ।
मानविशेषैरुत्तममध्याधमसंज्ञितं च सम्भवाति ।।

By the multiplicity of houses of *brahmins* etc. all begining with *grāma* are known to be of many types. By difference in measurements, they are called *uttama*, *madhyama* and *adhama*.

Commentary

This stanza may appear superfluous because what is stated here has already been described in the proceeding stanzas. Some versions of *Manuṣyālayacandrika*, hence. omit this stanza. But this clarifies the differences between the structure and size of the settlement. The classification of the settlement as *grāma*, *nagara*, etc. is based on the demographic and economic structure. Depending on measurements, a settlement type may however be

characterised as *uttama*, *madhyama* and *adhama* - meaning large, medium or small.

MEASUREMENT OF TEMPLES

Stanza - 21

उत्तरयुगबाह्यान्तो मन्दिरविस्तार एव देवगृहे ।
श्रेष्ठो दण्डस्तद्वज्जगति प्रान्तावसानिको मध्यः ।।

In temples, the width of the *garbhagṛha* between the outside edges of 2 wall plates is superior *daṇḍa*. Similarly that which ends outside the *jagati* is medium

Stanza - 22

पादुकयुगलावधिको दण्डः प्रोक्तोऽधमः सुरागारे ।
प्रासादाद् बहिरेतैर्मर्यदाः पञ्च तत्र कल्प्या : स्यु : ।।

The *daṇḍa* to the outside of *paduka* is said to be inferior. In temples, outside the *garbhagṛha*, the five boundaries (*maryādas*) are considered by this *daṇḍa*.

Commentary (Stanzas 21 and 22)

Reference was made to *tālamāna*, a system of proportionate scale in the making of icons (stanza 14 of this chapter). *Daṇḍamāna* is another proportionate scale used in the planning of temples.

In *daṇḍamāna*, the measurement of a specific part of the structure is taken as a *daṇḍa* (standard rod or module) and all other measurements are taken as ratios of this *daṇḍa*. This *daṇḍa* should not be confused with the 4 *hasta daṇḍa* mentioned earlier in the absolute method of measurement. For example, for pillars, the diameter or lateral dimension at top is taken as a *daṇḍa* (module) and its height etc are given in terms of this *daṇḍa* (For details, see sl. 24 of ch.5).

In the construction of temples also, *daṇḍamāna* is

employed. Here the *daṇḍa* is the width of the *garbhagrha* (shrine room). This is used to demarkate the boundary lines (*prākāra*) of a temples and for proportioning the different parts of the *garbhagṛha*. The *garbhagṛha* is also called *vimāna* because its parts are measured in a proportionate system.

In temples, the boundary lines of the five regions enveloping the central shrine (*prāsāda*) are called *panca-prākāras* (five boundary walls) (**fig. 03.06**). They are called *antarmaṇḍala, antahāra, madhyahāra, bāhyahāra and maryāda* respectively in the increasing order of distance from the *garbhagṛha.* Their positions relative to the *prāsāda* are decided by proportionate measurements, viz. *daṇḍamāna.* The standard *daṇḍa* is the outside to outside distance between 2 parallel wall plates of the *prāsāda* (**fig.03.07**). All the other measurements, horizontal or vertical, are made in proportion to this *daṇḍa.*

The practice of measuring *daṇḍa* from outside to outside of wall plates is considered superior (*uttama*), when compared to the practice of basing *daṇḍa* on the outside widths of other elements of the basement (*adhiṣṭhāna*) (**fig.03.07**). *Daṇḍa* measured as outside width of *jagati* is medium *(madhyama)* and that based on outside width of *pāduka* is inferior *(adhama)*. This indicates the importance attributed to the roof frame as compared to the walls or basement and speaks of the origin of the temple from an (early) wooden structure (*maṇḍapa*). With later stone masonry construction, measurements perhaps came to be taken based on walls or basement.

CONCEPT OF *YONI* (ORIGIN)

Stanza - 23

यानाङ्गादिषु केतुरेव विहितः सर्वत्र शस्तो ह्ययं
पर्यङ्कादिषु कुञ्जरो मृगपतिः पीठासनादौ हित : ।
भाण्डे कूपतटाकपञ्जरविधौ योनिर्वृषो वा ध्वजोऽ -
थाश्वत्थादिसमस्तकुट्टिमविधौ केतुर्विधेयः सदा ।।

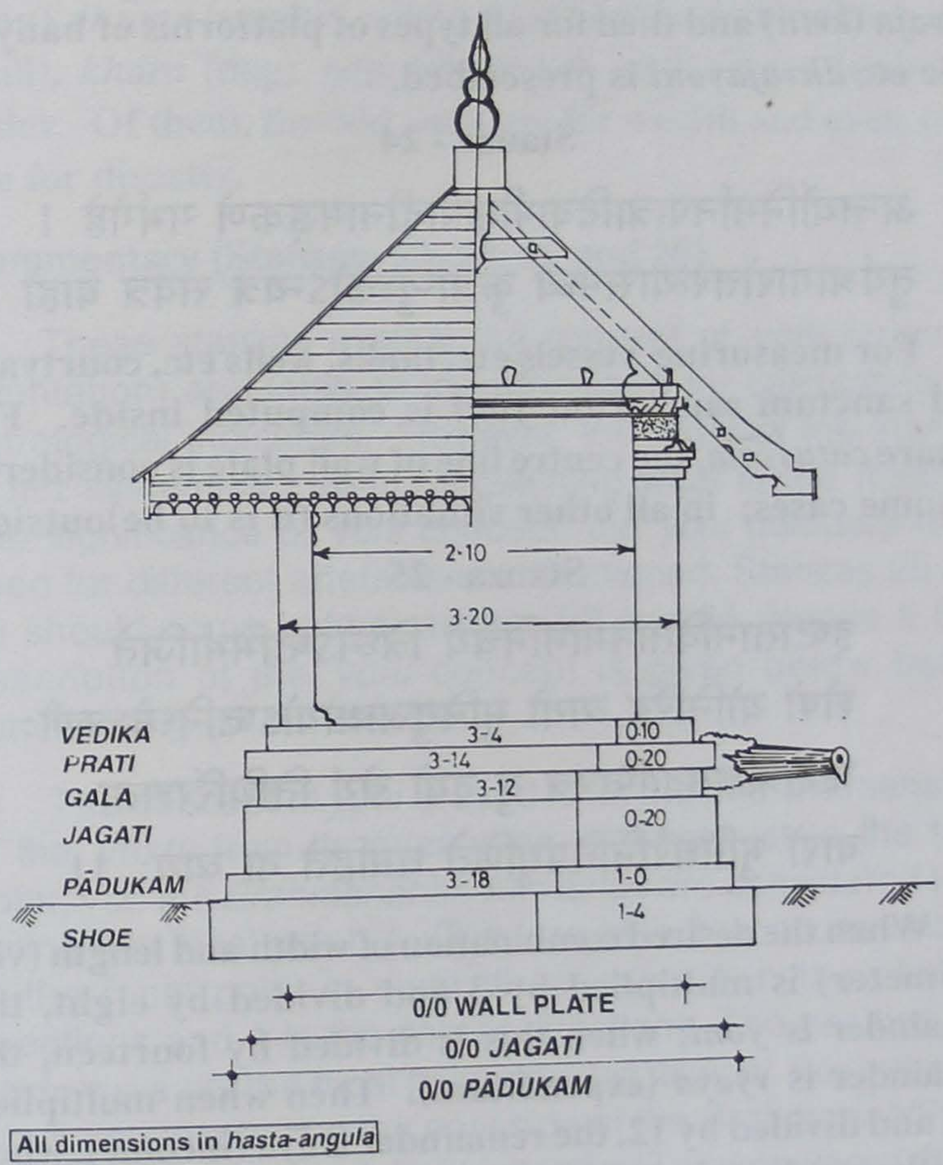


FIG. 03.07 STANDARD MODULE (*DANḌA*) FOR TEMPLES

In the elements of vehicles (*yāna*), *ketu* (flag) *yoni* alone is prescribed. After all, it is appropriated everywhere. In cots (*paryanka*) etc., *gaja* (elephant) *yoni* and in seats and chariots etc. *simha* (lion) *yoni* are desired. For box, well, lake and cage, the *yoni* is *vrsa* (bull) or *dhvaja* (*ketu*) and then for all types of platforms of banyan tree etc *dhvajayoni* is prescribed.

Stanza - 24

अन्तर्योनिर्मानपात्रादिवापीकूपादीनामङ्कणे गर्भगेहे ।
तुर्यश्रागारोत्तरब्यासमध्ये कुत्राप्युत्कोऽन्यत्र सर्वत्र बाह्ये ।।

For measuring vessels etc, tanks, wells etc, courtyard and sanctum sanctorum *yoni* is computed inside. For square *catuśśāla*, the centre line of wall plate is considered in some cases; in all other situations (it is to be)outside.

Stanza - 25

इष्टातानवितानमाननिचये त्रिघ्नेऽष्टभिर्भाजिते
शेषो योनिरिह व्ययो मुनियुजाथायोऽष्टनिघ्नेऽरुणैः ।
ऋक्षैर्ऋक्षमवाप्तिरत्र तु वयो ज्ञेयं तिथिस्त्रिंशता
वारो भुमिधरैर्निधिप्रगुणिते धर्माहृते वा व्ययः ।।

When the desired combination of width and length (viz. perimeter) is multiplied by 3 and divided by eight, the remainder is *yoni*; when this is divided by fourteen, the remainder is *vyaya* (expenditure). Then when multiplied by 8 and divided by 12, the remainder is *āya* (income), when this (the product) is divided by 27, the remainder is *nakṣatra* (star), and the quotient here is to be known as *vayas* (age). When divided by 30, the remainder is *tithi* (phase of the moon) and when divided by seven, the remainder is *vara* (week). When multiplied by nine and divided by 10, a different (type of) expenditure (will happen).

Stanza - 26

ध्वजधूमसिंहकुक्कुरवृषखरगजवायसाः क्रमेण स्युः।
प्रागादियोनयोऽष्टौ तेष्वयुजः सम्पदे युजो विपदे ।।

Starting from the east, the eight *yonis* will be *dhvaja* (flag), *dhūma* (smoke), *simha* (lion), *kukkura* (monkey), *vrsa* (bull), *khara* (dog), *gaja* (elephant) and *vāyasa* (crow) in order. Of them, the odd ones are for wealth and even ones are for disaster.

Commentary (Stanzas 23, 24, 25 and 26)

These stanzas explain the concept of *yoni* (origin or orientation) and indicate the procedure for calculating the astrological indicators. However, the order of the stanzas is not systematic. Before explaining what is the meaning and significance of *yoni* concept, the *yoni* numbers to be used for different artefacts are mentioned. Stanzas 25 and 26 should come before stanzas 23 and 24. Hence a brief description of the *yoni* concept is given below before commenting on the stanzas.

The concept of *yoni* is used to fix the prime dimensions of the *vāstu* from its orientation with respect to the focal point, viz. the *Brahmanābhi*. All *vāstus* are considered to be facing this focal point. A *vāstu* can take 8 locations relative to the focal point in eight directions - 4 in the cardinal directions and 4 in the corner directions. The position of a *vastu* vis-a-vis the focal point decides its *yoni*. For example, a building located on the east side of the *Brahmanābhi* and, therefore, facing west is of *dhvajyoni* or *ketuyoni* (*dhvaja* and *ketu* both mean flag). The names of other *yonis* and their locations are shown in table. 03.05.

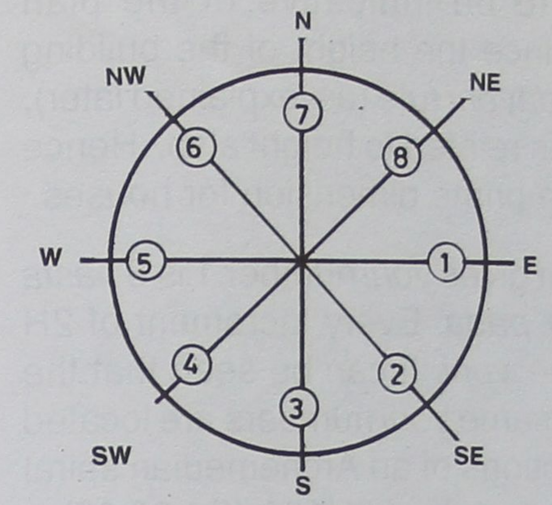
The *yoni* is computed by multiplying the prime dimensions of the *vastu* by 3 and dividing the product by 8, corresponding to the 8 possible directions. The remainder is called *yoni*

number *(yonisankhya)* and determines the *yoni.*

TABLE. 03.05. CHARACTERISTICS OF *YONI*

Location with respect to focal point	*Yoni* name	*Yoni* number	Characteristic quality
East	*Dhvaja* or *ketu* (flag)	1	Desired results
East-south	*Dhūma* (smoke)	2	Fear
South	*Simha* (lion)	3	Prosperity
South-west	*Kukkura* (monkey)	4	Quarrel
West	*Vṛṣabha* (bull)	5	Abundance of grain
West-north	*Khara* (dog)	6	Fickleness
North	*Gaja* (elephant)	7	Welfare
North-east	*Vāyasa* (crow)	8/0	Extinction of family

In stanza 13 of this chapter, it has been stated that the houses are to be described in *hasta.* Therefore, for computation of *yoni* of houses, the prime dimension in *hasta* is multiplied by 3, divided by eight and the remainder is taken as *yoni* number. The prime dimensions recommended in this text is the *paryanta* (the perimeter). Some other texts differ on this point. For example, *Bṛhatsamhita* prescribes area, *Vāsturājavallabha* prescribes height and *Mānasāra* recommends the width and *Mayamata* the perimeter as the prime dimensions. *Tantrasamuccaya,* another Kerala text, adopts the perimeter. *Tantrasamuccaya* and *Manuṣyālaya-ccandrika* are written after scrutinising all available literature



YONI NUMBER	POSITION OF *VASTU*	*YONI*
1	E	*DHVAJA*
2	SE	*DHŪMRA*
3	S	*SIMHA*
4	SW	*KUKKURA*
5	W	*VṚṢABHA*
6	NW	*KHARA*
7	N	*GAJA*
8	NE	*VĀYASA*

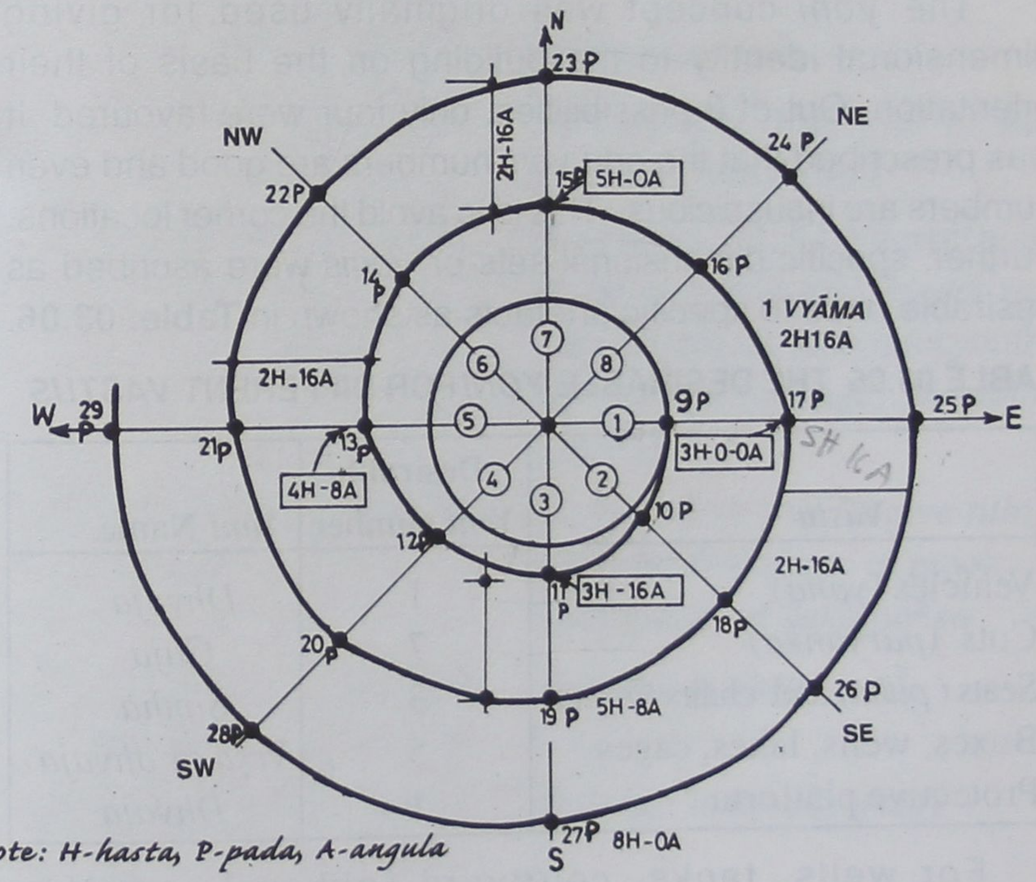


FIG. 03.08 *YONI*, THE ARCHITECTURAL FORMULA FOR ORIENTATION

and hence what is stated in them should be the most appropriate. Moreover, as perimeter is a combination of length and width, it can be taken to be indicative of the plan composition of the building. Since the height of the building will be related to its width by *padayoni* rule (as explained later), in a design scheme, perimeter is related to height also. Hence the perimeter is adopted as the prime dimension for houses.

The smallest perimeter that gives *yoni* number 1 is 3 *hasta* when multiplied by 3 it gives 9 *pada*. Every increment of 2H 16A (= 8 *pada*) gives the same *yoni.* It can be seen that the groups of perimeters giving the same *yoni* numbers are located on the 8 *radial* vectors in 8 directions of an Archemedian spiral with an initial radius of 3H and a pitch of 2H16A (**fig.03.08**).

The *yoni* concept was originally used for giving dimensional identity to the building on the basis of their orientation. Out of 8 possibilities, only four were favoured. It was prescribed that the odd *yoni* numbers are good and even numbers are inauspicious. This is to avoid the corner locations. Further, specific dimensional sets or *yonis* were ascribed as desirable ones to specific artefacts as shown in **Table. 03.06**.

TABLE 03.06 THE DESIRABLE *YONI* FOR DIFFERENT *VASTUS*

Vāstu	Desirable *Yoni* number	*Yoni* Name
Vehicles (*yāna*)	1	*Dhvaja*
Cots (*paryanka*)	7	*Gaja*
Seats (*pīṭha*) and chairs (*āsana*)	3	*Simha*
Boxes, wells, lakes, cages	5	*Vṛṣa* or *dhvaja*
Protective platform	1	*Dhvaja*

For wells, tanks, courtyard (*ankaṇa*), *sanctum sanctorum* etc with clearly defined interior, the internal perimeter was used for computing the *yoni*. For large constructions like houses and palaces, the outside perimeter

is generally adopted for the building as a whole and inside perimeter for the individual rooms. But in some case both inside and outside perimeters as well as the centre line perimeter are considered.

In addition to the *yoni*, certain other *jyotiṣa* factors are also used in selecting the dimensions and locations of *vāstus*. They are also computed from the prime dimensions P of the *vāstu* as given in **table. 03.07**.

TABLE. 03.07 COMPUTATION OF *YONI* AND *JYOTISA* FACTORS.

Factor	Computation	Remarks
i) *Yoni* (Origin)	Px3/8	Remainders1-8 give*yoni* numbers
ii) *Vyaya*	Px3/14 Px9/10	Remainder is expenditure
iii)*Āya*(Income)	Px8/12	Remainder is income
iv)*Nakṣatra* (Star)	Px8/27	Remainders 1to27 give 27 stars starting from *Aśwati*
v) *Vayas* (Age)	Px8/27	Quotients 1,2,3,4 5 corresponds to *bālya* (chilhood), *kaumāra* (adolescence), *yauvana*(youth) *vārdhakya,* (old age), *maraṇa* (death)
vi)*Tithi* (Phase of moon)	Px8/30	Remainders 1 to 30 give *tithi* from the first phase of moon (*pratipada)* of *śuklapakṣa*
vii) *Dhruwa* (Stability)	Px2/16 Px3/16	Balance is *dhruva*
viii) *Rāśi* (Month)	Px4/12 Px8/12	Balance is month (*rasi*)
ix) *Vāra* (Week)	Px8/7	Remainders 1 to 7 give week starting from Monday.

Note: P is the prime dimension in *hasta*. This text uses perimeter as prime dimension.

Stanza - 27

केतुयोनिरभिवाञ्छितार्थदः
सात्त्विकोऽमरगुरुर्द्विजो भवेत् ।
पुर्वदिक्ष्वभिहितोऽपि सर्वदा
सर्वदिक्ष्वभिहितो विशेषतः ।।

Ketu yoni **is the giver of desired wealth, is of gentle (*satwa*) quality, is the *guru* of gods (*Bṛhaspati*-Jupitor) and is *brāhmaṇa*. Though prescribed in the eastern direction, it is specially suitable for all (*vāstus*) in all directions.**

Stanza - 28

सिंहो दक्षिणदिक्स्थितः क्षितिसुतो लक्ष्मीप्रदस्तामसो
भूपोऽथो वणिगुत्तरे शुभकरो दन्ती बुधो राजसः।
शूद्रः पश्चिमदिक्स्थितोऽर्कतनयो धान्यप्रदस्तामसः
सम्प्रोक्तोऽथ विदिक्षु ये निगदितास्तत्रापि ते निन्दिता : ।।

Simha yoni **is located in the south, is *Kuja* (mars), is giver of prosperity, is of *tamas* quality, and is *kṣatriya*. *Gajayoni* is *vaiśya* (trading class), is located in north, is doer of welfare, is *Budha* (mercury) and of *rājasa* quality. *Vṛṣayoni* is suited to *sūdra* (working class), is located in west, is *Śani* (saturn), is giver of grains and is of *tamas* character. The *yonis* prescribed for corners are despised even there (i.e. they are not used even for corner houses).**

Stanza - 29

उद्वेगः स्याद् धूमे शुनि कलहश्चपलता खरे भवति ।
ध्वाङ्क्षे कुलहानिः स्यात् सर्वविदिग्योनयस्ततो निन्द्या :।।

There will be fear in *dhūma* and quarrel in *kukkura*. In *khara*, indiscrimination occurs and in *kāka* there will be the end of the race. Hence all corner *yonis* are despised.

Stanza - 30

प्राच्यां केतुर्विधेयः स तु भवति विधानेषु सर्वत्र नित्यं
शालायां दक्षिणास्यां मृगपतिरुदितः केतुयोनिश्च योज्यः।
मातङ्गः केतुसिंहावपि च वनपतौ पश्चिमे स्याद् वृषोऽन्ये
केतुः सिंहो गजश्चापि च निजनिजकोणालयेऽप्येवमेव ।।

In the east, *ketu* is prescribed. In the design of houses, it is good everywhere. In the southern house, *simha* is mentioned, *ketuyoni* is also suitable. In the north, *gaja* is suitable, also *ketu* and *simha*. In the west, let there be *vṛṣa*, also others *ketu*, *simha* and *gaja*. And in the corner houses in the same way (of the related houses).

Commentary (Stanzas 27,28, 29 and 30)

These four stanzas give the qualities of the four *yonis*. (see table 03.05). For each of the corner houses, the *yoni* of the house related to that corner house is to be considered. The relations of the corner house to the cardinal house is decided from the attribute of the regents of directions. NE corner, ruled by *Īśa* is related to the east; SE corner, ruled by *Agni* to the south, SW corner, ruled by *Nirṛti* to the west and NW corner, ruled by *Marut* to the north. This relations is used to assign the *yoni* to corner houses as given in table 03.08.

TABLE. 03.08

RELATION OF CORNER HOUSES TO MAIN HOUSES

Corner	Related to	Prescribed *Yoni*
N- E	E	*Dhvaja*
S- E	S	*Simha*
S- W	W	*Vṛṣabha*
N-W	N	*Gaja*

For certain houses, other *yonis* are also prescribed in addition to its own specified *yoni* (table 03.09). Since all the odd *yonis* can be used for the western house, its computation is easy and hence is the popular one in Kerala.

TABLE. 03.09 ACCEPTABLE *YONIS* FOR HOUSES

Location of house with respect to focal point	Name of house	Own *yoni* (*Nijayoni*)	Other acceptable *yoni*
E	Eastern house	1	---
S	Southern house	3	1
N	Northern house	7	1,3
W	Western house	5	1,3,7

YONI, THE SOUL OF HOUSES

Stanza - 31

योनिः प्राणा एव धान्मां यदस्माद्
ग्राह्यस्तत्तद्योग्य योनिप्रभेदः ।
मृत्युर्वर्ज्यः सर्वगेहेप्यवश्यं
सर्वव्यापत् प्राप्यतेऽस्मिन् गृहीते ।।

***Yoni* is the very soul of the building. Hence the *yoni* suitable for each is to be adopted. In all houses *mrtyu* (death) should certainly be avoided. If it (*mṛtyu*) is adopted, all dangers will happen.**

Commentary

Although *yoni* was conceived as on architectural formula deciding the orientation and modular measure of the *vāstu*, later it came to the attached to each and every element of the *vāstu*. This was achieved through what is known as the *padayoni* principle. According to this principle, every element of the *vāstu* is to chosen such that its dimensions satisfy the

rule that the perimeter of the square built on them will belong to that set of perimeter characteristic of the *yoni* of the *vāstu* (**fig.03.09**). It means that not only the outside perimeter of the *vāstu*, but its inside perimeter, square built on its width, length etc. all should have the same *yoni* . It can be compared to the genetic matching of every tissue representing the whole. This uniqueness will make each *vāstu* a separate entity, providing it a unique individuality like that of the human being. Hence only prescribed *yonis* should be adopted for all houses.

In the analysis of *Vāstu*, the concept of *yoni* is given an important place. The *yoni* concept groups the perimeters into 8 groups as given in table. 03.10.

TABLE 03.10 GROUPING OF PERIMETERS ON THE BASIS OF *YONI*

Yoni Nos.	1	2	3	4	5	6	7	8
Perimeter in *Hasta* and *Angula*	0-08	0-16	1-00	1-08	1-16	2-00	2-08	2-16
	3-00	3-08	3-16	4-00	4-08	4-16	5-00	5-08
	5-16	6-00	6-08	6-16	7-00	7-08	7-16	8-00
	8-08	8-16	9-00	9-08	9-16	10-00	10-08	10-16
	11-00	11-08	11-16	12-00	12-08	12-16	13-00	13-08

Continued

Each group of table 03.10 has a specific orientation. The perimeter includes width and length and therefore indicates area also. In a design scheme it can be related even to the height in a proportionate system. Hence it is an indicator of the horizontal and vertical compositions of the building. Thus the *yoni* concept which groups the perimeters into 8 separate categories is an attempt at standardisation of the dimensions. That is why it is stated that *yoni* is the soul

of all *vāstus*. At the same time, suitability of a perimeter depends not only on the *yoni* but on the astrological factors like income, expenditure, age, week, month, phase of the moon, star, etc. which were described earlier. The criteria for judging the suitability are given in the subsequent stanzas.

INCOME TO BE MORE THAN EXPENDITURE

Stanza - 32

आयाधिक्यं ब्ययतः सम्पाद्य सर्वथान्यथापत्तिः ।
नक्षत्रादिशुभत्वं ज्योतिःशास्त्रादिभिः सुविज्ञेयम् ।।

By all means, income more than the expenditure should be earned, otherwise dangers (will occur). The auspiciousness of the star etc. should be well understood through astrology etc.

Commentary

In the traditional sciences of India, material and esoteric aspects are so intermingled that it is difficult to completely ignore one and take the other exclusively. Determination of the superiority (*uttamatva*) or inferiority *(adhamatva)* of a given perimeter based on several astrological factors is a typical example. The first act in the design of a building is the adoption of a perimeter based on *iṣṭadirgha*. Hence this is considered as the birth of the *vāstu*. As the events in life are predicted on the basis of the position of the planets (*grahasthiti*) at the time of birth, the characteristics and future effects of the *vastu* are based on the prime dimensions viz. the perimeter. The six major astrological factors (*āyādi ṣadwarga)* are considered as the horoscope (*kuṇḍalini*) of the *vastu*. This is the reason for stating that the auspiciousness (*śubhatva)* should be known through astrological considerations. *Jyotiśśastra* means astronomy, but here it is used to denote astrology (*Jyotiṣa)*.

The *āyādi sadwarga* comprises of orientation (*yoni*), income - expenditure (*ayavyaya)*, age (*vayas*), star *(nakṣatra*), phase of the moon (*tithi*), and month *(rāśi*). The income and expenditure of an auspicious perimeter should be such that the income is more than the expenditure. Table. 03.11 gives the computed values of income and expenditure for perimeters form 3H to 10H8A in multiples of 16 *angula*. It can be seen that of these 12 perimeters considered, income is above expenditure in only 6 cases marked by the asterix.

TABLE 03.11 *ĀYA* & *VYAYA* FOR PERIMETERS.

Perimeter	*Yoni*	Income	Expenditure
H A		H A	H
3 - 00	1	12 - 00*	9
3 - 16	3	5 - 08	11
4 - 08	5	10 - 16	13
5 - 00	7	4 - 00*	1
5 - 16	1	9 - 08*	3
6 - 08	3	2 - 16	5
7 - 00	5	8 - 00*	7
7 - 16	7	1 - 08	9
8 - 08	1	6 - 16	11
9 - 00	3	12 - 00	13
9 - 16	5	5 - 08*	1
10 - 08	7	10 - 16*	3

* Income more than expenditure

COMPUTATIONS OF AGE

Stanza - 33

बालत्वं कौमारं यौबनमथ वार्द्धकं च निधनं च ।
पञ्च वयांस्येष्वन्त्यं नेष्टं शिष्टानि वास्तुनीष्टनि ।।

The age has 5 stages - childhood (*bālatva*), adolescenece (*kaumāra*), the youth (*yauvana*), old age (*vārdhakya*) and

death (*nidhana / mṛtyu*). Of these the last one (viz. death) is not desirable. The others are good in artefacts.

Commentary

As stated already, the age is determined on the basis of the quotient obtained when the perimeter is multiplied by 8 and divided by 27. When the quotient is one, the age is childhood. It is assumed that the childhood starts when the quotient is one and continues till the quotient becomes two. Two to three is adolescence, 3 to 4 is youth and 4 to 5 is old age. Death occurs when the quotient is 5. From then on till the quotient becomes 6 (5+1), the lifeless stage continues. When the quotient is 6, childhood again starts and the cycle continues. According to this belief, the perimeter coming within the lifeless stage. (*maraṇaparyanta*) are bad. Others are good. Therefore, the perimeters coming in the last column (death) of **table 03.12** are avoided in all constructions.

TABLE. 03.12 AGE OF PERIMETERS

Set 1	Childhood 2 .	Adolescence 3	Youth 4	Old age 5	Death 6
1.	3H9A- 6H18A	6H18A- 10H3A	10H3A- 13H12A	13H12A- 16H21A	16H21A- 20H6A
2.	20H6A- 23H15A	23H15A- 27H0A	27H0A- 30H9A	30H9A- 33H18A	33H18A- 37H3A
3.	37H3A- 40H12A	40H12A- 43H21A	43H21A- 47H6A	47H6A- 50H15A	50H15A- 54H0A
4.	54H0A 57H9A	57H9A 60H18A	60H18A 64H03A	64H03A 67H12A	67H12A 70H21A
5.	70H21A 74H06A	74H06A 77H15A	77H15A 81H0A	81H0A 84H09A	84H09A 87H18A
6.	87H8A 91H03A	91H03A 94H12A	94H12A 97H12A	97H21A 101H6A	101H6A 104H15A

A probable logic behind this concept is (1) to systematise the dimensional categories of *vastu* on a priority basis (2) to group them into discrete sets for design purposes and (3) to classify the dimensions into those suitable for secular structures and those unsuitable for secular structures but may be suitable for mystic uses. The elimination of the *maraṇaparyantas* groups the acceptable perimeters into distinct sets - set one from 3H 09A to 16H 21 A, set two from 20H 06A to 33H 18A and so on (see **table 03.12**). The perimeters of the first set are suitable for small *vastus* like seats (*pīṭha*), fire altar *(agnikunda*), platform for jasmine plant *(mallikuttima),* doors etc. The perimeters of the second group are suitable for small houses of approximately 13m² to 36m² area. Still larger houses can be built with the perimeters coming in the next groups. These distinct groups can be used for people of different social status or wealth. The *marayṇaparyanta* distinctly demarcates the dimensional groups without ambiguity as small, medium, large, very large, etc. Again the perimeters coming under columns 3 and 4 are favoured to those under 2 and 5. The perimeter coming under the last column of **table.03.12** are routinely avoided for houses. However, there are cases in which they are found to be adopted for many extant buildings, specially for temples, indicating their acceptability for mystic uses.

VARIATIONS IN THE FORMULAE FOR *YONI* ETC.

Stanza - 34

द्वेधा योनिश्चतुर्धा व्ययविधिरूदितश्च द्विधायो वयश्चा -
प्यृक्षं विप्रादिवर्णास्तिथिरपि च तथा राशयो द्विप्रकारा : ।
त्रेधा वारो ध्रुवादिस्त्रिविध इति विकल्पेन योन्यादयः स्युः
प्रोक्तेष्वेतेषू पूर्वोदितमखिलमतं कार्यमावश्यकेऽन्यत् ।।

***Yoni* is of two types, *vyaya* is said to be four, *āya* and *vayas* are of two types; *nakṣatra, varṇas* beginning with**

brāhmaṇa, tithi and so also rāśi etc. are of two classes; vāra is of 3 categories; dhruva etc. are of three types. Like this, yoni etc. will happen differently. In what have been mentioned, those stated earlier are acceptable to all. The others are to be used only when necessary.

Commentary

There are variations in the formulae for computing *yoni* and the astrological factors, computations for these have been given in stanzas 40 to 43. The author says that what has been stated earlier (in stanza 25 of this chapter) is acceptable to all. The variations can be used only when it is essential. The author simply lists the variations in computations noticed by him, but recommends those stated earlier as acceptables.

Stanza - 35

सामान्यं परिणाहतः सुविहिता योन्यादयो दीर्घतो
विस्तारेण च पादमानचरणाधिष्ठानतुङ्गैरपि ।
विस्ताराहतदैर्घ्यतोऽपि च पृथक् स्वोक्तयोन्यादयो
जाताश्चेदतिशोभना गृहविधौ पक्षान्तरोक्तैरपि ।।

From the perimeter, the *yoni* etc. prescribed for oneself should generally emerge. If the *yoni* etc. prescribed for one is obtained in houses separately for length, width, height from ground to wall plate (*pādamana*), pillar (*caraṇa*), basement (*adhiṣṭhāna*) and by the product of width and length as well as by what have been stated as alternatives, it is very auspicious.

Commentary

Usually if the perimeter satisfies the conditions regarding *yoni* and other *āyādi ṣadwarga* considerations, it is considered auspicious. In addition to this, if area, and linear dimensions like the width, length, total height of

building from the footing to the top of wall, height of basement and the height of the column etc. also satisfy the conditions, it is very auspicious. *Āyadi* rules can be applied to area by taking area in square *padas*.

The procedure for computing *yoni* for linear dimensions is called *padayoni* procedure which has been briefly stated under stanza 31. According to this, total height, basement height, column height etc. can be so chosen that the perimeter of the square constructed on these dimensions as side also should satisfy the *yoni* rules. This ensures that not only the overall perimeters but also the length, width and height are fixed in a particular dimensional set. Indirectly the perimeters of all surfaces of a room - floor, walls and roof are made to satisfy the *yoni* criterion (**fig.03.9**).

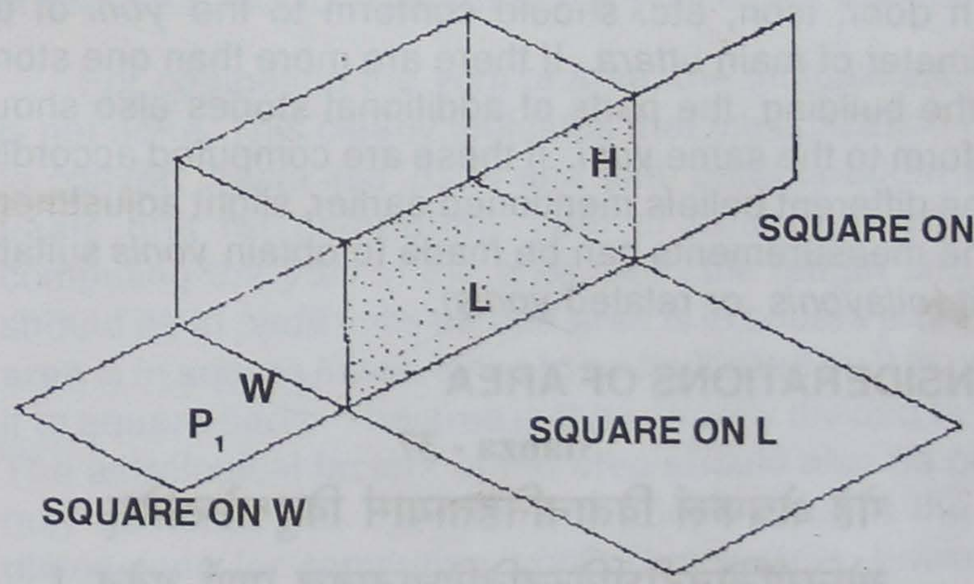


FIG.03. 09. *PADAYONI* PRINCIPLE

Stanza - 36

सर्वागारे प्रधानोत्तरपरिधिवशाद् दीर्घविस्तारतुङ्ग-
स्तम्भाधिष्ठानगर्भालयमितिविधयो द्वारबिम्बादयोऽपि ।
आरुढाद्युत्तरं च द्वितलविधिसमस्ताङ्गभेदा विकल्पे -
नोक्तैरंशैश्च कार्या यदि निकटगता योनिभेदाश्च योज्याः।

In all houses, the dimensions of the length, width, total height from ground to wall plate, pillar, basement and *sanctum sanctorum*, the door, icons, etc., *ārūdhottara* and all other *uttaras*, and the different parts of two-storied construction should be fixed based on the perimeter of the main *uttara* (*vārottara*) (in a proportionate system). If they are fixed based on different computations, they are to be made suitable (by *padayoni*) to adjacent *yoni*.

Commentary

This again stresses that the different parts of the horizontal and vertical factors of the building should have the same *yoni* as that of the perimeter computed outside the main *uttara* (wall plate). In temples, the *sanctum sanctorum,* main door, icon, etc. should conform to the *yoni* of the perimeter of main *uttara*. If there are more than one storey for the building, the parts of additional stories also should conform to the same *yoni*. If these are computed according to the different beliefs mentioned earlier, slight adjustments in the measurements can be made to obtain *yonis* suitable for it (*nijayoni*s or related *yonis*).

CONSIDERATIONS OF AREA

Stanza - 37

गेहे क्षेत्रफलं विताननिहतायामं विदुश्चेष्टदिग्-
योनिर्यन्मितदीर्घविस्तृतिविधानादत्र पूर्णो भवेत् ।
तावद्विस्तृतिदीर्घमानमभिकल्प्य प्रागथो नाहवत्
सर्वं कल्पयतु व्ययादिकमिदं त्वभ्यन्तरव्यापि हि ।।

The length multiplied by width should be understood as area. The width and length should be decided earlier in such a way that the desired *yoni* will be obtained by choosing the length and width. Then, as was prescribed for perimeter, all computations beginning with *vyaya* should be carried

out. This (procedure) relates to the inside of the space (*abhyantaravyāpi*).

Commentary

Some texts of *Manuṣyālayacandrika* (eg. K. Neelakantan Achari) include another stanza here as follows:

दीर्घे तु विस्तारहतेषभक्ते यथेष्टयोनिः परिशिष्यतेत्र ।
तथाप्रकल्प्यै शितधीदीरुच्चैर् विचार्य पूर्व्वं गृहतारदीर्घौ ।

The intelligent people should choose the width and length of the house beforehand after due considerations in such a way that the length multiplied by width and divided by eight leaves the desired *yoni*.

These two stanzas indicate that for perfection, the *yoni* of the area should conform to the *yoni* of the perimeter.

For computing the *yoni* of area, the multiplication by 3 is not done. This clearly indicates that multiplication by 3 is to convert *hasta* into *pada* and that *pada* is taken as the basic unit for computing *yoni* of houses. Hence, for computing the *yoni* of the area, both the length and width should be in *pada* units so that area is in square *pada*. If the area is in square *hasta*, it has to be multiplied by 9 to convert it to square *pada*. The area is then directly divided by eight. The astrological factors of the area should also be good. It may be noted that *Bṛhatsamhita* adopts area as the prime dimensions for computing *yoni*. This system, however, is not generally followed now.

ALTERNATE PROCEDURES FOR COMPUTING THE ASTROLOGICAL FACTORS

Stanza - 38

पूर्वं त्रिघ्नचतुर्दशाप्तपरिधेः सामान्यमुक्तो व्ययो
नन्दघ्नेऽष्टहते च पङ्क्तिविहृते शिष्टो व्ययो वा भवेत् ।

सिद्धर्क्षे वसुभाजितेऽपि च चतुर्धेति व्ययः सर्वथा -
स्याल्पत्वं परिकल्प्यमात्मजधनादीनां विनाशोऽन्यथा ।।

It has been stated earlier that usually the expenditure (*vyaya*) is obtained by multiplying the perimeter by three and dividing by fourteen. When (the perimeter is) multiplied by nine and divided by 8 or by 10 and also when the star, obtained (by the method described earlier), is divided by eight, the remainder will be expenditure. Thus the expenditure will be of four types. In all cases, it should be small (when compared to income). Otherwise, loss of children and wealth (will happen).

Commentary

Four different practices of computing the expenditure are mentioned.

1.	P x 3/14,	the remainder is expenditure
2.	P x 9/8	"
3.	P x 9/10	"
4.	P x 8/27 x 1/8	"

where P is the perimeter in *Hasta.*

The expenditure obtained by all these practices should be less than the income. But usually, only the first practice is followed for houses.

Stanza - 39

स्वत्र्यंशेन युते तथेक्षणहते नाहेऽष्टभक्ते भवे-
दायो वा पुनर्ऋक्षनिघ्नपरिधौ दिग्द्वन्द्वभक्ते वयः ।
बालत्वादिविशेषमात्रमवगन्तव्यं फलैः शेषत-
स्तेषामेव गताब्दमानमिह तारुण्यं वयः शोभनम् ।।

Adding one third of itself, then multiplying by two and dividing by eight, the remainder is income. Then, the

perimeter multiplied by 27 when divided by 20, the remainder is age. By the quotient, characteristics of childhood etc. should be known. By the remainder the computation of the years completed (is known). Here the youth age is good.

Commentary

This gives alternate procedure for computing income and age. According to the procedure stated in stanza-25, income is the remainder obtained when perimeter is multiplied by 8 and divided by 12. This stanza gives an alternate procedure according to which when 1 1/3 times the perimeter is multiplied by 2 and divided by eight (i.e. when perimeter is multiplied by 8 divided by 24), the remainder gives income.

Age was earlier given as the quotient of Px8/27 where P is the perimeter. According to this stanza, the stage of the life (childhood etc.) is obtained by the quotient of P x 27/20 as given in table 13.

TABLE.03.13 STAGES OF LIFE (AGE)

Quotient	Stage of life
1,6,11,16 etc.	Childhood
2,7,12,17	Adolescence
3,8,13,18	Youth
4,9,14,19	Old age
5,10,15,20	Death

The remainder obtained after the division indicates the number of years completed in that stage. Here, each stage is assumed to have 5 years and the number of years elapsed in that stage can be computed. By this the early phase of adolescence or the late phase of youth also could be avoided in the choice of the perimeter.

Stanza - 40

नन्दघ्ने परिधौ च केवलपरीणाहेऽथ वा त्रिंशता
भक्ते तत्र विकल्पपक्षयुगले प्राग्वत् तिथिः शिष्यते ।
त्रिघ्नेऽङ्कादिहतेऽथवार्णवहृते नाहे द्विजाद्याः कमाद्
वर्णा : स्युर्निगमाहते वसुहते वार्काहृते राशयः ।।

When nine times the perimeter or the perimeter as such is divided by 30, as before, what remains is the phase of the moon in both *pakṣas* (half the lunar month), according to different methods. The perimeter multiplied by 3 or by 9 when divided by 4, the remainders will be *brāhmaṇas* etc. (*brāhmaṇa, kṣatriya, vaiśya, sūdra)* in order. The perimeter multiplied by 4 or by eight and divided by 12, the remainders will be months.

Stanza - 41

केवलनाहेऽद्रिहृते त्रिघ्ने नाहे च शिष्यते वार : ।
द्विघ्ने वा त्रिघ्ने वा नाहे नृपभाजिते ध्रुवाद्याः स्यु : ।।

Either the perimeter as such or perimeter multiplied by 3 when divided by 7, the weeks are left. Perimeter multiplied by 2 or 3 and divided by 16, *dhruvas* (qualities) will occur.

Stanzas - 42 & 43

क्षेत्रफले व्यययुक्ते नृपभक्ते वा ध्रुवादयः शिष्टा :।
ध्रुवधान्यजयविनाशाः खरकान्तमनःप्रसादसुमुखत्वम् ।।

सौमुख्यासौम्यत्वे विरोधवित्तोद्भवक्षयाक्रन्दाः ।
वृद्धिजयौ च कमशः संज्ञातुल्यं फलं भवेदेषाम् ।।

The sum of area and expenditure when divided by 16, the remainders will also give *dhruva* etc.* Stability (*dhruva*), grains (*dhanya*), success (*jaya*), calamity (*vināśa*), hardness

(*khara*), attractiveness (*kānta*), cheerfulness of mind (*manaḥprasāda*), attractive face (*sumukhatva*), aversion (*vaimukhya*), roughness (*asaumyatva*), enmity (*virodha*), production of wealth (*vittodbhava*), consumption (*kṣaya*), crying (*ākrānda*), progress (*vṛdhi*) and victory (*jaya*) will happen in the order. For these, the effect will be similar to their names.

Commentary (Stanzas 40, 41, 42 and 43)

In these 4 stanzas, computation of astrological factors by methods other than that mentioned earlier in stanza 25 is described (table.03.14)

TABLE.03.14

ALTERNATE METHOD FOR COMPUTING ASTROLOGICAL FACTORS

Phase of the moon	:	P x 9/30 or P/30, the remainder is phase of the moon
Varṇa	:	P x 3/4 or P x 9/4, the remainder is *varna.* 1 is *brahmana*, 2 is *ksatriya* 3 is *vaisya* and 4 is *sudra.*
Month	:	P x 4/12 or P x 8/12, remainder is month (*rasi)* from *mesa* onwards
Week	:	P/7 or Px 3/7, the remainder is week from monday onwards
Dhruva	:	P x 2/16 or P x 3/16, the remainder is *dhruva* etc.

The 16 qualities beginning with the value of *dhruva* are given. The effect of each will be as indicated by their names.

In addition to the astrological factors mentioned above, other astrological factors like *viṣti, gandānta* and

rikta are also taken into consideration in deciding the superiority (*uttamatwa*) of a perimeter.

Viṣti is the period of 30 *nādika* (12 hours) of the following phases of the moon: In *śuklapakṣa*, first 30 *nādikas* of *paurṇami* and *aṣtami* and second 30 *nādikas* (31 to 60) of *ekadāśi* and *caturtthi* and in *aparapakṣa*, first 30 *nādikas* of *saptami* and *caturdaśi* and second 30 *nādikas* of *daśami* and *trtīya*. The period of *viṣti* is said to be inauspcious.

Gandānta is the period of 15 *nādikas* (ie. quarter day) in the begining of the stars (*aśwati, makam,* and *mulam* and in the end of the *revati, ayilyam* and *jyeṣṭha*. *Gandanta* period is also to be avoided.

Rikta tithis are *caturtthi, navami* and *caturdaśi*. These also should be avoided according to the astrological canons.

In the first chapter itself, the author has stated that he has referred to all available literature on the subject for compiling this text. That is the reason for giving several versions and practices for computing *yoni* and astrological factors. All these must have been in vogue in India in one place or other. But it may be noted that the author has given first the formulae given in the stanza 25 and the others as differing versions. This definitely shows that the author gives importance to the computations indicated in stanza 25. *Tantrasamuccaya* , the reference compilation for religious rituals and structures, uses these formulae. In fact the stanza 25 (*Iṣtatānavitānamānanicaye*) of this book is taken from *Tantrasamuccaya* (stanza 3 of *patala 2* of part - I and stanza- 3 of chapter-2 of Part - II*)*. The same *śloka* appears in *Vāstulakṣana* (stanza-30). This confirms that of all the diverse methods, the computations given in stanza 25 were conclusively accepted by the *jyotiṣis* on the authority of *Tantrasamuccaya.*

REFERENCES

03.01 तत्रादौ संप्रवक्ष्यामि सर्वेषां मानसाधनम् ।
मानेनैवाखिलं लोके वास्तु संसाद्ध्यते यतः ॥
V.V.,III- 3

03.02 सर्वेषामपि वास्तूनां मानेनैव विनिश्चयः ।
M.M., V - 1

03.03 परमाणुरीति प्रोक्तो योगिनां दृष्टिगोचरः ॥
V.V., I- 6

03.04 सर्वेषामपि वस्तूनां किष्कुरेवाधवा मतः ।
V.V., I - 9

03.05 किष्कुहस्तेन यन्मानं मानयेद्विश्वतस्तुवा ।
M.S., II-29

03.06 मात्रांगुलै : केवलमेव कार्यां
देवालयादीनि गृहादि वा नृणां ।
कुण्डादिकानामथ मण्डलानां -
सर्वत्र मात्रांगुलमिष्यते बुधैः ॥ **K.A.,**

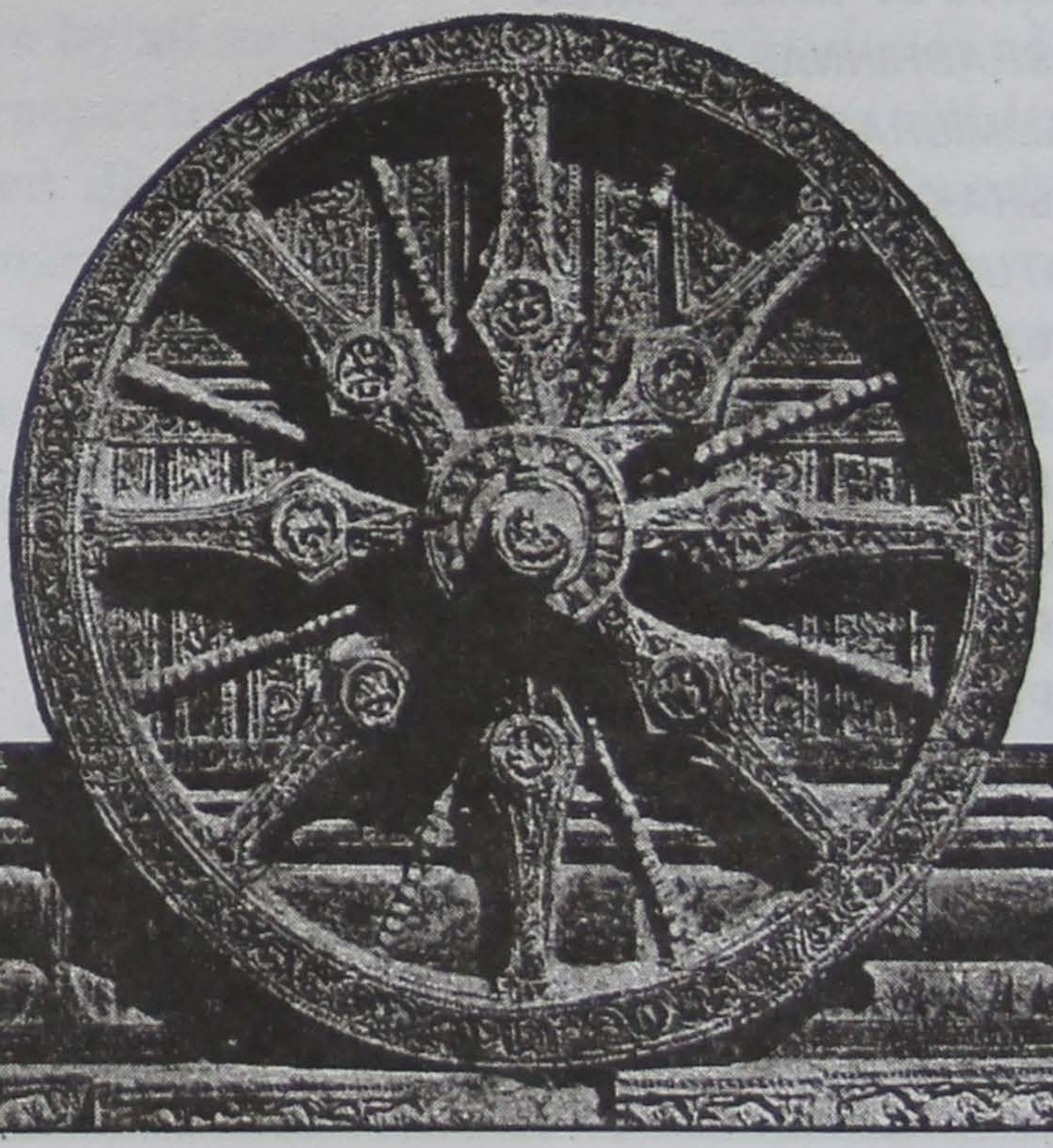
03.07 शीर्षाग्राद्यळिकान्तिमं त्रिभरतो भास्वन्मितैरंगुलै -
रुन्मेयं चिबुकान्तिमं गुणमितैः कण्ठो हृदन्तं ततः ।
नाभ्यन्तं च शिवान्तिमं च दिनकृत् संख्यैस्त्रि भिर्जानु नी-
गुल्फाद्यंघ्रियुगं च संस्कृतिमितैर्जं घाद्वयोरद्वये ॥
T.S.,(S) V - 7

4

LAYOUT AND PLANNING OF *ŚALAS*

शालाविधानम्

Iṣṭadīrgha; guṇāmśa rule; classification of śālas; order of priority of the salas; guṇāmśa rule; nine types of catuśśālas; nomenclature of dviśālas and triśālas.



LIST OF ILLUSTRATIONS

CHAPTER - 4

अथ चतुर्थोऽध्यायः

LAYOUT AND PLANNING OF *ŚALAS*

शालाविधानम्

COMPUTATIONS BASED ON DESIRED LENGTH OF HOUSE (*IṢṬADĪRGHAVIDHI*)

Stanza - 1

स्वाभीष्टालयदीर्घमङगणविधिं तेषां पृथङ्नाहतो
योन्यायर्क्षवयोव्ययादि शुभदं सर्वप्रकारादपि ।
सम्पाद्याथ गृहेऽष्टदीर्घगुणविस्तारादिभेदान् पृथग् -
दीर्घव्यासमितिं करोतु च यथात्राल्पान्तरालं सुधीः ।।

After adopting *yoni, āya, nakṣatra, vayas, vyaya* etc., which are by all means made auspicious for the perimeters of the respective houses with the desired length and courtyard dimensions, the intelligent person (*sthapati*) should make the length and width in such a way that the corridor will be small when they (length and width) conform to the rules of *iṣṭadīrgha* (desired length) and *guṇāmsa* (multiple of fraction).

Commentary

The three dimensional visible form of *vāstu* grows out of a plan composition. The plan shape defined by a bounding perimeter (*paryantasūtra*) is designated as the *maṇḍala*. The search for perfect forms, common to all design philosophies, led the ancient sages to many shapes such as circle, regular polygons and combinations of regular

shape. The enquiry was also directed to the ideal proportions of rectangular spaces. The condition that the buildings should be oriented in the cardinal directions led to the adoption of square and rectangle as the most commonly used shapes. These shapes also had the advantage that their centres (*Brahmanābhi*) can be easily located as the point of intersection of the diagonals. A square being a perfect shape, is reserved for *prasadas*. For houses rectangles were generally adopted.

This chapter starts with the method of selecting the dimensions (width and length) of the house with rectangular plan shape. Three procedures are generally followed for fixing the length and width of the houses. viz. *iṣṭadīrghavidhi, guṇāmśavidhi* or *guṇavistāravidhi* and *padavistāravidhi*. These will be discussed in detail later.

In all these procedures, the first step is to select a suitable and required length for the house (*iṣṭadīrgha*) and fix the dimensions of the courtyard. *Iṣṭadīrgha* means the length desired by the owner. It is generally taken as the length of the courtyard or front yard. Some texts refer to *iṣṭadīrgha* as the length of the ridge of the house and this may indicate an early association with the length of the *śāla* itself. In any case, the design starts from the *iṣṭadīrgha* which for all practical purposes is the approximate length of the house.

The perimeter of the house is computed based on *iṣṭadīrgha* in such a way that the '*yoni*' and the astrological factors are auspicious. After finally fixing the perimeter, the actual length and width are determined by any of the three methods mentioned above. While doing this, it should be assured that the corridors (*antarāla*) connecting the main houses (*dikśālas*) to the corner houses (*vidikśālas*) should be of optimum width.

As mentioned earlier, the main houses are oriented in the cardinal directions facing the *Brahmanābhi* taken as the focus.

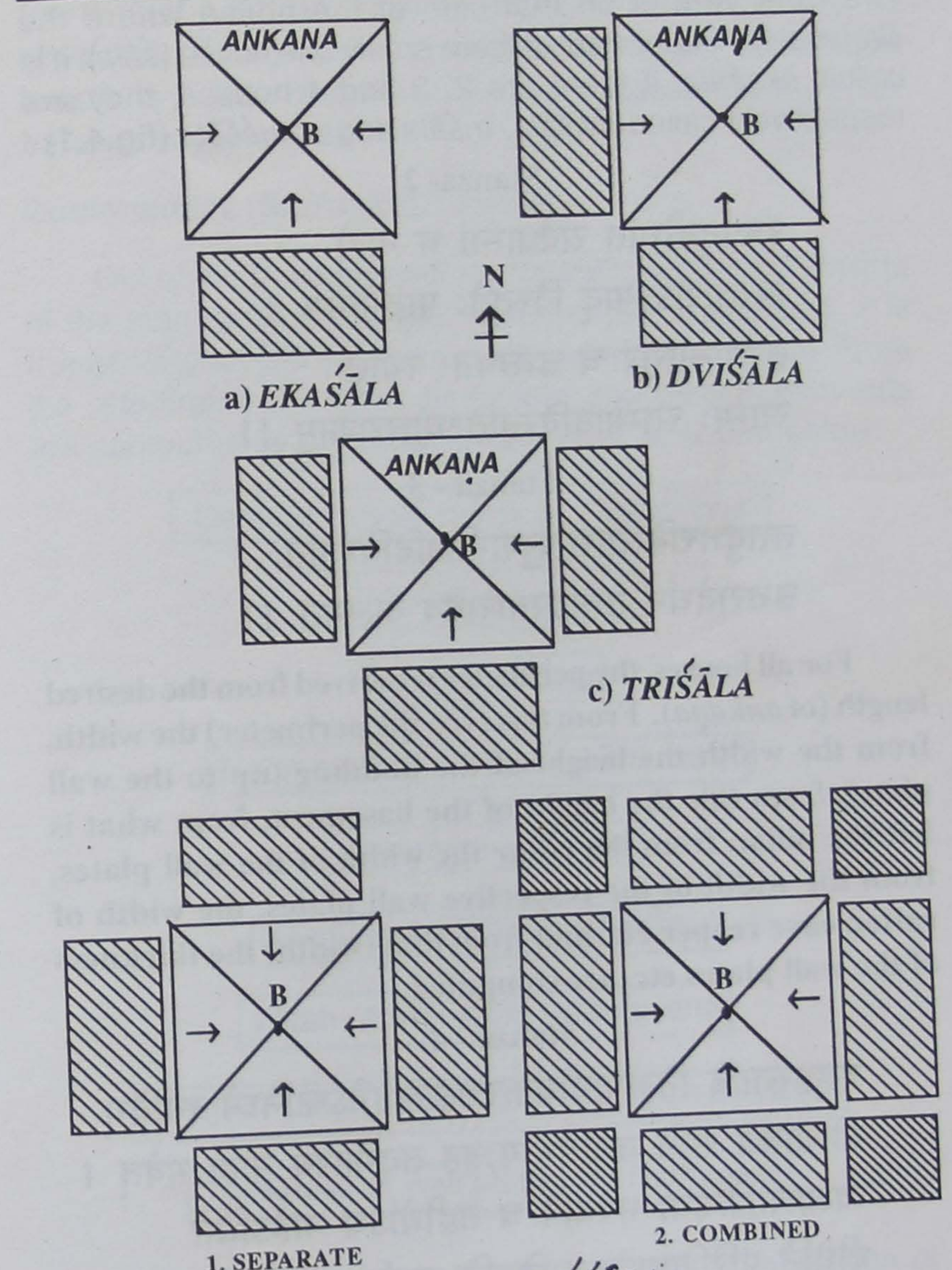


FIG.04.01 CLASSIFICATION OF HOUSES BASED ON NUMBER OF ŚĀLAS

The front yard is on that side of the house where the *Brahmanābhi* is located. If there is only one house (*śāla*), it is called *ekaśāla*; if there are 2, 3 and 4 houses, they are respectively called *dviśāla, triśāla* and *catuśśāla* (**fig.4.1**)

Stanza- 2

इष्टाद्दीर्घात् सर्वधाम्नां च नाहो
विस्तारोऽस्माद् विस्तृतेः पादमानम् ।
तस्मान्मासूरं च तच्छेषतः स्यात्
स्तम्भः स्तम्भाद्विस्तृतिश्चोत्तराणाम् ।।

Stanza - 3

तत्तदुत्तरविस्ताराल्लुपानीप्रादिविस्तृतिः ।
उत्तरादेर्घनं तत्तद्विस्तारादेव कल्प्यते ।।

For all houses, the perimeter is derived from the desired length (of *ankaṇa*). From this (viz. the perimeter) the width, from the width the height of the building (up to the wall plate), from this the height of the basement, from what is left the pillar, from the pillar the width of the wall plates, from the width of the respective wall plates, the width of rafter, eave reaper etc. and from that (width) the thickness of the wall plates etc. are computed.

Stanza - 4

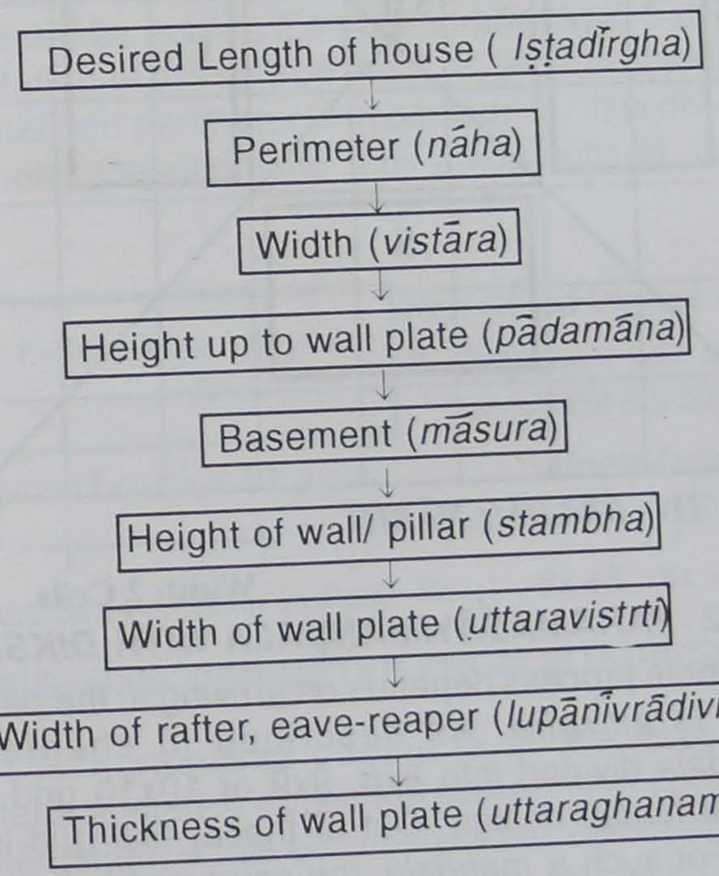
षड्हस्तादि निजेष्टदीर्घकरसङ्ख्यानेऽष्टनिघ्नें स्वदिग् -
योन्याढ्ये सति तत्त्रिभाग इह तद्गेहस्य नाहो भवेत् ।
व्यत्यासक्रियया भवेदपि च तद्वीर्घोऽथ नाहेऽर्धिते
दीर्धेने परिशिष्यतेऽत्र विततिः सर्वत्र मर्त्यालये ।।

Multiplying one's desired length, starting from 6 *hasta*, by eight and adding the *yoni* of the orientation, the perimeter of that house is here obtained by its one-

third part. By the reverse process, its length will be obtained. Everywhere in residential houses, the desired length is subtracted from the semi-perimeter, here the balance is the width.

Commentary (Stanzas 2,3 and 4)

Out of the three procedures for computing the elements of the plan composition mentioned earlier in stanza 1, it is the *iṣṭadīrghavidhi* that is generally adopted in Kerala. From the *iṣṭadīrgha*, the other horizontal and vertical elements are computed by proportionate method as shown below:



Iṣṭadirgha thus forms the basis for the computation of the vertical and horizontal elements. It is the desired length of the house depending on the width of the plot and requirements of the owner. But at times, length of the yard (*ankaṇadīrgha*) is also taken as *iṣṭadīrgha*. *Vāstulakṣaṇa*

takes the length of the ridge (*vaṁśamāna*) as the *iṣṭadīrgha* (Ref.04.01). In gabled houses, this, of course, is the same as the length of the house.

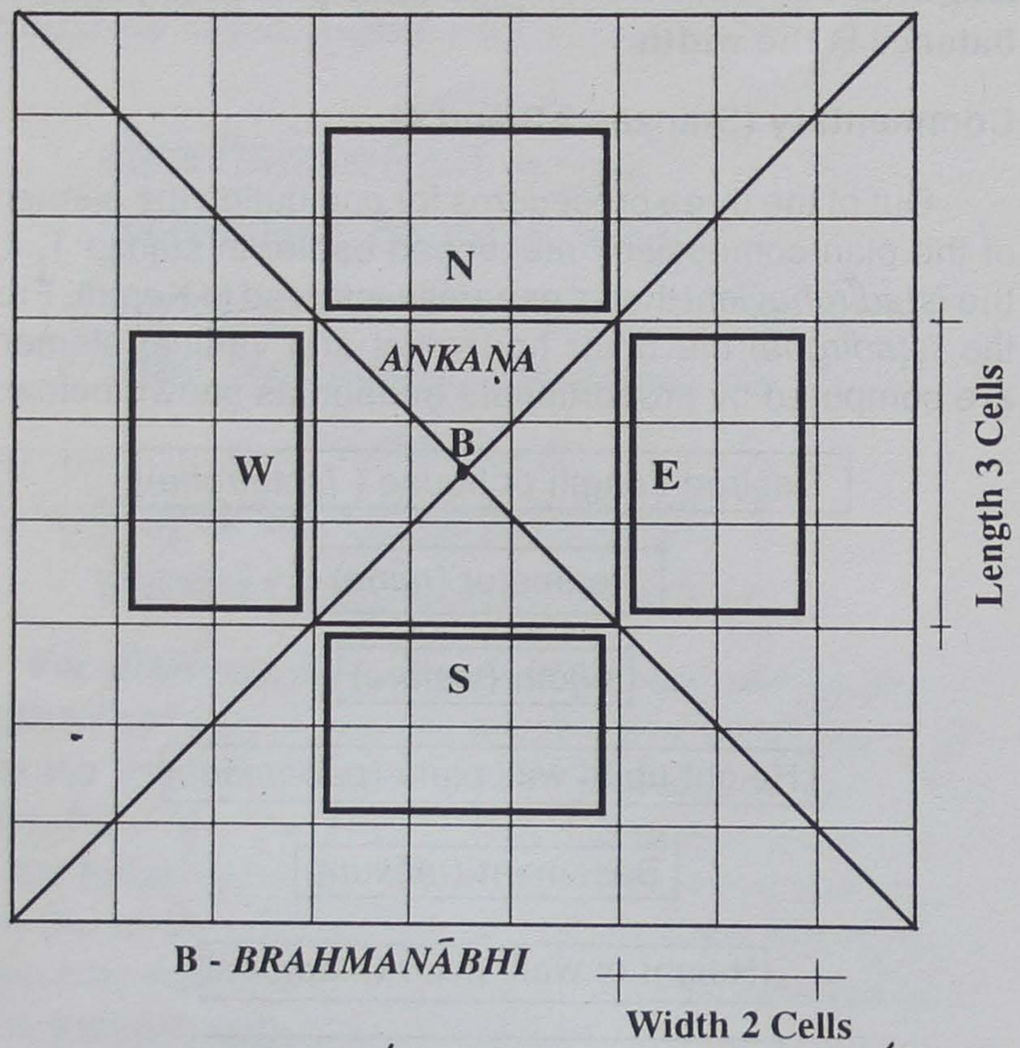
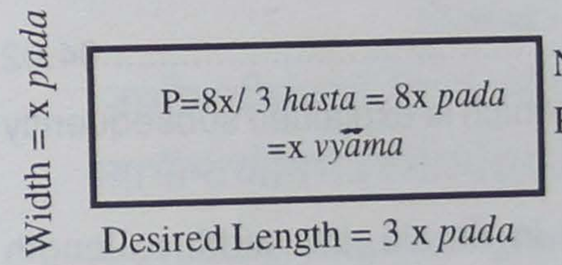


FIG.04.02 *PARAMAŚĀYIMAṆḌALA* WITH *DIKŚĀLAS*

The whole process depends on arriving at the perimeter from the *Iṣṭadīrgha*. As described in chapter 2, a *vāstumaṇḍala* divided into 8x8, 9x9 or 10x10 grid, is the adopted for house design. Out of these, 9x9 grid is most common. For such a *maṇḍala*, the courtyard is 3 cell wide (**fig.04.02**). Leaving the outer cells of *piśācavīthi*, the simplest house is a *śāla* coming on one of the cardinal directions facing this yard. The length of the *śāla* is the width of the *ankaṇa* or the *iṣṭadīrgha*. The width is 2 cells wide. If one cell width is taken for the house, the width to length ratio

of the *sala* is 1:3. If 2 cells are taken as the width, the width to length ratio is 2:3. The design hence starts from the former ratio of 1:3 and, keeping the length constant, the width is adjusted such that the *yoni* and other criteria are satisfied.

For a rectangle of width 1 unit and length 3 units, the perimeters is 8 units. This means that if 1 *pada* is the width, 3 *pada* which is equal to 1 *hasta* is the length and the perimeter is 8 *pada* which is equal to 1 *vyāma*. Hence if **x** *hasta* is the *iṣṭadīrgha*, **x** *vyāma* is the perimeter of the primary plan of the house. When this is multiplied by 8, we get the perimeter expressed in *pada* units. This perimeter is normalised by adding the *yoni* number 1, 3, 5 or 7 to suit the orientation of the *sala* on the E, S, W or N of the *ankaṇa*. The normalised perimeter is in *pada* units. It is divided by 3 only to bring the perimeter into *hasta* units (1 *hasta* = 3 *pada*).



House facing	W	N	E	S
Normalised Perimeter in *Pada*	8x +1	8x +3	8x +5	8x +7

FIG.04.03 PERIMETER FROM *IṢṬADĪRGHA*

The normalised perimeter of the house i.e. the perimeter adjusted to obtain the *yoni* number corresponding to its orientation, is halved and from this semi-perimeter the original *iṣṭadīrgha* is deducted to get the width. It is clear that the length of the house or *iṣṭadīrgha* or the width of the *ankana* is not changed, but the width is now increased. The width to length ratio now is not 1:3 but it increases. If the *iṣṭadīrgha* is 6 *hasta*, one cell width is 2H. If the house is facing west, the perimeter before normalisation is 6x8=48

pada. After normalisation to its location to the east of *ankaṇa*, it is 49 *pada* or 16H 8A. Semiperimeter is 8H 4A. Deducting the *iṣṭadīrgha* of 6H, the width is 2H 4A. If the house is on the northern side of *ankaṇa*, the normalised perimeter is 48+7=55 *pada* or 18H 8A. Semiperimeter is 9H 4H and keeping the same *iṣṭadīrgha*, the width is 3H 4A. The width of the house, ie. 3H4A is still within the buildable area. Hence this procedure of starting with the width as one-third of the length is a practical one to keep the width always less than 2 cell width.

If L_D is the desired length (*iṣṭadīrgha*) in *hasta* units and Y is the *yoni* number of the house, the perimeter of house P in *hasta* units is given by

$$P = (8\ L_D + Y)/3 \quad \text{.....04.01}$$

The width W is computed by the formula

$$W = P/2 - L_D \quad \text{.....04.02}$$

or by the *guṇāmsa* rule which is explained subsequently (in stanza 6 of this chapter.

In most of the houses in Kerala, the width to length ratio is 1:2 to 1:3. Taking the ratio as 1:3, the perimeter P of a house is given by

$$P = 2(L_D + L_D/3) = 8L_D/3 \quad \text{.....04.03}$$

This is the basis for multiplying *iṣṭadīrgha* by 8 and then dividing the product by 3.

It is of interest to note that if x *hasta* is the length, the width is x/3 *hasta* or x *pada* (when width to length ratio is 1:3) and perimeter P is given by

$$P = 2(x + x/3) = 8x/3 \text{ } hasta$$

$$= 8x \text{ } pada = x \text{ } vyāma \quad \text{.....04.04}$$

i.e., for x *hasta* length, the perimeter is x *vyāma* (**fig.04.03**).

The *yoni* number is added before the division by 3 to ensure the correctness of the *yoni* for the perimeter.

In proportioning houses, *iṣṭadīrgha* above 6 hasta is to be adopted. If *iṣṭadīrgha* is 6 *hasta* and if the house is facing west (eastern house with *ekayoni*), the perimeter is (8x6+1)/3 H =16H 8A. For a northern house (facing south) of 20 H length, the perimeter is. P = (8x20+7)/3 H = 55H 16A .

This computation can be easily made if the *pada* units are considered. It was shown that for a house of *iṣṭadīrgha* x *hasta*, the perimeter is 8x *pada* or x *vyāma* (with width: length ratio as 1:3). Thus for a northern house of 20H length, the perimeter is 20 *vyāma* = 8x20 *pada* = 160 *pada*. Adding the *yoni* number 7, the adoptable perimeter of 167 *pada* is obtained. Converting into *hasta* and *angula*, the adoptable perimeter is 55H 16A.

Stanza - 5

स्वाभीष्टदीर्घहस्ते द्विघ्ने सति तत्त्रिभागसंयुक्ते ।
स्वाभीष्टयोनिसङ्ख्यात्र्यंशयुते नाह इति च सम्भवति ।।

Also multiplying *iṣṭadīrgha* in *hasta* by 2, adding one-third of it and then adding one-third of the desired *yoni* number the perimeter is obtained.

Commentary

This is not an alternate method, but the same as the previously indicated one. According to this stanza the perimeter P is given by

$$P = (2L_D + 2\ L_D/3) + Y/3 \quad \text{.....04.05}$$

Simplifying, $P = (8L_D + Y)/3$ 04.06

same as the formula 4.01 given in the previous stanza.

GUNAVISTARAVITHI

Stanza - 6

नाहाङ्घ्र्यंशेन दीर्घो विततिरपि भवेत् तुल्यवेदाश्रगेहे
नाहार्धे नन्दभक्ते विततिरुदधिभागैंश्च दीर्घो विशिष्टैः ।
सः स्यात् पादाधिकोऽर्धाधिक इह परिणाहेऽर्धिते दिग्विभक्ते
षड्भिर्दीर्घश्चतुर्भिर्विततिरिति सुरागारयोग्यास्त्रयोऽमी ।।

In a square house, the length and also the width will be one-fourth of the perimeter. When the semi-perimeter is divided by 9, 4 parts give width and the balance gives length; that is *pādādhika.* When the semi-perimeter is divided by 10, by six parts length and by 4 parts width (will be obtained); this is *ardhádhika*. These three proportions are suitable for temples.

Stanza - 7

पादाधिको मनुजसद्मनि गृह्यते त-
त्रावश्यके समततायतिकोऽपि कैश्चित् ।
अर्धाधिकोऽत्र न हितो मुनिभिः समस्त -
पादोनतापि कथिताखिलनाशिनीति ।।

In the house of humans, *pādādhika* is adopted. Here, if necessary, the *samatata* is also adopted by some. Here *ardhādhika* is not desirable. It has been stated by sages that all *pādona* ratios are harmful for all.

Stanza - 8

नाहार्धे द्वादशाद्यैस्त्रिभिरपि च विभक्तेऽथवा षोडशाद्यै-
र्विंशत्याद्यैश्च तत्त्वादिभिरपि मनुयुग्मादिभिर्दन्तसङ्ख्यैः ।
तत्तत्तुर्यप्रहीणैरथ वितातिरुदध्यंशतः शेषभागैर् -
दीर्घो वस्वङ्कपङ्क्त्यादिभिरपि गुणविस्तारमाहुर्मुनीन्द्राः।।

When the semi-perimeter is divided by the three (numbers) beginning with 12 or by the three (numbers) beginning with 16 or by the three (numbers) beginning with 20 or by the three (numbers) beginning with 24 or by 32, with 4 parts the width and with the balance the length (should be computed). Sages thus state the *guṇāmśaivstāra* (proportionate width) as 8,9,10 etc. except the fourth ratio after *samatata*.

Commentary (Stanzas 6,7 and 8)

These three stanzas give the procedure for proportioning space according to *guṇāmśa* rule.

For houses, generally rectangular plans are adopted. The square, being a perfect shape, is reserved for temples, though it has been stated that the square plan can be used for houses, if essential. The elongation (*āyāma* or *dirghatva*) is given with several proportions of length and width. When the length is an integer multiple of width, the ratio is called *samatata*. When the length to width ratio is an integer plus 1/4 (eg. 1 1/4, 2 1/4, 3 1/4.....) it is called *pādādhika*. When the ratio is an integer plus 1/2, it is called *ardhādhika* and when the ratio is an integer plus 3/4, it is called *pādona*. The length to width ratios for these four proportions from 1.25 to 7 are given in **table 04.01**.

TABLE 04.01. CLASSIFICATION OF RECTANGLES ACCORDING TO LENGTH TO WIDTH RATIOS.

Pādādhika	*Ardhādhika*	*Pādona*	*Samatata*
1	2	3	4
1.25 to < 1.5	1.5 to < 1.75	1.75 to< 2	2 to < 2.25
2.25 to < 2.5	2.5 to < 2.75	2.75 to< 3	3 to < 3.25
3.25 to < 3.5	3.5 to < 3.75	3.75 to < 4	4 to < 4.25
4.25 to < 4.5	4.5 to < 4.75	4.75 to < 5	5 to < 5.25
5.25 to < 5.5	5.5 to < 5.75	5.75 to < 6	6 to < 6.25
6.25 to < 6.5	6.5 to < 6.75	6.75 to < 7	7 to < 7.25

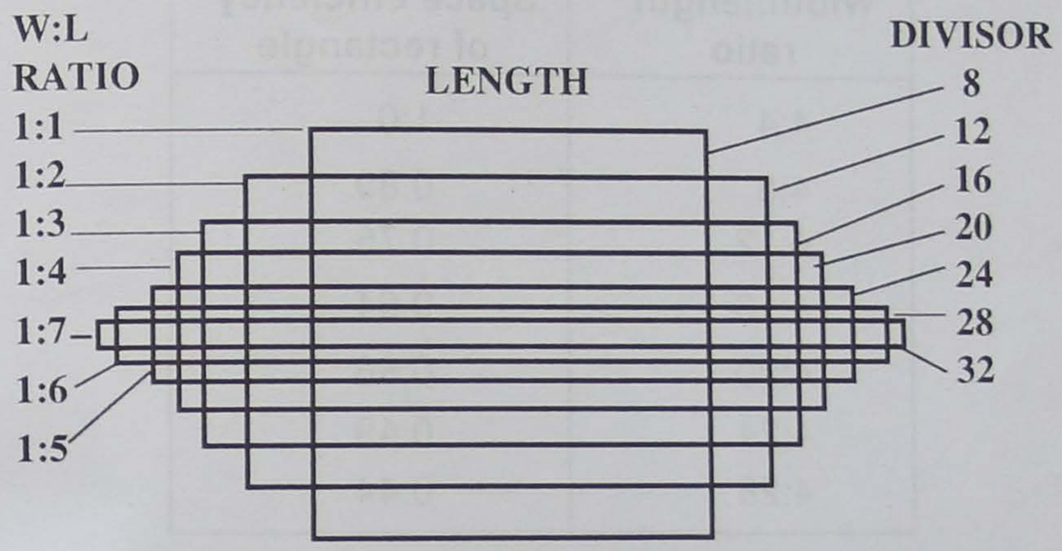
The ratios falling in between *samatata* and *pādādhika* are considered as *samatata*, the ratios between *pādādhika* and *ardhādhika* are *pādādhika*, the ratios between *ardhādhika* and *pādona* are considered as *ardhādhika* and the ratios between pādona and *samatata* are reckoned as *pādona* ratios. Thus all the rectangles can be grouped into these 4 categories described above (**Table 04.01**).

Guṇāmśa literally means fraction of a multiple. The *guṇamśavistāra* of a building is obtained by dividing its semi-perimeter by the integers from 8 to 32 and taking 4 parts of the division as width and the balance as length. While doing this, divisions by 11,15,19,23,27 and 31 are avoided as they will give *pādona* ratios of length to width (ratios of 1.75. 2.75, 3.75, 4.75, 5.75 and 6.75). Thus, there will be 18 acceptable width to length ratios viz. 4:5, 4:6, 4:8, 4:9,4:10, 4:12, 4:13, 4:14, 4:16, 4:17, 4:18, 4:20, 4:21, 4:22, 4:24, 4:25, 4:26, 4:28, leaving the *pādona* ratios of 4:7, 4:11, 4:15,4:19,4:23 and 4:27. The acceptable ratios are shown in columns 1,2 and 4 and the inauspicious ones in column 3 of table 04.01.

It has been specifically stated in stanza 7 that all *pādona* ratios will cause harm. It is also stated in stanza 7, that the ratio of 4:6 is not desirable. The word '*atra*' (here) in '*ardhādhikotra na hito*' refers to the ratio referred to in the previous stanza, viz. the ratio of. 4:6. The other *adhādhika* ratios described in stanza 8 (4:10,4:14,4:18 etc.) will not be covered by the word '*atra*' of stanza 7. They are acceptable for houses, only 4:6 (1:1.5) is unacceptable. The reason for avoiding this can be the objection to the use of perfect shapes like square. Length to width ratio of 1.5 will give a rectangle made up of one square and a half square. It also represents the limiting ratio of 2:3 discussed under stanzas 2,3,4.

For temples, the auspicious ratios of length to width for the *garbhagrha* are 1,1 1/4 and 1 1/2. The *ardhādhika* ratio of 1 1/2 which is unacceptable for houses is auspicious for temples because perfect shapes can be adopted for temples.

Generally, lengths more than 6 times the width are not adopted. The reason for not considering ratios beyond 6 is that the space enclosure efficiency of the rectangle, (defined as the ratio of the area of the rectangle to the area of a square of equal perimeter) goes below 1/2 for such ratios (**Table 04.02**) and **fig.04.04**. Also, it is stated in the next



EFFICIENCY OF RECTANGLES DECREASES WITH INCREASE IN L:W RATIO

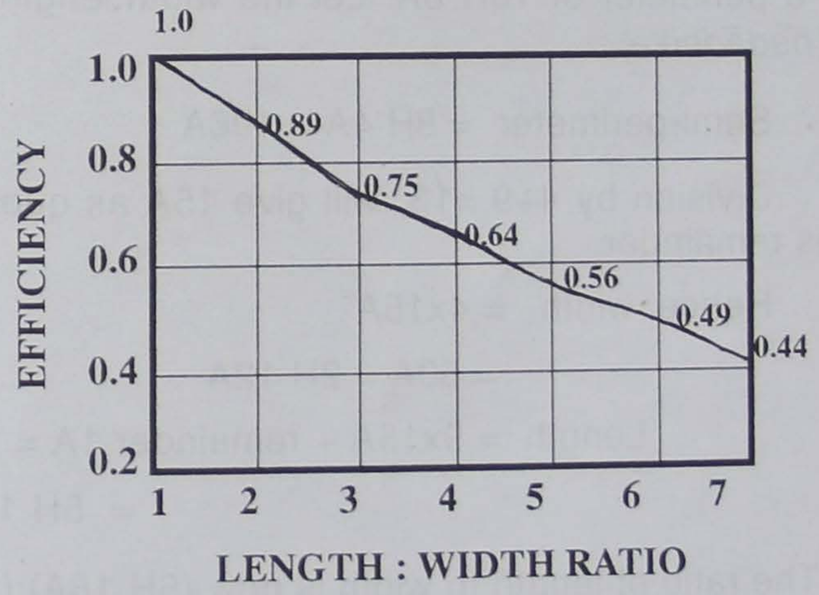


FIG.04.04 EFFICIENCY OF RECTANGLES

stanza that width more than half the length is not accepted by sages like *Dakṣa* and *Garga*. Thus the acceptable length to width ratios for houses are 1/4 to 6, avoiding, of course, the *pādona* ratios.

TABLE 04.02. SPACE EFFICIENCY OF RECTANGLE

Width:length ratio	Space efficiency of rectangle
4:4	1:0
4:8	0.89
4:12	0.75
4:16	0.64
4:20	0.56
4:24	0.49
4:28	0.44

While making the divisions by integers from 8 to 32, the remainder, if any, is added to the length. For example, take a perimeter of 16H 8A. Let the width:length ratio be 4:9 (*pādādhika*).

Semi-perimeter = 8H 4A = 196A

Division by 4+9 =13 will give 15A as quotient and 1A as remainder.

Hence, width = 4x15A

= 60A = 2H 12A

Length = 9x15A + remainder 1A = 136A

= 5H 16A.

The ratio of length to width is now (5H 16A):(2H 12A), i.e. 2.266. But because all ratios between *pādādhika* (2.25) and *ardhâdhika* (2.5) are considered as *pādādhika*, this is acceptable as *pādādhika* ratio.

Stanza - 9

नाहार्धे शिवभक्ते विततिस्त्रिभिरष्टभिश्च दीर्घो वा ।
दीर्घार्धादधिकतरं व्यासं नेच्छन्ति गर्गदक्षाद्या : ।।

When the semi-perimeter is divided by 11, by 3 parts the width and by 8 parts the length (can be taken). The width more than half the length is not accepted by *Garga*, *Dakṣa* etc.

Commentary

Though the proportioning of width and length is prescribed by the ratios of *guṇavistāravidhi*, there is a practice according to which the width to length ratio is taken as 3:8. Sages like *Garga* and *Dakṣa* prefer to restrict the width to less than half the length. It can be seen that for *iṣṭadīrgha* of 6H, the proportion of the *pūrvavāstu* (width 2H-4A :length 6H-0A) vide commentary on stanzas 2,3,4 of this chapter is very near to 3:8 mentioned here. The proportion of *uttaravāstu* (3H-4A:6H-0A) has width more than half the length, not recommended by *Dakṣa* and *Garga*. This means that minimum length of *iṣṭadīrgha* is to be more than 6H for houses. If this is, say, 8H-0A the perimeter will be 8 *vyama*=64*pada*. Normalised value for *simhayonivastu* will be 67 *pada* or 22H-8A. This is the perimeter of the minimal house as per *Vastuvidya* as expalined below:

A minimum house is to have a living room (*vāsa*) and a deity room (*ranga*). For free movements of human beings, (dynamic space), the minimum width of a habitable room is a *puruṣānjali* (3H8A). It may be noted that this is equal to 240cm, recommended as minimum width of habitable rooms in National Building Code of India. The minimum width of passive space is one *vyāma* equal to 2H16A. The minimal house is shown in figure 04.05. The perimeter is 22H. When this is normalised,

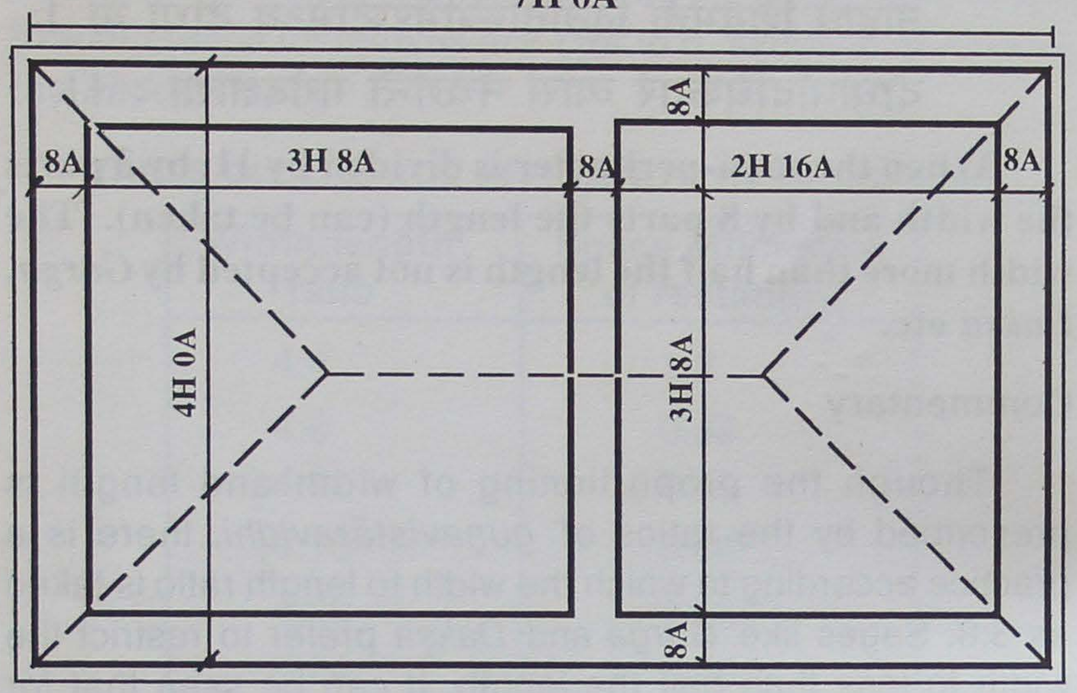


FIG.04.05 MINIMAL SIZE OF A RESIDENCE

the perimeter for *simhayoni* house is observed as 67 *pada* as given in the previous paragraph.

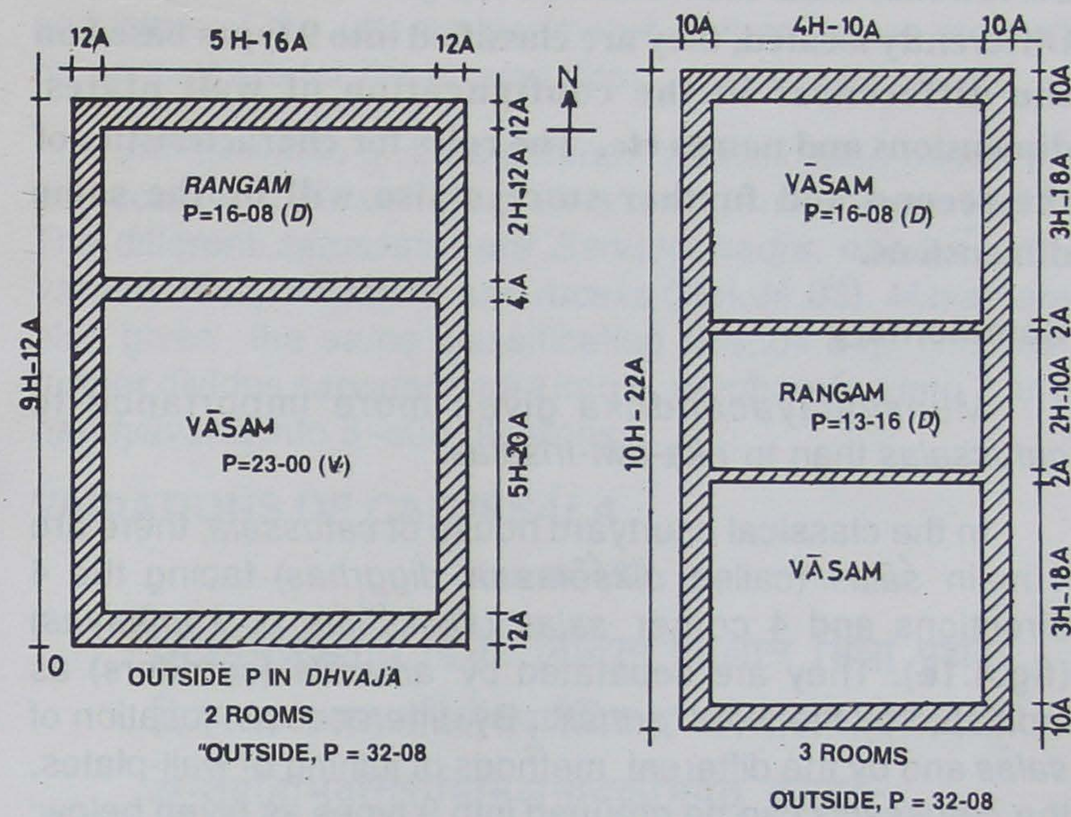
The acceptable ratios of length to width are between 2 and 6 excepting *pādona* ratios, as already stated. However, the practice generally followed is to make the upper limit 3 and divide the length into convenient rooms. (**fig.04.06**).

CLASSIFICATION OF *CATUṢṢĀLAS*

Stanza -10

चत्वारोऽत्र तु दिग्गृहाः पृथगथो कोणालयाश्चैवमि -
त्यष्टावेव नृणां गृहा मुनिमताः संस्थानभिन्नास्ततः।
भिद्यन्ते नवधोत्तरस्य गतिभिर्मानेन नामादिभि-
श्चैतेषां द्वितलादिलक्षणविधौ मानानि तान्येव च ।।

Here the sages have mentioned 8 separate houses for humans - four *diggṛhas* (houses facing the cardinal



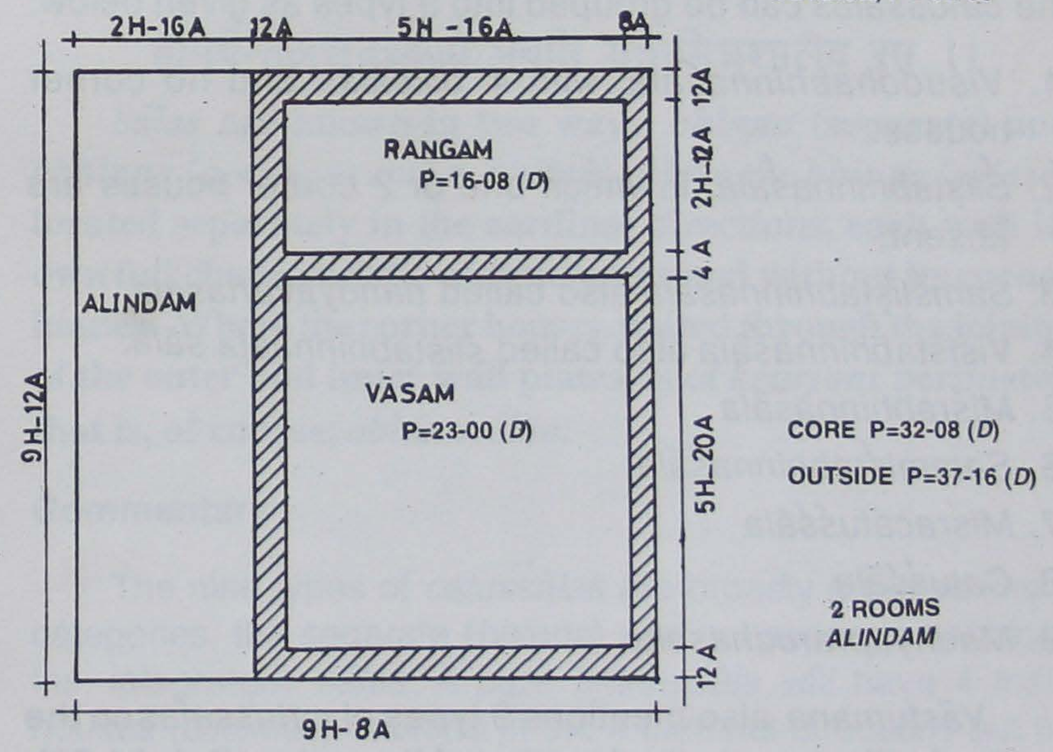


FIG.04.06 DIVIDING *ŚĀLA* INTO CONVENIENT ROOMS

directions) and then four *konalayas* (corner houses). Differently located, they are classified into 9 types based on the differences in the configuration of wall plates, dimensions and names etc. The rules for characteristics of the second and further storeys also will be the same dimensions.

Commentary

Munṣyālayacandrika gives more importance to *catussalas* than to *eka-dwi-trisalas*.

In the classical courtyard house of *catussala*, there are 4 main *śālas* (called *dikśālas* or *diggṛhas*) facing the 4 directions and 4 corner *salas* (*vidikśālas* or *koṇālayas*) (**fig.4.1e**). They are separated by *antarāla* (corridors) as indicated by the word '*pṛthak*'. By differences in location of *salas* and by the different methods of joining of wall-plates, the *catussalas* can be grouped into 9 types as given below:

1. *Viśuddhabhinnaśāla*, with 4 *dikśālas* and no corner houses.
2. *Śliṣṭabhinnaśāla;* in which one or 2 corner houses are absent.
3. *Samśliṣṭabhinnaśāla* also called *nandyāvartasala*.
4. *Viśiṣṭabhinnaśāla* also called *śliṣtabhinnaṣṭa śāla*.
5. *Miśrabhinnaśāla*
6. *Sammiśrabhinnaśāla*
7. *Miśracatuśśāla*
8. *Catuśśāla*
9. *Madhyaprarudhasala*

Vāstumana also mentions 9 types of *catussalas* on the basis of difference in the location of the *salas* (Ref .04.02). These will be explained in detail in subsequent stanzas.

For the upper floors, the location of salas, the position and joints of the *uttaras*, perimeter, nomenclature etc. will be as they are for the ground floor.

Brhatsamhita gives a different classification based on the location of the corridors. This is shown in **figure 04.07.** The different *catussalas* are *Sarvatobhadra, nandyāvarta, vardhamāna, swastika* and *rucaka* (Ref.04.03). *Mayamata* also gives the same classification (Ref.04.04). This text further divides *sarvatobhadra* into 5, *vardhamāna* into 7 and *nandyāvarta* into 5 sub-divisions.

VARIATIONS OF *CATUŚŚĀLA*

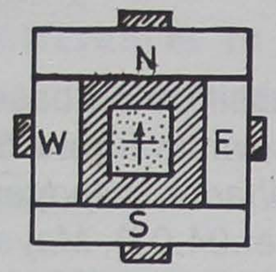
Stanza - 11

भिन्नाभिन्नवशाद् द्विधैव विदिता शालात्र भिन्ना पृथक्
दिक्स्था स्वाङ्गविशेषपूर्णविभवा कोणालयासम्भवात् ।
अन्तर्बाह्यभवोत्तराभिमिलनादेकीभवेत् कोणगे-
हापर्यन्तलसद्ध्वजो भवति यत्राभिन्नशालैव सा ।।

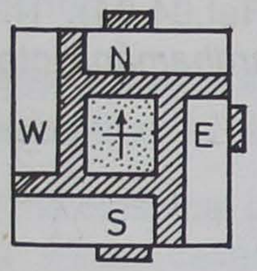
***Śālas* are known in two ways, *bhinna* (separate) and *abhinna* (not separate i.e. united). Here the *bhinna* (*śala*) is located separately in the cardinal directions, each with its own full characteristic complements and without its corner houses. Where the corner houses, united through the joining of the outer and inner wall plates, is of *ketuyoni* perimeter, that is, of course, *abhinnaśāla*.**

Commentary

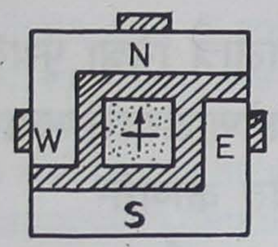
The nine types of *catuśśālas* are broadly grouped into 2 categories, the separate (*bhinna*) and not separate (*abhinna* i.e., integrated) *śālas*. A pure *bhinnaśāla* will have 4 main houses (*dikśālas*) oriented in the 4 cardinal directions but no corner houses (**fig.04.01d1**). For each one of the main *salas*, the *yoni, gamana* (shift from the centre-line of the *ankaṇa*)

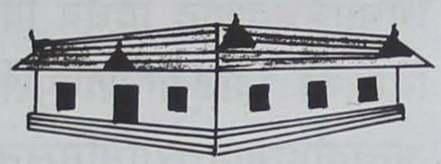


SARVATOBHADRA

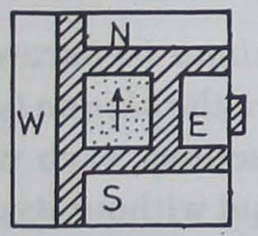


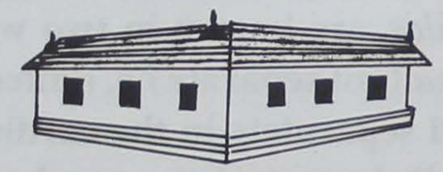
NANDYĀVARTA



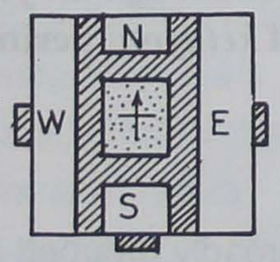


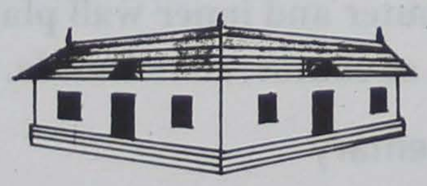
VARDHAMĀNA





SWASTIKA





RUCAKA

FIG.04.07 CLASSIFICATION OF *CATUṢṢĀLAS* BASED ON *BṚHATSAMHITA*

etc. will be that prescribed for the particular orientation. Each *sala* will be complete with its own separate *adhisthana* and each will be treated as a separate house. When the main and corner houses are united and built as a single unit, there will be an outer wall plate (*varottara*) going round the 8 houses and an inner wall plate (*ankanottara*) going round the central courtyard. When these are connected by extending the inner wall-plates up to the outer ones, the *abhinnasala* (united house) is formed. For such *catussala*, the *yonis* of the perimeters measured outside the outer wall plate and the inner wall plate should be of *dhvaja* category. Out of the nine types of *catussalas* described only one, viz. the *visuddhabhinnasala* belongs to the *bhinnasala* category.

VIṢUDDHABHINNAṢĀLA

Stanza - 12

शालास्त्वन्योन्यभिन्ना निजविहितगतिव्यासयोन्यादियुक्ताः
पर्युद्यत्पत्रमानावधिनिहितलसत्पादुकाभिन्नशालाः
सर्वार्हास्ता विशेषादवनिसुरहिताः कोणवेश्मप्रहीणा-
स्तत्रापि प्राङ्गणं केतुजमिति विदिता भिन्नशाला विशुद्धाः ।।

(Four) *salas* separate from each other, each with *gamana*, width, *yoni* etc. as prescribed for itself, with appropriate *padukas* (bottom course of basement) up to *patramana* (offset from wall plate) and without corner house, viz. the *bhinnasalas*, are suitable for all, especially for *brahmins*. There also, the perimeter of the courtyard should be of *dhvaja* (*yoni*). The *visuddhabhinnasalas* are known thus.

Commentary

In *visuddhabhinnasala*, there are 4 houses oriented in the 4 cardinal directions and there are no corner house. Each one of the four houses should have *yoni*, *gamana* etc.

as prescribed for that particular house according to its orientation. For example, *dhvajayoni* for eastern house, *simhayoni* for southern house, *vṛṣabhayoni* for western house and *gajayoni* for northern house. If the western house is considered as the important one, it will have the largest width, the southern, the northern and the eastern houses having their widths progressively reduced in that order. If the southern house is to be the important one, it will have the largest width, the width of the western, the northern and the eastern *śālas* being reduced in that order. The important house is called *sthāyi* and the others *asthāyi*.

Also, the shift (*gamana*) of the centre line of the house from that of the *ankaṇa* will be 3 units for the eastern house, 1units for southern house, 7 units for the western house and 5 units for the northern house. It is likely that the unit of *gamana* is *parva* as the operation of determining the *yoni* of the *gamana* is to multiply the *gamana* by 3 (to convert it into *angula)* and then to divide it by 8 (corresponding to the 8 directions) and then getting the remainder as 1,3,5 and 7 respectively. This will be true only if the *gamanas* are 3,1,7 and 5 *parva* respectively. The *gamana* can be increased by integer multiples of 8 units. Even the lowest footings of the basements of the house (viz. *pāduka*) will not touch each other. (**fig.04.08**). Each house will keep its special features and will be independent of each other. The *adhiṣṭhāna* will be simple ones with the *pāduka* extended to *patramāna*.

ŚLIṢṬABHINNAŚĀLA

Stanza - 13

मित्रे दक्षिणपश्चिमे पुनरुदक्प्राच्ये च गेहे मिथ-
स्तस्मात् तद्युगलोत्थकोणनिलयः शेषो विधेयोऽपि च ।
अन्यत् कोणयुगं तथैकमथवा न श्लेषयेत् सूतिका -
शूद्राद्यागमनिष्क्रमार्थमुदितो मार्गोऽयमेवात्र तु ।।

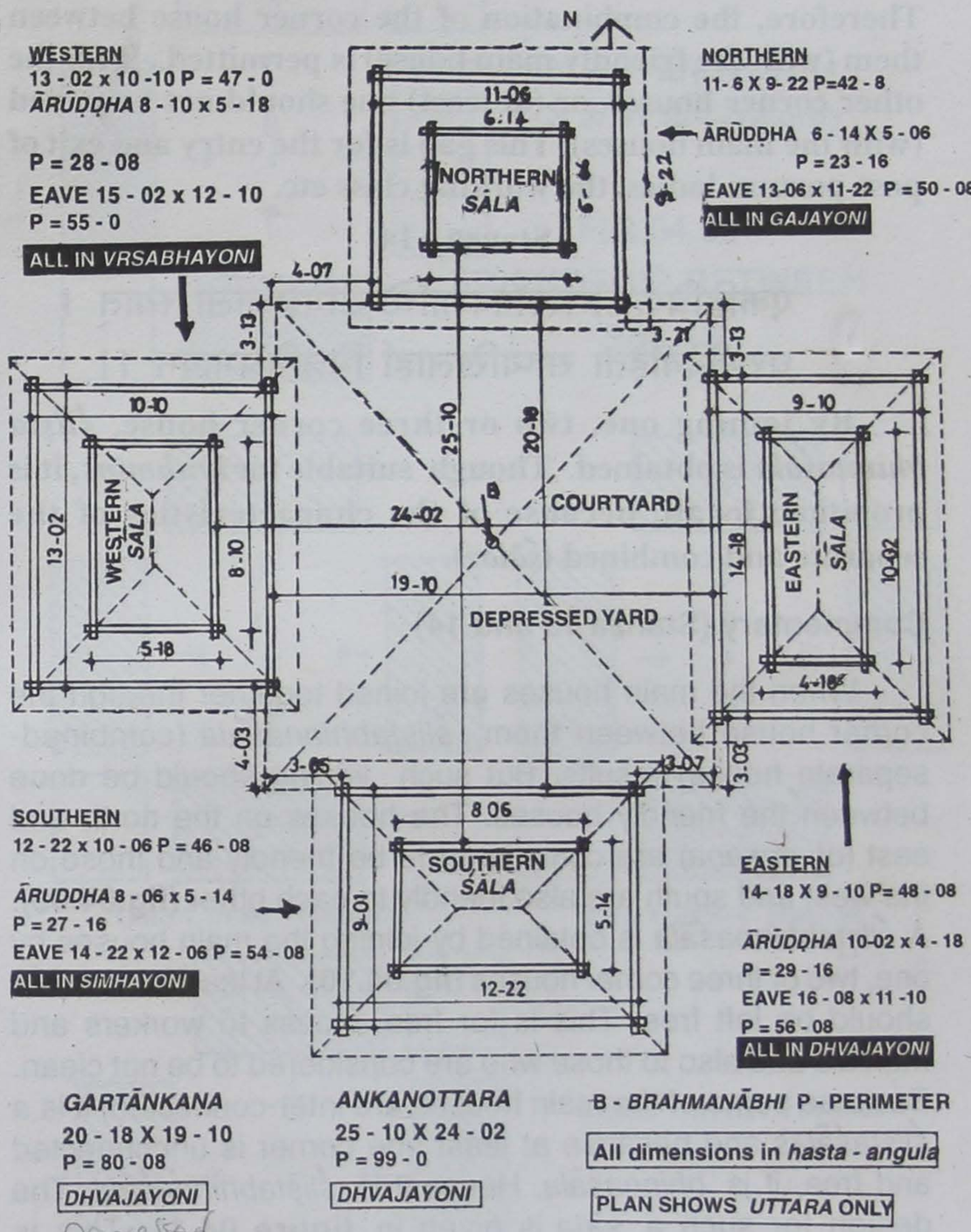


FIG.04.08 DESIGN OF A *ŚUDDHABHINNAŚĀLA*

The southern and western are mutually friendly; then the northern and the eastern are mutually friendly. Therefore, the combination of the corner house between them (with the friendly main house) is permitted. Both the other corner houses, or (at least) one should not be joined (with the main houses). This gap is for the entry and exit of post-partum ladies, the working class etc.

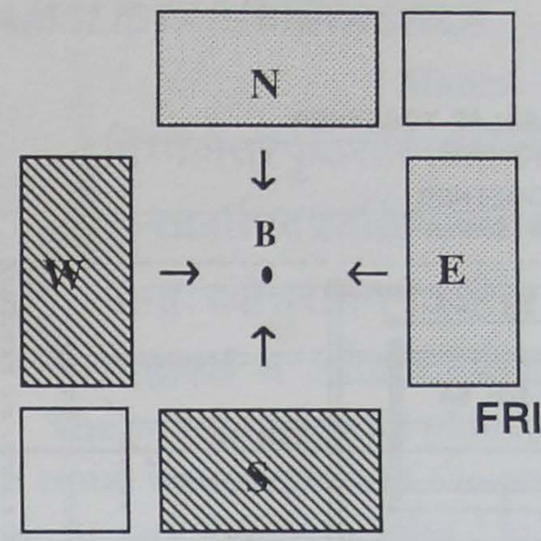
Stanza - 14

एकद्वित्रिककोणश्लेषवशाच्छिष्टभिन्नशाला स्यात् ।
धरणीदेवहिता साप्यखिलार्हा भिन्नमिश्रभावेन ।।

By joining one, two or three corner house, *śliṣṭa bhinnaśāla* is obtained. Though suitable for *brahmins*, it is propitious for all, because of the characteristics of the separate and combined (*śālas*).

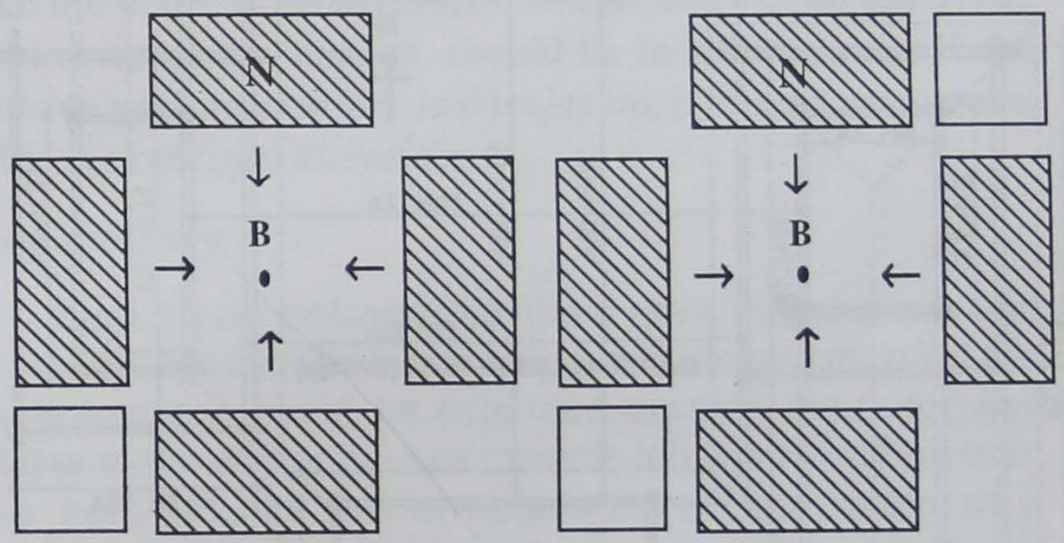
Commentary (Stanza 13 and 14)

When the main houses are joined together through the corner house between them, *śliṣṭabhinnaśāla* (combined-separate house) results. But such joining should be done between the friendly houses. The houses on the north and east (of *ankaṇa*) are considered to be friendly and those on the west and south are also friendly to each other **(fig.04.09)**. A *śliṣṭabhinnaśāla* is obtained by joining the main houses by one, two or three corner houses (**fig.04.10**). At least one corner should be left free. This is for free access to workers and menials and also to those who are considered to be not clean. Because some of the main houses are inter-connected, it is a *śliṣṭaśālas* and because at least one corner is unconnected and free, it is *bhinnaśāla*. Hence it is *śliṣṭabhinnaśāla*. The design for such a *śāla* is given in **figure 04.11**. This is considered to be suitable for brahmins, because unclean persons can enter the central courtyard with out entering and passing through the *śāla* so that such unclean persons will not pollute the main building.



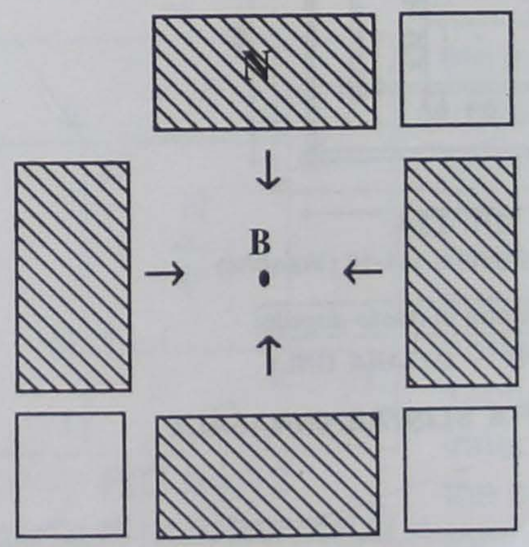
N & E are friendly
S & W are friendly

FIG.04.09
FRIENDSHIP BETWEEN *SALAS*



One Corner Houses

Two Corner Houses



Three Corner Houses

FIG.04.10
ŚLIṢṬABHINNAŚĀLA TYPES

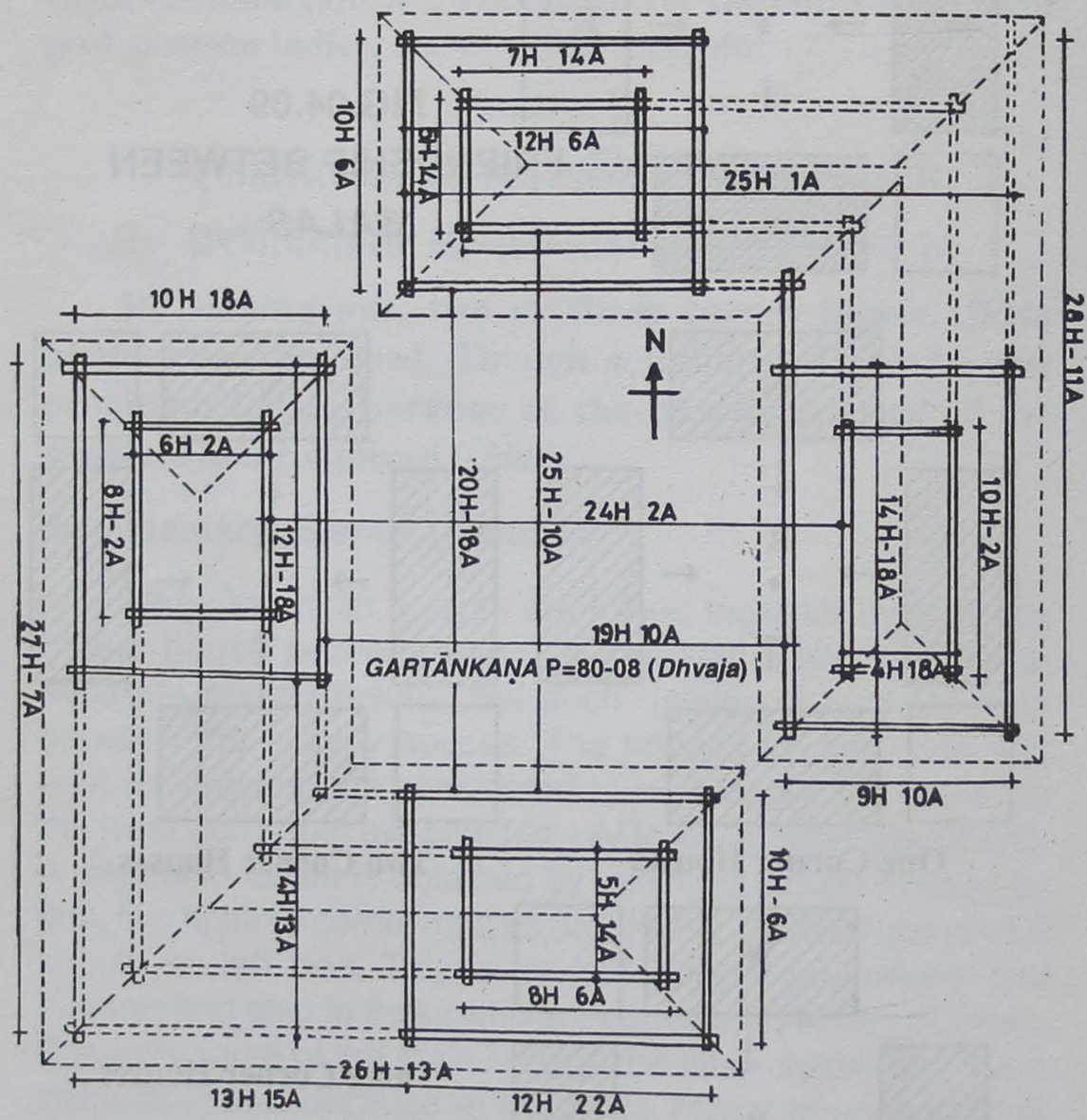


FIG. 04.11 DESIGN OF A *ŚLIṢTABHINNAŚĀLA*

SAMŚLIṢṬABHINNAŚĀLA

Stanza -15

दिग्गेहोत्तरपृष्ठसंहितविदिग्गेहोत्तराणि क्रमा-
न्नन्द्यावर्तपदप्रदक्षिणगतीन्यातत्य संयोजयेत् ।
अन्तःस्थोत्तरयोगनाहमिह सर्वत्रापि केतूद्भवं
बाह्यस्थं च तथैव चेदतिशुभं संश्लिष्टभिन्ना त्वियम् ।।

The ends of the wall plates of the corner houses which are equal in measures of the ends of the wall plates of the main houses should be joined in the anticlockwise direction, like the petals of *nandyāvarta* flower. Here in all cases, the perimeter of the *ankaṇa* should be in *dhvajayoni*. If the outside perimeter is also in *dhvajayoni*, it is most auspicious. This is *samślisṭabhinnaśāla*.

Commentary

For *samślisṭabhinnaśāla*, there are 4 main houses and 4 corner houses. The inner wall plates (*ankaṇothara*) of the main houses should be extended towards the outer wall plates of the corner houses towards left (while looking from the *ankaṇa*) like the arrangement of the petals of a *nandyāvarta* flower. (**fig.04.12**).

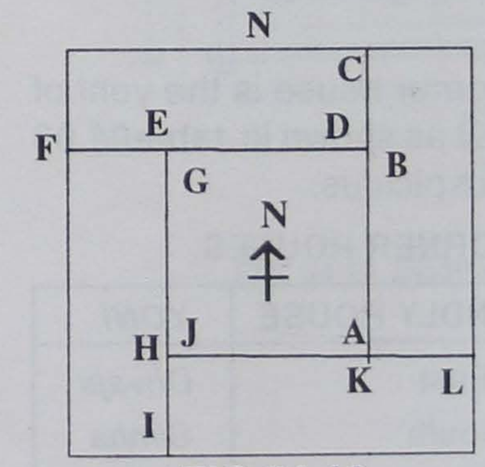


FIG.04.12
SAMŚLIṢṬABHINNAŚĀLA

The western wall plate (viz. the inner wall plate) of the eastern house (AB in figure) is to be extended to the outer wall plate (i.e., up to C) of the north-east corner house. Similarly, the southern wall plate DE of the northern house to F and so on. Technically this extension of the inner wall plate and its joining with the outer wall plate is to tie the two together as a stable frame.

The perimeter of *ankaṇa* is to be in *dhvajayoni*. The outside perimeter also should preferably be in the same *yoni*. But the *dikśālas* can have their own *yoni*. This is also called *nandyāvartaśāla*. Here the main *salas* with their corner *salas* are separated from each other by corridors. A typical design is given in **figure 04.13.**

YONIS FOR CORNER HOUSES

Stanza - 16

सर्वत्रापि च कोणगेहपरिणाहाप्त्यै स्वदिग्योनिरे-
वोक्तस्तत्र विदिग्गृहास्तु सकला जन्या भवन्त्येव हि ।
दिक्शाला जनका भवन्ति च ततः केतुर्भवेदीश्वरे
सिंहोऽग्नौ निर्ऋतौ वृषः करिवरो वायौ नृणां धामानि ।।

Everywhere (viz. for all *śālas*) for the perimeter of the corner house, the *yoni* of its main house is precribed. There all the corner houses become creations (*janya*) and the main houses are creators (*janaka*). Therefore, in the houses of human beings, there should be *dhvajayoni* in north-east, *simhayoni* in south-east, *vṛṣabhayoni* in south-west and *gajayoni* in north-west.

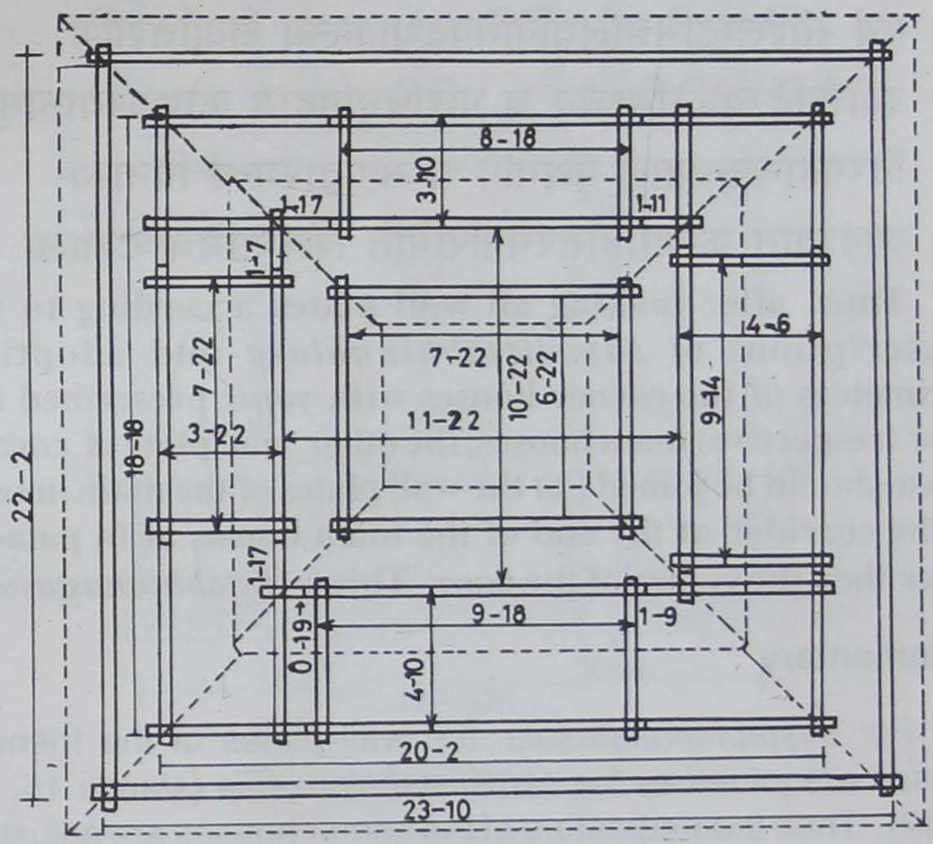
Commentary

The *yoni* prescribed for the corner house is the yoni of the main house which is friendly to it as shown in **table04.03** as even numbers for *yoni* are inauspicious.

TABLE 04.03 *YONI* OF CORNER HOUSES

CORNER HOUSE	FRIENDLY HOUSE	*YONI*
North-east (*Īśa*)	East	*Dhvaja*
South-east (*Agni*)	South	*Simha*
South-west (*Nirṛti*)	West	*Vṛṣabha*
North-west (*Marut*)	North	*Gaja*

OVERALL P= (23-10+22-02)2 = 91-00 (*Dhvaja*)
ARUDDHA P= (20-02+18-18)2 = 77-16 (*Dhvaja*)
ANKANA P= (11-22+10-22)2 = 45-16 (*Dhvaja*)
GARTANKANA P= (7-22+6-22)2 = 29-16 (*Dhvaja*)



Dimensions in *hasta angula*

PLAN AT *UTTARA*

FIG. 04.13 DESIGN OF A *SAMSLISTABHINNASALA*

In the *nandyavatra* arrangement, the corner houses are created (derived) from the main houses by the extension of the wall plates of the latter. Hence the corner houses are called the creations (*janya*) of the friendly main houses, which are considered to be creators (*janaka).*

ŚLIṢṬABHINNAṢṬAŚĀLA

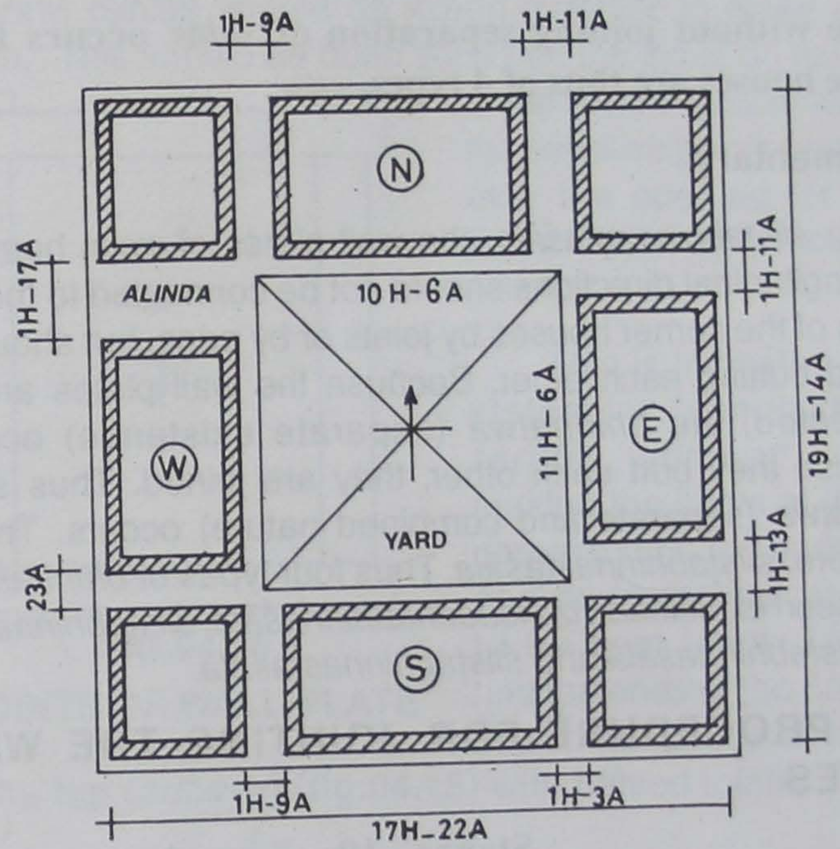
Stanza - 17

एवं संश्लिष्टभिन्नालयविधिवदथाकल्प्य सर्वोत्तराणि
स्वोक्तैर्दिग्योनिभिश्चैव च परिधिमुपादाय कोणालयानाम् ।
दिग्गेहान्तान्तराले पृथगपि च महाद्वारमध्यं विनान्य-
त्रादध्यात् कोणगेहोत्तरमपरिमिति श्लिष्टभिन्नाष्टशाला ।।

Thus, after making all wall plates according to the prescriptions of *samśliṣṭabhinnālaya* and adopting perimeters of the corner houses with *yonis* prescribed for their (respective) main houses, the other wall plate of corner house should be joined (to the wall plates of the main house) in the corridor at the end of the main house, at (a palace) other then the centre of the door. This is *śliṣṭabhinnaṣṭaśāla*.

Commentary

For *śliṣṭabhinnaṣṭaśāla,* the wall plates of the friendly houses are joined as for *samśliṣṭabhinnaśāla* (stanza 15, fig 04.12). Then the perimeters of the corner houses are adjusted to yield *yoni* numbers of their respective main houses (refer **table. 04.03**). The wall plates of the corner house in the right hand side (while looking from the *ankaṇa*) are joined to the main house on its left at the *antarāla* in such a way that the joint does not occur at the centre of the door opening. Here each *diksala* has corridors on both sides. Therefore, the 4 *dikśāla* and 4 *vidikśālas* remain separated by the corridors. Hence this is called *śliṣṭabhinnaṣṭaśāla*. At the same time the wall plates are interconnected (**fig.04.14**).



4 *DIKŚĀLAS,* 4 *VIDIKŚĀLAS,* 8 *ALINDAS*

OUTSIDE P = (17-22+19-14) 2 = 75-0 (*DHVAJA*)

YARD P = (11-6+10-6) 2 = 43-0 (*DHVAJA*)

FIG. 04.14 *ŚLIṢṬABHINNĀṢṬAŚĀLA*

Stanza - 18

कोणगृहोत्तरयोगः सन्धिमृते दिग्गृहोत्तरान्तेषु ।
यत्र स्यात् तत्र भवेद् भिन्नत्वं तद्गृहाश्चतुर्धेति ।।

Where the combining (*yoga*) of the wall plates of the corner house happens at the end of the wall plate of main house without joining, separation of *śālas* occurs there. Those houses are thus of 4 types.

Commentary

In *śliṣṭabhinnaṣtaśāla,* the wall plates of main homes in the longitudinal directions should not be connected to the wall plates of the corner houses by joints or by pegs, but should be placed butting each other. Because the wall plates are not connected, the *bhinnatwa* (separate existence) occurs. Because they butt each other, they are joined. Thus *śliṣṭa-bhinnatwa* (separate and combined nature) occurs. This is, therefore, *śliṣṭabhinnastaśāla.* Thus four types of *bhinnaśālas,* have been explained viz *visuddhabhinnaśāla, śliṣṭabhinnaśāla, samśliṣṭabhinnaśāla* and *śliṣṭabhinnastaśāla.*

THE PROCEDURE FOR JOINTING THE WALL PLATES

Stanza - 19

दीर्घव्यासाद्यभावे पृथगथ विधिवत् सन्ति कर्मोक्तनीत्या
सन्धायाकोणगेहावधि बहिरुदितान्युत्तराण्यत्र धीमान् ।
आधारीकृत्य पूर्वापरनिलयबहिष्ठोत्तरस्याग्रमूला-
वाधेयत्वेन चान्यद् द्वितयमिति चतुष्कोणसन्धिं विधाय ।।

When single pieces are not available for the wall plates along the length and width, the outer wall plates should be joined separately according to the rules and extended to the end of the of the corner house. The joints at the 4 corners should be made with the tail and head of

the eastern and western as the support (*ādhāra*) and the other two the supported (*ādheya*).

Commentary

When the scantlings for the walls plates are not sufficiently long to be made in one piece when extended to the corner, separate pieces should be joined together to make up the length. This should be done such that the joints do not occur at the centre lines of *śālas,* at the sensitive points (*marmas*), over the opening for doors and windows and in between pillars.

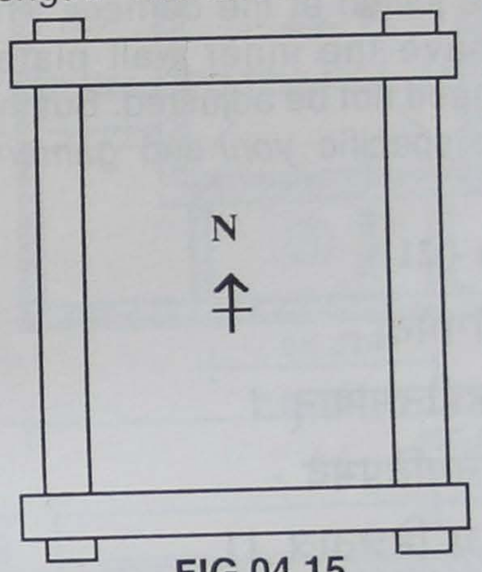


FIG.04.15
JOINTS OF WALL PLATE

This is indicated by the statement "*sandhikarmok-taritiā vidhivat*". While making the joints at the four corner joints, the ends of the east and west wall plates are to be kept below (*ādhāra*) and the ends of the north and south wall plates should be at the top (*ādheya*) (**fig.04.15**) with halved joints.

MIŚRABHINNAŚĀLA

Stanza - 20

नाहं केतुजमेवमत्र बहिरप्यन्तश्च कृत्वा विदिग्-
गेहान्तर्विहितोत्तरैर्विरहितं त्वन्तःस्थकोणेष्वपि ।
सन्दध्याद् बहिरुत्तरोक्तवदिदं स्यान्मिश्रभन्नं चतुः-
शालं दिङ्निलयाः स्वयोनिगतिभिर्युक्ताः समस्ता अपि ।।

Here making the perimeters of outside and yard in *ketuyoni*, the corners of the yard also should be joined as stated for the outer wall plate, without the inner wall

plates of the corner houses. All the *dikśālas* are to be with their own *yoni* and *gamana*. This shall be *catuśśāla* called *miśrabinna*.

Commentary

For the *miśrabinnacatuśśāla*, the perimeters of the outer and inner wall plates should be in *ketuyoni* (*yoni* number 1). Both the wall plates should be joined at the corners. The corner houses should not have the inner wall plates (**fig.04.16**), hence their *yonis* need not be adjusted. But the main houses should have the specific *yoni* and *gamana* prescribed for each direction.

Stanza - 21

कोणेषु सर्वनिलयोत्तरयोगभेदा -
न्मिश्रत्वमत्र तु विदिग्गृहहीनभावान् ।
दिङ्मन्दिराणि निजयोनिगतिप्रभेदै -
र्युक्तान्यमूनि यदतोऽपि च भिन्नतात्र ।।

Because the wall plates of all the houses are joined at the corners, here combination (*miśratwa*) occurs. Here separation (*bhinnatwa*) also occurs because the *diksalas* are with their own *yoni* and *gamana* and the corner houses are incomplete.

Commentary

This stanza explains why the above building is called *miśrabhinnacatuśśāla*. The four main *salas* are fully integrated with each other through the inner and outer wall plates joining at the corners. Hence it is a combined (*miśra*) *sala*. But the *yoni*, *gamana* etc. for each of the 4 main *salas* are those specifically prescribed for each (see **figure 04.16**) so that the main *salas* are all different in their characteristics

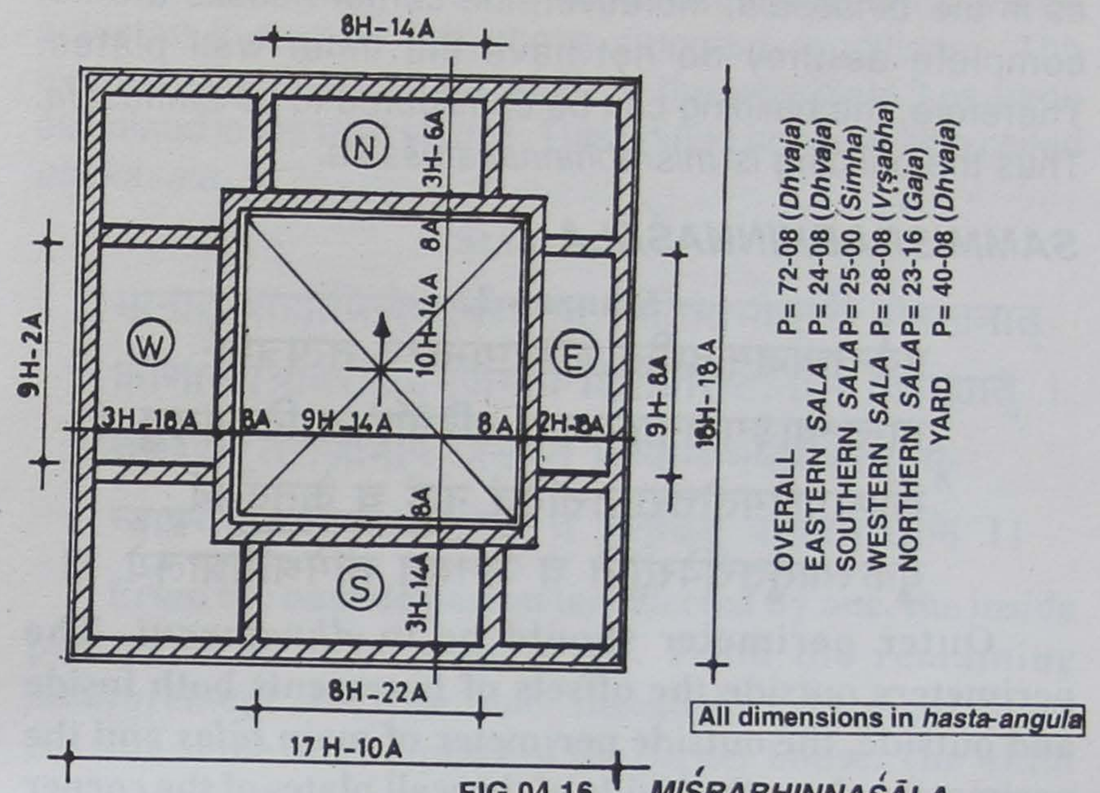


FIG.04.16 *MIŚRABHINNAŚĀLA*

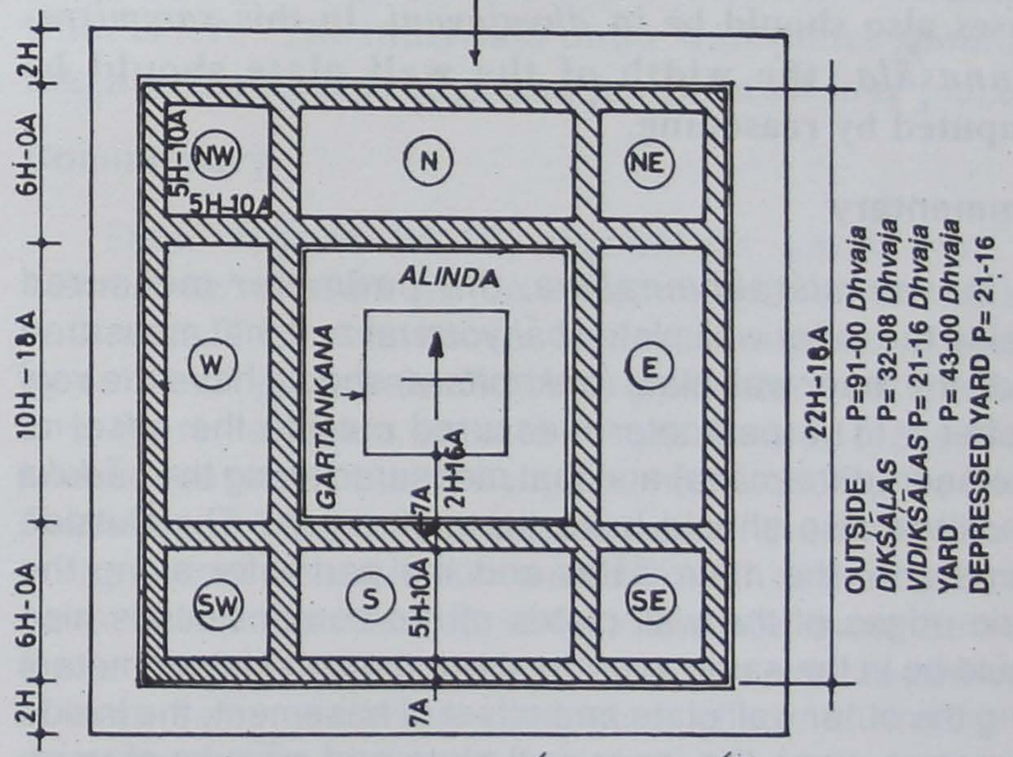


FIG.04.17 *SAMMIŚRABHINNAŚĀLA*

as in the *binnaśāla*. Moreover, the corner houses are not complete as they do not have the inner wall plates. Therefore, the building can be considered to be *binnaśāla*. Thus the building is *miśrabhinnacatuśśāla*.

SAMMIŚRABHINNAŚĀLA

Stanza - 22

प्रर्यन्तध्वजमादधीत बहिरप्यन्तश्च तत्पत्रमा-
नान्तश्चाङगणनाहमप्यथ बहिर्नाहं च दिग्धामसु ।
कोणागारगतोत्तरान्तरुदितं नाहं च केतूद्भवं
युक्त्यातूत्तरविस्तृतिं च जनयेत् संमिश्रभिन्नालये ।।

Outer perimeter should be in *dhvajayoni*. The perimeters outside the offsets of basements both inside and outside, the outside perimeter of main *śālas* and the perimeters along the inside of the wall plates of the corner houses also should be in *dhvajayoni*. In this *sammiśrabhinnaśāla*, the width of the wall plate should be computed by reasoning.

Commentary

In *sammiśrabhinnaśāla*, the perimeter measured outside the outer wall plate (*bāhyottara*) and that measured inside the inner wall plate (*ankṇottara*) should have the *yoni* number 1. The perimeter measured outside the offset of basement (*patramāna*) and that measured along the *pāduka* of *ankaṇa* also should have the same *yoni*. The outside perimeter of the main *śālas* and the perimeter along the inside edges of the wall plates of the corner houses also should be in the same *yoni*. In short, the outside perimeters along the outer wall plate and offset of basement, the inside perimeters along the inner wall plate and *pāduka* of yard, the outside perimeter of all main houses and the inside perimeters of all corner houses should conform to

dhvajayoni. (**fig.04.17**). The width of the wall plate will be adjusted to comply with these stringent conditions. The method of arriving at the width of the wall plate has been explained in the next stanza. This unified house is also called *ekakasala*.

Stanza - 23

मानाद् बाह्यान्निजेष्टाद्रहयतु मितिमाभ्यन्तरीं शेषमानात्
कोणाब्ध्यश्रोदरोद्यद्भुजमपि शितधीरष्टनिघ्नं विजह्यात् ।
तच्छेषादुत्तराणामपि जनयतु विष्कम्भमष्ट्यंशतोऽमू-
न्यापर्यन्तायतान्याकलयतु च चतुर्दिक्षु बाह्यान्तराणि ।।

From the outside perimeter selected by one, the inside perimeter is to be subtracted. From the remaining measurement the wise ones should forsake eight times the side of the inner square of the corner house. The width of the wall plate has to be computed by one-sixteenth of what is left. The inner and outer wall plates should be taken to the outside edge and joined in all four places.

Commentary

From **figure 04.17**, it can be seen that the *sammiśrabhinnaśāla* will be a square both on the outside and inside. The corner houses also will be square. Therefore by subtracting the selected inner perimeter from the outer one, the remainder is equal to 8 times the side of the corner house measured outside (length L_1 marked in **figure 04.17**) Therefore, if 8 times the measurement of the inner side (L_2) of the corner house is subtracted from this, the balance is equal to 16 times the width of the wall plate. It may be noted that according to the previous stanza, the outside perimeter of main *salas* and inside perimeters of corner houses are prescribed to be in *dhvajayoni*.

For example, let the perimeter along the outside edge of

outer perimeter be 40H 8A and that along the inside edge of the inner wall plate of *ankaṇa* be 16H 8A. Subtracting inside perimeter from the outside one, the balance is 24H. Thus, the outside length of corner houses is 24÷8 = 3H. The outside perimeter of corner house will then be 4x3 = 12H.

The inside perimeter of corner houses should be in *dhvajayoni*. Therefore the perimeter less than and nearest to 12H giving *dhvajayoni* has to be adopted for the corner houses. This value is 11H.

Then, the inside dimension of
corner house = 11 H/4
= 2H -18A
Therefore, the width of wall plate = (3H -2H 18A)/2
= 3A

This value can be obtained by subtracting 8 times the measurement of inner side of corner house (viz 8 times 2H 18A) from 24H and dividing the balance (i.e. 2H) by 16.

One more example is worked out here.

Let outside perimeter be = 80H-8A ---------- 4-(1)
Let inside perimeter along the
inside edge of *ankaṇottara* = 43H-0A ---------- 4-(2)
Subtracting 4 -(2) from 4 -(1), we get 37H 8A
Outside width of corner house = 37H 8A/8
= 4H 16A
Outside perimeter of corner house = 4x(4H 16A)
= 18H 16A
The nearest value of perimeter in
dhvajayoni lower than this = 16H 8A
Thus inside width of corner house = 4H 2A
Eight times this value = 32H 16A
Therefore, width of wall plate = (37H 8A-32H 16A)/16
= (4H-16A)/16 = 7A

MIŚRAKACATUŚŚĀLA

Stanza - 24

प्राग्वत् प्राङ्णपत्रमानबहिरन्तर्नाहकोणालयाः
केतूत्था हि दिगालयास्तु निजयोन्याढ्याः स्वगत्यान्विताः
राजार्हं तदपीह मिश्रकचतुःशालं नृगेहं विदु-
र्दिक्शाला निजयोनिजा यदखिलार्हं तद्द्विजेष्टं न वा ।।

That house suitable for royalty is to be known as *miśrakacatuśśāla* in which as mentioned earlier the perimeters along the offsets of basements of *ankaṇa* and outside and the inside perimeter of corner houses are in *dhvajayoni* and the main houses are with their own *yonis* and *gamanas*. Since the main houses have their own *yonis*, they are suitable for all but not suitable for the *brāhmaṇas*.

Commentary

In *miśrakacatuśśāla*, the perimeters along the outside edge of outside wall plate (*vārottara* or *bāhyottara*), inside edge of inside wall plate (*ankaṇottara*), the perimeter along the basement and inside perimeters of all corner houses are to be in *dhvajayoni* as prescribed for *sammiśra-bhinnaśāla*, but the main houses should have their own specified *yonis* and *gamanas*. This house is suitable for all, but is generally used for royal houses. It is believed that this is not suitable for the *brāhmanas* (**fig.04.18**).

CATUŚŚĀLA

Stanza - 25

तुल्यातानवितानताङ्णविधौ गत्या विनान्तर्बहि-
र्योगे तूत्तरपत्रमानपरिणाहोऽप्यस्तु केतूद्भवः।
केतूत्था अपि दिग्विदिङ्निलयनान्तर्बाह्यनाहाः स्वम-
ध्योद्यद्वारपदा भवन्ति च चतुःशालं गृहं भूभुजाम् ।।

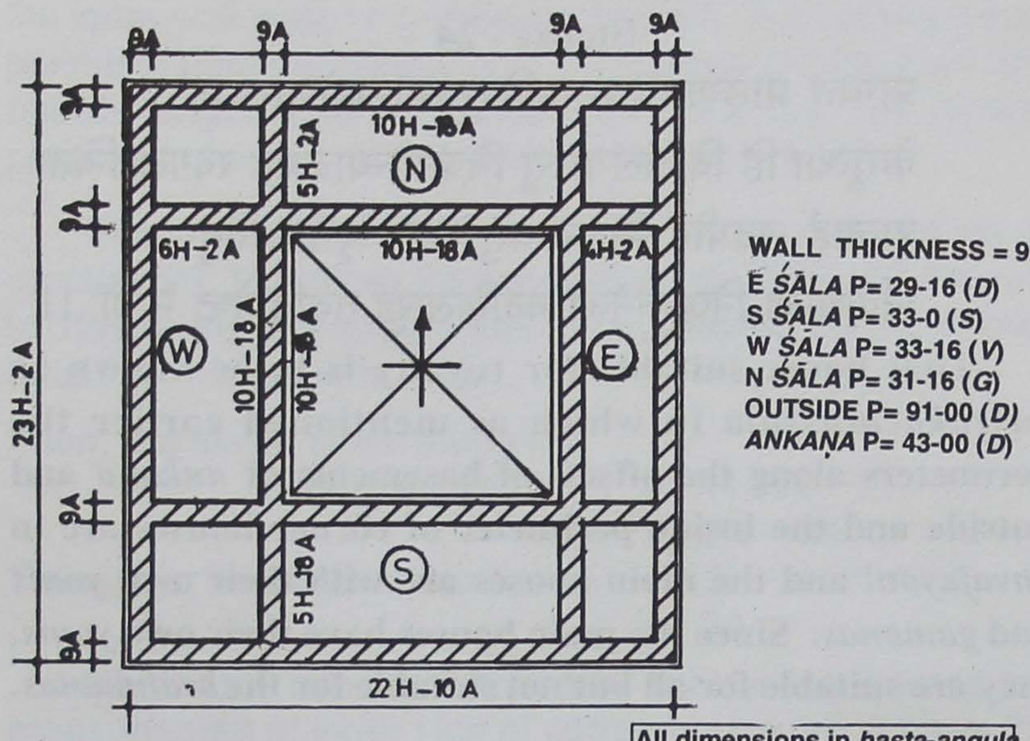


FIG.04.18 *MIŚRAKACATUŚŚĀLA*

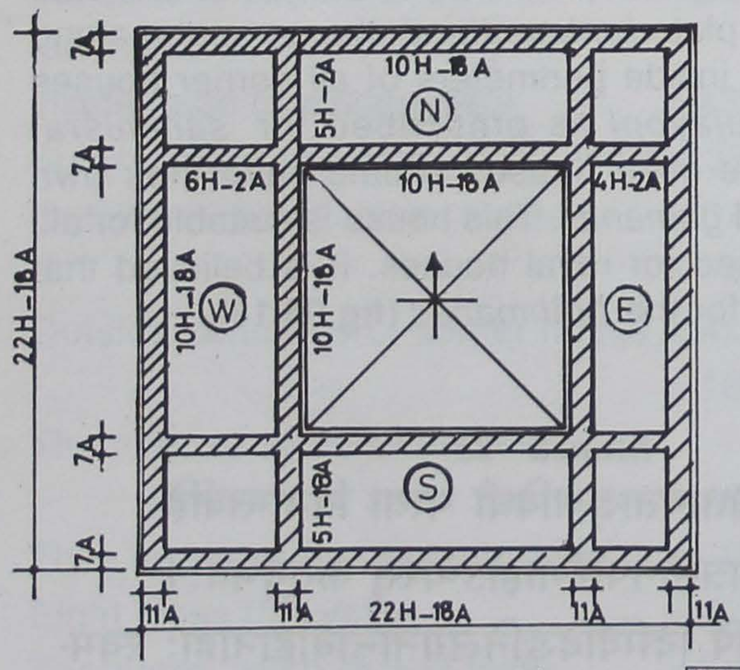


FIG.04.19 *CATUŚŚĀLA*

With the length and width of *ankaṇa* equal to each other, without *gamana* and with the perimeters of the inner and outer wall plates, and that of the offsets being in *dhvajayoni* and also the inside perimeters of the main and corner houses and the central doorways being in *dhvajayoni* these *catuśśāla* houses, are for the kings.

Commentary

For *catuśśāla*, the plan shapes along the outer edge of the outside wall plate (*bāhyottara*) and along the inner edge of the wall plate around the *ankaṇa* are square i.e, they are not given any elongation (*āyāma*). The perimeters measured outside the offset of the basement and inside the *pāduka* of the yard are to be in *dhvajayoni*. The inside perimeters of the main and corner houses also should be in *dhwajayoni*. Similarly, the main doorways at the middle of the *sala* also should have their inside perimeters in *dhvajayoni*. Such a house is prescribed for the warrior class (*kṣatriyas*) **(fig.04.19)**.

MADHYAPRARŪDHASALA

Stanza - 26

क्वचिच्चतुःशालगृहे समस्ते सर्वोत्तराणामपि मध्यसूत्रे ।
नाहो विधेयो यदि तत्तु मध्यप्ररूढमानं भवनं वदन्ति ।।

If the perimeters are computed along the centre lines of all wall plates in all *catuśśāla* houses, in some places that is called *madhyaprarūdha* house.

Commentary

From the descriptions of the eight previous types of *catuśśālas*, it can be seen that adherence of the prescribed rules individually for the main halls, corner halls, corridors etc. makes their design complicated and cumbersome. The prescriptions to have the same *yoni* for both inside and outside perimeters in them make it obligatory to adjust the

wall thickness, widths of wall plate etc. every time when computations are made for the main halls and corner rooms. In any house they will vary from wall to wall. Even in earlier days, there must have been studies to reduce such complexities and evolve simpler design procedures. One such method is to consider the perimeters along the centre lines of the wall plates instead of the outer and/or the inner side of the wall plate. This method is called *madhyaprarūdha* rule and the houses designed by this method are called *madhyaprarūdha* houses. Since *yoni* is calculated on the basis of the centre-line dimensions, the thickness of the walls and the width of the wall plates can be chosen in convenient modules. Integer multiples of different values for width of walls and wall plates also can adopted. Two examples are given in **fig.04.20**.

It is possible that the centre-line rule was adopted when timber curtain walls (*ara* and *nira*) were used in building in which the thickness may be only 1 or 1 1/2 *angula* and the difference between inside perimeter and outside perimeter of walls was insignificant. It can also be seen that this method is very convenient in columnar structures. In modern engineering practice centre line dimensions are used in framed constructions.

It is only in *Manuṣyālayacandrika* that this method is mentioned. Even here, detailed descriptions or rules are not given, but passing reference is made in this stanza. It is interesting to investigate why, inspite of its easiness, centre line system was not used. In all probability only the perimeter which can be directly measured was favoured in order to avoid any computational error. Centre line perimeter has to be computed and further it cannot be checked by direct measurement. Only methods involving tangible, measurable system was evidently prescribed for artisans. The centre line system, however, definitely existed amongst the *sthapatis* and the *ācāryas* and was indeed followed in some places with advantages.

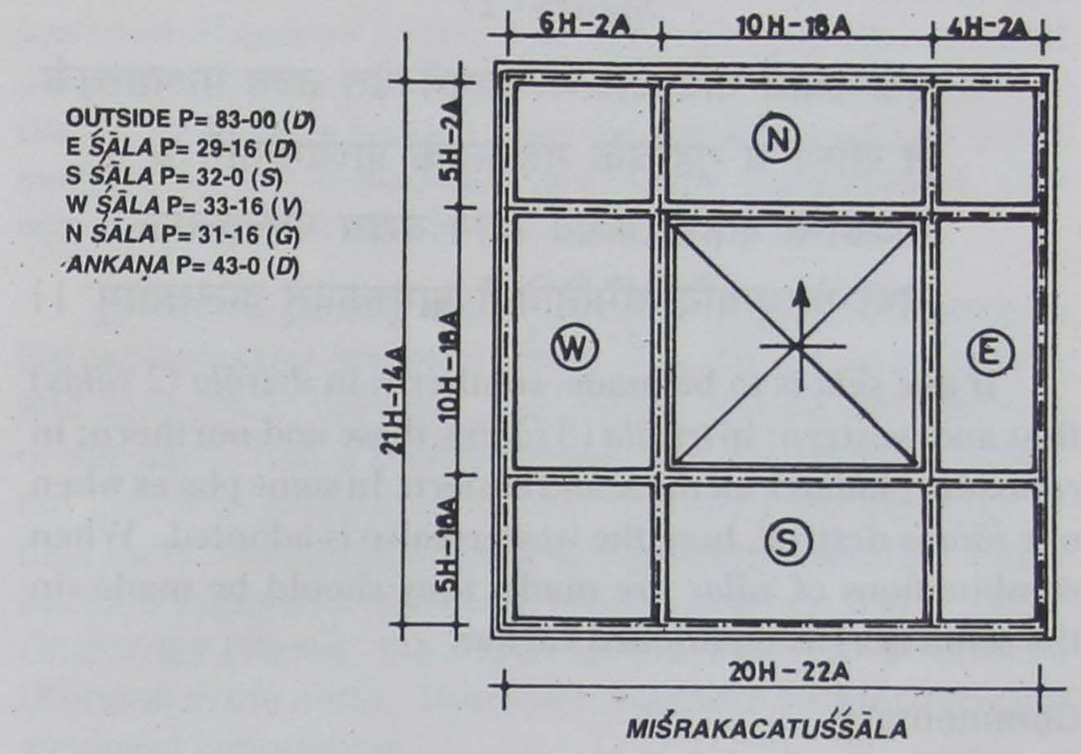


FIG.04.20 *MADHYAPRARUDHASALA*

ORDER OF PREFERENCE OF *SALAS*

Stanza - 27

एकं स्याद् यदि दक्षिणं गृहमुभे चेत् तच्च पाश्चात्यकं
ते सौम्यं च गृहत्रिके गृहचतुष्के प्राच्यमेतानि च ।
वाञ्छन्ति क्वचिदेकमेव भवनं यद्यत्र पाश्चात्यकं
चेष्टं गेहयुगादिनिर्मितिविधौ प्रागुत्तवत् कल्प्यताम् ।।

If one *śāla* is to be made, southern; in *dviśāla* (2 *śālas*) that and western; in *triśāla* (3 *śālas*), these and northern; in *catuśśāla* (4 *śālas*), all these and eastern. In some places when one *śāla* is desired, here the western also is adopted. When combinations of *śālas* are made, they should be made (in the sequence) as mentioned earlier.

Commentary

Ekaśāla (one rectangular house oriented in a cardinal direction) is of simple plan. On the other hand, the *catuśśāla* (with 4 main houses and 4 corner houses), built around the *Brahmasthāna* and utilising the entire buildable area of the *mandala* is a complex but complete house-form.

In the case of *ekaśāla*, the first preference is for the southern *śāla* facing north. It is said that western *śāla* facing east also can be built as an *ekaśāla*. In Kerala, western *śālas* are more in number than others. One reason for this can be that in addition to *vṛṣabhayoni*, the other 3 *yonis* can be adopted for the western *śāla*. This gives flexibility in design of the western *śāla*. The preference to western *śāla* may also be due to the influence of topography, proximity to the ocean on the western side and the climate. The general slope of ground in Kerala is from east to west. *Brhatsamhita* prescribes that in ground stopping towards west, western *śāla* is to be built.

In the colder latitudes of the northern hemisphere, south-

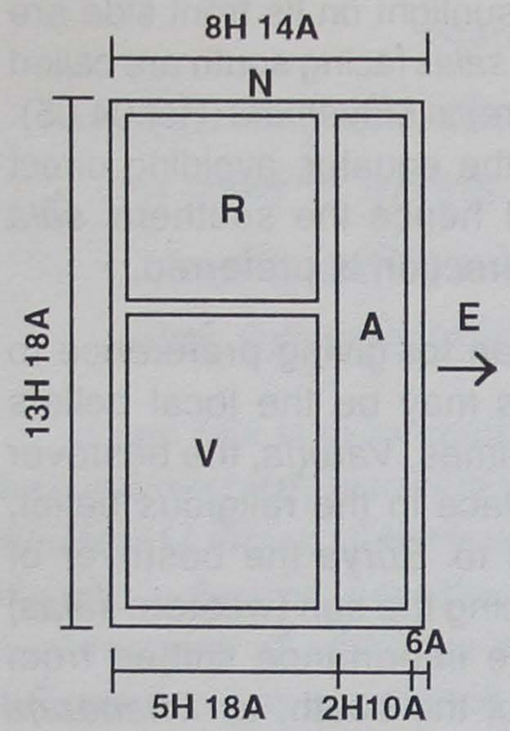
facing houses which will receive sunlight on its front side are preferred. Therefore, the northern *salas* facing south are called *sukhâlayas* (houses giving pleasure) in *Mayamata* (Ref.04.05). But in South India located near the equator, avoiding direct sunlight is more pleasurable and hence the southern *śāla* with its front yard facing north direction is preferred.

Another probable explanation for giving preference to the western and southern *śālas* may be the local beliefs and customs. In the early vedic times, *Varuṇa*, the bestover of salvation, had a prominent place in the religious belief, but later the importance shifted to *Sūrya* the bestover of prosperity. Therefore, houses facing the sun (western *śālas*) became important. Similarly, the importance shifted from *Dharmrāja* (*Yama*), the regent of the south, to *Dhanarāja* (*Kubera*) in the north. Therefore, southern *śāla* facing north assumed importance.

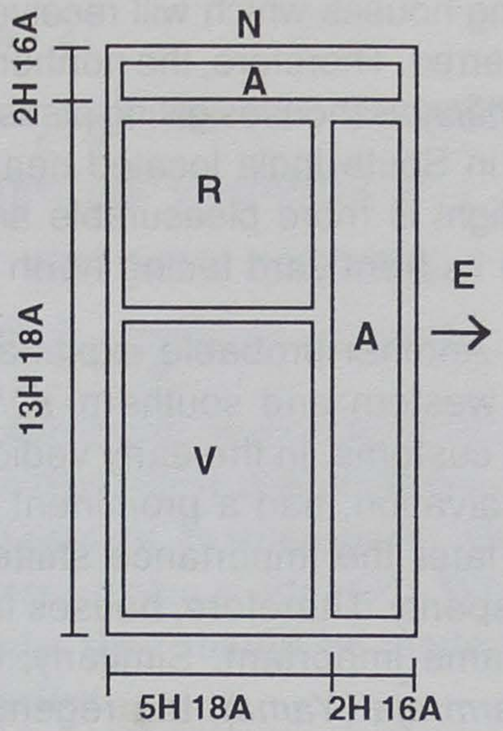
The preferred order of preference is south, west, north and then east.

If more than one *śāla* is to be built, the same order of preference is to be followed; i.e. build the southern *śāla* first, then the western, then the eastern and lastly the northern.

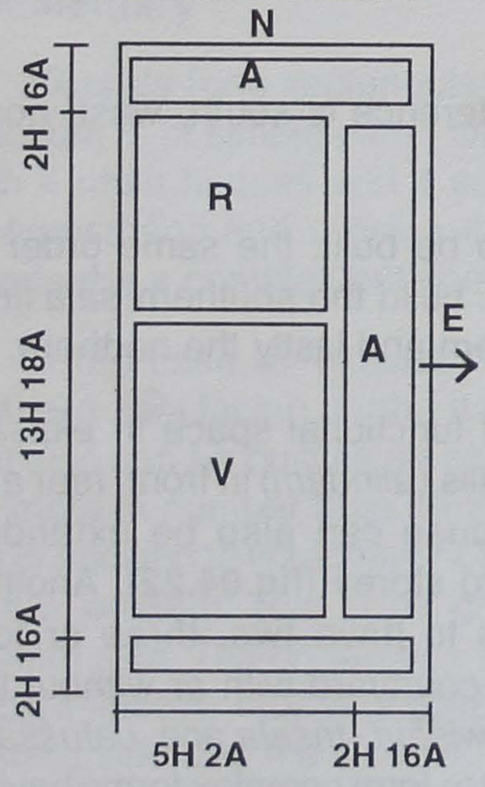
The common expansion of functional space in *ekaśāla* may be done either by adding halls (*alindam*) in front, rear and sides (**fig.04.21**). The core house can also be extended upwards to the second and third storey (**fig.04.22**). Another method of space expansion is to have two, three or four *ekasalas* built around a central courtyard with or without the corner houses. This leads to *dwiśāla*, *triśāla* and *catuśśāla*. The *catuśśālas* can be combined to form complex forms having 2,3 or 4 internal courtyards arranged along one axis or both axes (**fig.04.23**). This gives great flexibility for adding spaces without modifying the first unit and at the same time integrating all the additions around the courtyards.



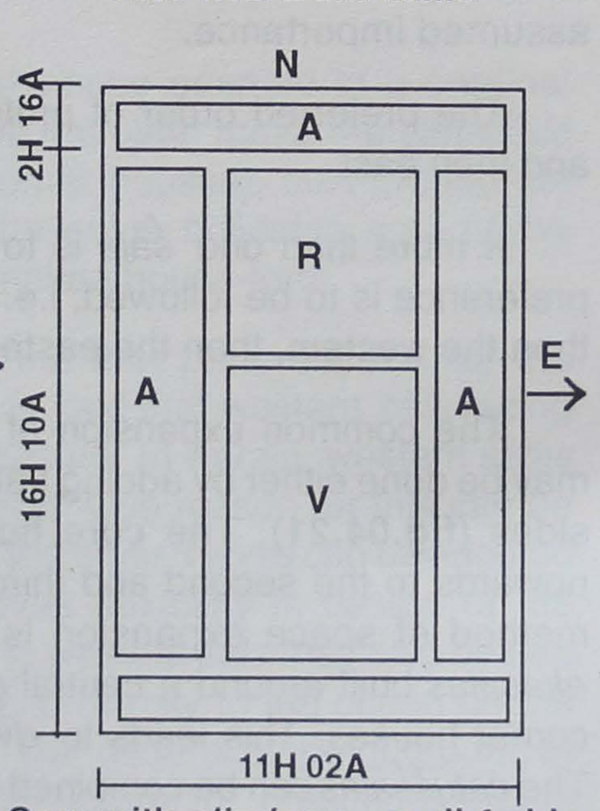
Core with 1 *alindam*



Core with 2 *alindams*



Core with 3 *alindams*

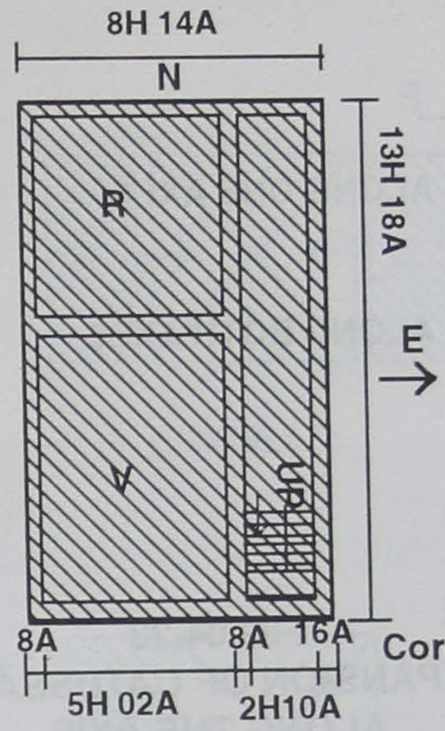


Core with *alindams* on all 4 sides

R - *RANGAM*, V - *VĀSAM*, A - *ALINDAM*

(Not to scale)

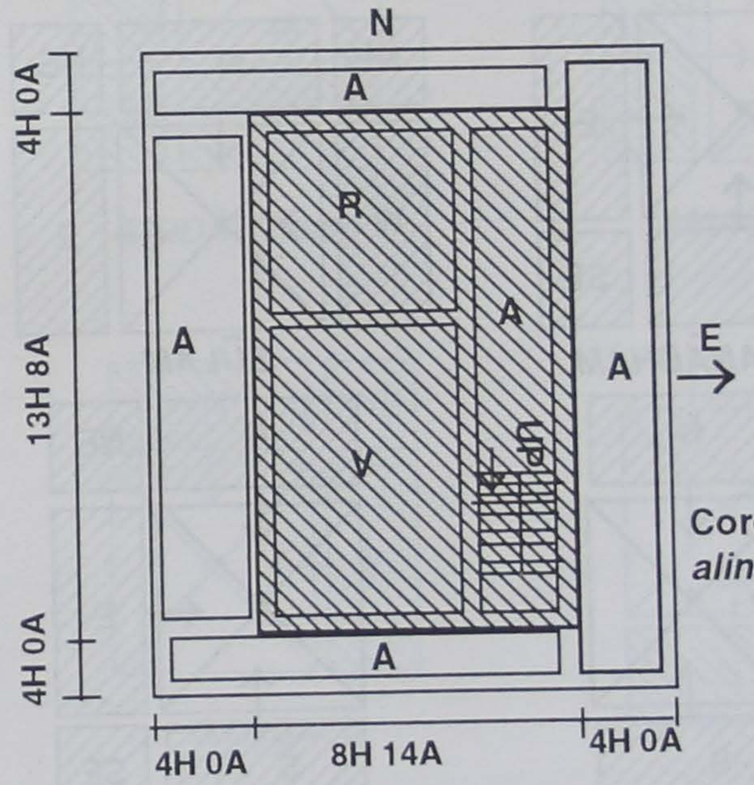
FIG.04.21 EXPANSIONS OF *EKAŚĀLA* HORIZONTALLY



R - *RANGAM*, V - *VĀSAM*,
A - *ALINDAM*

CORE HOUSE RAISED TO UPPER FLOORS

Core and one *alindam* raised



Core with 1,2,3 or 4 *alindams*

(Not to scale)

FIG.04.22 EXPANSIONS OF *EKAŚĀLA* VERTICALLY

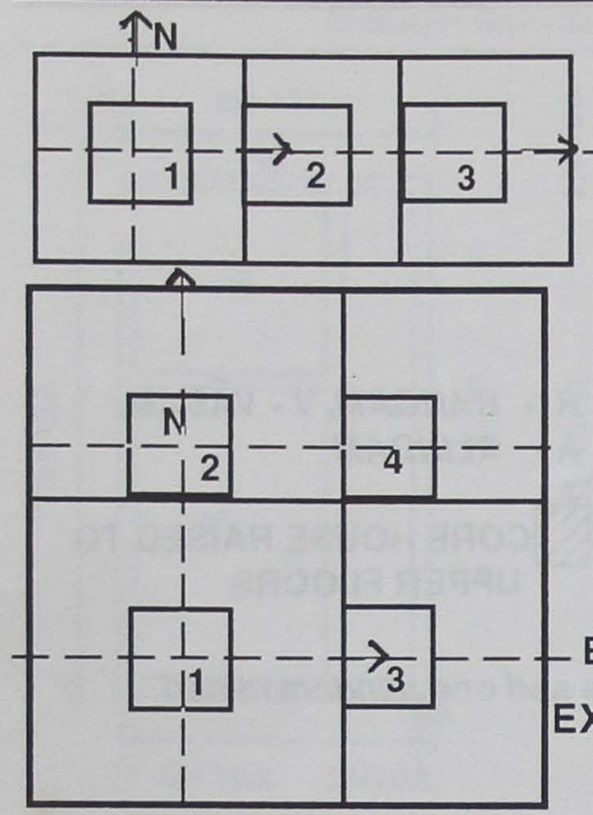
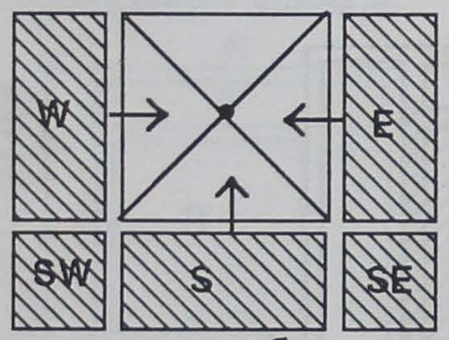
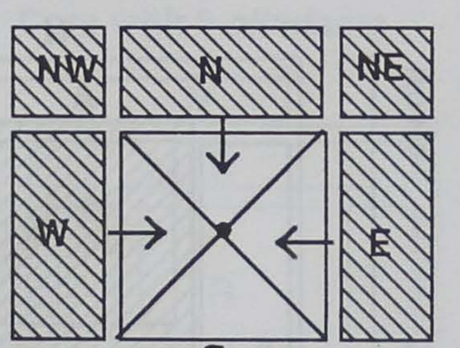


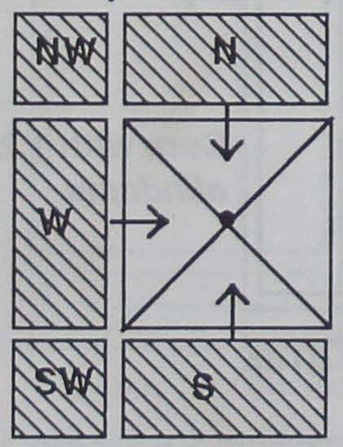
FIG.04.23
EXPANSION OF *CATUSSĀLA*
ALONG THE AXIS



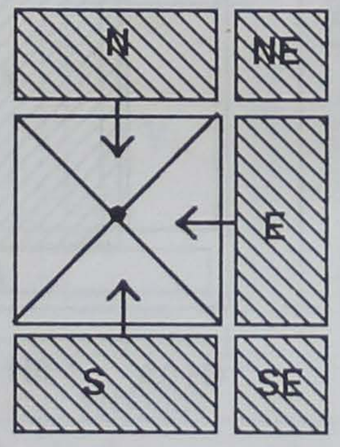
HIRAṆYANĀBHAM



SŪLAM

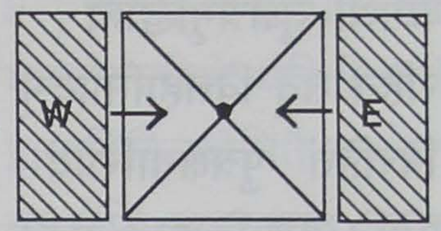


SUKṢETRAM

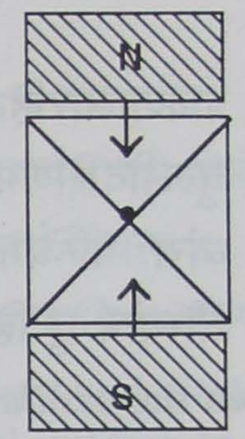


PAKṢAGHNAM

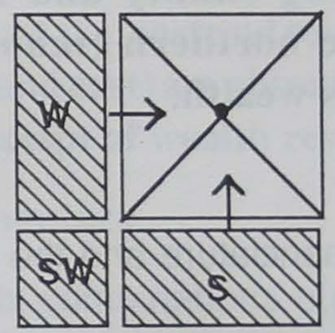
FIG.04.24 TYPES OF *TRIŚĀLAS*



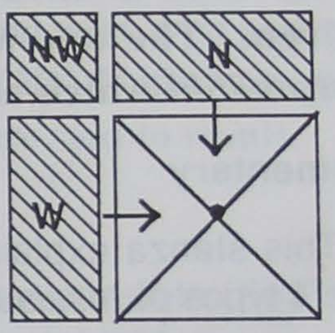
CULLI



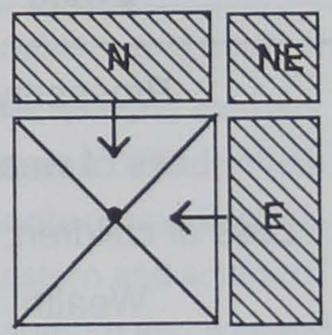
KĀCAM



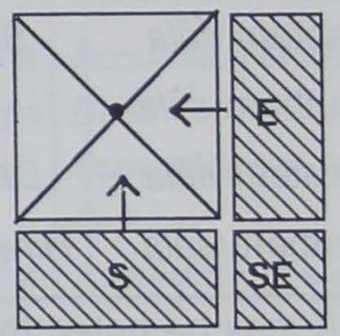
SIDDĀRTHAM



YAMASŪRPAM



DAṆḌAM



VĀTAM

FIG.04.25 TYPES OF *DVIŚĀLAS*

NOMENCLATURE OF *TRISALAS* AND *DWISALAS*

Stanza - 28

प्राक्शालारहितं गृहत्रिकमथो सुक्षेत्रमृद्धिप्रदं
चुल्लीदक्षिणमन्दिरेण रहितं तद् वित्तहानिप्रदम् ।
ध्वंसः पश्चिमशालया विरहितं पुत्रक्षयारिप्रदं
सौम्योनं तु हिरण्यनाभमिति तद् वित्तप्रदं सर्वदा।।

Then the *triśāla* without the eastern *śāla* is *sukṣetra* which gives prosperity. The one without the southern *śāla* is *culli* and it causes loss of wealth. That without the western *śāla* is *dhvamsa* causing enmity and loss of children. The one without the northern (*saumya*) is *hiranyanābhi* which always gives wealth.

Commentary

This stanza explains the nomenclature and the effects of the 4 types of *trisalas* (**fig.04.24**).

TABLE 04.04

NOMENCLATURE OF *TRISALAS*

***Trisala* without**	**Name**	**Effect**
Eastern *śāla*	*Sukṣetra*	Prosperity
Southern *śāla*	*Culli*	Loss of wealth
Western *śāla*	*Dhwamsa*	Loss of children; Enmity
Northern *śāla*	*Hiraṇyanābhi*	Wealth

It may be noted that the preferred one as given in the previous stanza is the *sukṣetra* type. The *hiraṇyanābhi* type is said to be good for the kings. Some texts eg. *Bṛhatsamhita* (Ref.04.06) calls the *dhvamsa* type by the name of *pakṣaghna* also.

Stanza - 29

प्राक्पाश्चात्यविहीनके कलहमुद्वेगं च काचाभिधे
याम्योदग्रहितेऽर्थसिद्धिरुदिता सिद्धार्थकाख्ये द्विके।
प्रागादिद्वितयोनिते क्रमवशान्मृत्युं भयं विक्रमं
चार्थाप्तिं प्रवदन्त्यतः क्रमवशाद् याम्यादिकं कल्पयेत् ।।

If the twin is done without eastern and western it is called *kāca*, which will result is quarrel and fear. In the twin without southern and northern, called *sidhārthaka*, acquisition of wealth results. If the coupled *śālas* beginning from east (i.e. east and south, south and west, west and north, north and east) are absent (in a *catuśśāla*) death, fear, quarrel and receipt of wealth respectively are said to result.

Commentary

Six combinations of *dwiśālas* are possible (**fig.04.25**). Their names and effects are given in table 4.

TABLE O4.05 NOMENCLATURE OF *DWISALA*

S.No	***Dwisala* with**	**Name**	**Effect**
1.	Southern and northern	*Kāca*	Quarrel and fear
2.	Western and eastern	*Siddhārtha*	Acquisition of wealth
3.	Western and northern	*Yamasūrpa*	Death
4.	Northern and eastern	*Daṇḍa*	Fear, misery
5.	Eastern and southern	*Vāta*	Quarrel
6.	Southern and western	*Siddhārtha*	Acquisition of wealth

According to *Bṛhatsamhita*, the combination of western and eastern is *gṛhaculli* and will cause loss of money (Ref.04.07). This is a better way of naming because (1) it avoids the confusion of calling two combinations by one name and (2) two *salas* opposite to each other is not auspicious.

Ekaśāla is the most common type of house used by commoners, mainly because of its flexibility. Starting with a core (*sthāyi*), living areas can be added to it by constructing (*alindams*) on one or more sides and also by raising the *sthayi* to second and third floor. *Dviśāla*, especially the combination of southern and western *śālas* (*siddhartha*) is also commonly seen, but *triśālas* are very rare.

REFERENCES

04.01 षड् हस्तादिक वंशमान निचयेष्टघ्ने सदिक् संख्यके ।

V.L.,28

04.02 शालास्तु नवधा ज्ञेया स्थितिभेदवशादपि । **V.M**

04.03 अप्रतिषिद्धालिन्दं समन्ततोवास्तु सर्वतोभद्रम् ।

रुचके द्वारं न शुभदमुत्तरतोन्यानि शस्तानि ॥

B.S., LIII, 31-35

04.04 विवृताङ्कणकं शेषं कुर्याद्यत्र यथोचितम् ।
आद्यं तु सर्वतोभद्रं द्वितीयं वर्धमानकम् ॥
तृतीयं स्वस्तिकं चैव नन्द्यावर्तं चतुर्थकम् ।
पञ्चमं रुचकं विद्याछालानामभिधानकम् ॥

M.M., XXVI,66-67

04.05 पूर्व्वादि मद्ध्यसूत्राणि चान्नं धान्यं धनं सुखम् ॥
इति नामानि तन्नामाचत्वारि स्युर्गृहाणि चा ।
अन्नालयं धान्यालयं धनालयं सुखालयम् ॥

M.M.,XXVII,18-19

04.06 याम्यहीनं चुल्ली त्रिशालकं वित्तनाशकरमेतत्
पक्षघ्नमपरया वर्ज्जितं सुतध्वंस वैरकरम् ॥

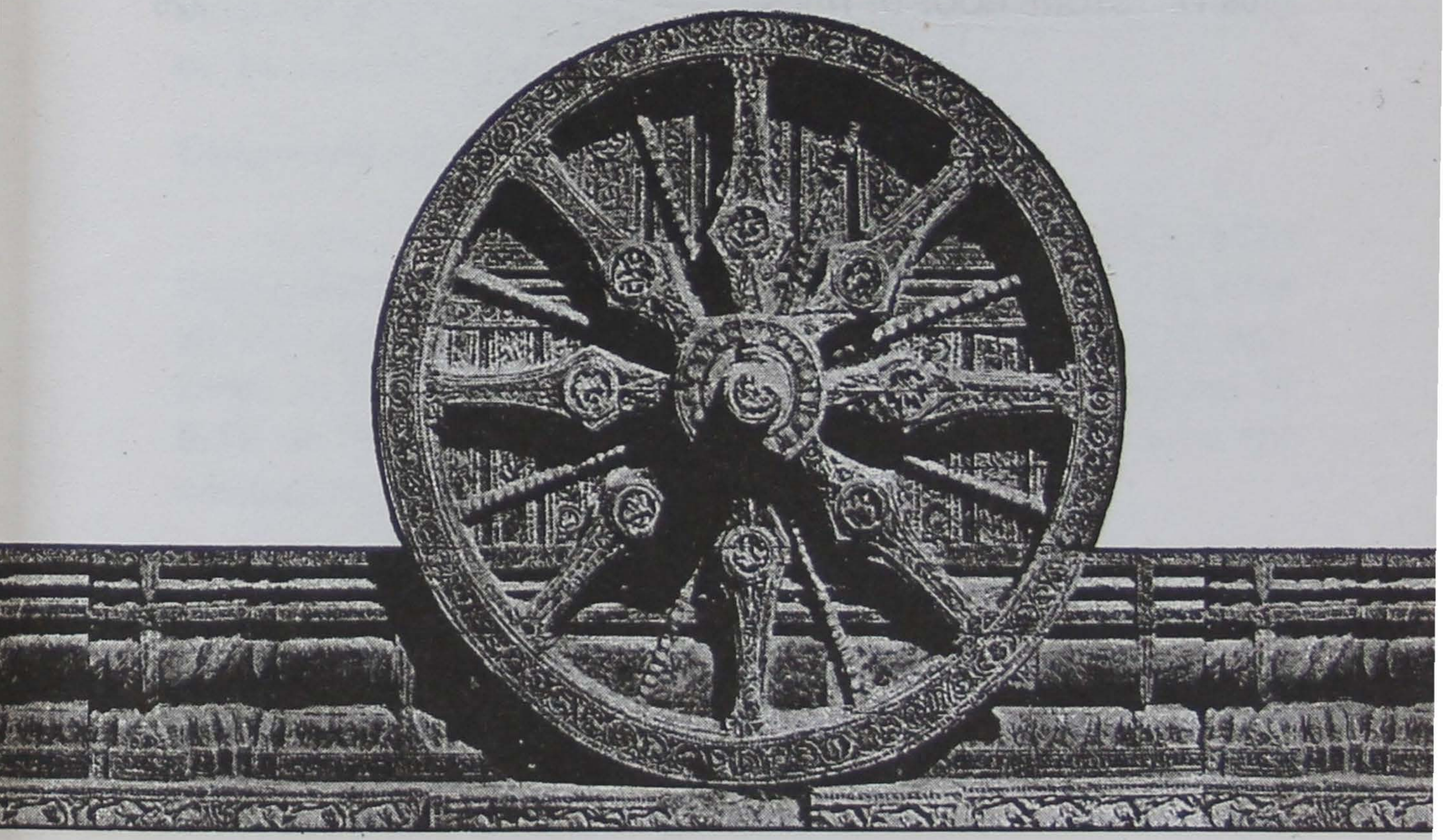
B.S., LIII.,38

04.07 सिद्धार्त्थमपरयाम्ये यमसूर्पं पश्चिमोत्तरे शाले ।
दण्डाख्यमुदक् पूर्वे वाताख्यं प्राग्युक्ता याम्या ॥
पूर्वापरेतुशाले गृहचुल्ली दक्षिणोत्तरे काचम् ।
सिद्धार्त्थेर्त्था वाप्तिर्यमसूर्ये गृहपतेर्मृत्युः ॥
दण्डवधो दण्डाख्ये कलहोद्वोगः सदैव वाताख्ये ।
वित्तविनाशश्चुल्यां ज्ञातिविरोधः स्मृतः काचे ॥

B.S. ,LVIII, 39,40,41

5
PARTS OF HOUSE
गृहावयवविधयः

Socle; platform for jasmine; courtyard; guṇāmśa; height between base ansd wall plate; basement; pillar; wall; wall plate.



LIST OF ILLUSTRATIONS

CHAPTER - 5
अथ पञ्चमोऽध्यायः
PARTS OF HOUSE
गृहावयवविधयः

RAISING THE SITE FOR DRAINAGE

Stanza - 1

कुर्याद् गृहाय कृतवास्तुपदं समस्तं
मातङ्ग भास्करनृपाङ्गुलमात्रतुङ्गम् ।
बाह्यान्तराङ्गणगतान् गमनाय मध्य-
निम्नत्वदोषविरहाय च मृच्छिलाद्यैः ।।

For the flow (of water) from the outer and inner yards and to avoid the defect of depression in the middle, the entire area earmarked for the building should be raised by 8,12 or 16 *angulas* with soil, stone etc.

Commentary

It has been stated earlier (ch.1, st.20) that sites depressed in the middle should be avoided, as such sites would cause stagnation of water and difficulty in drainage. Even in a level ground the building site is to be raised by 8,12 or 16 *angulas* for easy drainage of water from the central and outer yards of the house.

Most of the text books on *Vāstuśāstra*, including this book, describe only the parts of the building above the ground. This has given rise to the belief that no importance is given to the foundation in *Vāstuśāstra*. This is not correct. *Mānasāra* (Ch.12) and *Mayamata* (Ch.12) give details of

foundation in the section on *garbhavinyāsa* (foundation deposit). It is stated that a foundation with all the prescribed components adds to the success of the building and an incomplete foundation deposit leads to failure (Ref.05.01). It has been stated depending on the soil conditions, that the depth of the foundation shell be equal to

a) the height of the basement;
b) *kāya* (height) of a man;
c) up to the hard surface (rock) or water table, or
d) one-third the width of house, but not loess than 1H8A (96cm). .

For heavy structures (*prāsādavāstu*), the entire plinth area is to be dug up to hard surface, filled with soil, sand and pieces of stone in different layers and consolidated with water layer by layer either by ramming or making the elephants walk over it. At the ground level, a layer of stone or brick is laid to form the shoe (*upānaha*) or the levelling course. The basement (*adhiṣṭhāna*) is to be built over this shoe (**fig.05.01**).

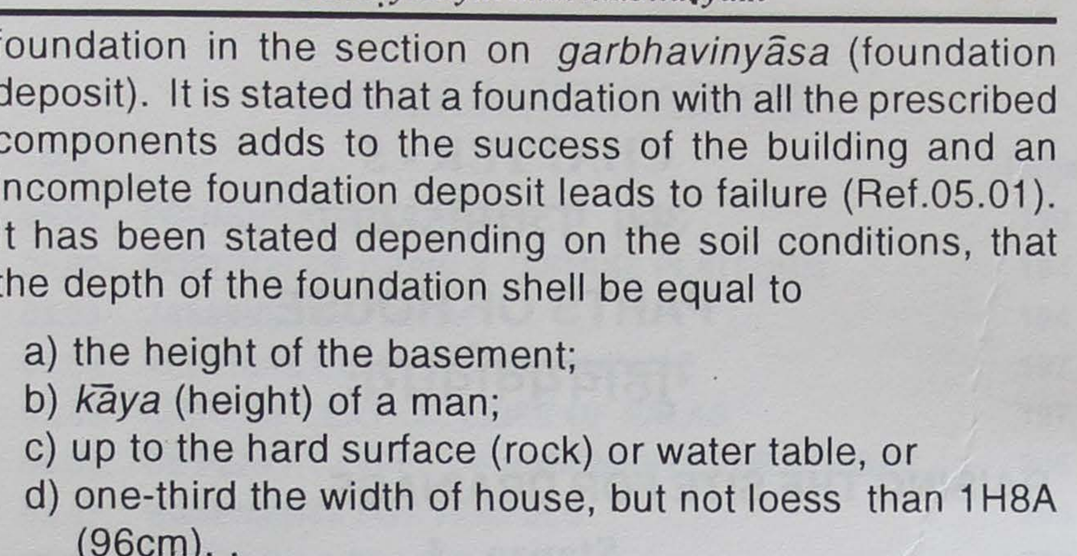


FIG.05.01 DETAILS OF FOUNDATION

This text recommends the raising of the building site above the surrounding area. Preferably the site should be ploughed and all biodegradable substances removed before raising it with soil and stones.

UPAPĪTHA, THE SEAT BELOW THE BASEMENT

Stanza - 2

रक्षाशोभोच्छ्रयार्थं सकलनिलयमासूरतोऽधः समन्तात्
कुर्यादेकद्विहस्तप्रविततमुपपीठं गजाद्यङ्गुलाढ्यम् ।
अन्तर्भागे तु गर्ताङ्गणमथ वृषजं केतुजं वायताढ्यं
दिश्यैशान्यामथोदङ्मुखमपि रचयेत् प्राङ्मुखं वाम्बुमार्गम् ।।

Below the basement (*māsura*) of all houses, an additional seating (or pedestal or socle) should be made with a width of one to two *hasta*, with increments of 8A, for strength, beauty and height. Inside, a depressed yard (*gartāṅkaṇa*) elongated (in the NS direction) in *vṛṣabhayoni* or *dhvajayoni* with a passage for water (drain) towards north or east directions in the northeast side should made.

Stanza -3

गेहाधिष्ठानोच्चतुल्यो रसाद्य-
ष्टाङ्काशांशैरूनितो वा यथेष्टम् ।
मर्त्यागारस्योपपीठोच्छ्रयः स्यात्
तत्तद्भागैः पादुकाद्यं विधेयम् ।।

The height of the socle of houses of humans can be equal to or 5/6,6/7, 7/8, 8/9 or 9/10 part of the height of the basement of the house. Footings etc. are to be done by dividing this.

Commentary

This text prescribes that every house should have a pedestal (socle) above the ground and below the basement for safety, beauty and height. *Mayamata* also recommends the construction of socle below basement (Ref.05.02). This is an additional basement (*upapitha*), made with the

prescribed elements (*avayava*) of a regular basement (vide stanzas 18 to 20 of this chapter). Its projection outside the basement is 1H, 1H 8A 1H 16A or 2H and height equal to or a fraction 5/6, 6/7, 7/8, 8/9, 9/10 of the basement.

Mayamata prescribes the projection to be one-tenth to five-tenth of height of basement. It may even be one to three *danda*. (Ref.05.03). *Mayamata* categories the socles into 3 viz. *vedibhadra, pratibhadra* and *subhadra* (Ref.05.04).

Safety from(1) erosion of the ground outside the basement, (2) from water logging and (3)from reptiles is achieved by this. Since the entire building will be elevated, it will add to its appearance.

Though this text as well as *Mayamata* prescribe that the *upapīṭha* is a necessary part (*sakalanilayamāsuratodhassamantāt*), some others say that it is optional (*upapīṭham tu kartavyam yadhāvasyam narālaye*). Therefore, it can be said that this is necessary only when it is required for the safety of the building or it is desired to have an elevated platform for majestic appearance.

Inside the courtyard, the offset of the *upapīṭha* will cause a depressed rectangular yard (*gartānkaṇa*). This should be in *vṛṣabhayoni* or *dhavajayoni*. It should have an outlet drain in the NE corner, either in the north or in the east direction (**fig.05.02**).

PLATFORM FOR JASMINE PLANT

Stanza - 4

गर्तप्राङ्गणतारतोऽधिककृतायामार्धमप्युत्तरे
निक्षिप्यार्धमवाक् च मध्यचतुरश्रेष्टाष्टकोष्ठात्मके ।
मल्लीकुट्टिममापसंज्ञपदयोः कुर्यात् पदे दक्षिणे
यद्वा तत्पुनरापवत्सपदयोश्चोदक्पदेऽन्तेर्वृतौ ।।

After leaving half the *āyāma* (elongation) exceeding the width of the *gartānkaṇa* in the north and half in the south, when the central square is divided into 8x8 grid, the platform for the jasmine plant should be made in the northern *pada* of the two *padas* of *āpa* or then in the southern cell of the two *padas* of *āpavatsa* in the middle envelope.

Stanza - 5

केतूत्थं तुल्यतारातिजलनिधिकोणं च वस्वष्टिकोणं
वृत्तं वा सोपपीठाद्यवयवसहितं कैरवाद्यन्वितं वा ।
गेहाधिष्ठानतुङ्गं कुहचिदपि तदूर्म्यादिरुद्रान्तभागैर् -
हीनं वा रज्जुवेधाद्यपगतमुदितं मल्लिकाकुट्टिमं तत् ।।

That platform for jasmine plant is prescribed with *dhvajayoni*; and may be square, octagon, 16 sided polygon or circle with the limbs beginning with *upapīṭha* etc. or with *kumuda* belt etc. The height is to be equal to the height of *adhiṣṭhāna* or one part less when it (*adhiṣṭhāna*) is divided by (numbers) 6 to 11. It should avoid crossing the diagonal.

Commentary

It is commonly seen that a platform for jasmine or tulsi is made in the *ankaṇa*. The central square of the *ankaṇa* is taken leaving half the elongation on the north and half on the south. The square is then divided to 8x8 cells. Since the *Brahmavīthi* should be left free in the houses of humans, the platform is constructed in the N-E corner in the northern *pada* of *Āpa* or the southern *pada* of *Āpavatsa* in such a way that it will not vitiate (cause *vedha* of the diagonal (*karṇasūtra*) (**fig.05.02**). Though circle, square, octagon and 16 sided polygon are adopted as plan shapes for the platform, the square is the most common shape (**fig.05.03**). To avoid *karṇavedha*, its lateral dimension is to be less than the width of a cell in the 8x8 grid by half the width of the

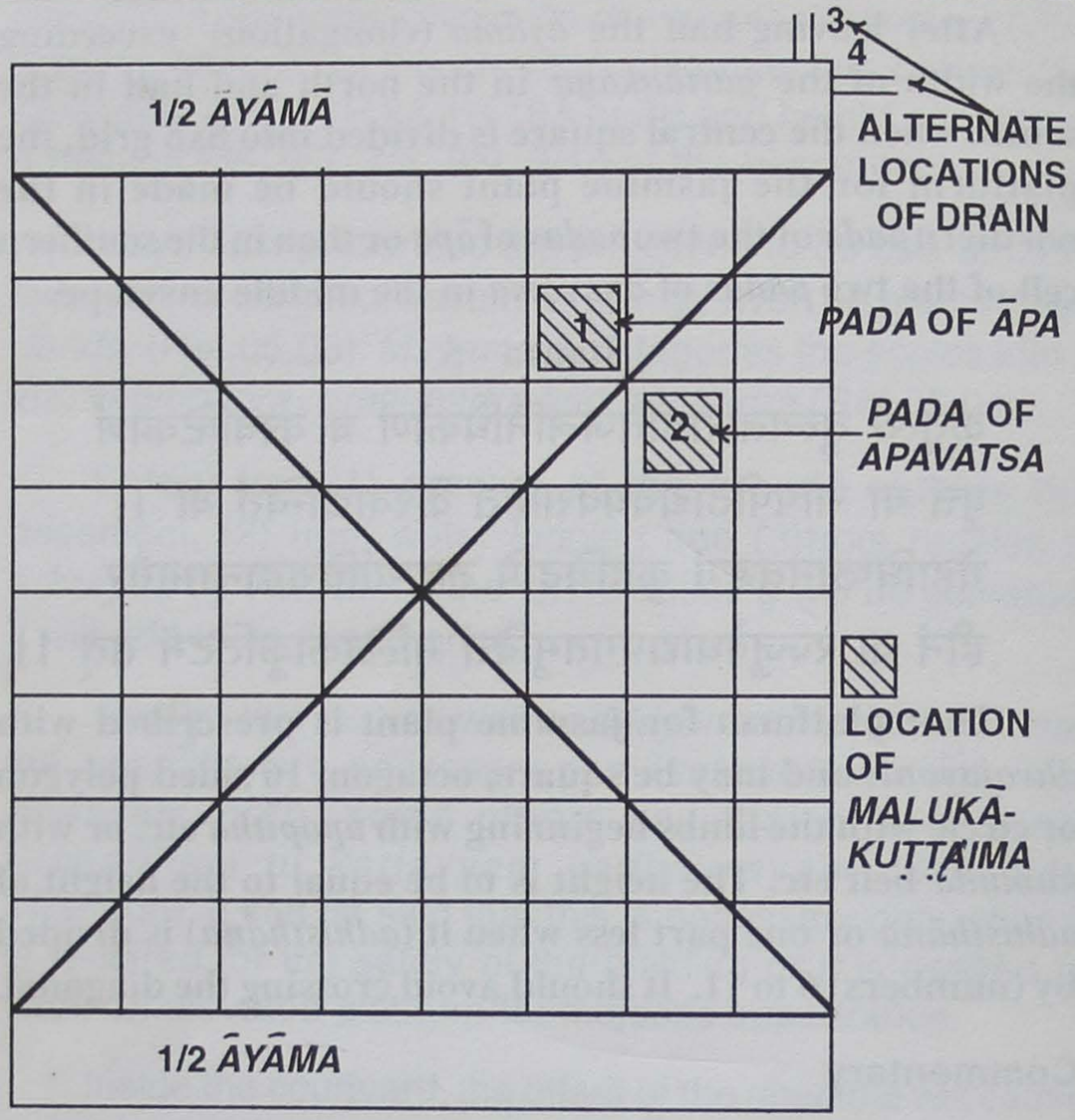


FIG.05.02 POSITION OF *MALLIKĀKUṬṬIMA* & DRAIN IN *ANKAṆA*

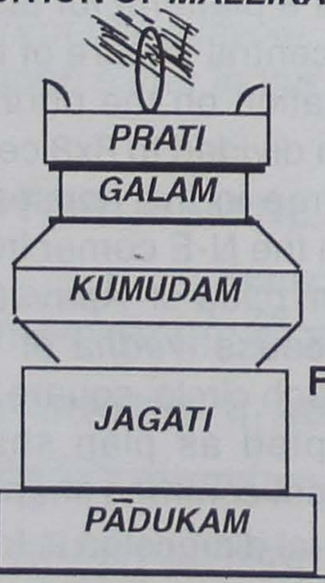


FIG.05.03 PLATFORM FOR JASMINE PLANT

sutra on either side i.e. its width will be 15/16 times the width of *pada*. The height is such that its top will be in level with the top of *adhiṣṭhāna* of house or a little below that level(1/6,1/7, 1/8,1/9,1/10 or 1/11 of height of *adhiṣṭhāna* below the top level of *adhiṣṭhāna*). It is usually constructed with *pāduka*, *jagati* and *prati* and sometimes with *kumuda*, *gala* etc. (The details of these elements are given in stanzas 18 to 20 of this chapter). The outside perimeter should be in *dhvajayoni*.

SHOE AND THE PLINTH

Stanza - 6

उपपीठोच्चसमोच्चा मासुरोपानहं करोतु दृढम् ।
तदुपरि परितः पादुकमथ कुर्यादुक्तपत्रमानान्ता ।।

The shoe of the basement should be constructed firmly to the level equal to the top level of the *upapīṭha*. Above that the *pāduka* (footing) should be done up to *the patramāna* as prescribed.

Commentary

Where there is *upapīṭha*, its top should be strongly constructed as the shoe (regulating course). *Mayamata* refers to this course as the origin (Ref.05.05). Where there is no *upapīṭha*, the shoe will be at the ground level (**fig.05.01**). The lowest course of *adhiṣṭhāna, viz, pāduka* is constructed above the shoe with its outer edge in plumb with *patramāna*.

PATRAMĀNA

Stanza - 7

सर्वत्रोत्तरबाह्यपार्श्वविहिताल्लम्बाद् बहिः कुट्टिम-
स्याष्टाष्टाङ्गुलनिष्क्रमो य उदितस्तत् पत्रमानं विदुः ।
यद्वा तद्विगुणं च तत्त्रिगुणितं वा तद्विधेयं तथै-
वावाच्युत्तरयोः षडङ्गुलमतो द्वन्द्वं प्रतीच्यां क्वचित् ।।

What is prescribed everywhere (in all houses) as the outside offset of eight *angula* of the basement is known as *patrāmna* (offset). Either this (i.e. 8 *angula*) or its double or treble is prescribed. Then, like that, six *angula* in south and north and in some places twice that (i.e., 12 *angula*) in west (are prescribed).

Commentary

The offset from the outer vertical edge of wall plate (*bāhyottara*) outside edge of the plinth is called *patramāna* (**fig. 05.04**). It can be 8 *angula* or multiples of eight *angula*. This is for keeping the *yoni* of *patramāna* the same as that of the *yoni* of the outer perimeter of *uttara*. But sometimes the outside offset is 6 *angula* in north and south and 12 *angula* in the west. With such offsets also the *yoni* rule will be satisfied as the total increase in perimeter will be 64 *angula* or 8 *pada*.The *pāduka* (lowest footing) of the basement should be such that its outer edge should be vertically below the outer edge of *patramāna*.

Stanza - 8

तत्पत्रमानमसमं च समं च बाह्येऽ-
प्यन्तश्च तद्विहितयोनिकनाहयुक्तम् ।
मर्त्यालयेषु विहितं सुरमन्दिरान्त-
हाराप्रदीपनिलयेषु च गोपुरेषु ।।

That *patramāna* is prescribed outside and inside with equal or unequal measurements and with perimeter having prescribed *yoni*, for the houses of humans and for the *dīpamāla* of *antahāra* structure and for *gopuras* of temples.

Commentary

The offset of the plinth (from the vertical plane of *uttara*) can be equal or unequal at the inside and outside. This applies to the *dīpamala* structure for oil lamps which forms

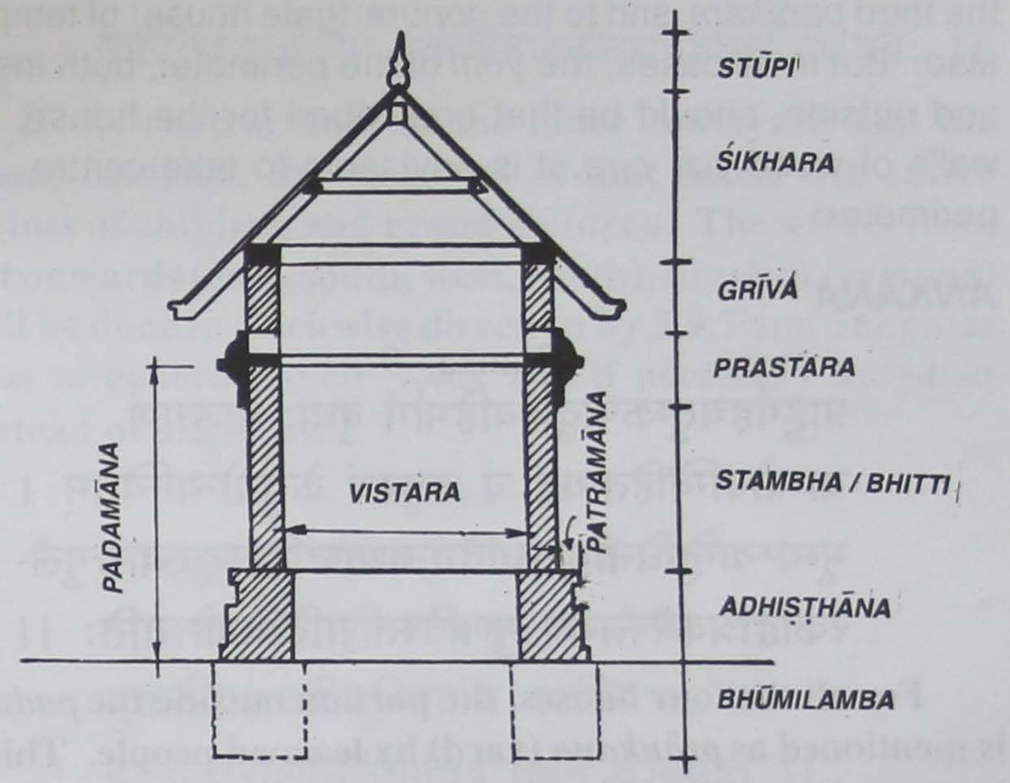


FIG. 05.04 VERTICAL ELEMENTS OF A HOUSE

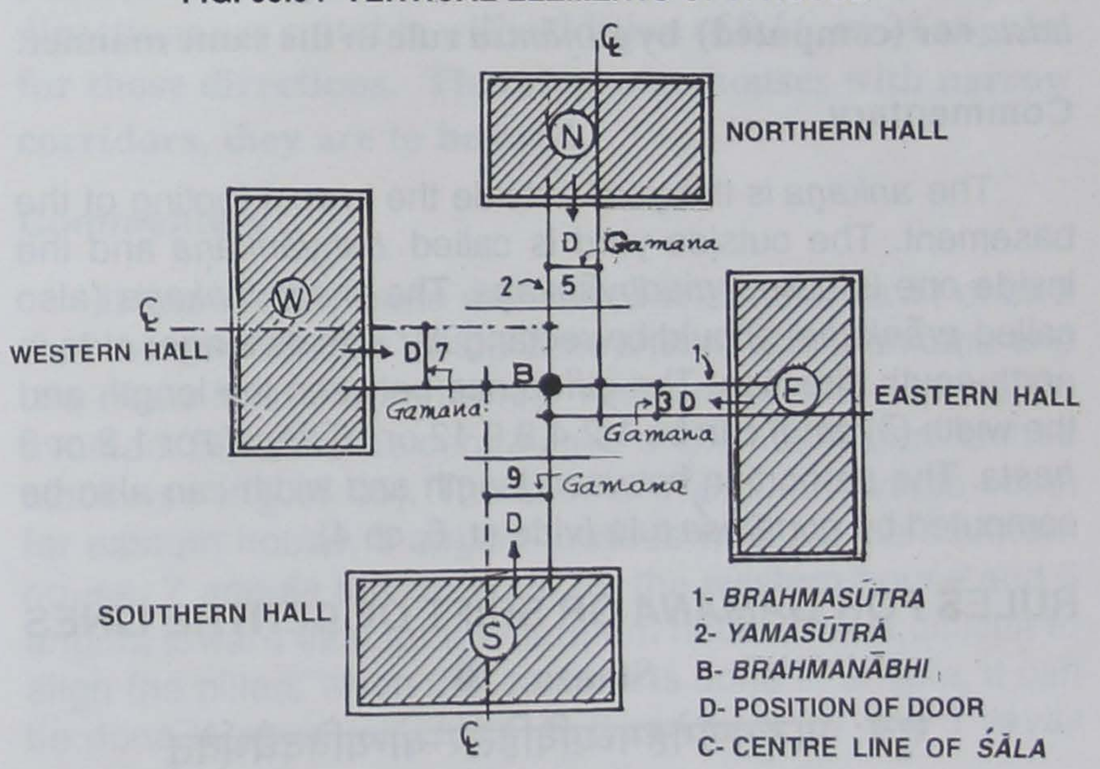


FIG. 05.05 SHIFT OF CENTRAL LINES OF *ŚĀLAS*

the third *parākāra* and to the *gopura* (gate house) of temples also. But in all cases, the *yoni* of the perimeter, both inside and outside, should be that prescribed for the house. For walls of wood viz, *nira*, it is advisable to take centre line perimeter.

ANKAṆA

Stanza - 9

प्राहुर्गेहचतुष्कपादुकबहिर्भागं बुधाः प्राङ्गणं
याम्योदग्विहितायतं च चतुरश्रं केतुयोन्यन्वितम् ।
भूम्यश्वाम्बुधिनागरन्ध्रदिननाथाष्टद्विसङ्ख्याङ्गुलै-
रेकद्वित्रिकरैस्तथैव गुणविस्तारादिभिर्वा यतिः ।।

For all the four houses, the portion outside the *paduka* is mentioned as *prāṅkaṇa* (yard) by learned people. This is rectangular with north-south elongation and with *dhvaja-yoni*. Its *āyāma* will be 1,2,4,8,9,12 or 16 *angulas* or 1, 2 or 3 *hastas* or (computed) by *guṇāmśa* rule in the same manner.

Commentary

The *ankaṇa* is the yard outside the lowest footing of the basement. The outside yard is called *bahyāṅkaṇa* and the inside one is called *madhyāṅkaṇa*. The *madhyāṅkaṇa* (also called *prāṅkaṇa*) should be rectangular with its longer side in north-south direction. The difference between the length and the width (*āyāma*) can be 1,2,4,8,9,12 or 16 *angula* or 1,2 or 3 *hasta*. The proportion between length and width can also be computed by *guṇāmśa* rule (vide st. 6, ch 4).

RULES FOR *GAMANA* OR SHIFT OF CENTRE LINES

Stanza - 10

सूत्रैः प्राङ्गणगेहमध्यविहितैरन्योन्यविद्धैर्भवेत्
तद्गेहस्थितपुत्रपौत्रविलयस्तस्माद् गृहाणां क्रमात् ।

कर्तव्यं गमनं प्रदक्षिणतया प्रागादितो वह्निर-
न्ध्राद्रीष्वङ्गुलकैः स्वयोनिजनकैरावश्यके वा यवैः ।।

If the central lines of the inner courtyard and the houses coincide, the residents of that house will suffer the loss of children and grand children. Therefore, from east onwards (east, south, west, north), the shift (*gamana*) shall be done in clockwise direction by 3,9,7 and 5 *angulas* so as to generate their *yonis* and if necessary by *yavas* (instead of *angulas*).

Stanza - 11

गत्यङ्गुलानि निजदिग्विहितानि यानि
तान्यष्टतद्द्विगुणितत्रिगुणाङ्गुलैश्च ।
युक्तानि तद्द्वीगुचितानि भवन्ति यत् त-
दल्पान्तरालनिलयादिषु तानि युञ्ज्यात् ।।

The *gamanāngulas* prescribed for the specific directions are suitable with addition of 8,16, or 24 *angulas* for those directions. Therefore, for houses with narrow corridors, they are to be used.

Commentary

It has already been mentioned under stanza 11 of ch 2 that the coincidence of the centre-lines of the *ankaṇa* and the main house constitutes *vedhadoṣa* and should be avoided. For this, the centre lines of the houses are shifted clockwise (**fig.05.05**). The shift is 3 *angula* towards south for eastern house, 9 *angula* towards west for the southern house, 7 *angula* toward north for the western house and 5 *angula* toward east for the northern house. If it is difficult to align the pillars when the *gamana* is done in *angula*, it can be done in *yava* units also i.e. it can be 3,9,7 and 5 *yavas* respectively.

The *gamana* is decided by the *yoni* number of the house. For example for eastern house, the *gamana* is 3 *angula*. Multiplying by 3 and dividing by 8, the *yoni* of *gamana* is 1(*dhvajayoni*) (3x3/8, remainder1) as prescribed for eastern house. For the southern house, *gamana* is 9 *angula*. Multiplying 3 and dividing by 8, the *yoni* number is obtained as 3, the same as that prescribed for the southern house. The same consideration applies to the other houses also.

By adding 8,16, or 24 *angulas* to the *gamanāngulas* the *yoni* remains unchanged. Hence, these higher values can also be used. These will become necessary to avoid *vedha* in houses with narrow corridors.

There is an anomaly in the units prescribed for the shift (*gamana)* of houses. If the *gamana* of the houses are in *angulas* why must they be multiplied by 3 to compute the *yoni* number? In the case of perimeter of the house this multiplications was needed to convert *hasta* into *pada*. Hence, here the units given (3,9,7 and 5) are more likely to be *parva* than *angula*. Additions prescribed to them in para 11(ie. 8,16,24,etc.) also can be in *parva*. This is to be investigated from extant buildings or other sources.

CORRIDORS

Stanza - 12

दिक्कोणालयभेदकृन्ति च भवन्त्यष्टान्तरालानि तद्-
बाहुल्यं तु धनक्षयाय हि भवेदत्यल्पता व्याधये ।
मृत्युर्भित्तिविरोधनेऽन्तरविहीनत्वादतः प्रायशो
नेष्टं गेहरसांशतोऽधिकतरं द्वित्र्यङ्गुलाच्चोनितम् ।।

To separate the main houses (in the cardinal directions) and the corner houses, there are eight corridors. If they are large, waste of money and if small diseases will happen. If the walls touch, death will occur

because of lack of gap. Therefore, generally it is not desirable to have the width of corridor too much greater than, or more than 2 or 3 *angulas* shorter than, one sixth of the length of the house.

Commentary

Eight corridors connect the 4 main houses and 4 corner house. Since the main function of the corridors is to link the houses, their size should be optimum. If they are very wide, naturally, the cost will increase and will result in waste of space and money. If they are very narrow, the ventilation will be affected and they will not serve as passages. Hence they will not serve as easy passages.

The width of the corridors is made approximately equal to 1/6 of the length of the house. The width should not be much more than this and should be not be less than this by 2 or 3 *angulas*. If we take passage width of 1H-8A (96cm), the length of the house will be just 6 times this (ie. 8H), leaving 2 corridors each of 1H8A on the sides.

PĀDAMĀNA

Stanza - 13

नृणां धामनि पादमानमुदितं स्वस्वोत्तरोपानहो-
र्मध्यं साङ्घ्रिकरत्रिकोन्मितमिदं त्वल्पालये दृश्यते ।
गेहव्याससमं तदर्धसहितं व्यासाब्धिषट्सप्तव-
स्वङ्काशांशयुतं च तैर्विरहितं चैवं मुनीन्द्रा जगूः ।।

In the house of humans, the height between the shoe and its *uttara* is called *pādamāna*. In small house, this is seen as 3H 6A. The sages have prescribed *pādamāna* as equal to the width of the house or its one and a half times or 1 1/4, 1 1/6, 1 1/7 1 1/8 1 1/9 1 1/10, 3/4, 5/6, 6/7, 7/8m 8/9 or 9/10 (part of width).

Commentary

Pādamāna is the height of the building up to the level of *uttara* **(fig.05.04)**. If there is *upapīṭha*, it is measured from the top of *upapīṭha* and if not from the levelling course at the ground level. *Pādamāna* is thus the height of *adhiṣṭhāna* plus the height of the wall/pillar. The minimum value prescribed for *pādamāna* is 3H 6A (234cm). It can be equal to the width of the house or 1 1/2, 1 1/4, 1 1/6, 1 1/7, 1 1/8, 1 1/9, 1 1/10, 3/4, 5/6, 6/7, 7/8, 8/9, or 9/10 of the width i.e., it should be between 3/4 to 1 1/2 times the width. If the minimum measure of *pādamāna* of 3/4 width corresponds to 3H-6A, the minimum width of the *sala* will be 4H-8A. The inside width of this house will be 3H-16A, assuming a wall thickness of 8A.

During the early period of evolution of the house form, the roof was supported on pillars rising from the levelled ground without basement. Hence the term *pādamāna* was used to denote the total height of the pillar. When *adhiṣṭhāna* was added as a distinct feature, the term was continued to be used to denote the height up to the *uttara* (i.e., height of basement + height of pillar/wall).

BASEMENT

Stanza - 14

भक्तेऽस्मिन् पादमाने गुणचतुरिषु षट्सप्तनागाङ्कदिग्भि-
स्तेष्वेकांशो भवेत् कुट्टिममपि च तथेध्मांशिते वा रसांशः।
नन्दद्वन्द्वैः शरांशो दिनकरयुगभक्तेऽद्रिभागो मुनीन्द्रैर् -
द्व्यंशं तिथ्यंशिते स्याज्जलधिपरिमितो विश्वभक्तेऽपि चैवम् ।।

When this *pādamāna* is divided by 3,4,5,6,7,8,9 or 10, one part of that will form the basement. Similarly, 6 parts when divided by 21, 5 parts when divided by 18, 7 parts when divided by 24, 2 parts when divided 7 and 4 parts when divided by 15 or 14 will also form the basement.

Stanza - 15

मासूरमानानि चतुर्दशैवं भवन्ति तेभ्यः पृथगूनिताश्चेत् ।
रसाद्रिनागाङ्कदशेशभागाश्चतुर्युताशीतिमितानि सन्ति ।।

Thus there are 14 measurements of basements. From them, if one part out of 6,7,8,9,10 and 11 divisions is subtracted separately, (they become) 84 types.

Commentary

As mentioned earlier, *adhiṣṭhāna* is a fraction of the *pādamāna*. This fraction can be 1/3, 1/4, 1/5, 1/6, 1/7, 1/8, 1/9, 1/10, 6/21, 5/18, 7/24, 2/7, 4/15, 4/14 - altogether 14 values. In addition to these, the 5/6, 6/7, 7/8, 8/9, 9/10, or 10/11 part of each one of these 14 values can also be used. Thus there are 14x6=84 values.

It can be seen that some of there fractions are the same, e.g. 6/21 and 2/7. In short it can be taken that the height of the basement is to be between 1/12 and 1/3 of the *pādamāna*.

ELEMENTS OF BASEMENT

Stanza - 16

इष्टाधिष्ठानमाने नवभिरथ विभक्ते त्रिभिःपादुकोच्चं
षड्भिः कुर्याज्जगत्युच्छ्रयमथ नयनाद्रयंशकैर्वा क्रमेण ।
द्वेधैवं मञ्चकं स्यात् प्रतिगलरहितं सर्वतः पादुकस्य
स्वोच्चाङ्घ्र्यूनार्धवह्न्यंशत इह शरभक्ते त्रिभिर्निष्क्रमो वा ।।

When the desired height of *adhiṣṭhāna* is divided by 9, with 3 parts the height of *pāduka*, and with 6 parts the height of *jagati* should be made. Then, alternatively (they) can be made with 2 and 7 parts. Thus the *mancaka* (basement) without *prati* and *gala* are of two types. Here, the outward

shift (offset) of *pāduka* will occur everywhere with three-fourth, half or one-third part of its own height or 3 parts when divided by 5.

Stanza - 17

रसांशिते वाञ्छितकुट्टिमोच्चे प्रकल्पयेत् पादुकमेकतोऽथ ।
त्रिभिर्जगत्युच्छ्रयमेकतस्तद्गलं प्रतिं तद्वदिहैकतोऽपि ।।

When the desired height of basement is divided by 6, by one part *pāduka,* then by 3 parts height of *jagati*, by its one part *gala* and similarly *prati* should be designed.

Stanza - 18

सायकांशिनि तु कुट्टिमोच्छ्रये पादुकोच्छ्रयमिहैकभागतः ।
द्व्यंशतोऽथ जगातीं गलं प्रतिं चैकतो विरचयेदथेति वा ।।

Or when the height of basement is divided by 5, by one part of it the *pāduka,* then by 2 parts *jagati,* by one part *gala* and then *prati* also shall be constructed.

Stanza - 19

देवेन्द्रांशिनि कुट्टिमे द्वितयतः सम्पादयेत् पादुकं
षड्भागैर्जगतीगलङ्गमिलया कुर्यादधो वाजनम् ।
अश्विभ्यां गलमूर्ध्ववाजनमवन्यंशेन नेत्रांशतः
प्रत्युच्चं गलमञ्चकाभिधमिदं सद्वाजनं भूतिकृत् ।।

When the basement is divided by 14, *pāduka* should be adopted by 2 parts; by 6 parts *jagati,* by one part the lower *vājana* of the *gala,* by 2 parts *gala*, one part upper *vājana* and by 2 parts the height of prati should be done. Thus is the *galamancaka* with *vājana.*

Stanza - 20

एवं त्रिधोक्तं गलमञ्चकाख्यं प्रतिर्जगत्या समनिष्क्रमैव ।
तेषां गलान्तर्गमनं गलोत्सेधाङ्घ्र्यंशतः स्याद् गलमञ्चकानाम् ।।

Thus three types of *galamancaka* have been mentioned. For *prati*, the outward shift (offset) will be equal to that of *jagati*. The inward shift of *gala* of those *galamancakas* should be one-fourth of the height of the *gala*.

Commentary (Stanza 16, 17, 18, 19 and 20)

These 5 stanzas give the dimensions of the different ornamental elements (*avayava*) of the basement (**fig.05.06**). Ornamentation is achieved by the subtle proportions of these parts and by sculpturing on them.

For ordinary houses, the simple basements without *gala* and *prati* (**fig.5.06. a & b and c)** are used. For more important buildings, *galamancaka* (**fig. 05.06 d,e and f**) are used. In the case of temples decorative motifs are sculptured over prati, gala and sometimes over *jagati.* Some ornamental basements used in temples are given in **fig.05.07**. The bold horizontal lines of the parts of the basement give a rythm to the building. *Mayamata* has given 14 types of treatments for the basement (Ref.05.06) from *padabandha to kailasa.* They are used in religious buildings. Texts like *Mayamata, Mānasāra, Śilpatantra, Īśānaśivagurudevapaddhati* prescribe that the topmost moulding (*prati* or stereobate) should not be broken for placing the door ie. the door should be placed over the *prati* (Ref.05.07, 05.08).

PILLAR

Stanza - 21

कृत्वाधिष्ठानमेवं द्वढतरमथ तच्छेषितं पादमानं
विद्यादङ्घ्र्युच्चमस्मिन्नृतुतुरगभुजङ्गाङ्कपङ्क्तीशभक्ते ।
एकांशेनान्वितं वा विरहितमथवेतीप्सितात्ताङ्घ्रिदीर्घा-
दोमासंज्ञाङ्घ्रिपीठोच्चयमपनयता पोतिकाया घनं च ।।

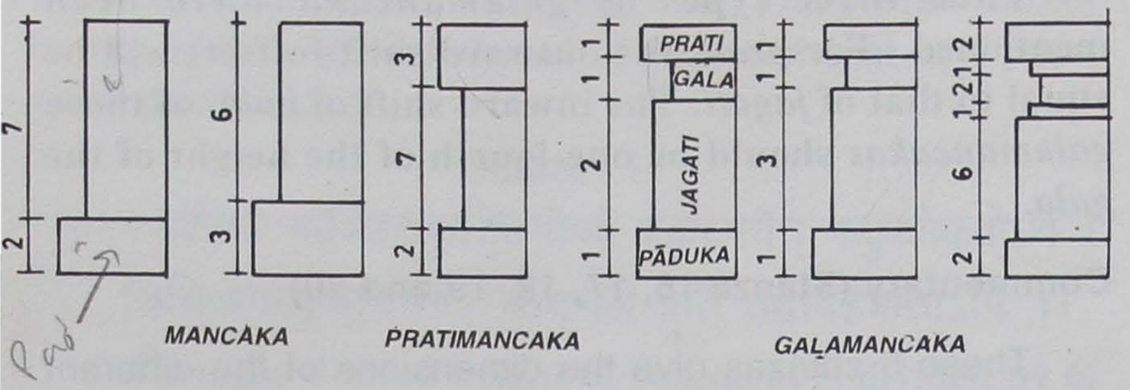
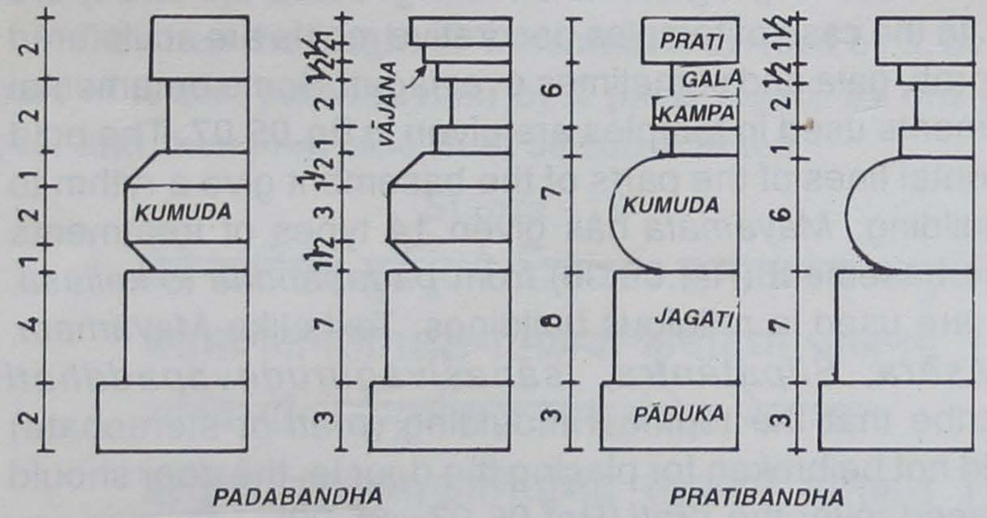


FIG. 05.06 DIFFERENT TYPES OF BASEMENTS FOR HOUSES



• FIG. 05.07 BASEMENTS FOR TEMPLES

Thus, after making the basement with strength, then what is left of *pādamāna* is to be known as the height of the pillar. Here, by adding or subtracting one part after dividing by 6,7,8,9,10 or 11 also, (the height of pillar can be) adopted. From the desired length of the pillar, the height of the seating (*pādapīṭha*) known as *oma* and the thickness of *potika* should be deducted.

Commentary

The pillar or wall supporting the *uttara* is supported by the basement. The difference between the *pādamāna* and the height of basement is its height. The actual height can be reduced or increased by its 1/6, 1/7, 1/8, 1/9, 1/10 or 1/11 part. The pillar is seated on a pedestal known as *oma*. At the top of the pillar a supporting bracket called *potika* is provided (**fig.05.08**) to distribute the load from the *uttara* over the pillar. The thickness of these two should be subtracted from the calculated height of the pillar to get the actual height of the shaft (*kāṇḍa*).

Stanza - 22

विन्यस्येत् पादपीठं सुदृढतरशिलासारदारुप्रक्लृप्तं
मासूरोपर्यथाब्ध्यश्रकवसुनृपकोणं क्वचिद्वर्तुलं वा ।
स्तम्भाधोभागकर्णोन्मितविततदर्धोच्छ्रयं वा तदङ्घ्रय-
ग्न्यर्धांशोनं च पद्मोपममपि कुहचिद् वाजनाद्यन्वितं च ।।

Then, the *pādapīṭha* (*oma*) made with hard stone or core of wood, square, octagonal or sixteen sided or in some places circular section should be placed above the basement with width equal to the diagonal at the base of the pillar and height equal to half that (diagonal) or 1/3 or 1/4 or 1/2 less than that, resembling lotus flower, and sometimes with fillets.

Stanza - 23

स्तम्भाः स्वविस्तारहुताशभागप्रक्लृप्तमूलाग्रशिखासमेताः।
स्थाप्या यथार्हं निजपीठिकोर्ध्वं तद्गर्तसंलग्नशिखाः समस्ताः ।।

All pillars, with square tenons of width equal to one third of own width, should be placed above their own *omas* with the said tenons joined with their mortises.

Commentary (Stanza 22 and 23)

The *oma* should be made with strong materials like hard stone or heart -wood. Square, octagonal, sixteen sided or sometimes circular shapes are adopted. Its width is equal to the largest diagonal dimension at the base of the pillar and thickness is 1/2 the width. It can be made in ornamental shapes of lotus and/or with *vājana* (fillet). The connection between pillar and *oma* is made with mortise and tenon joint, with the tenon of width equal to one third width of pillar firmly seated in the mortise made in the *oma*.

Stanza - 24

स्तम्भोच्चाब्धीषुषड्भूधरवसुनवदिग्रुद्रभागैकतः स्यात्
स्तम्भाधोविस्तृतिस्तद्वसुनवदशरुद्रांशहीनोग्रतारः ।
दण्डाप्यश्चायमेतेन च कुहचिदथो मीयते दारक्लृप्तौ
कुड्यस्तम्भाग्रतारोऽप्यथ तदवयवाकल्पने दण्डसंज्ञः ।।

The bottom width of the pillar will be 1/4, 1/5, 1/6, 1/7, 1/8, 1/9, 1/10 or 1/11 of the height of the pillar and the top width will be reduced by 1/8, 1/9, 1/10 or 1/11 part of the bottom width. This (top width) is called *daṇḍa*. Then by this, the dimensions of timber works are computed in some place. The top width of the pillar in the wall (viz., pilaster) is named as the *daṇḍa* for its decorative works.

Commentary

In the commentary on stanza 14 of chapter 3, mention was made of the proportionate system of *daṇḍamāna* used for pillars and carvings. Its details are given in this stanza.

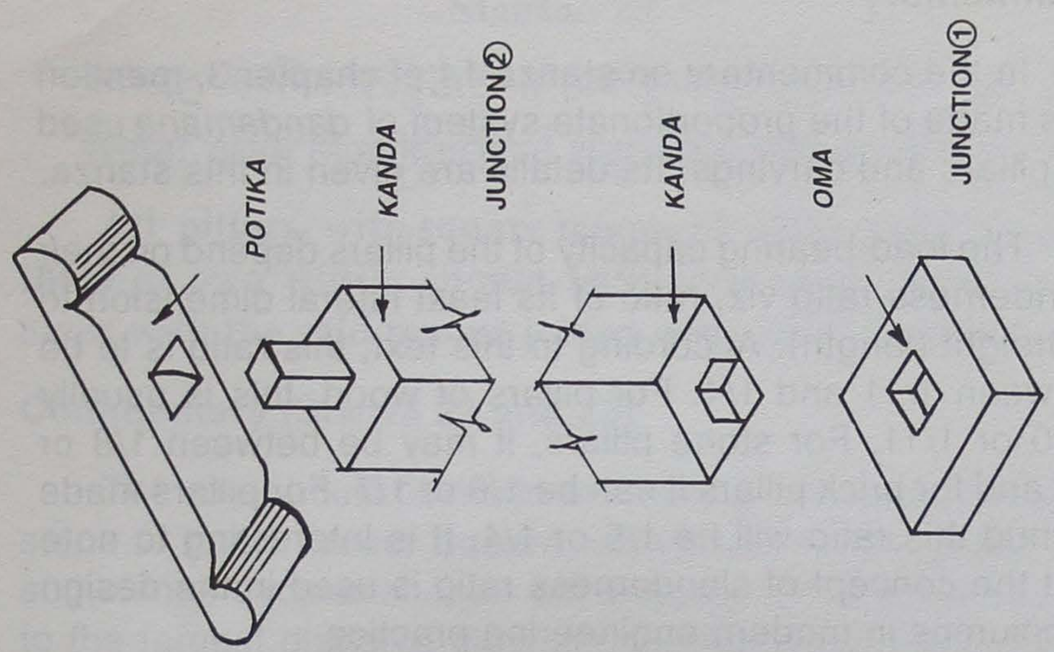
The load-bearing capacity of the pillars depend on their slenderness ratio viz. ratio of its least lateral dimension to its height (length). According to this text, this ratio is to be between 1/11 and 1/4. For pillars of wood, this is usually 1/10 or 1/11. For stone pillars, it may be between 1/8 or 1/9 and for brick pillars it can be 1/6 or 1/7. For pillars made of mud this ratio will be 1/5 or 1/4. It is interesting to note that the concept of slenderness ratio is used in the design of columns in modern engineering practice.

The pillars usually taper towards the top. The top width is 7/8 to 10/11part of the bottom width. According to *Mayamata*, the diameter at top is 5/6 to 11/12 of that at bottom. This is taken as the unit (*daṇḍa*) for computing the dimensions of all other parts (**fig.05.08**) as indicated earlier in commentary on stanzas 13 and 14 of chapter 3. (also ref.05.09).

Stanza - 25

स्तम्भास्तन्मूलतारश्रुतिमितचतुरश्रोर्ध्वभागाः समस्ता
मूलेऽध्यर्धाग्निवेदाशुगरसततिकर्णोन्मिताब्ध्यश्ररूपाः ।
मध्ये व्यासश्रुतिप्रोन्मितकृतचतुरश्रास्तदूर्ध्वाधरोद्यद्-
वस्वश्राः सर्वतो वर्तुलनृपवसुकोणाश्च यद्वा विधेयाः ।।

All pillars must be made with square (section) at the top to the length equal to its bottom diagonal (*karṇapramāṇa*), with square shape at bottom to the length equal to 31/2, 3, 5 or 6 times *karṇapramāṇa*, with square section at centre equal to *karṇapramāṇa* (of the mid section) and with octagonal (section) at top and



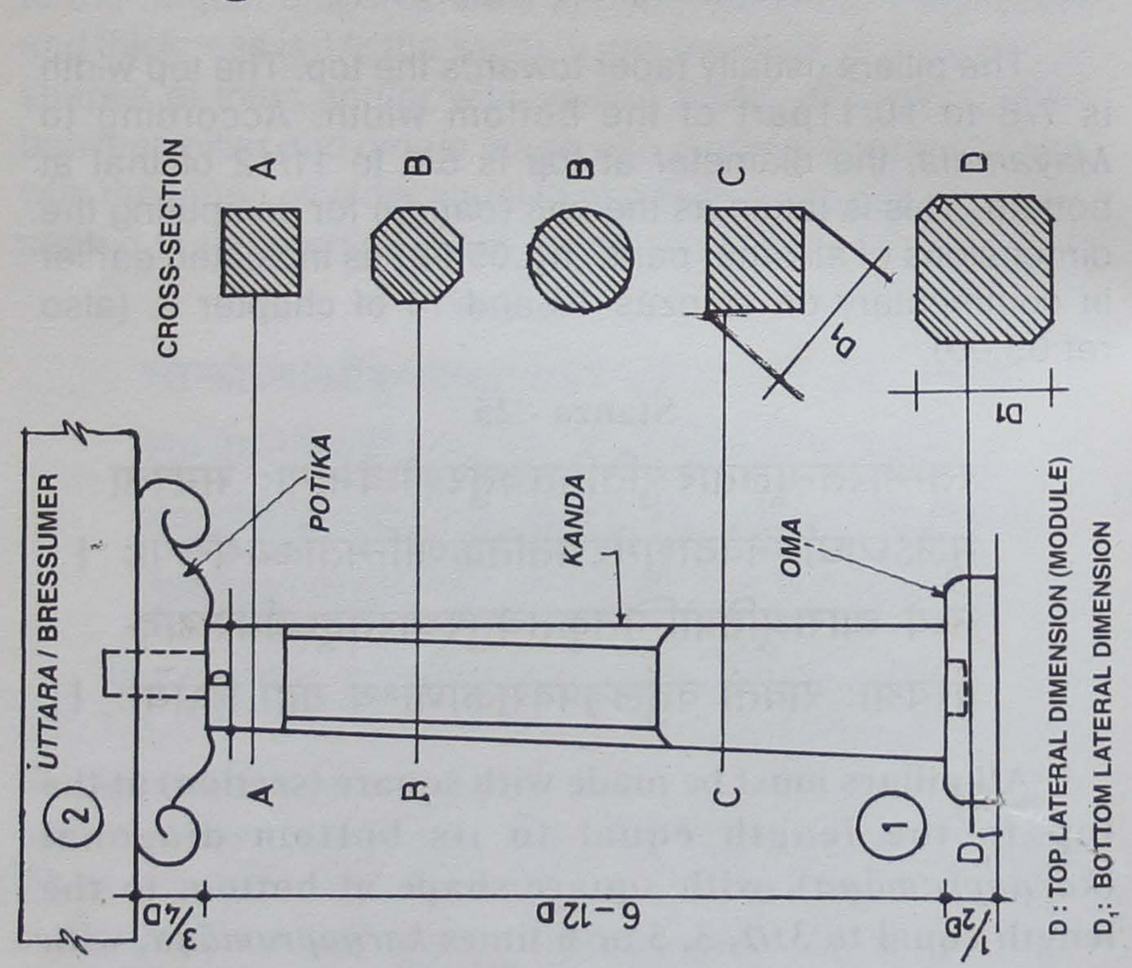


FIG. 05.08 PARTS OF A PILLAR

bottom of that (central square section), or with circular or octagonal or 16 sided (sections) throughout.

Stanza - 26

वृत्तादयस्ते चरणास्त्रयोऽमी मध्यादधस्ताच्चतुरश्रका वा ।
यद्वा वितानश्रवणोपक्लृप्ततुर्यश्रमूलाश्च तथा विधेया : ।।

These 3 pillars of circular (sections) etc. (viz., circular, 16 sided and octagonal), should be made square below the middle or with bottom square section (to a length equal to) the diagonal of width.

Commentary

These two stanzas deal with the mixed cross-sections recommended for the pillars. For square pillars, there will be 2 belts of octagonal section between the square sections. The dimensions are given in **figure 05.09**. The pillars can also be made with their upper half in circular, octagonal or 16 sided sections and lower half in square section. The height of this square section can also be equal to the diagonal of the bottom section.

According to *Mayamata*, square pillars are called *Brahmakānta*, octagonal ones are called *Visnukkānta*, the sixteen-sided ones are *Saumya* and the circular ones are *Rudrakānta*. A pillar comprising 3 equal parts of square octagonal and circular sections is called *Rudracchanda* (Ref.05.10).

Stanza - 27

अत्युच्चेऽङ्घ्रौ तु तत्तत्यधिचरणदलद्विघ्नविस्तारमासू -
रोच्चोच्चाध्यधतुङ्गं रचयतु चरणं कुत्रचिन्मध्यतोऽधः
कुर्यादेवं शिलाभिः प्रणिगदितसुधाभेदसंमेलिताभिर् -
यद्वा सारेष्टकाभिः क्वचिदखिलसमुत्सेधमर्धोच्छ्रयं वा ।।

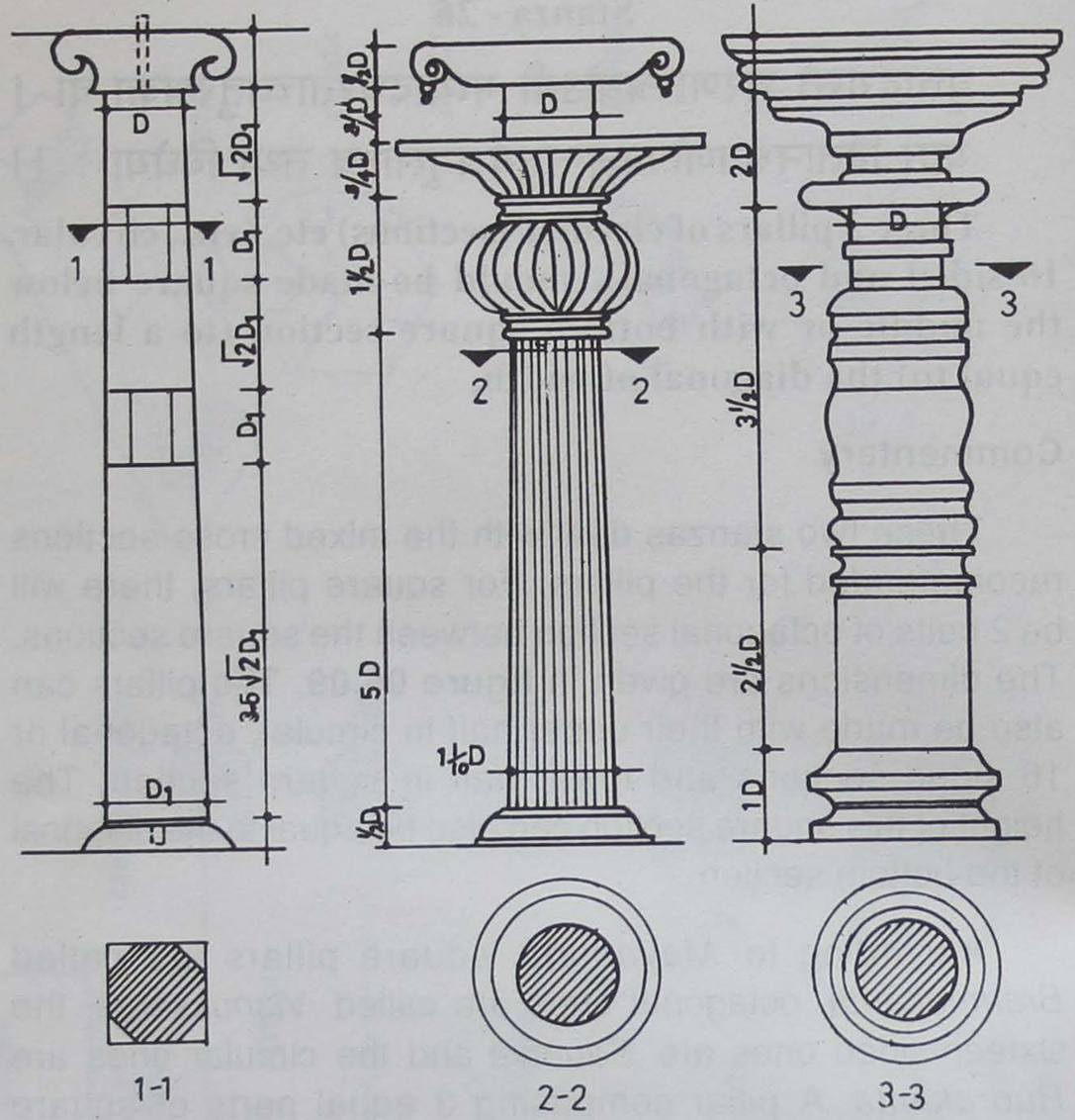


FIG. 05.09 ORNAMENTAL PILLARS

For very high pillars, the height equal to or 11/2 times the height of the basement or in some places the portion below the middle, should be made with width equal to 11/4 or 11/2 of its (prescribed) width. This should be done with stones in properly prepared mortar or strong bricks in some places for the entire height or half height.

Commentary

When the pillar is very tall, its bottom width is increased to 11/4 or 11/2 times the usual width. This is done to a height equal to 11/2 times its prescribed width: Alternatively, for the entire bottom half, the width is increased. In such cases, the bottom portion can be made with stone masonry or brick masonry. Also the entire pillar is made of stone or brick, if it is felt necessary to do so.

Stanza - 28

एकं वाजनमुत्तरस्य यदि तत् स्तम्भान्तराब्ध्यश्रकं
नेष्टं संमतमल्पवाजनयुते पत्रान्विते चोत्तरे ।
स्तम्भा मौक्तिकदामशुण्डवलयाद्याढ्यास्तथेष्टास्तयो -
र्गेहाङ्गं च समस्तमुत्तरवशादूर्ध्वाधरस्थं भवेत् ।।

If there is only one *vājana* (projection or fillet) for the *uttara*, the central square section is not desired for the pillars. In *uttara* with small *vājana* and in *patrottara*, pillars are desirable with decorations of pearl *necklace*, trunk of elephant, and rings etc. All the elements of the house should be done based on (dimensions of) *uttara*.

Commentary

Uttara (wall plate) which transfers the load of the roof to the walls/pillars is an important structural element. Hence it is given great importance in *Vāstuvidya*. The auspicious

perimeter is calculated on the basis of *uttara*. Similarly, all parts of the roof and decorations are made on the basis of the measurements of *uttara*.

Vājana means wing. For *uttara,vājana* is the projection from the vertical face (**fig.05.10**). *Vājanothara* is the main *uttara* with projections. *Patrottara* is the *uttara* which has its thickness equal to three fourth its width (ref.05.11).

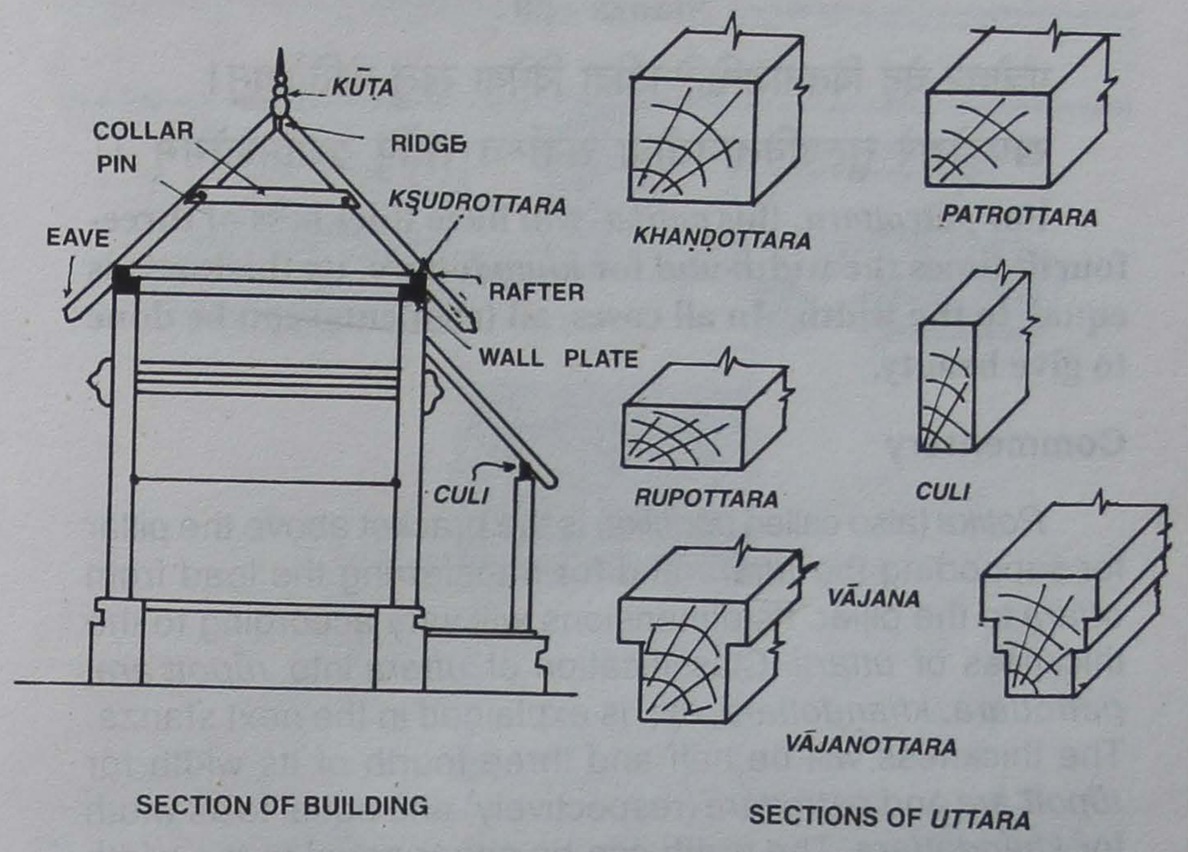
If the *uttara* has only one simple *vājana*, the central square section of the pillar is not made. If the *uttara* has a *mahāvājana* (large *vājana*) and one or more *alpavājana* (small *vājana*), the central square section is given to the pillars. For *patrottara* also, the supporting pillar will have central square section. The pillars are decorated with carvings and reliefs. Here it appears that the details of the central section of the pillar has a role of identifying the type of *uttara* coming on it. Thus the decoration becomes symbolic of a function.

POTIKA, THE SUPPORTING BRACKET ABOVE THE PILLAR

Stanza - 29

स्तम्भाग्रोत्तरतारयोगदलविस्तारं तथा स्तम्भम-
ध्योद्यद्व्याससतां च तद्दलघनां रुपोत्तरे पोतिकाम् ।
स्तम्भाग्रोदितदण्डवह्न्युदधिबाणायामिनीं वोत्तर-
व्यासत्रिघ्नसमायतां कलयतु स्तम्भे लसद्वाजनाम् ।।

Potika **(bracket) should be made above the pillar supporting the *rūpothara* with (its) width equal to half the sum of the widths of top of pillar and *uttara* or equal to the width of pillar at its middle, with its thickness equal to half the width and with length 3, 4 or 5 times the *daṇḍa* generated by the top of the pillar or with length of 3 times the width (of the *potika*)**



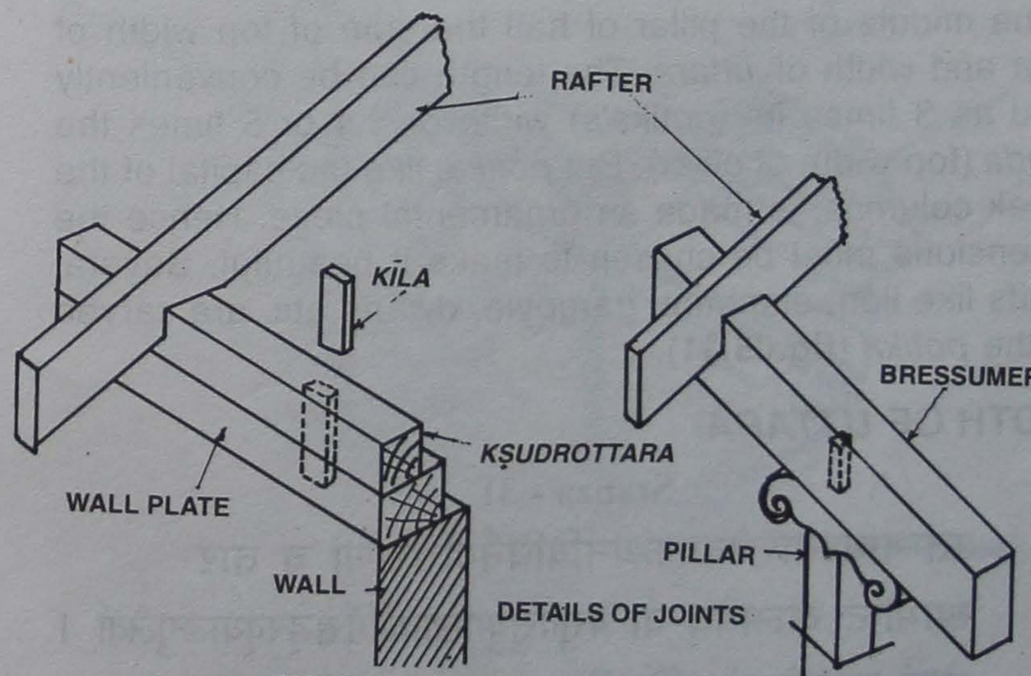


FIG. 05.10 DETAILS OF *UTTARA*

Stanza - 30

पत्रोत्तरे चेद् विततार्द्धिहिनतीव्रा विधेया खलु पोतिकेयम्।
खण्डोत्तरे तुल्यवितानतीव्रा सर्वाश्च सर्वेषु यथोपशोभम् ।।

For *patrottara*, this *potika* will have thickness of three-fourth times the width and for *khaṇḍottara*, its thickness is equal to the width. In all cases, all (elements) can be done to give beauty.

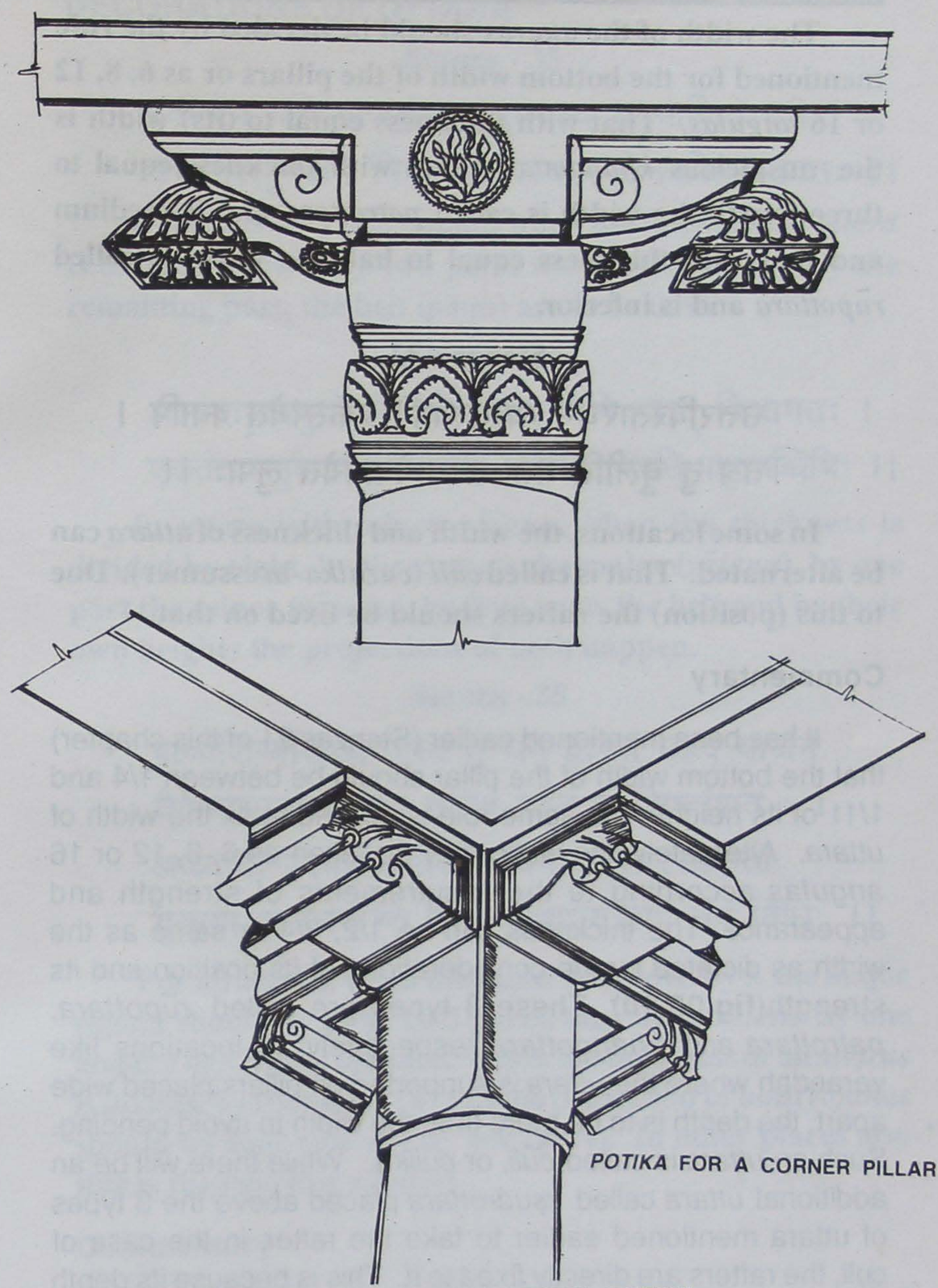
Commentary

Potika (also called *bodhika*) is the bracket above the pillar for supporting the *uttara* and for transferring the load from *uttara* to the pillar. Its dimensions will vary according to the thickness of *uttara*. Classification of *uttara* into *rūpottara*, *patrottara*, *khaṇḍottara*, etc. is explained in the next stanza. The thickness will be half and three-fourth of its width for *rūpottara* and *patrottara* (respectively) and equal to its width for *khaṇḍottara*. The width can be either equal to the width at the middle of the pillar of half the sum of top width of pillar and width of *uttara*. The length can be conveniently fixed as 3 times its (potika's) width or 3,4 or 5 times the *daṇḍa* (top width of pillar). But *potika*, like the capital of the Greek columns, is made an ornamental piece. Hence the dimensions must be chosen to make it beautiful. Several motifs like lion, elephant, gargoyle, dwarfs etc. are carved on the *potika* (**fig.05.11**).

WIDTH OF *UTTARA*

Stanza - 31

स्तम्भाधस्तारभेदप्रकथनविधिनैवोत्तराणां च तारं
खाभीष्टं कल्पयेद् वा वसुवसुयुगलार्कोर्मिसड्रव्याड्गुलैर्वा ।
श्रेष्ठं खण्डोत्तरं तद्विततिसमघनं मध्यमं पत्रसंज्ञं
पादोनोच्चं कनिष्ठं विततिदलघनं तत्तु रुपोत्तराख्यम् ।।



POTIKA FOR A CORNER PILLAR

FIG. 05.11 ORNAMENTAL *POTIKA*

The width of the *uttaras* should be decided by the rule mentioned for the bottom width of the pillars or as 6, 8, 12 or 16 *angulas*. That with thickness equal to (its) width is the auspicious *khaṇḍottara,* that with thickness equal to three-fourth the width is called *patrottara* and is medium and that with thickness equal to half the width is called *rūpottara* and is inferior.

Stanza - 32

उत्तरविस्तारघने व्यत्यस्यापि प्रकल्पयेत् क्वापि ।
तत्र तु चुलीति मता तस्यामेवार्पयेत लुपाः ।।

In some locations, the width and thickness of *uttara* can be alternated. That is called *cūli* (*cuzhika*-bressumer). Due to this (position) the rafters should be fixed on that.

Commentary

It has been mentioned earlier (Stanzas 21 of this chapter) that the bottom width of the pillar should be between 1/4 and 1/11 of its height. The same rule is applied to fix the width of *uttara*. Alternately, the width may be taken as 6, 8, 12 or 16 *angulas* according to the requirements of strength and appearance. The thickness can be 1/2, 3/4 or same as the width as dictated by the considerations of its position and its strength(**fig.05.10**). These 3 types are called *rūpottara, patrottara* and *khaṇḍottara* respectively. In locations like verandah where the *uttara* is supported on pillars placed wide apart, the depth is to be more than the width to avoid bending. Such an *uttara* is called *cūli*, or *culika* . While there will be an additional *uttara* called *kṣudrottara* placed above the 3 types of uttara mentioned earlier to take the rafter, in the case of culi, the rafters are directly fixed to it. This is because its depth is equal to more than its width and can easily accommodate the rafters.

DECORATIONS OF *UTTARA*

Stanza - 33

एक एव यदि वाजनं भवत्युत्तरस्य शरभाजिते घने ।
उच्चमंशयुगलेन निष्क्रमोऽप्यस्य पट्टमवशिष्टभागतः ।।

If there is only one *vājana*, when the thickness of *uttara* is divided by five, by two parts the projection and by the remaining part, the belt (*paṭṭa*) are to be done.

Stanza - 34

अल्पवाजनयुतोत्तरे घने नागभागिनि महत् त्रिभागतः ।
एकतोऽल्पमुभयाश्च निष्क्रमः स्वोच्चतो भवति पट्टमब्धिभिः ।।

In *uttara* with minor *vājana*, when the thickness is divided by eight, by three parts the major (*vājana*), by one part the minor (*vājana*), by four parts the belt and by their own heights the projections of both happen.

Stanza - 35

बाणांशिन्यखिलोत्तरस्य तु घने द्वाभ्यां महद् वाजनं
चैकेनाल्पमथातनोतु महितं पट्टं च शिष्टांशत : ।
अब्ध्यादीश्वरपश्चिमांशिनि घने सर्वोत्तरस्यैकतो
युक्त्या वाजनयोश्च निष्क्रममथान्यत्रापि चैवं विधिः ।।

For all *uttaras,* when thickness is divided by 5, the major *vājana* should be done by 2 parts, the minor *vājana* by one and the belt by the balance. When the thickness of all *uttaras* is divided by (numbers) 4 to 11 the projection of both *vājanas* should be done suitably by one (part). In other places also this is the rule (for *vājana*).

Commentary

The *uttaras* are made with stepped vertical faces. The projecting portion is called the *vājana* (wing or fillet) and the

lower portion is called the belt (paṭṭa). If there is only one fillet, the ratio of thickness of *vājana* and *patta* is 3:2. If there are 2 fillets, the lowers portion is *paṭṭa* and the two projections are *vājanas*. The top *vājana* is major *vajana* (*mahāvājana*) and the lower one is minor (*alpavājana*). The proportions of their width are shown in **figure 05.10**. The projections can be from 1/4 to 1/11 times the thickness. Stepped projections (*vājanas*) are made in other wooden members like *oma*, *potika*, door frame etc. The above mentioned rules are applicable in those cases also.

Stanza - 36

स्तम्भमूर्धनि निधाय पोतिकामुत्तरं तदुपरि प्रकल्पयेत् ।
पोतिकाविवरतः समूद्गतस्तम्भमस्तकशिखाहितावटम् ।।

Then after placing the *potika* over the pillar, the *uttara* should be fitted such that the tenon of the pillar projecting through the hole in the *potika* will be in its mortice (*āvata*).

Commentary

The tenon at the top of the pillar will project through the hole in the *potika* (**fig.05.08**). The *uttara* will have a depression to which this projection will fit.

MINOR *UTTARA*

Stanza - 37

अथोत्तरोच्चोच्चतदर्धतारां क्षुद्रोत्तराख्योत्तरपट्टिकां च ।
सङ्कीलयेदुत्तरबाह्यपार्श्वादूर्ध्वं दृढैः स्वोचितदारुकीलैः ।।

Then the *uttara* reaper (*uttarapaṭṭika*) called minor *uttara* (*kṣudrottara*) with height equal to the height of *uttara* and width equal to its half should be placed vertically on the *uttara* with the outer portion flush with it and pegged by suitable wooden pegs .

Commentary

The rafters are generally not placed directly over the *uttara* but fixed to what are called minor *uttara* (*kṣudrouttara*) placed over the *uttara*. These minor *uttaras* will have depth equal to depth of *uttara*, but their width will be half the depth. Wooden pegs, pegged in between the rafters are used to fix these to the *uttara* (**fig.0512**). These pegs should have thickness equal to 1/3 the height of the minor *uttara* and width equal to 4 times its (pegs) thickness. The purpose of the *kṣhudrottara* is to support the roof frame when it is made and assembled on the ground as well as to facilitate the removal of roof frame without affecting the lower portions. This enables one to dismantle the roof frame without removing the *uttara*. The masonry wall is held stable by the *uttara* as a tie and it also serves to support the roof thus giving stability to the structure below and above it.

Stanza - 38

कीलास्ते कूटसूत्रेष्वखिलनिलयमध्येऽपि च द्वारमध्ये
कर्तव्यास्ते समस्ता यवमितगतिभिः सुत्रतोऽतीतमध्याः ।।
युक्त्या पङक्तिं लुपानां सममपि परिकल्प्याथ मध्ये च तासां
कार्याः कीलास्त्वयुग्माः खलु सकललुपायुग्मसङ्ख्या विधेयाः ।।

These pegs should be placed along the centre lines of *kūṭa* and centre of all house and doors. All of them (pegs) should be fixed with a shift of one *yava* from the centre. After spacing the rafters generally by adjustment, the pegs should be placed centrally between them. The pegs are prescribed to be in odd numbers and all the rafters are to be in even numbers.

Commentary

This describes the position of the pegs. It is prescribed that the pegs should be placed at vital points like the centre

lines of the *kūta*, midlines of house and centre lines of doors. The pegs are to be placed centrally between the rafters. However, the centre line of the peg should be shifted by *gamana* in *yava* units in the clockwise direction from these lines. It has been prescribed that the number of rafters should be even and the number of pegs should be odd. The thickness of pegs is 1/3 the height of *kṣudrottara* and the width is 4 times their thickness.

THE CEILING

Stanza - 39

एकाङ्घ्र्यूनादिदणडोच्छ्रयमुपरि निधायोत्तरे वाजनं प्राक्
तिर्यग्दण्डोच्छ्रयाङ्घ्र्यूनितबहलतुलास्तासु वंशानुवृत्त्या ।
स्वार्धाक्रान्ता जयन्ती तदुपरि सुसमीकृत्य कृत्वानुवंशं
निश्छिद्रं छादयेत् खोचितघनफलकाप्रस्तरेणोर्ध्वभागम् ॥

After first placing the *vājana* (*vājanottara*) of depth of one or 3/4 module over the *uttara*, the joists of one module depth and 3/4 module width are placed crosswise (*tiryak*) with the cross pieces (*jayanti*) encroaching by their half and level at its top, the top should be covered without crevices with rows of planks of suitable thickness.

Commentary

Minor *uttara* is placed over the main *uttara* when there is no ceiling. When there is a ceiling, *uttaras* called *vājanottara* are placed over the main *uttara*. Then, connecting them, joists are placed crosswise. The depth of *vājanottara* is 3/4 *daṇḍa* and above, while that of the joist is one *daṇḍa*. (Here, *daṇḍa* is the module equal to the top lateral dimensions of the pillar) Cross pieces are placed connecting these joists with halved joints, the cross-pieces projecting into the beam to half the width of the latter (**fig.05.13**). The top is then levelled and covered with planks

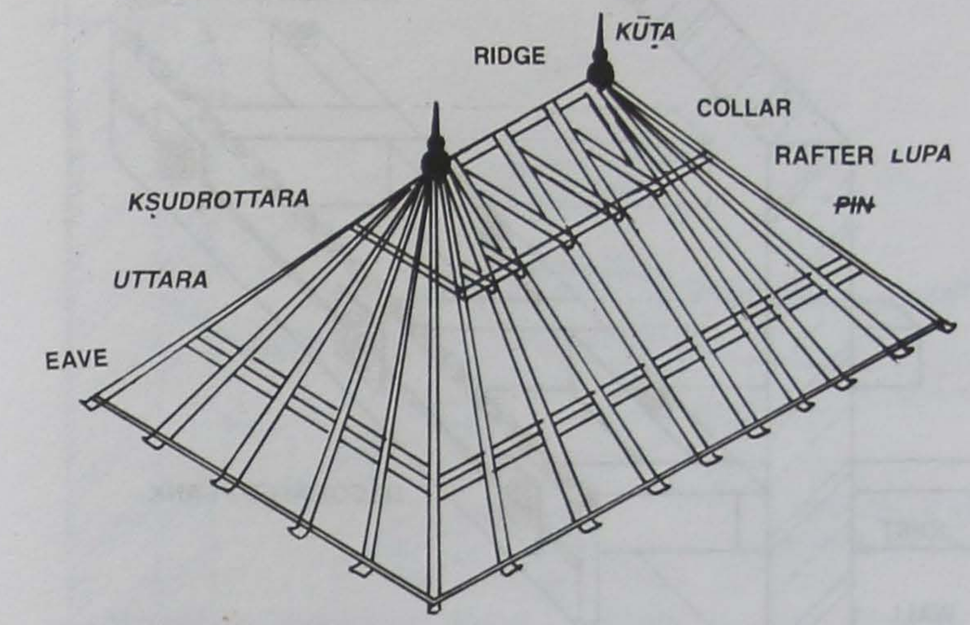


FIG. 05.12 TYPICAL ROOF FRAME

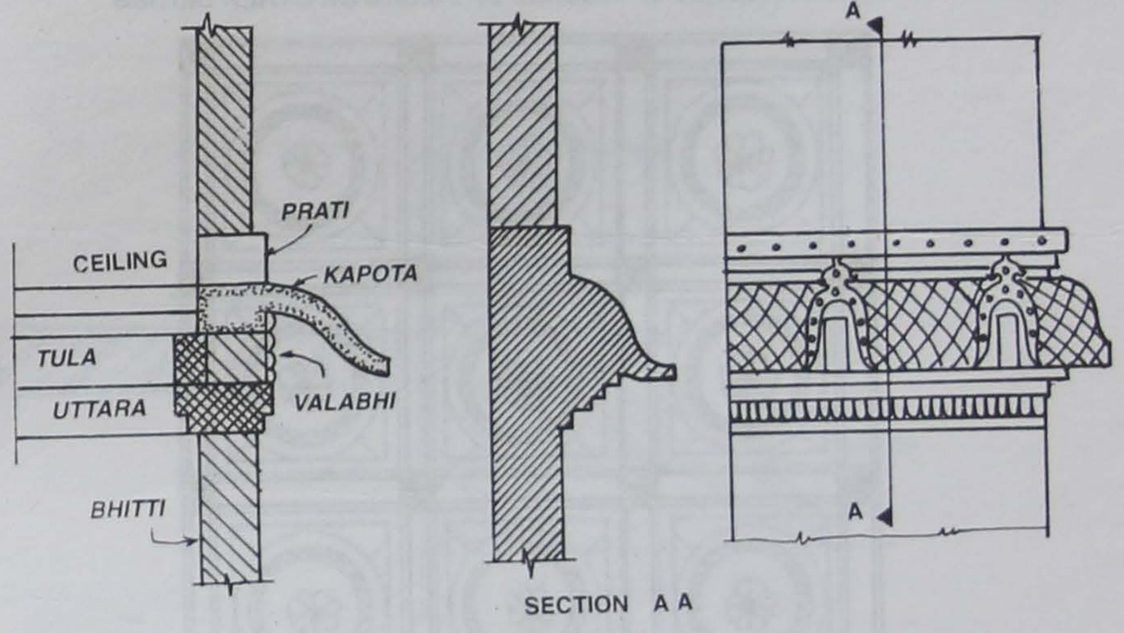


FIG. 05.13 DETAILS OF CEILING

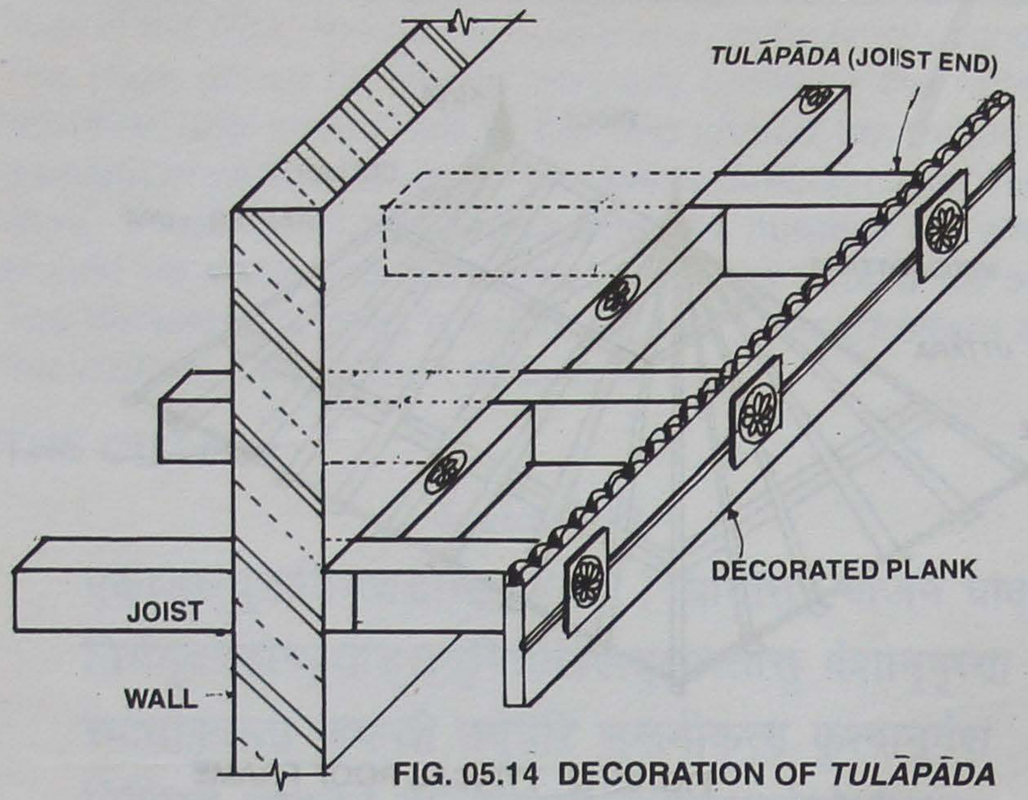


FIG. 05.14 DECORATION OF *TULĀPĀDA*

NAVAKHANDA DECORATED WITH FLORAL MOTIFS IN TEMPLES, DECORATION WILL BE WITH ***NAVAGRAHA*** FIGURES OF FIGURES OF ***LAKṢMI*** OR OTHER DEITIES

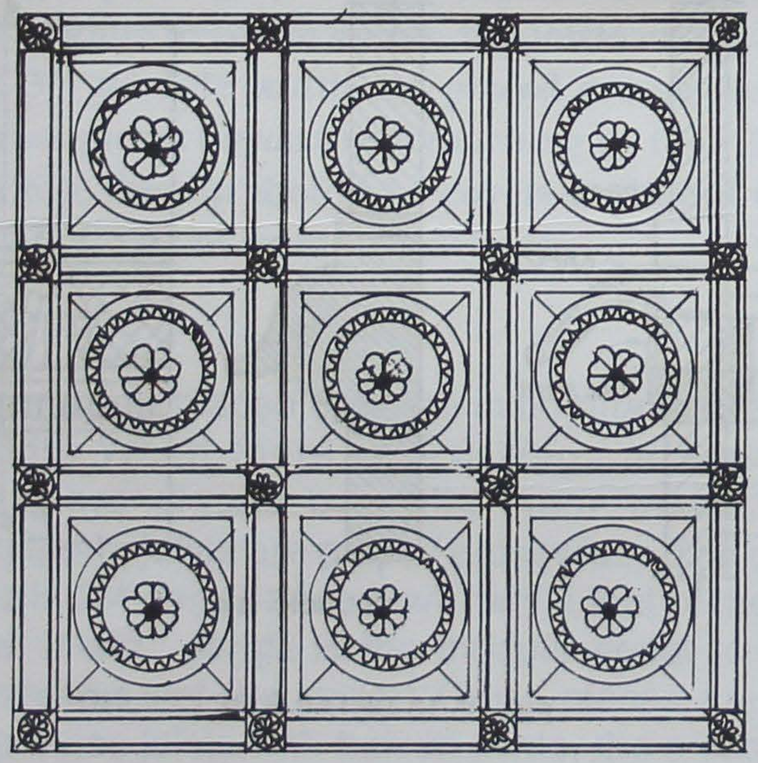


FIG. 05.15 DECORATED CEILING

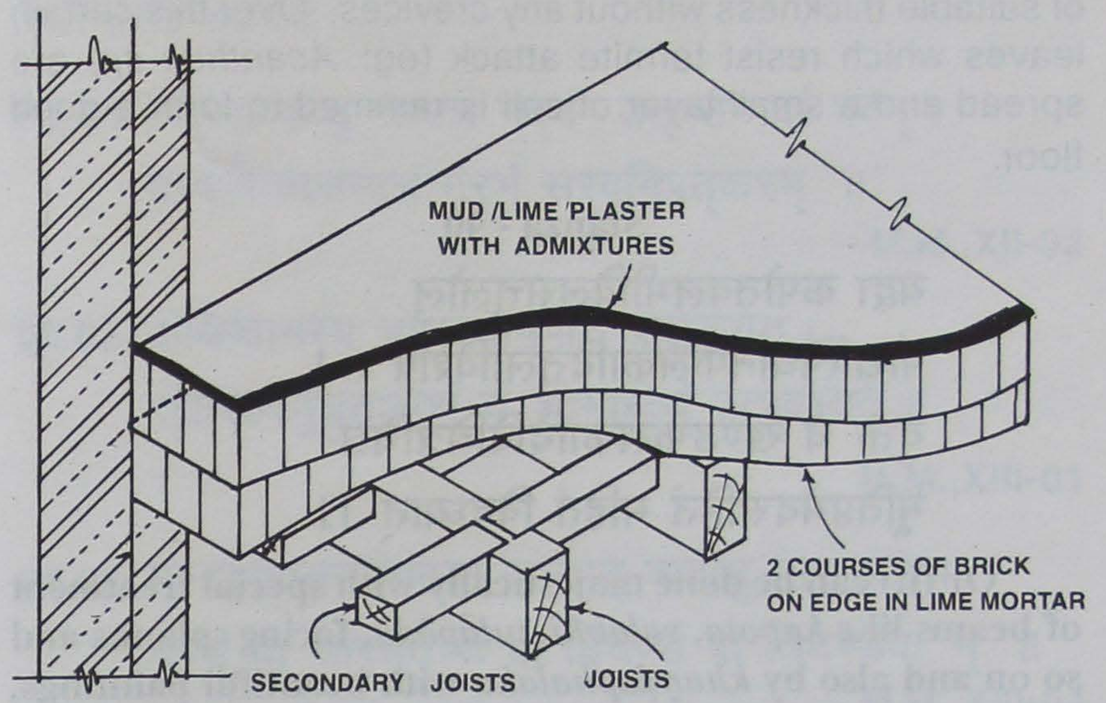


FIG. 05.16 MADRAS TERRACE FLOOR

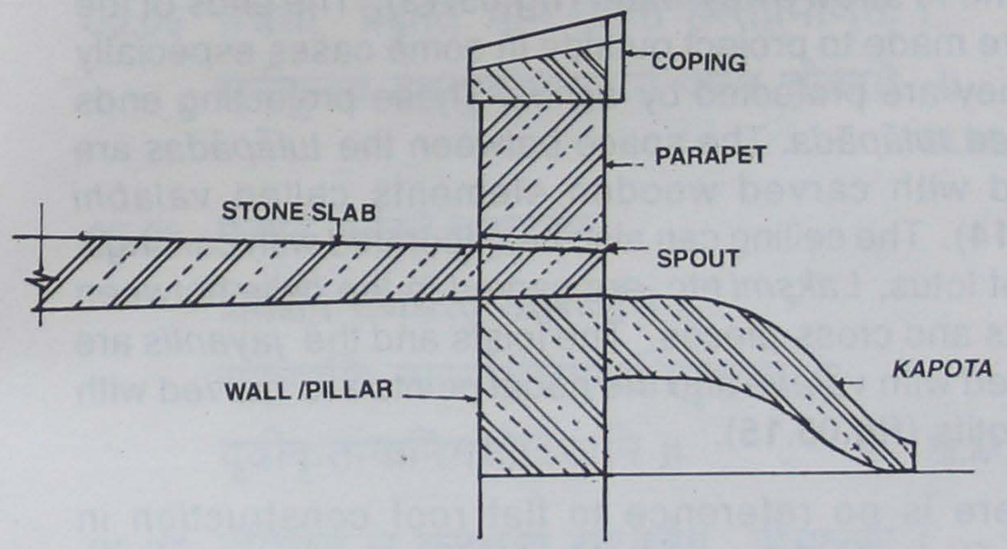


FIG. 05.17 STONE ROOF DETAILS

of suitable thickness without any crevices. Over this certain leaves which resist termite attack (eg: *Acanthus sp*) are spread and a small layer of soil is rammed to form a good floor.

Stanza - 40

यद्वा कपोतवलभीविलसत्तुलोलु.
पोद्यत्पिधानफलकादितुलाविशेषै : ।
युक्तं च खण्डफलकादिविचित्रचित्र-
मूर्तिप्रभेदसहितं महितं विदध्यात् ।।

Or (it) can be done majestically with special treatment of beams like *kapota*, *valabhi*, *tulāpāda*, facing planks and so on and also by *khaṇḍaphalaka* with beautiful paintings, drawings, different figures and so on.

Commentary

In the case of buildings with ceilings, *kapota* is made with stone to throw away water (**fig.05.13**). The ends of the joists are made to project outside in some cases especially when they are protected by *alinda*. These projecting ends are called *tulāpāda*. The space between the *tulāpādas* are covered with carved wooden elements called *valabhi* (**fig.05.14**). The ceiling can also be decorated with carvings. Motifs of lotus, *Lakṣmi* etc. are carved in the cells between the joists and cross-pieces. The joists and the *jayantis* are decorated with *vājana* and the nodal points are carved with floral motifs (**fig.05.15**).

There is no reference to flat roof construction in *Manuṣyālayacandrika* probably because flat roof is an adaptation of the floor construction, as typically seen in the Madras Terrace roof. (**fig.05.16**). In the stone roofs of temples, the *tula* (joists) are seen replaced by stone slabs, simplifying the construction (**fig.05.17**).

REFERENCES

05.01 सर्वद्रव्यस्तु सन्पन्नं गर्भं तत् सन्पदां पदम् ।
द्रव्यहीनमसन्पन्नं गर्भं सर्वविपत्करम् ॥
M.M.,XII-02

05.02 अधिष्ठानस्य चाधस्थापपीठं प्रयोजयेत् ।
रक्षार्त्थमुन्नतार्त्थं च शोभार्त्थं तत्प्रवक्ष्यते ॥
M.M.,XIII-01

05.03 पञ्चांशान्तमधिष्ठान जन्माद् बाह्येतु निर्गमम् ।
दण्डं वा सार्धदण्डं वा द्विदण्डं वा त्रिदण्डक म् ॥
M.M.,XIII-04

05.04 अधिष्ठानजगत्या वा समं तत्पादबाह्यकम् ।
वेदिभद्रं प्रतिभद्रं सुभद्रं च त्रिधा मतम् ॥ **M.M.,XIII-05**

05.05 उन्नतां प्रकृतिं भूमिं कृत्वा हस्तप्रमाणतः ।
घनीकृत्य तदूर्ध्वस्थमुपानं जन्म चोच्यते ॥
M.M., XIV - 9

05.06 एतानि भेदैस्तु चतुर्दशैव
प्रोक्तानि तज्ज्ञैस्तु मसूरकाणि ।
सर्व्वाणि नास्यङ्घ्रियुतानियुक्त्या
दृढीकृतांगानिमयोदितानि ॥ **M.M., XIV-38**

05.07 प्रतिछेदं न कर्त्तव्यं सर्वत्रैवं वीचक्षणैः ।
द्वारार्त्थं यत् प्रतिच्छेदं सन्पद् द्वारं च नेत्यलम् ।
पादबन्धमधिष्ठानं छेदनीयं यथोचितम् ॥
M.M., XIV-44

05.08 प्रतिछेदेन तु द्वारं न कुर्वीत कदाचन ।

I.S. Kriya, XXXI, 101-102

05.09 सर्वे पोतिकया युक्ता नानारूपैर्विचित्रिता ।
पादाग्रविपुलं यत्तु तद्दण्डमिति कथ्यते ॥

M.M.,XV-28

05.10 चतुरष्टाश्रवृत्ताभं रुद्रच्छन्दं समांशतः ।

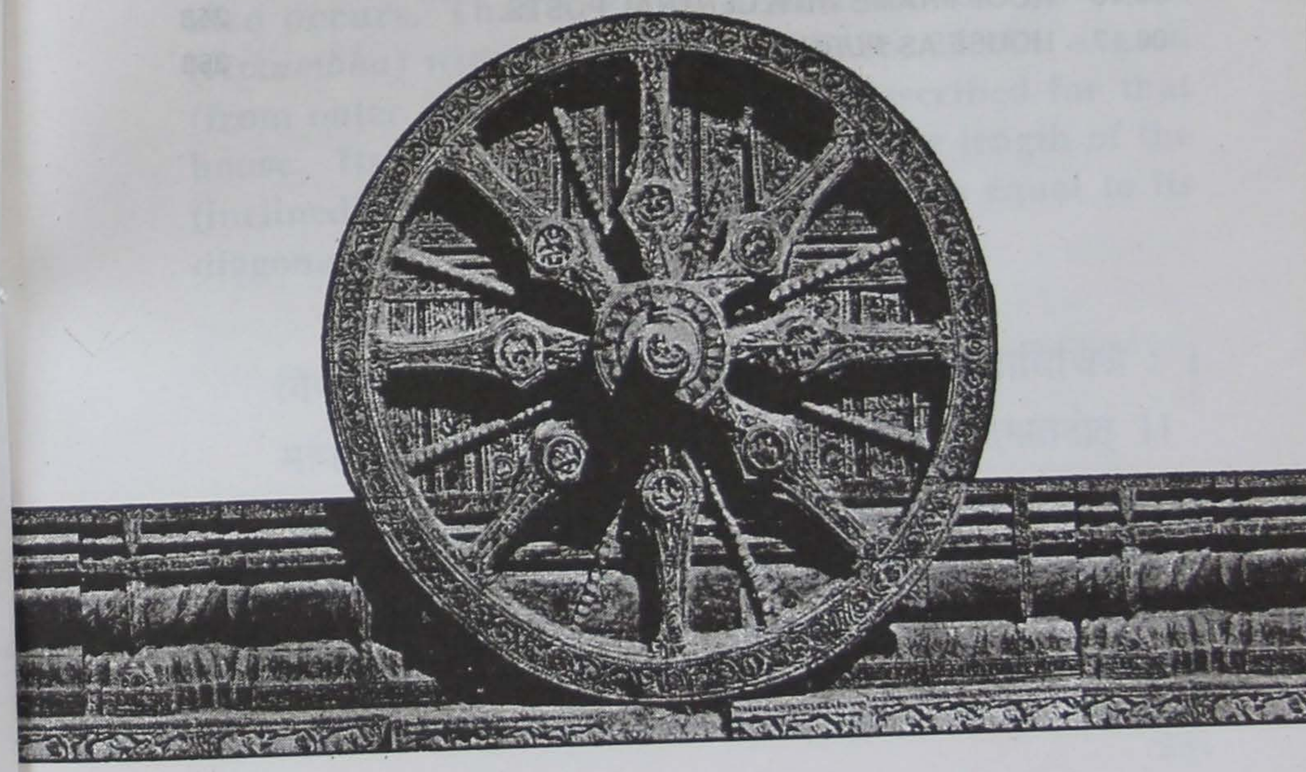
M.M.,XV-17

05.11 उत्तरं त्रिविधं पादविस्तारं तत्समोद्गमम् ।
त्रिपादोदय मध्योच्चं विस्तारं पादतः समम् ॥
खण्धोत्तरं पत्रबन्धं रूपोत्तरमिति त्रिधा ।
त्रिभागं वा त्रिभागोनमर्धं वा कर्णनिर्गमम् ॥

M.M., XVI-2,3

6
ELEMENTS OF ROOF
शिखरविधयः

śālas of large span, raised uttara; eaves, ridge; kūṭa; rafters; collar pin; reapers.



LIST OF ILLUSTRATIONS

CHAPTER - 6
अथ षष्ठोऽध्याय :
ELEMENTS OF ROOF
शिखरविधयः

RAISED *UTTARA* (*ĀRŪDHOTTARA*)

Stanza - 1

अल्पे धामनि बाह्यमेव महति त्वारूढमप्युत्तरं
विष्कम्भे तनुयात् स्वगेहविहितैर्योन्यादिभिः संयुतम् ।
वस्वृष्यर्कयुगाङ्गुलादिगतिरन्तः स्यादलिन्दं तु तत्
तावत् स्वोच्छ्रयमस्य कर्णसदृशी विष्कम्भपादायतिः ।।

In small houses, only the outer (*bāhyottara*) (is sufficient); in large houses the raised *uttara* (*ārūdhottara*) also occurs. That is to be done over the tie beam (*viṣkambha*) with inward shift of 8, 16, 24 etc. *angula* (from outer *uttara*) and *yonis* etc. prescribed for that house. Its rise is same as the shift. The length of the (inclined) supporting strut of the beam is equal to its diagonal.

Stanza - 2

विष्कम्भपादं तु तदङ्गभेदैर्युक्तं तथा कल्पलतादिचित्रै : ।
महातरङ्गान्तरुदीर्णचूचुक (प्र ?)सूनसंशोभितमातनोतु ।।

The supporting strut of the tie beam should be decorated with different wave motifs and pictures of *kalpalata* etc. and also with buds and flowers emerging out of the large wavy patterns.

Commentary

The previous chapter (ch.5), ended with description of the ceiling. This chapter deals with the inclined roof.

If the span is small, only the wall plate (*uttara*) to give support at the bottom of the rafters is required for rigidity and strength of the roof frame. The rafters connected by the ridge at the top and fixed to the wall plate at bottom will form a rigid frame. Further, there will be collars between the rafters to tie the rafters against spreading and these collars will be held rigidly by the continuous collar pins. In addition to these, the eave reaper at the outer edge will add rigidity and strength to the roof frame (see figure 05.12).

If the span is large, there will be an additional supporting *uttara* in between the ridge and the wall plate. This *uttara* is called *ārūdhottara*. It is supported over tie beams (*viṣkambha*) which are supported by vertical or inclined struts (*viṣkambha pāda*) **fig.06.01**.

The horizontal distance between the wall plate and the *ārūdhottara* is called *alinda*. This distance should be an integer multiple of 8 *angula*. It is prescribed that the *yoni* and other characteristics of the perimeter measured outside *arudhottara* should be the same as that prescribed for the perimeter of the house. This is ensured by the shift of *ārūdhottara* by multiples of 8 *angula* from the wall plate. This shift is called *alinda*. The *alinda* width should not be greater than the span between *ārūdhottaras* (central span) i.e. it should not be greater than the total span.

The inclined supports of the tie beams should be carved with sinusoidal motifs with creepers and leaves and also flowers and buds.This prescription is to highlight the structural importance of the struts, requiring special considerations of strength and size of the member.

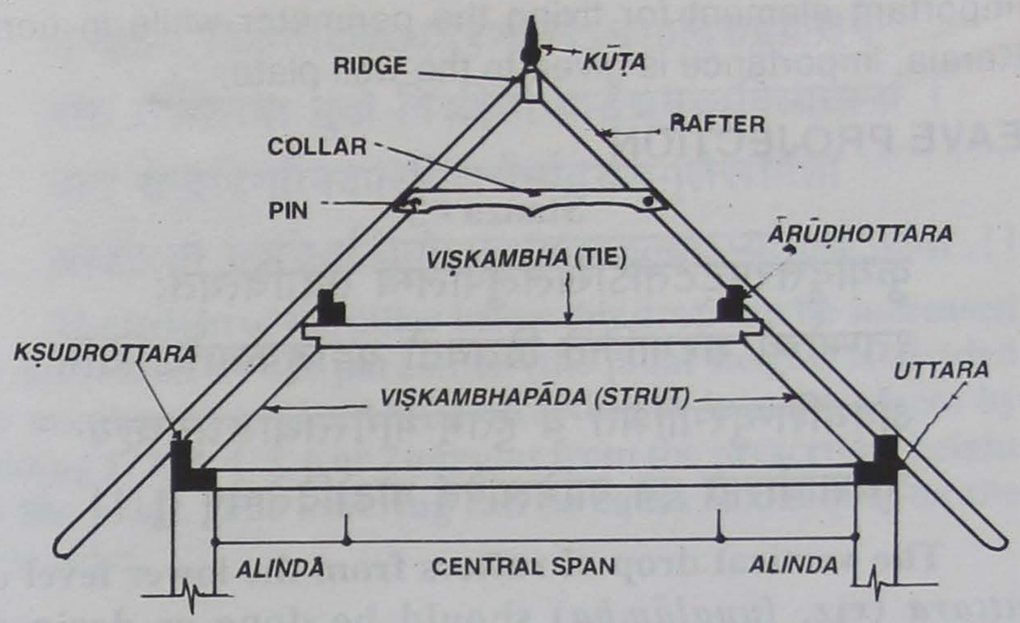


FIG. 06.01 ELEMENTS OF ROOF FRAME WITH *ĀRŪḌHOTHARA*

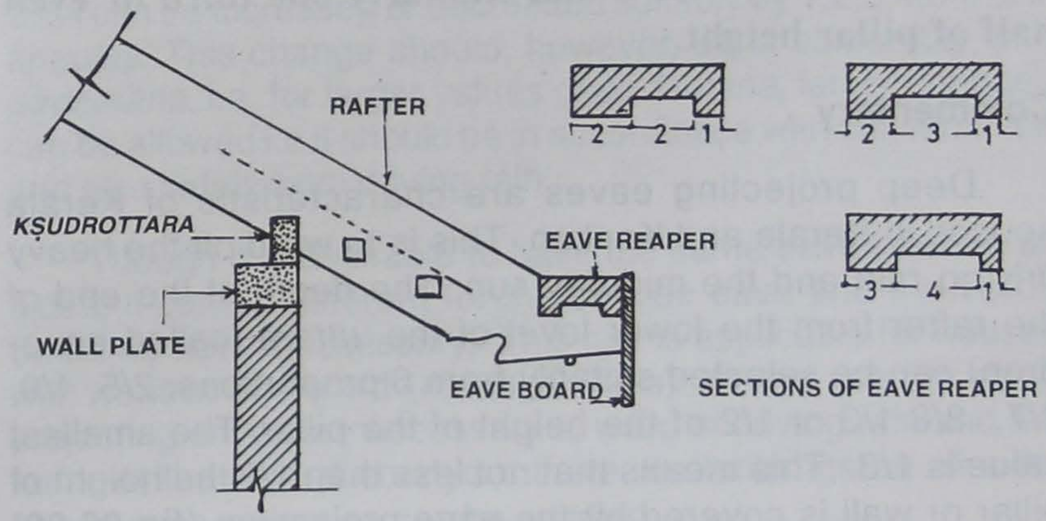


FIG. 06.02 DETAILS AT EAVE

In south Kerala, the *arudhottara* is taken as the most important element for fixing the perimeter while in north Kerala, importance is given to the wall plate.

EAVE PROJECTION

Stanza - 3

कुर्यादुत्तरपट्टतोऽखिललुपालम्बं तदौचित्यतः
स्तम्भोच्चे शरभाजिते द्वितयतो यद्वाङ्कभक्तेऽब्धिभि : ।
अद्र्यंशिन्युरगांशिते च हुतभुग्भागैस्तथाङ्घ्र्युच्छ्रय-
त्र्यंशार्धांशत एव वाभिलषितं षोढोदितेष्वेषु तु ।।

The vertical drop of rafters from the lower level of *uttara* (viz. *lupalāmba*) should be done as desired, according to the suitability of each, in 6 ways as mentioned: by 2 parts when the height of pillar is divided by 5 parts, by 4 parts when divided by 9, by three parts when divided by 7 or 8 and similarly one third or even half of pillar height.

Commentary

Deep projecting eaves are characteristic of Kerala houses in Kerala and Konkan. This is to ward off the heavy driving rain and the mid-day sun. The depth of the end of the rafter from the lower level of the *uttara* (called eave-drop) can be selected suitably from 6 proportions: 2/5, 4/9, 3/7, 3/8 1/3 or 1/2 of the height of the pillar. The smallest value is 1/3. This means that not less than 1/3 the height of pillar or wall is covered by the eave projection. (**fig.06.02**) and this can go up to half the height.

In good designs, the perimeter measured outside the eave also is considered important and is made with the same *yoni* as that of the perimeter of the wall plate. This means that the eave-projections shall be in multiples of 8A.

Stanza - 4

लम्बोऽयं विहितादधस्थचरणोच्चेऽङ्गादिरुद्रान्तिमै-
र्भक्ते तेष्विलया युतो विरहितो वाङ्घ्र्युच्चविध्यध्वना ।
यद्वा चन्द्रदिगग्निवारिधिशरोर्म्यद्र्यङ्गुलैरूनितो
लम्बोऽसौ क्वचिदन्वितोऽप्युभयतस्तुल्योऽप्यतुल्योऽथवा ।।

The height of the pillar below this drop can be increased or decreased by one part when (the pillar height) is divided by numbers 6 to 11 or by subtracting or in some places by adding 1, 2, 3, 4, 5, 6 or 7 *angulas* from the prescribed height of the pillar. The lowering can be equal or unequal on the two sides.

Commentary

In stanza.3, ratios have been mentioned for the lowering of the eave. While doing this, if it is found that the height of the pillar is too small or large, the height of pillar below the eave level can be increased or decreased suitably by 1,2,3,4,5,6 or 7 *angulas*. This change should, however, be in conformity with *pādamāna*, i.e. for larger values of *padamana*, larger changes can be allowed i.e it should be in accordinace with convenience and also safety from driving rain.

Though it is desirable to have the same eave level on all sides, it can be different for the outside eave and the inside (*ankaṇa*) eave if necessary. This rule is applicable for houses with central courtyard (*madhyānkaṇa*). At the outside deep projecting eaves are necessary to ward of driving rain and hot sun. At the central courtyard there are buildings on all side, hence eave projection can be smaller.

UTTARA, NOT TO BE BROKEN

Stanza - 5

विस्तारेण घनेन वापि च लुपालम्बो भवेदुत्तर-
स्यैकेनाधिदलद्वयत्रयचतुर्बाणोर्मिशैलोन्मितैः ।

योगे सत्यपरालयैरपि लुपाच्छेद्याश्च नीप्रादयो
गेहाङ्गेष्वखिलेषु चोत्तममतो नच्छेदयेदुत्तरम् ।।

The eave-drop can be done by 1, 11/2, 2, 3, 4, 5, 6 or 7 times the width or the depth of *uttara*. When combining with other houses, the rafters, eaves etc. can be broken. But *uttara* is the most important part of all houses, hence the *uttaras* should not be broken.

Commentary

When large eave projections are not required, for example, when two houses are combined, the drop of the eave can be made 1 to 7 times of the width or depth of *uttara*. When two houses are to be combined, the rafters and the eaves can be broken, but the *uttara* should be continuous and complete, since *uttara* is the most important part and is the basis for deciding the *yoni* which in turn decides the orientation as well as the dimension of the building.

RULES FOR RAFTERS

Stanza - 6

ऋजुमञ्चाख्यास्तुल्याः प्रकृतिलुपाः पार्श्वसंस्थिताः सर्वाः।
कोटयुपकोट्याद्याः स्युर्विकृतिलुपास्तास्त्वतुल्यदीर्घतताः।।

Equal and straight rafters are straight rafters (*ṛjumancas*). Unequal and slanting rafters are *hip* rafters (*koṭis*) and *alasi* rafters (*upakoṭis*) and are equally positioned on the sides.

Stanza - 7

कार्या लुपाश्चोत्तरपट्टिकोर्ध्वं कूटाहिताग्रा विकृताः समस्ताः।
पार्श्वाहितास्ताः खलु निर्विकारा निवेशिताग्राः पुनरग्रधान्याम्।।

All slanting rafters should be made with the ends on the *kūṭa*, and all the straight ones on the two sides should be

fixed on top of the minor *uttara* with their top fitted in the ridge (*vaṁśa*).

Commentary

The rafters are divided into two categories(1): the straight (*rju or prakṛta*) ones also called common rafters and the(2) slanting (*vikṛta*) ones.(**fig.06.03**). The slanting rafters are again divided into *koti* (*hip* rafters) and *upakoti* or *anukoti* (slanting rafters on the hip ends). The common rafters are called *madhyalupas* in *Mayamata* and have their top ends fitted into the ridge and bottom ends into the minor (*ksudra*) *uttara* fixed above the wall plate. The *koṭi* is the longest slanting rafter and *upakoṭis* are the shorter slanting rafters at the two shorter sides. All the slanting rafters fit into the *kuta* at the top and the minor *uttara* at bottom. The number of straight rafters should be same on both sides of the ridge. The slanting rafters will be equal in number at both the hipped ends also.

This may be compared to the modern practice in which all the rafters on the two ends are fixed on the hip rafter and are called jack rafters (**fig.06.04**).

RIDGE

Stanza - 8

पार्श्वप्राप्तलुपाग्रयोगवशतो वंशाख्यया साग्रया
युक्त्वा चोत्तरतारपादरहितव्यासोच्छ्रयं चाथवा।
अद्र्यूर्म्यङ्गुलतारतीव्रसहिता पत्रैर्लुपानींव्रव-
ह्न्यब्ध्यंशप्रमितैर्लुपापदगतैर्युक्ता लसद्वाजना ।।

Because of the combination with the ends of the rafters on the sides, the ridge (*agradhāni*) is called *vaṁśa*. The ridge can have width and length both equal to three-fourth the width of wall plate or to 6 or 7 *angula* square.

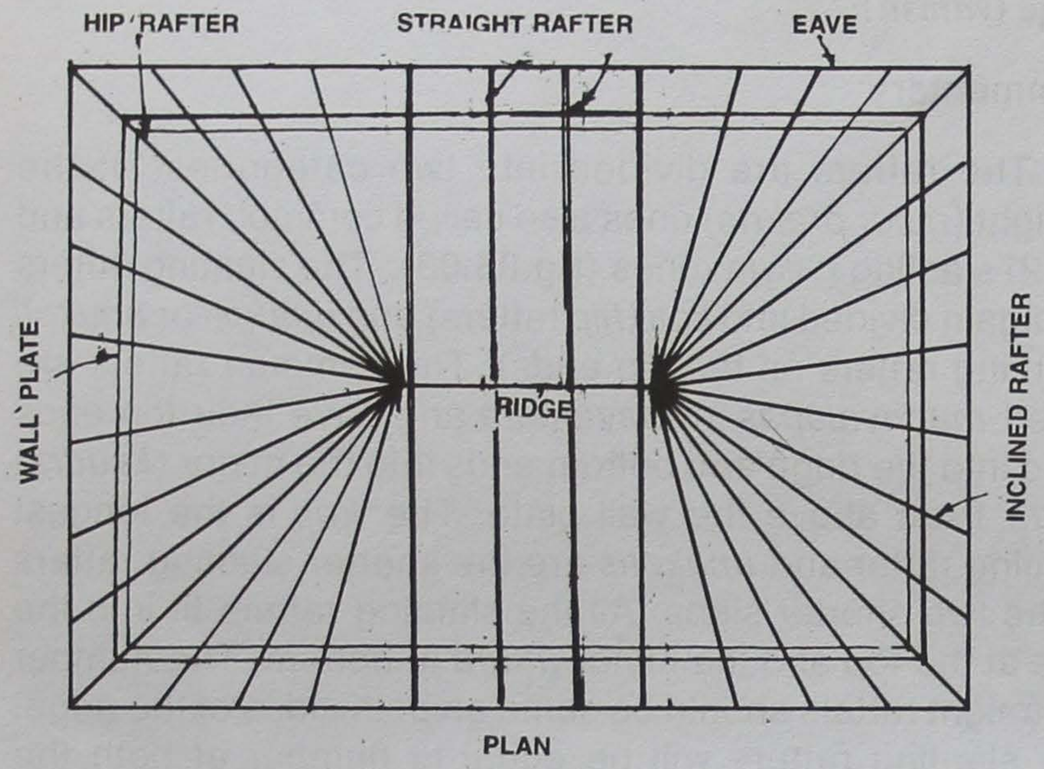


FIG. 06.03 ROOF SHOWING STRAIGHT & INCLINED RAFTERS

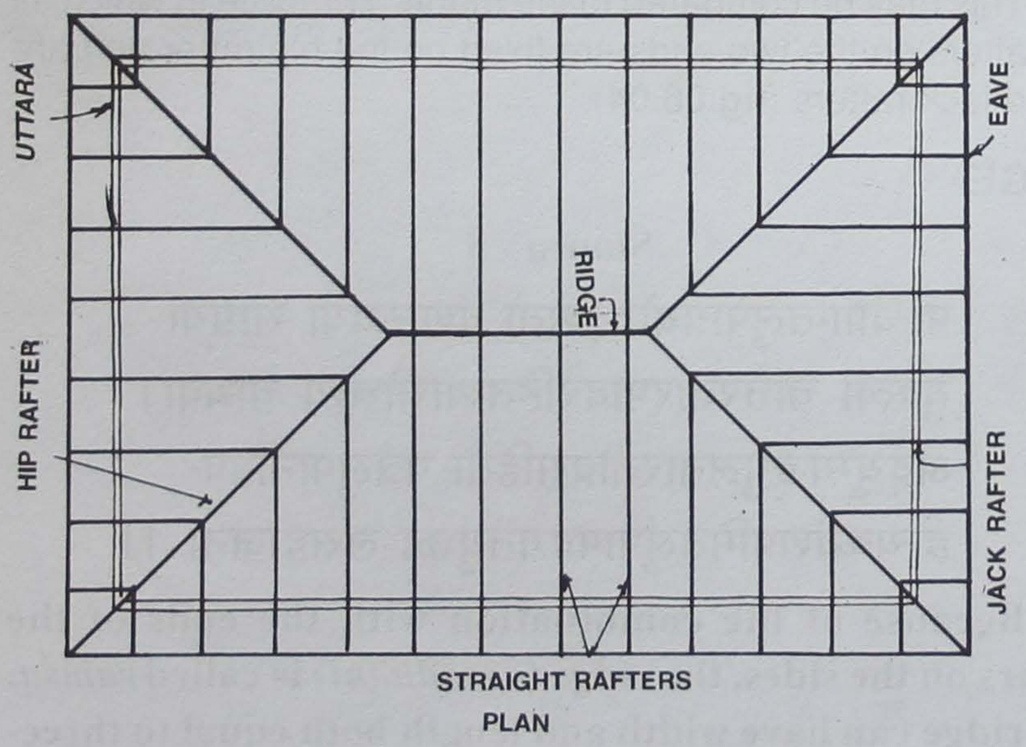


FIG. 06.04 ROOF SHOWING JACK RAFTERS

At the joints with the rafters, belts and fillets should be made with 3 or 4 times the rafter thickness.

Commentary

Vamśa literally means clan. The ridge is called *vamsa* because all the rafters join there. The ridge piece is to be square with its side equal to 3/4th the width of *uttara* or equal 6 *angula* or 7 *angula*. At the joints with the rafters, groves should be made in the ridge to fit the rafter end. The width of the groove should be 1/3 or 1/4 the thickness of the rafters.(**fig.06.05**).

KUTA

Stanza - 9

कूटः कोटिलुपाग्रकल्पिताशिखासम्प्राप्तपार्श्वावटः
पार्श्वाक्रान्तलुपाग्ररन्ध्रनिहिता यः कीलसङ्कीलितः।
आधारोऽस्य लुपाग्रकल्पितशिखा तस्मादधो मूल ए-
वोक्तोऽसौ विकृता लुपाश्च सकला गेहे समाब्ध्यश्रके।।

The *kūṭa* should be such that the tenons of the hip rafters will fit the mortice in it sides and the ends of the rafters coming from the sides are fixed by iron nails. The tenon at the top of the rafter is the support for the *kūṭa*. Hence, this is prescribed to be bottom down. In a square house, all rafters are slanting (*vikṛta*).

Commentary

The *hip* rafters and the other slanting rafters on the sides are fixed to the *kūṭa* (pendant or newel) which is fixed at the end of the ridge piece. The *kūṭa* will have mortices (*randhra*) to accommodate the tenon of all the slanting rafters. This requires provision of as many number of mortices as there are slanting rafters. As this may cause difficulties, this practice is generally limited to temples and other important buildings. In unimportant constructions, the slanting rafters (other than the hip rafters)

are fixed by nails. The *kuta* is such that when pushed down, the joints will become stronger. Here the *kuta* is said to be "bottom down" (*adhomūla*) because it is supported on the ridge and the hips and hence is considered as hanging from them.

In buildings with square and circular plans, there will not be any straight rafters. All rafters will be slanting and will be fixed to the *kūṭa* at the centre.(**fig.06.06**).

Stanza - 10

धुर्धूरप्रसवोपमोऽष्टनृपकोणो वा तथा वर्तुलः
सम्फुल्लाब्जयुतोऽथवाथ गुलिकारूपः स्वमध्यादधः।
विस्तारद्विगुणायतस्तदुरगाद्यंशो न दीर्घोऽथवा
कूटोऽब्ध्यादियवोत्थपत्रविलसन्मध्यप्रदेशो भवेत् ।।

The *kūṭa* is to be like the *datura* flower with 8 or 16 corners or (is to be) circular or (is to be) like full blown lotus flower, with rounded shape below its middle. Its length (height) is equal to twice the lateral dimension. The length can be reduced by one part of 8 to 11 divisions with its middle portion decorated with bands over 4 or more *yava*.

Commentary

This gives details of *kūṭa* in square or circular or regular polygonal plans. *Kūṭa*, the pendant to which the *hip* rafters and the sloping rafters at the hipped ends are attached, should be made in the shape of inverted *datura* flower or lotus flower. The bottom half should be rounded. In the middle portion, decorative belts of width 4,5 *yava* or 6 *yava* can be made. The entire roof is made and assembled on the ground and then dissembled and reassembled over the walls. Dissembling can be done by lifting the *kūṭa* upwards by hammering.

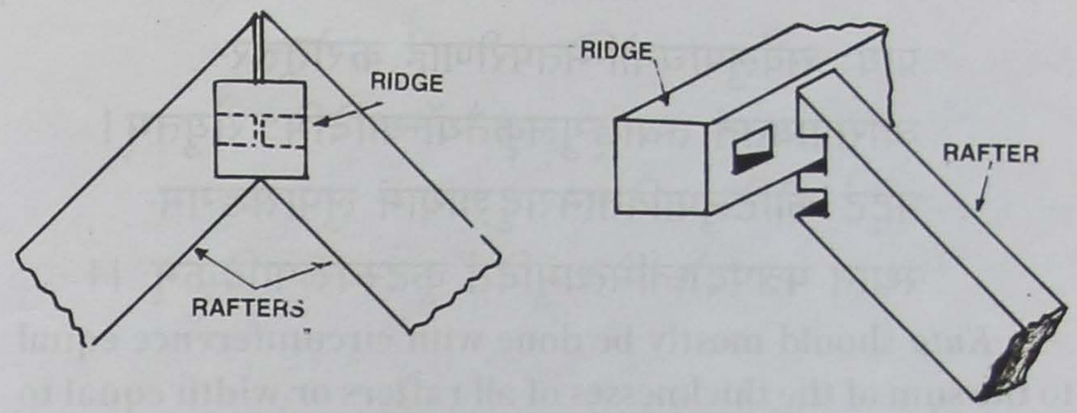
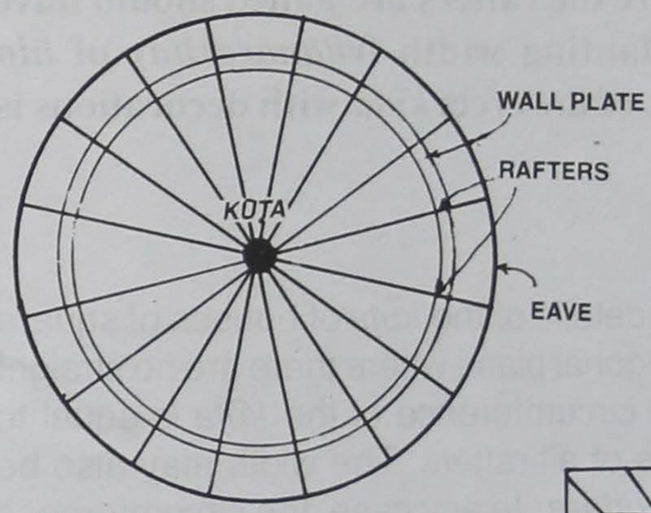


FIG. 06.05 DETAILS AT RIDGE



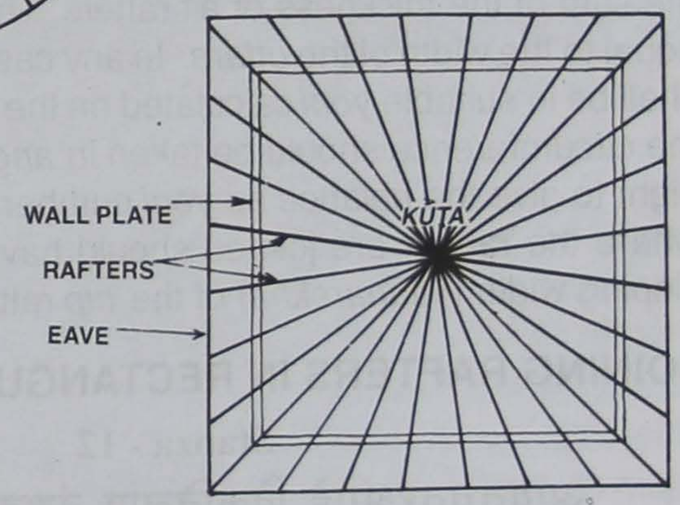


FIG. 06.06 PYRAMIDAL ROOFS

Stanza - 11

प्रायः सर्वलुपाघनोन्मितपरीणाहं करोतूत्तर-
व्यासप्राययततं तथाङ्गुलकृतैर्योन्यादिभिः संयुतम्।
पट्टं कोटिलुपावितानसदृशायामं लुपासङ्गम-
स्थानं पत्रपदोर्ध्वमित्थमुदितं कूटस्वरूपादिकम् ।।

***Kuta* should mostly be done with circumference equal to the sum of the thicknesses of all rafters or width equal to that of the *uttara* and with (suitable) *yoni* etc. computed in *angulas*. The belt where the rafters are joined should have length equal to the slanting width (*vitānarekha)* of *hip* rafters. The shape etc. of the erect *kūṭa* with decorations is stated thus.**

Commentary

This also gives the details of the *kūṭa* of houses of square or circular or regular polygonal plans where there are no straight or common rafters. The circumference of the *kūṭa* is equal to the sum of the thickness of all rafters. The width may also be equal to the width of the *uttara*. In any case, the circumference shall be in suitable *yoni* calculated on the basis of *angulas*, i.e. the circumference should be taken in *angulas*, and divided by eight to give the balance as *yoni* number. The belt of the *kūṭa* where the rafters are jointed should have width equal to the sloping width (*vitānarekha*) of the *hip* rafters (**fig.06.07**).

JOINING RAFTERS IN RECTANGULAR HOUSES

Stanza - 12

आयतचतुरश्रगृहे विकृतिलुपा वंशबद्धकूटगताः।
वंशस्थाग्रास्त्वन्याः प्रकृतिलुपाः कीलिता ह्ययःकीलैः ।।

In rectangular houses, the slanting rafters are to go into the *kūṭa* connected to the ridge. The other common rafters are to be fixed with iron nails with their tops at the ridge.

Commentary

For rectangular houses, there will be common (straight) rafters as well as slanting rafters. The slanting rafters are to be connected to the *kūta* which is fixed to the ridge. The common rafters are to be fixed to the ridge and nailed down. But in good constructions, the nails are not used. The rafters are connected firmly to the ridge by tongue and groove joint.

CONNECTING *KŪṬA* TO RIDGE

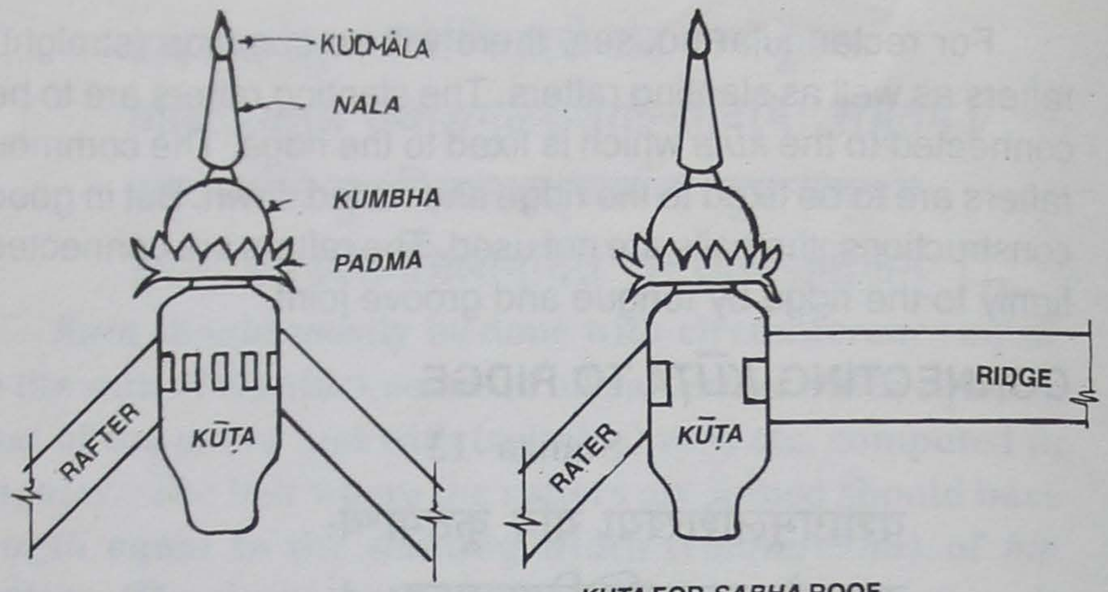
Stanza -13

वंशाग्रमूलशिखया यदि कूटपार्श्व-
रन्ध्रप्रवेशकृतसन्धिरिहाजयुद्धः ।
आधारभेदकृतसन्धिवशेन कूट-
स्याधोगतं भवति मूलमिहापि नित्यम् ।।

The connection of the tenons at the top and bottom ends of the ridge to the groove in the side of the *kuta* is through *ajayuddha* joint. By the joint of support and supported (*ādhārabheda*), here also the bottom of the *kuta* is below.

Commentary

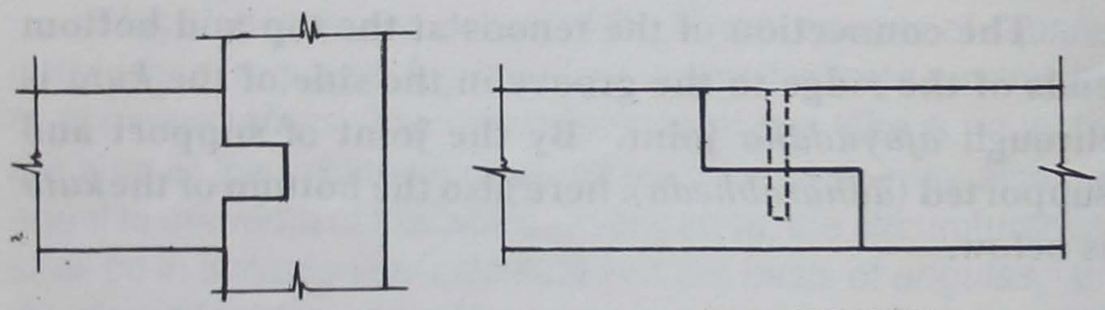
The *kūṭa* is supported on the ridge. The tenons at the top and bottom of the ridge-piece (i.e. two end of the ridge) are fitted into the mortices on the sides of the *kūṭas*. The ridge is the support (*ādhāra*) and the *kūṭa* is that which is supported (*ādheya*). The joint is called *ajayuddhasandhi* (goat-fight joint) (**fig.06.09**). Since the *kūṭa* is supported on the ridge, its major portion will be below the ridge. The *kūṭa* should be made with the timber kept in the natural position i.e. bottom portion below and top portion above. The final *sabha* roof form was clearly evolved from the simple *sala* roof as given in stanza 14.



KUTA FOR PYRAMID ROOF

KUTA FOR SABHA ROOF

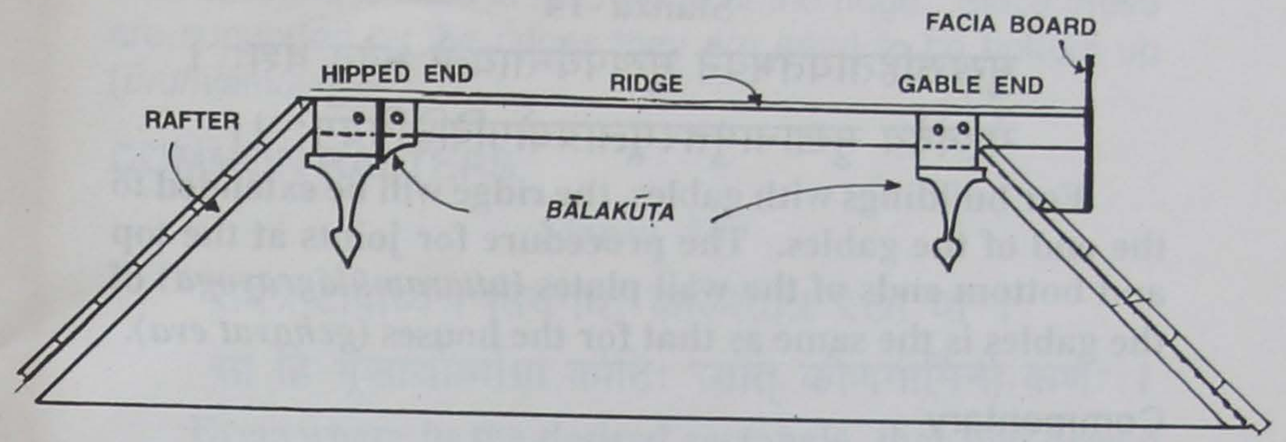
FIG. 06.07 KUTA

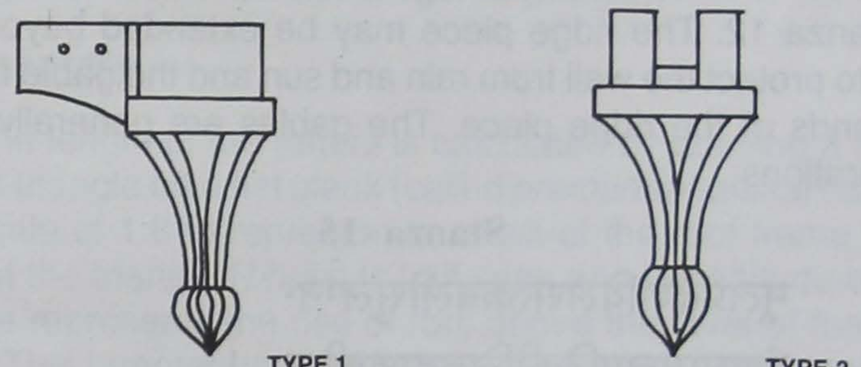


AJAYUDDHASANDHI

ARDHAPAṆISANDHI

FIG. 06.08 AJAYUDDHSANDHI & ARDDHAPAṆISANDHI





TWO WAYS OF ATTACHING BĀLAKŪṬA

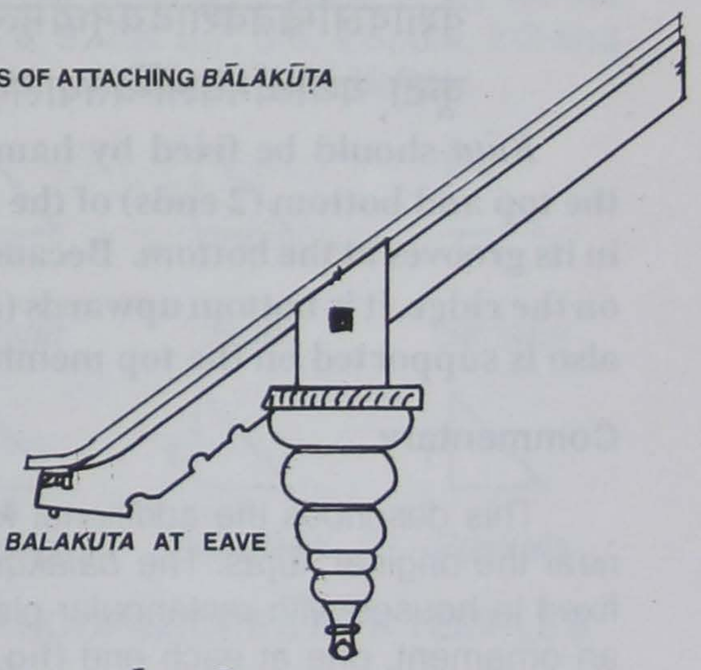


FIG. 06.09 BĀLAKŪṬA

Stanza -14

मुखसहितायतभवने मुखपर्यन्तायतो भवेद् वंशः ।
गेहवदेव मुखानामुत्तरमूलाग्रयोगविधिनियमः ।।

For buildings with gables, the ridge will be extended to the end of the gables. The procedure for joints at the top and bottom ends of the wall plates (*uttaramūlāgrayoga*) of the gables is the same as that for the houses (*gehavat eva*).

Commentary

In gabled roof, the ridge will be extended up to the end of the gable. The rafters are joined to the wall plates at the two sides at the bottom and the ridge at the top as explained earlier is stanza 12. The ridge piece may be extended beyond the wall to protect the wall from rain and sun and the gable fixed at the ends of the ridge piece. The gables are generally given decorations.

Stanza -15

मूलप्रदेशविलसत्कबलीसुलग्न-
वंशाग्रमूलपरिकीलितदारुकीलः ।
वंशावलम्बितवशादयमूर्ध्वमूलः
कूटो यथोर्ध्वमवलम्बितबालकूटः ।।

***Kūṭa* should be fixed by hammering wooden nails at the top and bottom (2 ends) of the ridge which is connected in its grooves at the bottom. Because this (*kūṭa*) is supported on the ridge, it is bottom upwards (*ūrdhvamūlam*). *Balakuta* also is supported on the top member as the *kūṭa*.**

Commentary

This describes the additional *kūṭa* called *bālakūṭa* fixed near the original *kūṭas*. The *bālakūṭa* is a small *kūṭa* which is fixed in houses with rectangular plans to the ridge mainly as an ornament, one at each end (**fig.06.09**). In some cases, a

thrid *balakuta* is fixed in the middle of the ridge. Since these are supported by the ridges they are send to be bottom up (*ūrdhvamūla*)

COMMON RAFTERS

Stanza -16

सर्वत्रेष्टाबाध्यश्रे तिर्यगधः कल्पितात्र रेखा या ।
सा हि भूजाथोर्ध्वाग्रा कोटिः स्यात् कोणगामिनी कर्णः ।

Everywhere in the desired rectangle, that line drawn as horizontal (*tiryak*) is the base (*bhuja*). Then, the line from top to bottom is the vertical (*koṭi*) and that which goes through the corner is the diagonal (*karṇa*).

Commentary

The length of the rafters is calculated by drawing a right-angled triangle on a flat plank (called *pramanaphalaka*) usually to a scale of 1:8 to represent one half of the roof frame. The base of the triangle (*bhuja*) is half span and the altitude of the triangle represents the rise of roof above the level of the wall plate. The hypotenuse (*karna*) will therefore represent the straight rafter. Texts generally describe a slope of 1:1 for the roof, but other slopes like 8: 9, 7:8, 6:7, 5:6, 4:5, 3:4, 2:3 and 1:2 are also used (**fig.06.10 and 06.11**).(Ref.06.01)

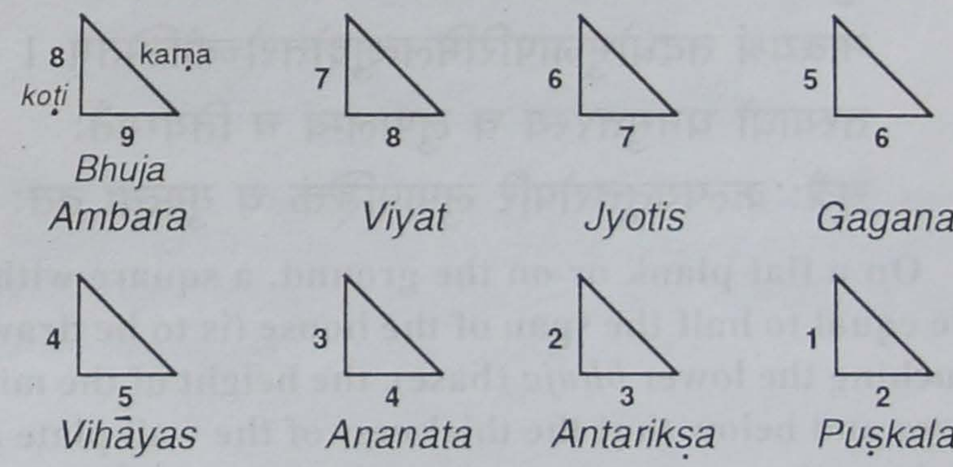


FIG.06.10 NAMES OF ROOF SLOPES FOR TEMPLES

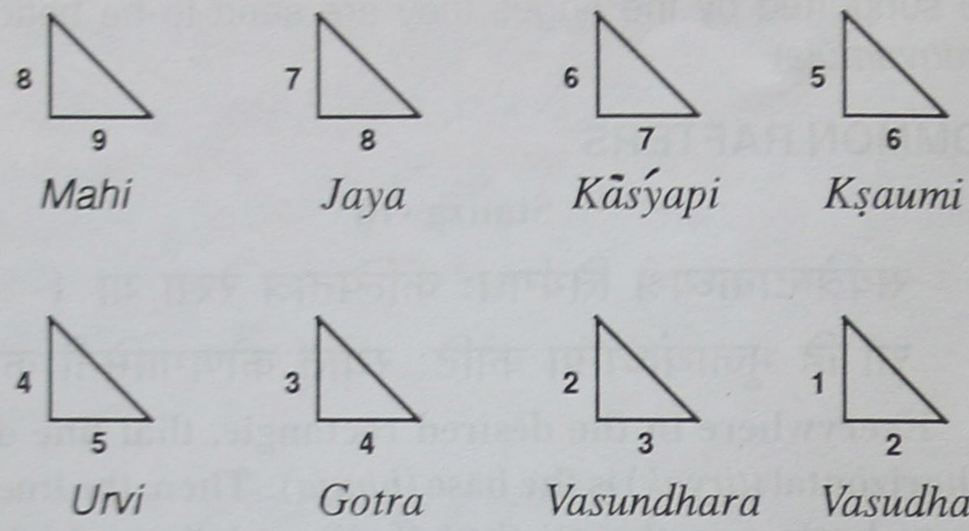


FIG.6.11 NAMES OF ROOF SLOPES FOR HOUSES (*MĀNĀSARA*)

Mayamata designates the slopes as *pāncāla* (4/5), *vaideha* (6/7), *magadha* (8/9), *kaurava* (10/11), *kausala* (12/13), *śaurasena* (14/15), *gāndharva* (16/17) and *avantika* (1/1). Of these all except the last viz; 1:1 is said to be suitable for houses (Ref.06.02).

Stanza -17

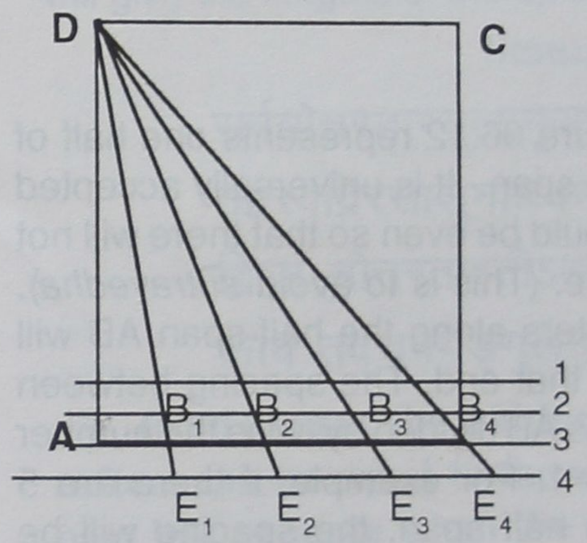
सुश्लक्ष्णे फलकातले क्षितितले वा गेहतारार्धमा-
नाब्यश्रं तदधोभुजापरिमिलत्क्षुद्रोत्तरोच्चोन्मितम् ।
तस्याधो घनमुत्तरस्य च लुपालम्बं च तिर्यग्गतैः
सूत्रैः कल्पयतूत्तरोपरि लुपापङ्क्तिं च युक्त्या ततः ।।

On a flat plank or on the ground, a square with its side equal to half the span of the house (is to be drawn). Touching the lower *bhuja* (base), the height of the minor *uttara* and below that the thickness of the wall plate and the drop of the rafter end are to be marked by horizontal lines. Then on that the row of rafters should be marked.

Commentary

As mentioned in the previous stanza, the dimensions of the rafters are found out graphically. Here the procedure for a roof slope of 1:1 is given. The text *Vāstuvidya* and *Mayamata* also gives a similar method (Ref.06.03 and 04). When the slope is different, the rise (*koṭi*) should be drawn corresponding to the slope and the same procedure adopted.

For a slope of 1:1, a square with its sides equal to half the width of the house (half-span) is drawn on a flat plank or even ground to a scale, usually of 1:8. It is assumed that the base (*bhuja*) of this square is at the top level of *uttara*. The thickness of the minor *uttara* is marked above this and the thickness of the wall plate is marked below this (**fig.06.14**).



AB_4 - *Bhuja* (half span)
AD - *Koṭi* (rise)
BD - *Karṇa* (diagonal)

1-1- Level of top of minor *uttara*
2-2- Top level of wall plate
3-3- bottom level of wall plate
4-4- bottom of rafter end.

FIG.06.12 LENGTH OF RAFTERS

The vertical drop of the end of the rafter is marked below this. Horizontal lines 1-1, 2-2, 3-3, 4-4 are drawn through these points to mark the top level of minor *uttara,* top and bottom levels of wall plate and the end of the rafter.

The spacing of the slanting rafters on the wall plate is then marked on the *bhuja* as explained in the next stanza.

Stanza -18

सङ्ख्याः कोट्युपकोटिकादिविकृतानां या लुपानां तत-
स्ताः सङ्ख्या द्विगुणैकसङ्रव्यरहिताः कल्प्यास्तु सर्वत्र च
द्वे द्वे कोट्युपकोटिकादिविकृतानामन्तराले पृथक्
तत्रैका गृहतारमध्यनिकटेऽप्येवं विभागो मतः ।।

Then, subtracting 1 from twice the number of slanting rafters like *koṭi* and *upakoṭi*, these numbers (the numbers obtained as balance) are to be considered everywhere (as the number of spacings). Then 2 parts between each of the slanting rafters like *koṭi*, *upakoṭi* etc. separately and one (part) at the centre of the width of house, thus the division is accepted.

Commentary

The triangle ABD of figure 06.12 represents one half of the roof frame. AB is half the span. It is universally accepted that the number of rafters should be even so that there will not be any rafter at the centre line. (This is to avoid *sūtravedha*). Therefore, the number of rafters along the half-span AB will be half the total number on that end. The spacing between the rafters will hence be 2 times AB divided by twice the number of rafters in half span minus 1. For example, if there are 5 rafters (including the *koṭi*) in half span, the spacing will be 2AB/9. This *śloka* says that the spacing will be twice the half span divided by 2r-1 where r is the number of rafters (including *koṭi*) in half span. In the centre, the distance of the rafter from the centre line will be half of this. This spacing is to have dimensions of 18 or 22A to satisfy the *padayoni* rule.

Stanza - 19

इति विकृतिलुपानां पङ्क्तिमाकल्प्य तत्त-
न्मितिनियमकृताङ्को यत्तदाक्रान्तकर्णम् ।

नियतकृतलुपालम्बादथाकूटपार्श्वं
भवति पृथगमीषां दीर्घमानं लुपानाम् ।।

Thus deciding the spacing of the slanting rafters,, mark their positions on the *uttara* line. Then the diagonal measurement from the selected drop of the rafters (*niscitalupālamba*) to the side of the *kūṭa* directed through the marked location of each (rafter), forms the length of each rafter.

Commentary

In fig.06.12, the position of the inclined rafters in the wall plate are marked as B_1, B_2, B_3, B_4. From D, the position of *kuta*, draw lines passing through B_1, B_2, B_3 and B_4 and terminating in the horizontal line 4-4 at E_1, E_2, E_3 and E_4. DE_1, DE_2 ..... etc. will give the lengths of the *upakoṭis*.

Stanza - 20

सर्वत्रोत्तरतारतुल्यमृजुमञ्चानां लुपानां ततं
तद्वस्वद्रिरसाशुगाब्ध्यनलभागैकोनितं वान्वितम् ।
द्विघ्नं चोत्तरतारतोऽङ्घ्रिरहिताद्विघ्नं च सार्धं पुनः
कार्यं तद्घनमङ्गुलेन यववृद्ध्या यावदृत्वङ्गुलम् ।।

In all houses, the width of straight rafters and inclined rafters can be equal to the width of the wall plate, or one part less or more when the width of wall plate is divided into 8, 7, 6, 5, 4 or 3 parts, or 2, 1 3/4, 1 1/2 times of the width of wall plate. Its thickness can be made from 1 *angula* to 6 *angula* with increments of 1 *yava*.

Commentary

The width and thickness to be adopted for the straight rafters are given in this stanza. The width can be 2/3, 3/4, 4/5, 5/6, 6/7, 7/8, 1, 1 1/8, 1 1/7, 1 1/6, 1 1/5, 1 1/4, 1 1/3, 1 1/2, 1 3/4 or 2 times the width of the wall plate. The thickness can

be made from 1 *angula* to 6 *angula* in increments of 1 *yava*. (Ref.06.05). Some texts use the word *dalavṛdhya* instead of *yavavṛdhya*. This means that the increment should be in terms of *angula* and not *yava*. The minimum thickness is 1 1/2 *angula* according to this text.

The width and thickness will depend on the span, the quality of wood used and the type of roofing materials. The fact that a wide choice is given for the depth and thickness shows that the actual values are to be decided at site according to these factors. As the width of *uttara* is specified as 1/16 of the width of the room, this is also the minimum depth of rafter.

Stanza - 21

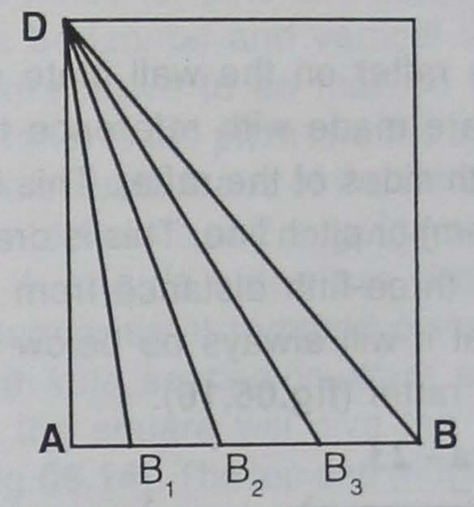
अब्ध्यश्रं मञ्चकस्य प्रततिमितमथाकल्प्य तत्कर्णमर्धी -
कृत्य न्यस्येद् भुजायामथ विकृतिलुपापङ्क्तिमत्रैव कुर्यात् ।
तत्तत्कर्णप्रमाणं खलु विकृतिलुपानां पृथग् विस्तृतिः स्यात्
पार्श्वे कार्यं ध्वजादित्रयमपि च वितानं च लम्बं च सूत्रम् ।।

Drawing a square (with sides) equal to the width of the straight rafter, its diagonal is the width of the hip rafter (*koṭi*). On the base (of the square), the points corresponding to the number of slanting rafters are to be marked. The projection of each on the diagonal through these points will be the width of the slanting rafters separately. The flag line (*dhwajasūtra*) and the horizontal and vertical (lines), should also be marked.

Commentary

The width of the common rafters (straight rafters) on the two sides of the ridge is decided first on the basis of the conditions mentioned earlier. Then draw a square with its sides equal to the width of the straight rafter. The diagonal

of the square, DB will give the width of the hip rafter (*koti*) (Ref.05.06). Assuming that the base of the square is half-span, mark points indicative of the positions of the slanting rafters described earlier in stanza 18.



AB = AD = Width of Straight rafters

FIG.06.13
WIDTH OF RAFTERS

Then draw diagonals through these points B_1, B_2, B_3, B_4 (**fig.06.15**) to D. Then DB, DB_2, DB_3, will be the widths of the slanting rafters, from the centre to the hip.

The pitch line (*dhwajasūtra)*, which is the reference line to be drawn on the rafter for making the cuts and joints and also the base and perpendicular lines to be drawn on the rafter are explained in the succeeding stanzas viz. stanzas 22,23 and 24.

DRAWING THE REFERENCE LINE ON RAFTER

Stanza - 22

व्यासेऽङ्कांशिन्यधोऽब्धिप्रमितमुपरि बाणोन्मितं कल्पयित्वा
मध्ये सूत्रध्वजाख्यं विरचयतु लुपापार्श्वयुग्मे समन्तात् ।
अद्र्यंशिन्यप्यधस्तादनलमितमुदध्युन्मितं चोर्ध्वभागं
यद्वा बाणांशितेऽग्निप्रमितमुपरि दस्रोन्मितं चाप्यधस्तात् ।।

The line called flag line (*dhvjasūtra*) has to be drawn on both sides of the rafter in the middle after dividing the width into 9 parts and leaving 4 parts at top and 5

parts below. Alternatively, it is to be made dividing into 7 parts and leaving 3 parts below and 4 parts above or dividing into 5 and leaving 2 parts above and 3 parts below.

Commentary

The cuts for seating the rafter on the wall plate and holes for the collar pin etc. are made with reference to a longitudinal line drawn on both sides of the rafter. This line is called flag line (*dhvājasūtram*) or pitch line. This is drawn at five-ninth, four-seventh or three-fifth distance from the top cut of the rafter such that it will always be below the longitudinal centre line of the rafter (**fig.06.16**).

Stanza - 23

ध्वजसूत्रस्योभयतो द्व्ययङ्गुलमानेन कल्पयेत् सूत्रम् ।
तदधस्तादप्यूर्ध्वं तत्तद्विस्तारमाननियमः स्यात् ।।

On both sides (top and bottom) of the pitch line, lines have to be drawn at a distance of 2 *angula* (from the pitch line). The measure of width of each has to taken below and top of these.

Stanza - 24

कृत्वा वेदाङ्गुलाब्ध्यश्रकमखिललुपापार्श्वयोर्मध्यसूत्रे
तद्वेदाश्रोत्थकर्णद्वितयमिह वितानं च लम्बं च विद्यात् ।
सर्वत्रैतद् विधेयं द्वयमपि वलयस्थानकूटावासान-
स्थानेष्वप्युत्तराद्यर्पणनियमपदे नीव्रलम्बान्ततोऽपि ।।

Drawing a square of side 4 *angulas* on both sides of all rafters with reference to the pitch lines, the two diagonals of the square are to be known as horizontal (*vitānam*) and vertical (*lambam*) lines. These two have to be drawn everywhere at the positions of collar pins, at the joint with the *kuta*, at the seating over wall plate etc.

and at end of eave drop.

Commentary (Stanza 23 and 24)

In the roof frame, the rafters are kept inclined. To mark the holes for pins and notches for seatings on *uttara* etc., the horizontal and vertical lines (*vitānarekha* and *lambarekha*) have to be marked on the rafters. For this, lines parallel to the pitch line are drawn on both sides of the pitch line on both faces of the rafters. These are generally drawn at a distance of 2 *angula* from the pitch line. Then squares of 4 *angula* sides are drawn with these two lines as boundaries at required places like positions of pins, joints with *kūṭa*, seating on *uttara*, eave end etc. The two diagonals of the square will give the horizontals and vertical lines. (**fig.06.14**). The top end (ridge end) of the rafter is cut parallel to the vertical line. The top and bottom sides of the pin holes and top of seating on *uttara* and the seat bird's beak at the lower end are all parallel to the horizontals.

This procedure of taking the diagonals of the square as vertical and horizontal lines is true only when the rise is half the span. For lesser slopes, this rule will not apply. In such cases, the procedure followed is as follows:

Draw the triangle ABD as in figure 06.12 to scale with AB representing *bhuja*, AD representing *koti* and DB representing the length of rafter. Take a rectangular wooden plank of width equal to the upper part of the rafter (portion above pitch line). Place this with its longer top edge aligned with the line DB (**fig.06.15a**). Slide it along DB till the bottom corner touches the line AB. In that position, mark on the plank the point F corresponding to the point B (**fig.06.15b**). Then mark on the pitch line of the actual rafter, the points where the holes and notches have to be made. These are called selected points (*iṣṭabindu*). Place the rectangular plank on the rafter with its top edge in line with top edge of the rafter and bottom edge in line with the pitch line and

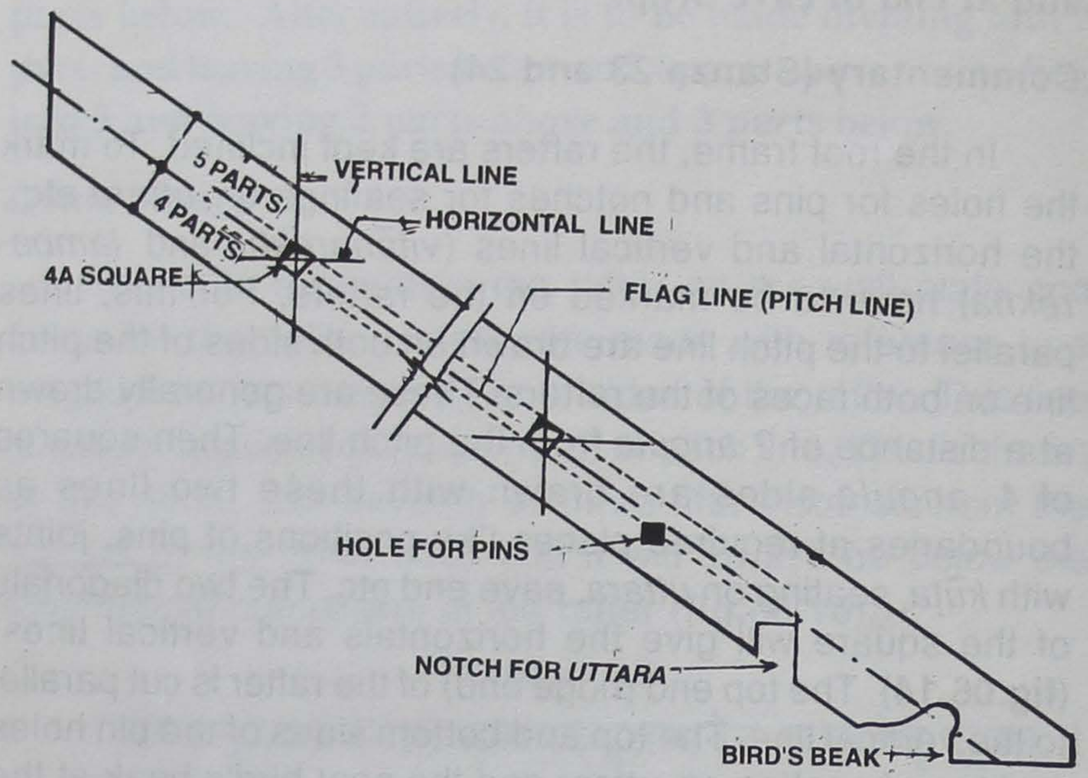


FIG. 06.14 MARKING REFERENCE LINE OF RAFTER

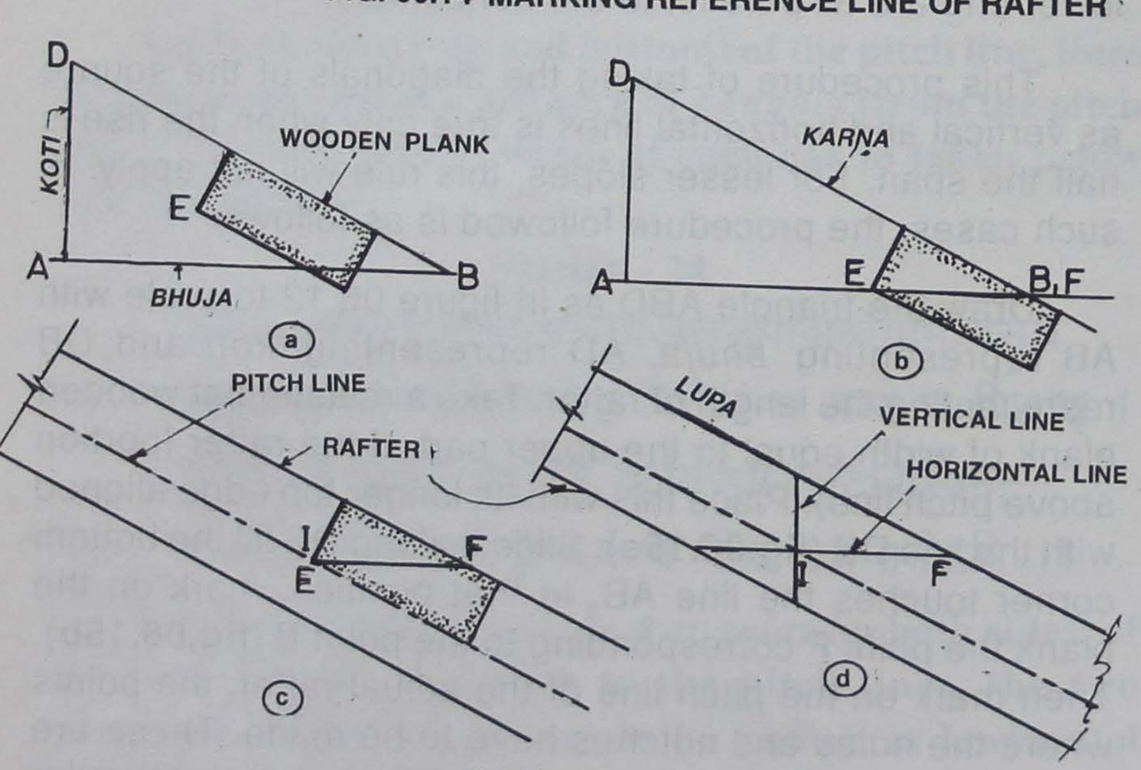


FIG. 06.15

METHOD FOR CUTTING RAFTERS WHEN SLOPE IS NOT 1:1

move it along the pitch line till the edge E conincides with one of the *iṣṭabindus* I (**fig.06.15c**). In this position, transfer the point F to the top edge of the rafter. The line joining IF will be the *vitānarekha*. The *lambarekha* is drawn perpendicular to this .

ALPAMANDIRAVIDHI

Stanza - 25

चूली वा क्वचिदल्पमन्दिरविधौ तत्रापि युग्माः स्मृता
विष्कम्भाश्च तदर्धसम्मिततदङ्घ्रयग्रेषु वंशोऽपि च ।
तस्मादङ्घ्रिसमुच्छ्रयात् त्यजतु वा क्वाप्यद्रिनागाङ्कदिग्-
रूद्रांशं त्विह चूलिकोपरि लुपाश्च स्वाग्रधान्याचिताः।।

In small houses, *cūli* (can be used) in some places. Even in such cases, the cross beams (*viṣkambhas*) are prescribed to be in even numbers. The ridge (is to be placed) on top of the central post at its (that of cross beam) centre. From the length of the post, one part out of 7, 8, 9, 10 or 11 parts can be reduced in some place. Here the rafters with their ridge are to be fixed over the *cūli*.

Commentary

For small houses, ie. houses with small span, the wall plates are placed as *cūlis* (bressumer) with the depth more than the width. In such cases, the minor *uttara (kṣudrouttara)* is not necessary. The rafters are placed directly on the *culis* (**fig.06.18**). Cross beams (*viṣkambhas*) are provided between the *cūlis* in even numbers 2,4 etc.. At the centre of the *viṣkambhas,* centre posts are provided to support the ridge. The height of the posts may be half span (45° slope). The height can be less than this slope if desired.

In buildings with large span and in all important buildings, the roof-frame will be as described in the earlier stanzas. The ridge, *ārūdhottara*, wall plate, eave reaper,

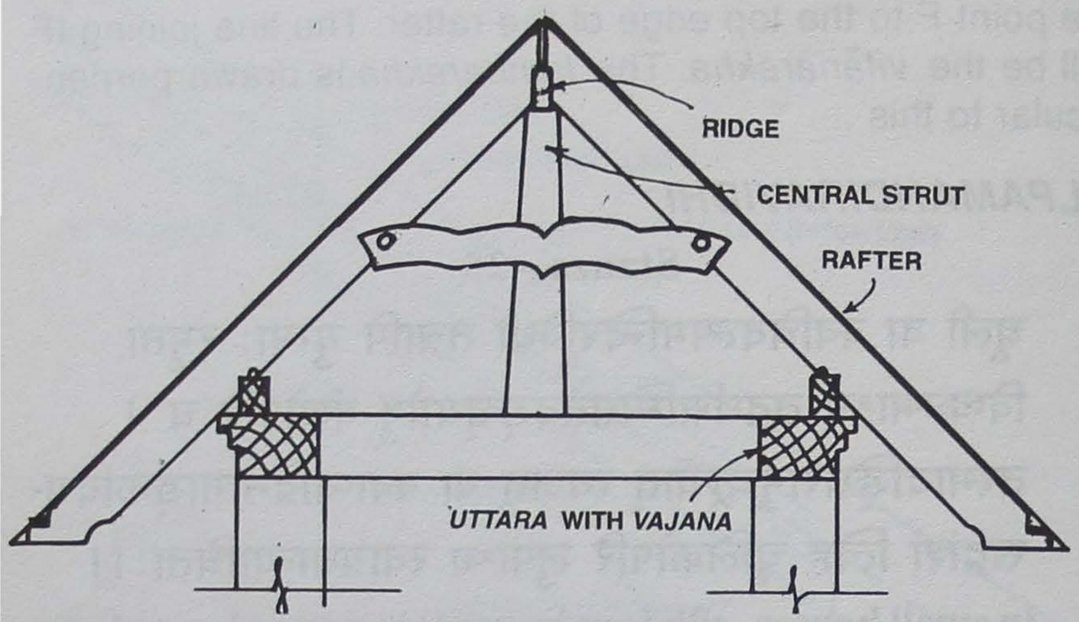


FIG. 06.16 ROOF FRAME WITH CENTRAL POSTS

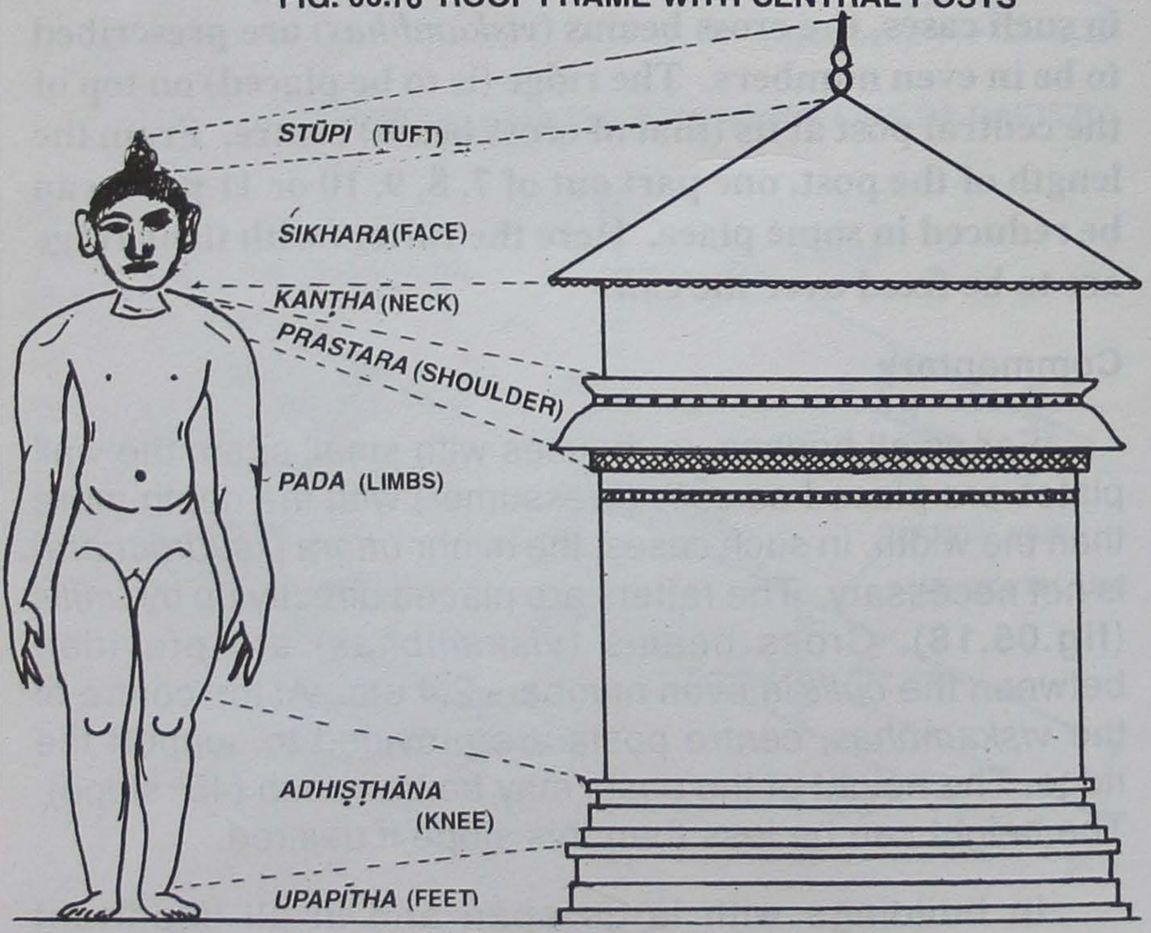


FIG. 06.17 HOUSE AS *PURUṢA*

rafters, collars and pins give rigidity and strength to the frame. In buildings of small span, *ārūdhottara* is not necessary. Minor *uttara* for fixing the rafters is also avoided. In such cases, tie beams at the level of the *uttara* and vertical posts supported on these tie beams give sufficient strength and rigidity to the roof.

EAVE REAPER

Stanza- 26

विस्तारे पुनरुत्तरस्य दशधा भक्ते रसाद्यष्टदिग्-
भागैर्वोत्तरतारतोऽङ्घ्रिरहितं वाद्रयंशितेऽग्न्यंशकैः।
विस्तारं प्रकरोतु नीप्रफलकस्यैतत्त्रिभागं घनं
विस्तारे शरभाजितेऽपि च घनं द्वाभ्यां प्रकुर्यात् क्वचित्।।

The width of the eave reaper (*nīvraphalaka*) is to be made by 6, 7 8, 9 or 10 parts when the width of *uttara* is divided by 10 or by reducing one part out of 4 parts of the width of *uttara* or by 3 parts when divided by 7. The thickness is 1/3 of this. The thickness can be made by 2 (parts) when the width is divided by 7.

Stanza - 27

नीप्रव्यासे शरांशिन्यथ तदुभयतस्तूर्ध्वपट्टं तलं च
द्वाभ्यामेकेन पट्टं चरममपि विधेयं तथा षड्विभक्ते।
द्वाभ्यां तस्योर्ध्वपट्टं त्रिभिरपि च तलं स्यादधः पट्टमेके-
नैवं वा नागभक्ते ज्वलननिगमभूम्यंशतः कल्पनीयाः ।।

When the width of eave reaper is divided by 5, the top belt is to be done with 2 (parts), then with 2 parts the groove, and by one (part) the last belt. Similarly when divided by 6, its top belt is to be by 2 (parts), groove by three (parts) and by one (part) the lower belt. Likewise when divided by 8, they should be designed by 3, 4 and 1 parts.

Commentary

Stanzas 26 and 27 give the details of the eave reaper. The eave reaper connecting the lower ends of all the rafters adds rigidity to the roof frame. In the roof frame, the collars prevent lateral twisting of the rafters. The collar pins not only provide connection between the rafters and the collars but also prevent buckling and bending of the rafters. The eave reapers prevent displacement and torsion of the free and of the rafters. The entire roof frame is made at the ground and erected part by part. Eave reaper is the last element to be jointed. Therefore, fixing the eave reaper is considered to be an important function and, should be accompanied by rituals like *vāyavya homa* as explained in the next stanza.

The width of the eave reaper is prescribed to be 3/7, 6/10, 7/10, 8/10, 9/10 , 1 or 3/4 of the width of the wall plate ie. from about 43% to 100% of the width of wall plate.

The thickness is 1/3 or 2/5 of its width, the larger ratio being used when the width is small.

The cross-section of a typical eave reaper is given in **fig.06.03**. The proportions recommended for a, b and c are given in table 06.01.

TABLE 06.01

Type	a	b	c
1	2/5w	2/5w	4/5w
2	2/6w	3/6w	1/6w
3	3/8w	4/8w	1/8w

The lower belt c is avoided in certain cases. Then a = 3/5 w, b=2/5w, c=0.

It is prescribed that the perimeter measured along the outside edge of the eave reaper should be in *yoni* prescribed for the orientation of the building.

Stanza - 28

नीप्रव्यासे विभक्ते शरगिरिनवभिः सर्वतो वह्निभागं
नीप्रस्थानाद् वितानादुपरि तदुचितं कोटिकर्णाध्वनात्र।
नीत्वा नीप्रं लुपासु स्वयमिह विधिना धूलिकारोधयोग्यं
कृत्वा वायव्यहोमाद्यवहितहृदयः कारुभिः कल्पयेत् तत्।।

When the width of the eave reaper is divided into 5,7 or 9 parts, 3 parts should be the transverse shift of the corner above the pitch line everywhere and then the eave reaper should be fixed on the rafter so as to accommodate the eave-board.

Commentary

Apart from the structural function explained in the previous stanza, the eave reaper has another use. It helps to give an upward tilt to the roof covering at the tip such that the water draining from the roof is thrown off preventing the water dripping along the edge (**see fig.06.03**). This practice may have its origin from the time when tiles were used for the roof covering because it prevented the end tile from sliding. The eave board serves as a protection to the rafter-ends and is to be fixed flush with eave-reaper vertically.

As indicated earlier, it is prescribed that *vāyavya homa* should be done at the time of fixing the eave-reaper. This shows the important of the eave-reaper as a major element of the roof frame. Moreover fixing of the eave reaper marks the end of the work of erection of the roof-frame.

The artisans who are engaged in the work should be given food, cloth etc. to please them. The text *Vāstuvidya* prescribes that the eave reaper should be washed with pure water, coconut water, milk and *pancagavya* (the five items received from the cow, viz. milk, buttermilk, ghee, urine and dung). (Ref.06.07).

COLLAR PIN

Stanza - 29

मनुयवचतुरश्रं द्व्यङ्गुलं तत्र तु द्वि-
द्वययवपरिवृद्ध्या त्र्यङ्गुलान्तं क्रमेण।
वलयमिति मुनीन्द्रैः षड्विधं दर्शितं ते
ष्विह विहितलुपौचित्येन तत् कल्पनीयम् ।।

The collar pin has been seen by the sages in 6 ways, from 14 *yava* square to 3 *angula* in increments of 2 *yava*. Among these, it should be made to suit the rafter prescribed here.

Commentary

The collar pins (liernes) fix the collars to the rafters. They are of square section inorder to prevent buckling of the rafters. Their size will depend on the width of the rafter. The side of the square pin varies from 14 *yava* (5.25cm) to 3 *angula* (9.00cm) in increments of 2 *yava* (0.75cm). The recommended widths are, therefore, 5.25cm, 6cm, 6.75cm, 7.5cm, 8.25cm and 9cm.

The holes for the pins are made on the rafter below what is known as the pitch line (*dhvajarekha)*. The pitch line is drawn longitudinally on the flat side of the rafter a little below the centre line. Usually 5/9 part of the width is kept above and 4/9 part below the centre **(fig.06.16)**.

REAPER

Stanza - 30

तत्र सप्तदशभिर्यवैः स्मृता पट्टिकावितितिरङ्कसम्मितै : ।
तद्घनं घनपदोनमन्तरं सन्दधीत च लुपासु कीलकै : ।।

There the width of reaper is made by 17 *yava* and its thickness by 9 *yava*. The gap is three-fourth of its thickness. It is to be fixed to reaper by nails.

Commentary

This gives the dimensions of the reapers. The width and thickness are prescribed to be 17 *yava* (5.775cm) and 9 *yava* (3.3175cm) respectively. The gap is only 6.75 *yava* (2.68cm). The prescribed gap is small because in earlier days, the tiles were small (plot tiles, flat tiles and pan tiles). For Mangalore pattern tiles, the centre to centre distance of the reapers is to be 35cm equaivalent to 131.25 *yava*.

Stanza - 31

लोष्टैराच्छाद्यते चेदखिलनिलयने पट्टिकाप्रस्तरः स्यात्
तत्स्थाने क्वाापि कार्योऽपि च घनफलकाप्रस्तरो बद्धकील : ।
लोष्टाधाराय किञ्चित् तलमपि चखनेच्चाञ्चु सन्धारणार्थं
ताम्रैराच्छाद्यते चेन्न तु तलरचना देवगेहादिकेषु ।।

In all buildings that are covered by tiles, there should be rows of reapers. In some situations, thick planks fixed by nails also are to be fixed and a groove for the lip of the tiles also (is to be made) to fit the nib (of the tile). If temples etc. are covered by copper plates, this groove need not be made.

Commentary

If the roof is covered by tiles, the spacing of the reapers should be according to the length of the tiles. Instead of the reapers fixed with gaps in between them, the entire roof surface is sometimes covered by thick planks fixed to the rafters by nails. If the roof is covered by tiles, grooves should be made in the planks to accommodate the nibs of the tiles as otherwise, the tiles will slip. The depth of the groove need only be sufficient

to accommodate the nib. In important structures like the *garbhagṛha* of temples, copper sheet is used as roof covering to give full protection from pouring rains. In such cases, of course, the grooves are not required as the copper sheets are directly fixed over the planks.

Covering the entire roof surface by planks is like providing a ceiling below the roof covering. This gives security also. But when tiles slip or break and causes leak, it is very difficult to detect the faulty tiles and effect replacement.

Stanza - 32

शिरःप्रदेशस्त्वभिधानमुक्तं वेश्माख्यपुंसस्तदधोमुखं स्यात् ।
मासूरतुङ्गार्धपदोनितं तद्विस्तारमाद्यङ्गघनाद् घनं च ।।

The turban of the man called the house is mentioned as *apidhāna*. It should be face down. Its width is half or three-fourth of the height of basement and thickness is the thickness of *pāduka* (*ādyamśa*).

Commentary

In *Vāstuvidya*, the house is considered as a human being (*puruṣa*) (**fig.06.17**). The roof is considered as the head and the ridge as the top of the head. The ridge is covered by a plank called *apidhāna* specially when the roof covering is done with copper plates. Being the last wooden member of the roof, it is also called the last plank (*avasāna phalaka*). This plank is compared to the turban. The width of *apidhāna* is three-fourth or half the height of the basement. Its thickness is equal to the thickness of the *pāduka*, the bottom course of basement.

In ordinary constructions and in constructions where ridge tiles are provided at the top, this *apidhana* is not generally provided.

[Note: Stanzas 25 to 32 included in this chapter are seen given as slokas 1 to 8 Chapter 7 in the text edited by Ganapati Sastri. These slokas describe the details

such as bressumer, eave, collar pin, reaper etc. of the roof. Hence it is more appropriate to include them in chapter 6 which describe the other parts of the roofs. Several editors follow this method. Hence, it is followed in this book also]

REFERENCES

06.01 देवानां मानुषाणां च लुपमानं यथाक्रमम् ।
अंबरं चव्ययं (वियज्) ज्योतिर् गगनं च विहायसि ॥
अनन्तं चान्तरीक्षं च पुष्कलं चाष्टधा लुपाः ।
देवानां हर्म्यके कुर्यादुक्तमेवं पुरातनैः ॥
महीज्या काश्यपी क्षौणी चोर्वी गोत्रा वसुन्धरा ।
वसुधा चाष्टथा प्रोक्ता कारयेन्मानुषालये ॥
M.S.,XVIII - 86,87,88

06.02 दण्डिका च विधातव्या तदूर्ध्वेशीखरक्रिया ।
शिखरोत्सेधमात्तोच्चा भागमानवशेन च ॥
दण्डिकावधि विस्तारं पञ्चांशं द्वंशमानकम् ।
सप्तनन्दशिवांशे तु त्रयो दशतिथौ तथा ॥
सप्तदशांशके बन्धवेद भूतषडंशकं ।
सप्ताष्टांशं तु तारार्धमित्यष्टौ शिखरोदया ॥
पाञ्चालं चापि वैदेहं मागधं चापि कौरवम् ।
कौसलं शौरसेनं च गान्धारावन्तिकं तथा ॥
यथाक्रमेण नामानि ज्ञातव्यानि विचक्षणैः ।
जघनाद्बहिरेवैते एका सर्वे समाहिताः ॥
सर्वते तैतलानां स्युरर्धाधस्तु मानुषम् ।
तद्दशाद्यासप्तदशाभागदेकांशवर्द्धनात् ॥
M.M.,XVIII, 7 - 12

06.03 व्यासार्द्धेप्यूर्द्ध्वगां रेखां यावद्वंशायतां लिखेत् ।
तयोः कर्णगतं सूत्रं वंशान्नीव्रान्तमालिखेत् ॥

V.V.,XI-03

06.04 दण्डिकावधि तारार्धं चतुरश्रीकृतं समम् ।
तत्तत् पुष्करसंजातं तत्तन्मल्लायतं विदुः ॥

M.M., XVIII, 23 - 29

06.05 सार्द्धांगुलं समारभ्य यावदृत्वंगुलान्तकम् ।
लुपानामंशवृद्ध्यातु बहुळ्यं यववृद्धितः ॥

V.V.,X.03

06.06 विकृति व्याससदृशं तुर्याश्रं कल्पयेत् बुधः ।
तारार्द्धगतसूत्राणि लुपानामपिकल्पयेत् ॥
तस्य कर्णादिनां तारं कोट्यादिनां प्रकीर्त्तितं ।

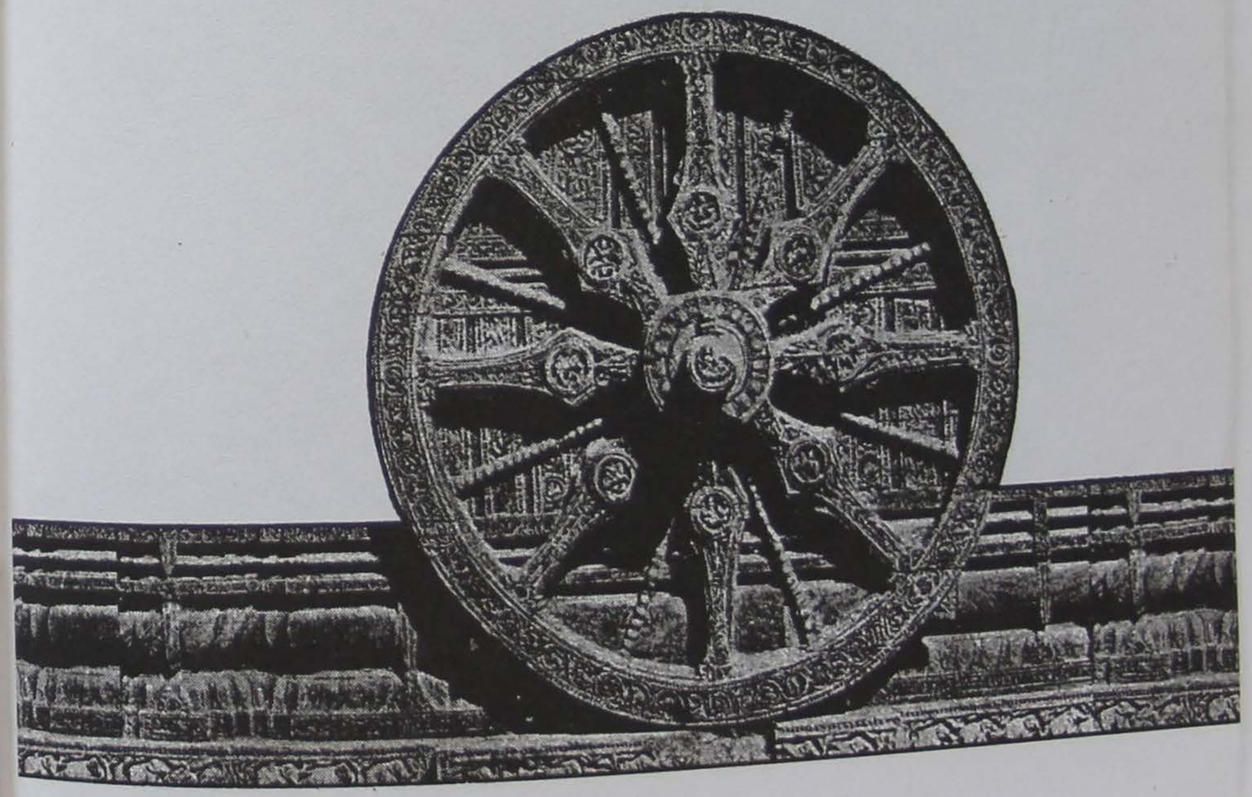
V.V.,10-04

06.07 तैरेव विप्रमुख्यैश्च सहस्राणि प्रपट्टिकाः ।
प्रक्षाळ्यशुद्धतोयेन नाळिकेरोदकेन च ।
क्षीरेण च तथा कृत्वा चतुर्द्दिक्षु सुसंस्थिताः ।
आसिच्य पञ्चगर्व्येन संपाताज्येन सेचयेत् ॥

V.V.,XII-7

7
ANCILLARY STRUCTURES
कवाटबाह्यगेहकूपादिविधयः

Doors; gate; location of facilities; secondary buildings; wells; tanks; compound wall; first entry into the house.



LIST OF ILLUSTRATIONS

CHAPTER - 7

अथ सप्तमोऽध्यायः

DESIGN OF ANCILLARY STRUCTURES

कवाटबाह्यगेहकूपादिविधयः

POSITION AND DETAILS OF DOORS

Stanza - 1

द्वाराण्यङ्गणगेहमध्यसिरयोर्मध्यस्थमध्यान्यधो
कुर्यादङ्गुलकल्पितागमवयोयोनीनि पूर्वादितः ।
योगावुत्तरतारतुल्यवितौ विस्तारतुल्याङ्घ्रिव-
ह्न्यर्थांशोनघनौ भुवङ्गमपतङ्गाढ्यौ लसद्वाजनौ ।।

Doors should be placed below in east etc. with the centres located midway between the centre lines of courtyard and houses and with income, age and *yoni* computed in *angula*. The two door posts with *vājanas* (should have) width equal to width of *uttara* and thickness equal to or 3/4, 2/3 or 1/2 of (their) width with sill and head.

Stanza - 2

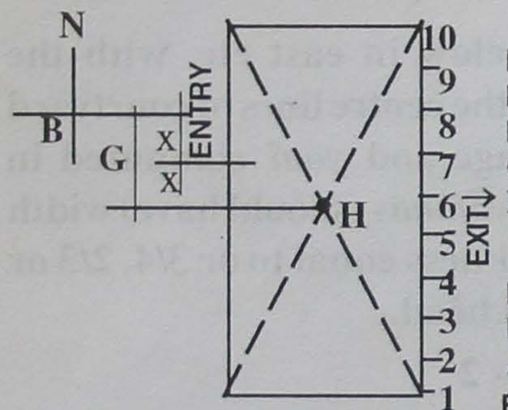
योगादङ्घ्र्यग्निभागाधिकघनयुतनिर्वाजनाधः पटी स्या-
दूर्ध्वस्थाने तु तुल्योत्तरमिलितनिजाग्रौ च योगौ विधेयौ ।
योगान्तर्भागनाहो निजदिगुचितयोन्यायवृद्ध्यादियुक्त -
स्वेष्टायामोन नाहार्धत इह विततिः स्याद् गुणव्यासतो वा।।

The sill should have thickness of one-fourth or one-third part more than the thickness of posts and no *vājana*. The top beam should be similar to the posts. The posts should be made with their tops reaching the *uttara*. The inside

perimeter of the frame should have *yoni* suitable for the direction and excess income etc. The width (is to be obtained) from the semi-perimeter by its *iṣṭadīrgha* or *guṇāmśa*.

Commentary

The doors described here are the doors for entering the *salas* from the courtyard. It has already been described that the centre lines of the main *śala* should be shifted from the centre-lines of the courtyard in the clockwise direction to avoid *vedha* (affliction). The doors should be located such that the centre of the door opening should be at the centre of the shift (*gamana*) of the centre line of the house from the centre line of the *ankaṇa* (**fig.07.01**) (Ref.07.01). *Mayamata* also says that the door at the centre line of the house is suitable in temples, palaces and the houses of *brāhmaṇas*. For all others it should be to one side of the central axis (Ref.07.02). The doors should face the *ankaṇa*.



N - NORTH
B - CENTRE OF YARD (*ANKAṆANĀBHI*)
H - CENTRE OF *SALA* (*HARMYA NABHI*)
G - SHIFT OF *SALA* (*GAMANA*)
X - SHIFT OF DOOR CENTRE *(DWĀRA-MADHYA)*

ENTRY DOOR OF *SALA* IS LOCATED IN BETWEEN *ANKAṆA*, *SUTRA* AND *HARMYASŪTRA*

EXIT DOOR OF *SALA* IS LOCATED WITH ITS CENTRE ON 6TH LINE OF 10 LINES DIVIDING THE REAR LENGTH INTO 9 PARTS AS SHOWN FOR A TYPICAL WEST FACING *ŚĀLA*. IT CAN ALSO BE ON THE 7TH LINE OF 12 LINES DIVIDING THE LENGTH INTO 11 PARTS

FIG.07.01 LOCATION OF MAIN ENTRY AND EXIT DOORS OF BUILDINGS

The inside perimeter of the door frame should be in the *yoni* prescribed for the house, i.e. *dhvajayoni* for the door in the eastern house and so on. For finding the *yoni,* the perimeter should be converted to *angula* units, as already mentioned in the commentary on stanza 13 of chapter 2. The income (*āyā*)

should be more than the expenditure (*vyaya*). The age should not be in the range of death (*maraṇaparyanta*). The other astrological factors like star, phase of the moon also should be auspicious. Table 07.01 gives some measurements that can be used for the doors.

TABLE 07.01

DIMENSIONS OF DOORS, WINDOWS AND VENTILATORS

Description	Inside dimensions			
	Height		Width	
	H - A	cm	H - A	cm
i) Doors				
Main door	2 -16	192	1 -4	84
do	2 -14	186	1 -6	90
Sub door	2 -10	174	1 -2	78
ii) Windows				
Large	1 -16	120	2 -4	156
do	1 -22	138	1 -14	114
Small	1 -18	126	1 -2	78
do	1 -10	102	1 -2	78
iii) Ventilators	0 -14	42	1 -6	90
do	0 -12	36	1 -0	72

For the door posts, the width should be equal to the width of *uttara* (**fig.07.02**). Their thickness can be equal to the width or equal to 3/4, 2/3 or 1/2 the width. The door posts can have *vājana* decoration. The doors posts should reach up to the *uttara*. There should be upper and lower connecting pieces called head and sill. The width of the sill and head should be same as that of the post. The thickness of the sill should be $1\frac{1}{3}$ or $1\frac{1}{4}$ of the thickness of the posts. The head should have thickness equal to that of the posts.

The width of the door is decided either by *iṣṭadīrghavidhi*

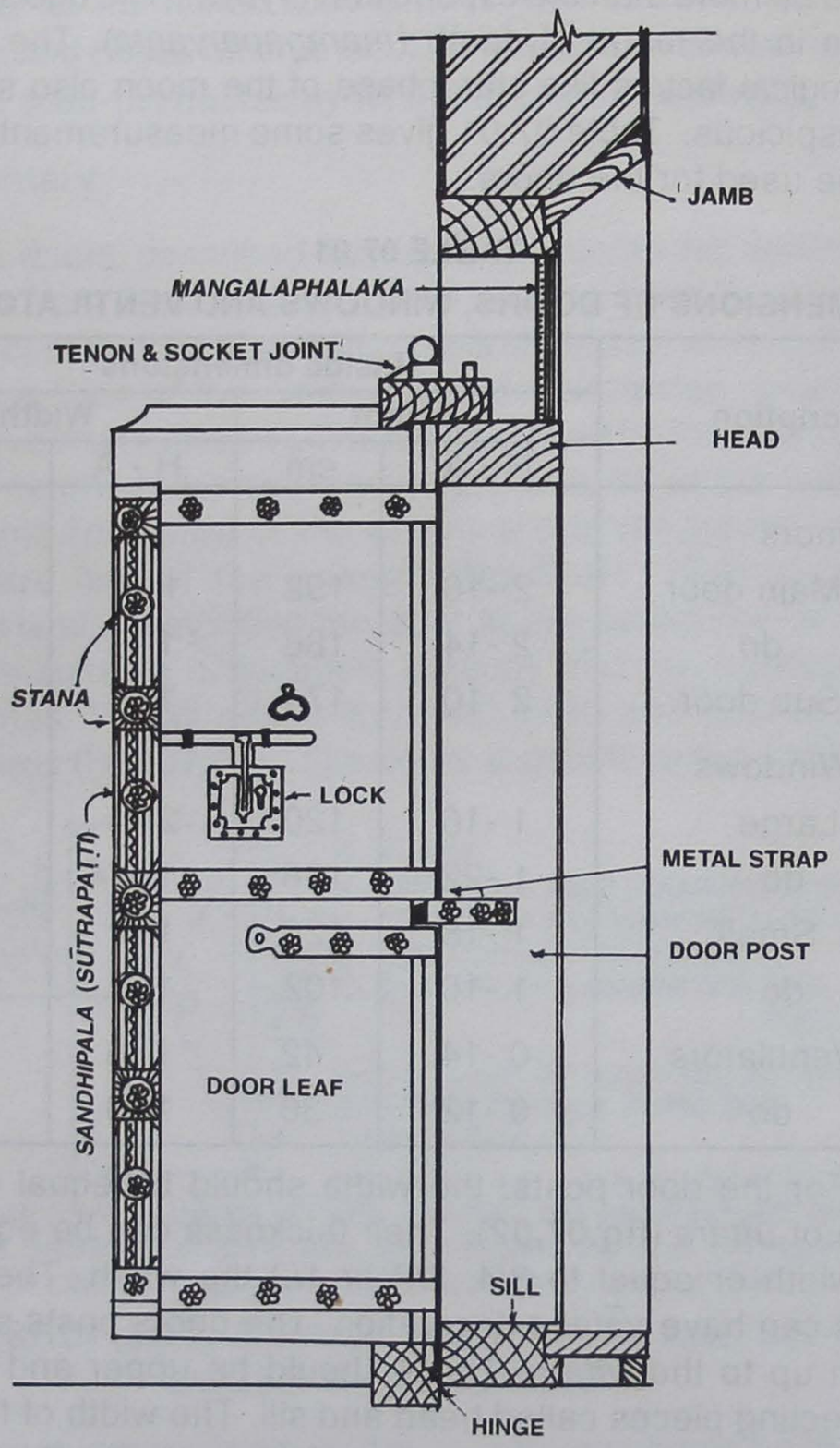


FIG. 07.02 DETAILS OF DOORS

or *guṇāmsávidhi.* From the semi-perimeter, the *iṣṭadīrgha* is subtracted to give the width or the semi-perimeter is divided in the ratios prescribed by *guṇāmśa* rule.

For example, let the perimeter of the door be 8H8A in *dhvajayoni*. Subtracting *yoni* number 1 and taking length to width ratio as 3, the *iṣṭadīrgha* is 3H. The corresponding width is 1H 4A. By *guṇāmśa* rule, let the semi perimeter be 4H4A. Dividing by 14 and taking 4 parts as width, the width adjusted to *angula* is 1H4A and the length is 3H 0A.

According to *Īśánaśivagurudevapaddhati*, (Ref. 07.03) the thickness of the sill and head are arrived as follows:

Subtract the height of doors from the height of the pillar/ wall and divide the remainder by 5. Then two parts will give the thickness of sill. Three parts will give the depth from the *uttara* to the bottom of the head. From this value (i.e.. 3 parts), the head of prescribed thickness (i.e. equal to that of post) is kept and the balance is used to provide the *managalaphalaka* (described later in the next stanza).

MANAGALAPHALAKA

Stanza - 3

द्वारोर्ध्वपट्यूर्ध्वमथो गणोशपद्मालयायादवमूर्तिभेदान् ।।
यथेष्टमापाद्य विचित्रपत्रिप्रभेदयुक्तां फलकां विदध्यात् ।।

Then above the head of the door, the plank (called *mangalaphalaka)* should be placed with the sculptured images of *Gaṇeśa, Lakṣmi* or *Kṛṣṇa* made as desired and with the images of different birds.

Commentary

This describes the *mangalaphalaka* fixed above the head and between the door posts. It was stated in the last stanza that the top of the door posts should reach up to the

uttara for strength. Then the gap above the door head is covered by this plank. This should be decorated with carved or relief figures of Gods and birds. This served the purpose of not only covering the gap above the head of the door, but also providing a storage space behind it.

DOORS IN THICK WALLS

Stanza - 4

कुड्ये भूयिष्ठविस्तारिणि दिवसकरैर्भाजितेऽन्तर्बहिश्चा-
प्यद्रीष्वंशान् विधायान्तरविहितसिरालग्नमध्यौ च योगौ ।
कृत्वा क्वाप्येतयोर्मूर्धनि सुदृढतरामूर्ध्वपट्टीं तदूर्ध्वं
भित्त्यङ्गादीनि कुर्याद् दृढतरशिलया मृत्सुधायोगभेदैः ।।

Wall of great width is to be divided into 12 and keeping 7 and 5 parts inside and outside (respectively), the door posts should be placed with their centres at this line (viz. dividing line). Sometimes, above these, a strong top plank (*ūrdhvapaṭṭi*) and above that the limbs of the wall should be done, with strong stone or combinations of mud and mortar.

Commentary

In walls with thickness more than the thickness of door posts, the door posts should be placed such that their centre line is at 5/12 times the thickness of the wall measured from outside i.e. the door will be towards the outside edge of the wall. Above the top beam, instead of the *mangalaphalaka,* masonry wall or stone wall can be constructed. In such cases, a strong plank (*ūrdhvapaṭṭa - maṇpalaka* in Malayalam) is kept above the top beam for supporting the wall. The *ūrdhvapaṭṭa* serves the function of lintel.

DOORS OF WALLS ABOVE CELLARS

Stanza - 5

अन्तर्नाहजमन्दिरे घनतरे कार्ये च कुड्ये क्वचिद्
गेहप्राङ्गणपादुकावधि करोतु स्वांशकुड्यं घनम् ।
तत्तत्प्राङ्गणगेहसूत्रमनुसृत्यैवेष्टकुड्यप्रथा -
निष्ठं पृष्ठत एव नेयमुदितद्वारोत्तरादीनि च ।।

If the walls are made very thick in buildings generated with inside perimeter, in some places, the wall is to be done with its edge up to the *pāduka* of the building's courtyard. The doors and wall plates are prescribed to be taken outside to the edge of the selected wall obeying the centre line rule of respective *śālas* and yards.

Commentary

There was a practice of raising some *diggṛhas* and/or *vidiggṛhas* by constructing an additional *adhiṣṭhāna* by placing a second *pāduka* over the first *adhiṣṭhāna*. The wall is constructed over the second *adhiṣṭhāna*. In such cases, the limbs of *adhiṣṭhāna* like *jagati, gala, prati* are generally shown only outside the *ankaṇa* wall. Such raised *salas* are called *antarnāhamandiras* because their dimensions are decided by considering the inside perimeter. Such *śālas* are generally used as strong rooms for keeping costly articles. For such *śālas* also, the doors are placed midway between the centre lines of the yard and the *śāla*.

RULES FOR DOORS

Stanza - 6

कावाटयुग्मं निजतीव्रयुक्तद्वारप्रथार्धप्रततं विधेयम् ।
मात्राङ्गुलैर्नेत्रहुताशसङ्ख्यैः सार्धैश्च यद्वाब्धिमितैर्घनं च ।।

The two shutters (*kavāṭayugma*) should be made with width equal to half the width of the opening plus their own

thickness. The thickness can be made 2 1/2 or 3 1/2 *mātrāngulas* or 4 *mātrāngulas*.

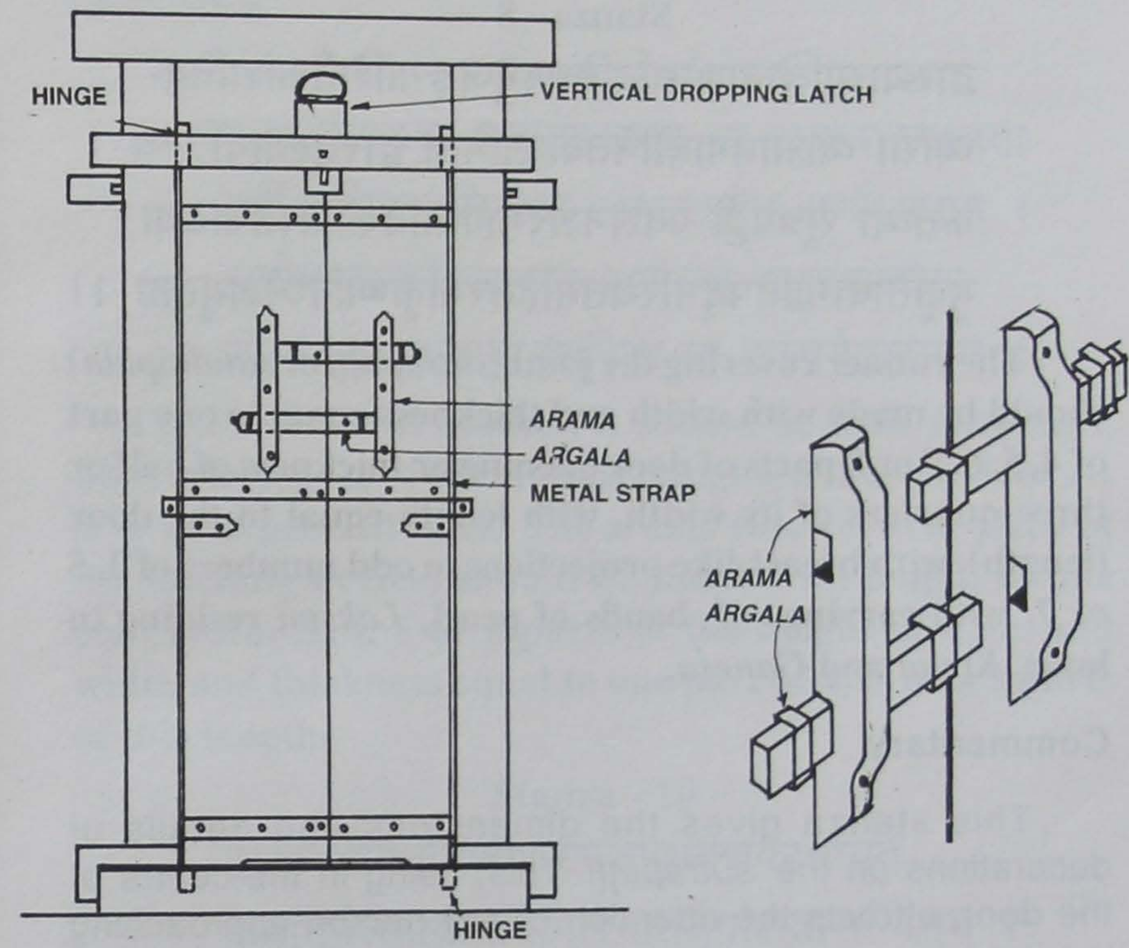
Stanza - 7

ऊर्ध्वाधरभ्रमणकार्गलसन्धिपाल-
प्रक्षेपणीयवलयान्यपि पत्रकाणि ।
तिर्यञ्च्युदञ्चि पुलकार्तवकुड्मलानि
सश्रीमुखेन्दुशकलानि कवाटयोः स्युः ।।

There should be hinges (*bhramaṇaka*) at top and bottom, latches (*argala*), reaper covering the joint (*sandhipāla; sūtrapaṭṭika* in Malayalam), rings (handles) for closing (*prakṣepaniyavalayāni*), longitudinal and lateral straps (*tiryanciudanci patrakāṇi*), *śrīmukha*, crescent of the moon (*induśakala*) and flower-buds and fully blosomed flowers on the two shutters.

Commentary

The doors generally, are made with two shutters of equal width. The thickness of the shutters may be 2 1/2, 3 1/2 or 4 *angulas*. The width of each shutter is half the width of the opening plus the thickness of the shutter. This is for providing rebates at the joints. The joint is concealed by a runner called *sandhipāla* placed outside. (**fig.07.02**). The shutters are connected to the sill and head by pinion and socket joints. The shutters are secured from inside by latches (**fig.07.03**), the details of which are given in stanza 18. For holding the shutters for closing, plain or ornamental metal rings are provided. Metal straps (of mild steel or brass) are provided to make the shutters strong. The heads of nails or rivets for fixing the straps will be shaped like flowers or birds. Ornamentation with *śrīmukha* (literally meaning face of *Laksmi*) which are hemispherical attachments and with curved metal embellishments in the shape of crescent of the moon, all made of mild steel or brass are also provided.



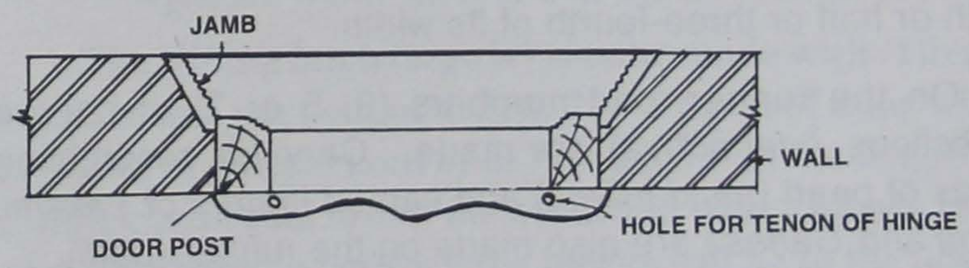


FIG. 07.03 LATCHING DEVICES

RUNNER COVERING THE JOINT OF SHUTTERS

Stanza - 8

द्वाख्यासाब्धिबाणोर्म्यवनिधरभुजङ्गांशितैकांशतिव्र-
व्यासा व्यासार्धपादोनितबहलमिता द्वारतुल्यायतिश्च ।
कर्तव्या सूत्रपट्टी ज्वलनशरमहीध्रादिकौजस्तनाढ्या
मुक्तादामादिपद्मस्थितमहितरमाकृष्णविघ्नेशयुत्का ।।

The runner covering the joint (*sūtrapaṭṭi* or *sandhipāla*) should be made with width and thickness equal to one part of 4, 5, 6, 7 or 8 parts of door opening or thickness of half or three-quarters of its width, with length equal to the door (length), with breast-like projections in odd numbers of 3, 5 or 7, with carvings of bands of pearl, *Lakṣmi* residing in lotus, *Kṛṣṇa* and *Gaṇeśa*.

Commentary

This stanza gives the dimensions and details of decorations on the *sūtrapaṭṭi*. This, being in the centre of the door, attracts the attention of any person approaching the door. Hence it is made ornamental specially in the case of the main door. Its width is equal to 1/4, 1/5, 1/6, 1/7 or 1/8 part of door opening. The thickness can be equal to its width or half or three-fourth of its width.

On the runner, odd numbers (3, 5 or 7) of carved projections *(stanādhya*) are made. Carvings resembling bands of pearl (*muktādāma*) and carved figures of *Lakṣmi, Kṛṣṇa* and *Gaṇeśa* are also made on the runner (*paṭṭi*).

Instead of or in addition to the ball and socket joint (*bhramaṇaka*) at top and bottom, lateral metal straps on the door are sometimes extended beyond the shutters to form additional hinges for added security.

In important buildings, the door jambs are covered with

timber planks with *vājana* decorations.

LATCHES

Stanza - 9

माता वामगता कवाटफलका सा सूत्रपट्टयाश्रया
पुत्री दक्षिणगामिनीति सकलद्वारेषु सम्प्रेक्ष्यताम् ।
द्वारोच्चानलवेदबाणरसभागोच्चां तदुच्चाब्धिबा-
णोर्म्यद्र्यंशघनप्रतानसहिता मा कल्पयेतारमाम् ।।

The left leaf is mother, it should be with *sūtrapaṭṭi*. That which goes to the right is daughter. For all doors it is to be expressed thus. The *arama* (the vertical piece of the latching device) should be made with length of one part out of 3, 4, 5 or 6 parts of the height of door and width and thickness equal to one part of 4, 5, 6 or 7 parts of this length.

Stanza - 10

द्वारव्यासपयोधिबाणरससप्तादंशकात्तायतं
कुर्यादर्गलमायतोर्मिगिरिमातङ्गांशतारान्वितम् ।
विस्तारार्धघनं घनोन्मितलसत्खण्डद्वयं चारमा-
मूलाग्रान्तिकसम्प्रक्ल्प्तकबलीसम्प्राप्तखण्डान्तरम् ।।

The sliding latch (*argala*) is to be made with (1)length equal to one part out of 4, 5, 6, 7 or 8 parts of door width, (2)width of one part out of 6, 7 or 8 parts of the length and (3)thickness equal to half the width and with 2 square blocks such that the gap between the blocks will be in the notches at the top and bottom of *aramas*.

Stanza - 11

अधोर्गलं मातृकवाटसंस्थं पुत्रिगतं चार्गलमूर्ध्वसङ्गि ।
अथारमामध्यमतीत्य मध्यात् सुकीलयेताथ कवाटपृष्ठे ।।

The lower sliding latch should rest on the mother leaf and the upper one should go on the daughter. Then (they should be) fixed on the back of the door with the centre of *arama* above the centre of the door.

Commentary

Stanzas 9, 10, 11 describe the typical latching device called *arama* and *argala* (**fig.07.03**). When one is standing inside ie. behind the door, the leaf on the left side is called mother leaf and that on the right side is called daughter leaf. The mother leaf is closed first (from inside) and the daughter rests on the mother. Therefore, the *sūtrapaṭṭi* should be fixed on the mother.

The doors are secured by means of a latching device fixed inside the door. This consists of 2 vertical pieces called *arama,* one on each door and 2 sliding latches called *argala* or *sākṣa.* The length of each *arama* is 1/3, 1/4, 1/5 or 1/6 of the height of door. Its width and thickness are 1/4, 1/5, 1/6 or 1/7 of its length.

The sliding latches are to be attached to the *aramas*, with the lower latch on the mother leaf and the upper one on the daughter. The length of the latches is 1/4, 1/5, 1/6, 1/7 or 1/8 the door width. Their width is 1/6, 1/7 or 1/8 of their length and their thickness is half the width. Each of them will have 2 square blocks such that the *arama* to which it is attached will be between the square blocks. For this suitable cuts will be made in the *arama.*The centre line of the *arama* should be shifted slightly above the horizontal centre line of the door.

Stanza - 12

एकजातितरूभिः प्रकल्पितं द्वारपादफलकादिकं शुभम्।
अन्यथा यदि वधूकुशीलतां सम्भवेदिति वदन्ति केचन।।

The door posts, shutters etc. made with one kind of wood is auspicious. If otherwise, some people say that the ladies will be of bad character.

Commentary

The different parts of the door should be of the same wood. This is to avoid differential shrinking or warping and to ensure tight joints. The warning that the character of the ladies will be bad, if the same wood is not used, may be taken only as a warning to see that the prescription of using the same wood is followed strictly. If differential shrinkage or warping occurs, outsiders can open the doors by introducing tools through the gaps and harm the ladies. Hence, the same type of wood should be used for the different parts of the door and that too after proper seasoning for security.

Stanza - 13

एकं कवाटं यदि वामभागे मध्यादधो वोपरि वारमा स्थात्।
तदर्गलं वर्तुलमष्टकोणं वेदाश्रकं वादृढशृङ्खला वा।।

If (there is) only one door leaf, it should be on the left side. The *arama* should be below or above the centre. Its sliding latch may be made circular, octagonal or square or (it can be fastened by) strong chain.

Commentary

For doors with single leaf, the leaf is to be fixed on the left side. The *arama* can be below or above the centre, but not at the centre. One will be on the door and the other will be on the right-hand door post. The sliding latch may be circular, square or octagonal. Its length will be equal to or 3/4 or full width of leaf.

Instead of or in addition to the *arama* and *argala*, the leaves can be secured by chains to the sill and head. In addition to these, bolts can be provided at the top and bottom (see **fig.07.04**).

LOCATION OF OUTER DOORS

Stanza - 14

आशाभास्करसूत्रभेदिनि गृहे षष्ठेऽथवा सप्तमे
सूत्रे द्वारमथापरं क्रमवशात् पृष्ठे निजेष्टं पुनः ।
सव्यार्धे भवनस्य कार्यमुचितैर्योन्यादिभिः संयुतं
चैकैवेच्छति चेत् कवाटफलका वामे भवेन्निष्क्रमे ।।

When length of the house is divided by 10 or 12 lines, the outer door is to be placed generally behind, on the right side in the 6th or 7th line according to one's desire with suitable *yoni* etc. If only one door leaf is desired, it will be on the left side when going out.

Commentary

In the previous stanzas, the procedure for placing the doors from the *salas* to the *ankaṇa* were elaborated. This stanza gives the procedure for locating the door for going out from the *śālas.*

The length of the houses is divided into 9 or 11 parts by 10 or 12 lines respectively (see **fig.07.01**). The door is placed such that is centre is at the 6th line from the left if the division is by 10 lines and at 7th line if the division is by 12. This ensures that the door is in the left half of the centre line of the *śāla* when viewed from inside. Some commentators take '*savya*' to mean right and prescribe the door to be placed in the right half.

DOORS IN THE CORRIDORS

Stanza 15

कुर्यात् प्राङ्गणतो गमागमकृते द्वारं महत् पादुके
तद्बाह्ये पथि पादुकोपरि गतं त्यक्त्वा मसूरोच्छ्रयम् ।

मार्गव्यासचतुर्गुणेन परिधिः स्वाभीष्टयोनिर्यथा
तद्व्यासं तु तथा करोतु च विदिग्धामास्ति चेत् कुट्टिमम् ।।

For entry to and exist from the *ankaṇa*, the important door (passage door) should be placed above the *pāduka.* If there is wall for the corner house in the passage outside the door, the height of (upper) *adhiṣṭhāna* above the *pāduka* should be ignored and its (that of the opening) width should be such that four times the width of the passage gives the perimeter with desired *yoni.*

Commentary

The doors, so far described are for direct access to and from the *salas.* The major access is through the corridors (**fig.07.04**). The inner major doors for this are to be placed above the upper *pāduka,* if there is a raised *adhiṣṭhāna* as mentioned previously in stanza - 5 for *antarnāhamandira.* For easy access, the corridor (*antarāla*) should be at the same level. If there is raised platform only for the main houses, naturally the corridor will be at the lower level. If there is wall for the corner house and the corner house is also raised, the *antarala* will be kept at the level of the upper *pāduka.* For this the width of the *antarāla* is computed in such a way that when multiplied by 4 it gives auspicious *yoni.*

These passage doors are placed in the corridors of respective *śālas* (Ref:07.04). The eastern door will be in the corridor north of eastern *śāla*, the southern door will be in the eastern corridor of southern *śāla* and so on as shown in **fig. 07.04**.

The method of deciding the width by assuring that when multiplied by 4, it gives auspicious *yoni*, is called *padayonividhi.* For example, the width for *dhwajayoni* will

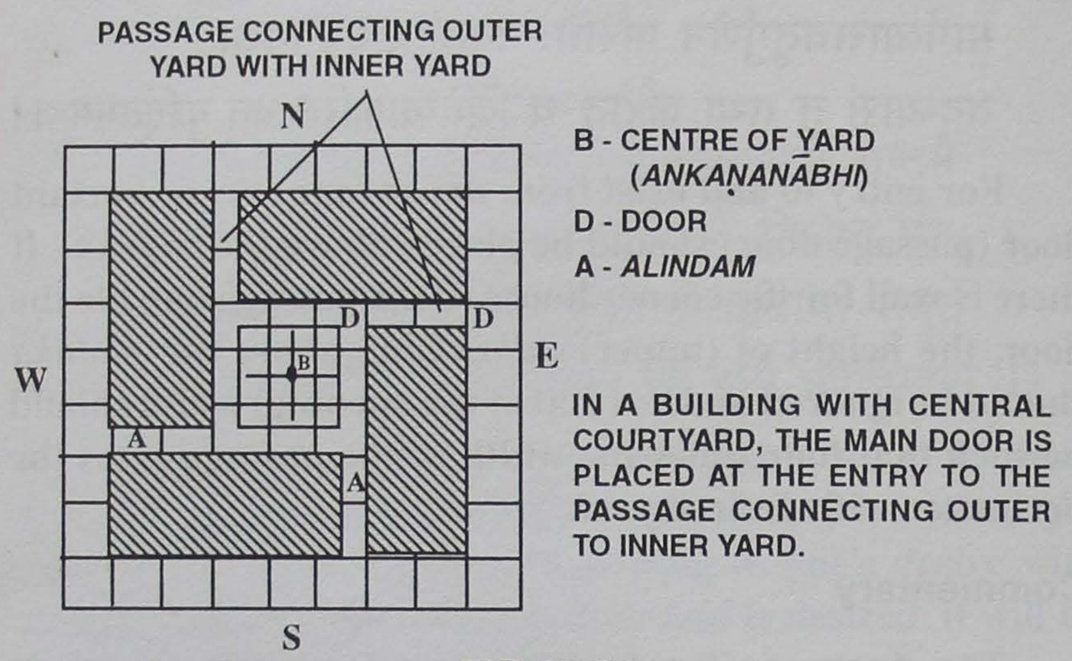


FIG.07.04
ENTRY DOORS FROM OUTER TO INNER YARDS

be 18 *angula*, 1H10A, 2H2A and so on, and that for *simhayoni* will be 22A, 1H14A, 2H6A and so on.

The *padayonividhi* is based on the three-dimensional concept of the *vastu*. The perimeter for computation of *yoni* of a *vāstu* is based on the plan composition, i.e. the perimeter considered is that of the plan of the *vāstu*. This perimeter is converted to the unit of *pada* and divided by 8 for computing the *yoni*. The application of *guṇāmśavidhi* standardises the measurements of the plan composition. More subtle standardisation is achieved by using the *padayonividhi* also for the plan composition. According to this procedure, the value obtained by multiplying the width and/or length by 4 should be in the prescribed *yoni*. In *gṛhavāstu, padayonividhi* is generally applied only to the width. Since the height upto wall plate (*pādamāna*) is generally equal to the width, the value of 4 times width is in effect twice the sum of width and height i.e. perimeter of the vertical face.(refer to **fig.03.09**) Thus *padayonividhi* takes into consideration the vertical composition also.

For temples (*prasadavāstu*), length also should conform to *padayoni*. For square temples, length is equal to width, hence here also the height (which is equal to width) is included in the computations.

GATE HOUSE

Stanza - 16

दण्डात् प्राङ्गणमध्यतोऽब्धिशरषट्सप्तादिसङ्ख्यान् व्यती -
त्यादध्यादथ पौष्पदन्तिकपदे द्वारं प्रचारोदितम्
भल्लाटेन्द्रगृहक्षतेष्वपि महाद्वाराण्युपद्वारका-
ण्यष्टाप्युन्नतभूतले द्वितलतद्वक्त्रादियुक्तानि वा ।।

The gateway for travel should be placed in the *pada* (cell) of *Puṣpadanta* and those of *Bhallāta, Indra* and *Gṛhakṣata,* shifted from the centre of the yard by 4, 5, 6, 7 etc. *daṇḍa*. The major gateways and also the eight subsidiary gateways can be on high ground with two stories, gables etc.

Stanza - 17

पर्जन्यकोष्ठे च भृशे च पूष्णि भृङ्गेऽपि च द्वारपशोषयोश्च।
नागेऽप्यदित्युक्तपदेऽपि चेच्छन्त्यष्टेत्युपद्वारगृहाणि नृणाम् ।।

In the *pada* of *Parjanya* and in that of *Bhṛśa, Pūśa, Bhṛga, Dwārapāla, Soṣa, Nāga, Aditi*- thus the eight subsidiary gateways for residences are desired.

Commentary (Stanza 16 and 17)

These two stanzas give the positions of the major and subsidiary gate-houses. All these should be in the outermost envelope (*piśācavithi*) occupied by the 32 gods from *Iśāna* to *Diti*. The major gateways should be in the cells of *Puspadanta* in the west, *Bhallāta* in the north, *Indra* in the east and *Gṛhakṣata* in the south (**fig.07.05**). According to

Bṛhatsamhita, (Ref 07.05) they can also be located in the *padas* of *Jayanta, Sugrīva, Varuṇa* and *Soma.* The effects of the location of gateways (according to *Bṛhatsamhita*) are indicated in **fig.07.06**. The general rule is that for a person entering the plot, the gateway should be in the right side.

The gateways have to be at a distance of 4, 5, 6, 7 or more *daṇḍa* from the *Brhamanabhi* according to the width of the plot and the number of grid divisions. (Here *danda* means the width of a grid division).

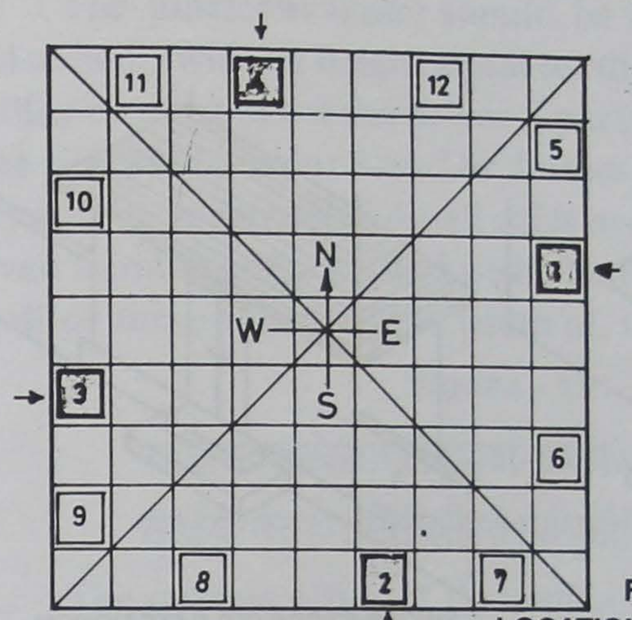
On both sides of the main gateways, *Manuṣyālaya-candrika* allows subsidiary gateways also. Their positions are shown in **fig. 07.05**. These are for the use of cattle and the servants. In modern usage, these can be used for the passage vehicles. Clearly, it is not by the size, but by the position that the main and secondary gates are identified.

The gateways are to be built in high ground. This is probably to ensure that any stranger can be easily spotted from the gateway or the gateway can be easily located by a visitor approaching the house. Two-storeyed construction with gables recommended for main gateway reinforces this assumption. Here the ground floors can be used by gate-keepers and casual visitors or travellers and the rooms at the top floor can be earmarked as guest rooms or room for keeping the records (**fig.07.07**).

VEDIKA

Stanza - 18

स्तम्भाधस्तारतो वोच्छ्रयरसतुरगोऽष्टांशतो वा प्रतेर-
प्युत्सेधेनात्र सार्धावनियुगलहुताशोन्मितैश्चात्र वेदी ।
कर्तव्या कुट्टिमोर्ध्वं तदुपरि चरणैर्युग्मसङ्ख्यैश्च दारु-
स्तम्भार्धाङ्घ्रयूनतुल्यप्रततिभिरभितः स्वोत्तराद्यैश्च भित्ति :।।



MAIN GATE POSITIONS
1. *INDRA*
2. *GṚHAKṢATA*
3. *PUṢPADANTA*
4. *BHALLĀṬA*
5. *PARJANYA*
6. *BHṚSA*

SECONDARY GATE POSITIONS
7. *PŪṢA*
8. *BHṚNGA*
9. *DWĀRAPĀLA*
10. *SOṢA*
11. *NĀGA*
12. *ADITI*

FIG. 07.05
LOCATION OF GATEWAYS

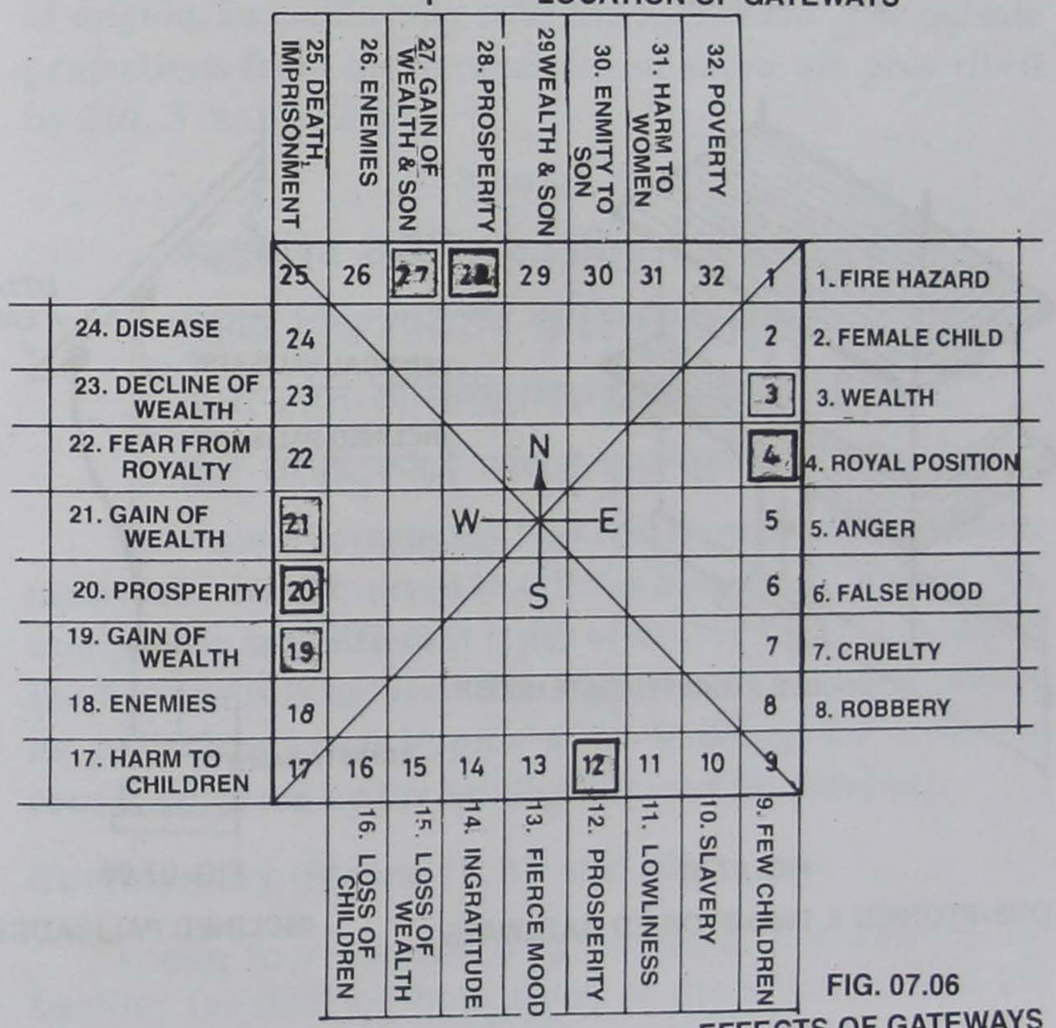
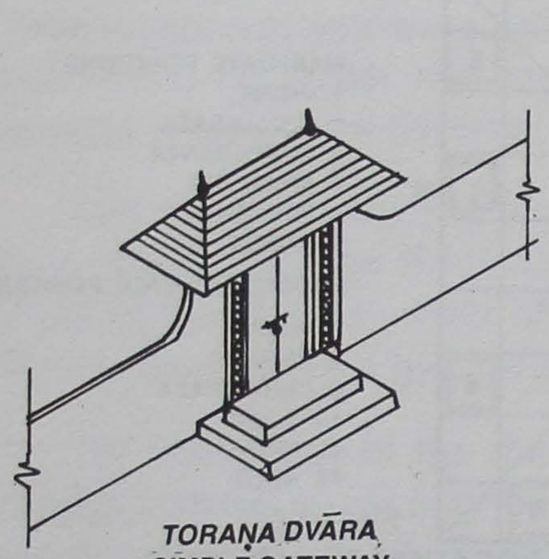


FIG. 07.06
EFFECTS OF GATEWAYS



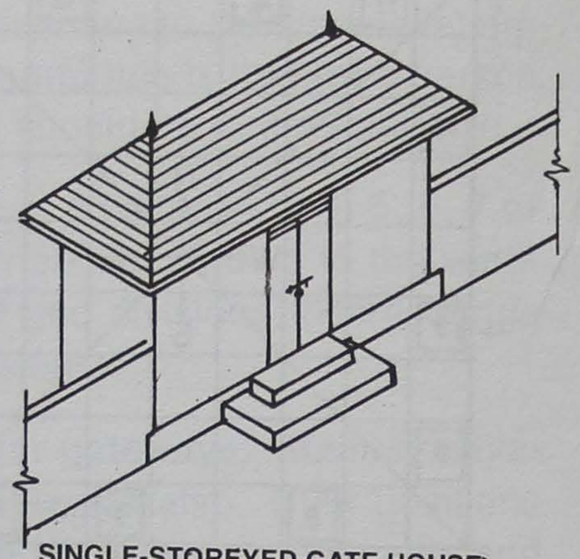
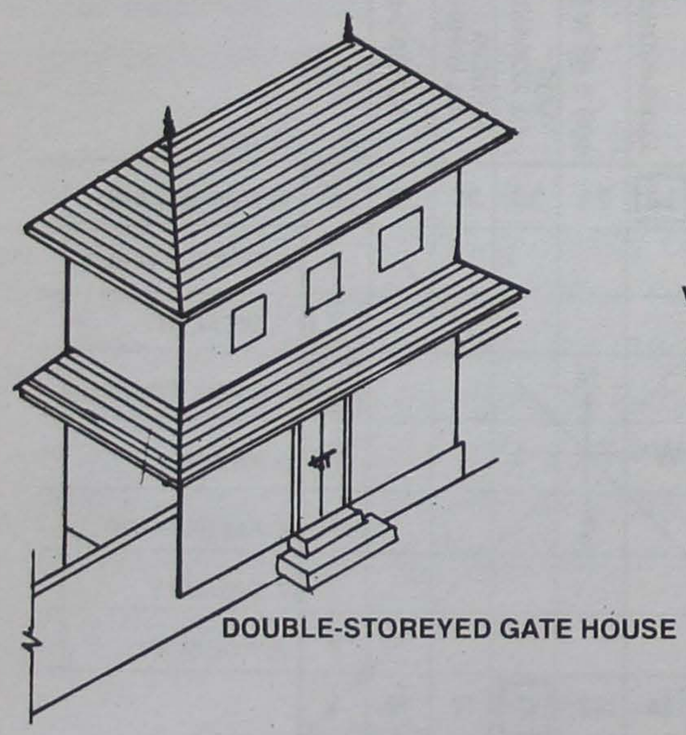


FIG. 07.07
ONE-STORIED & TWO-STORIED GATEWAYS



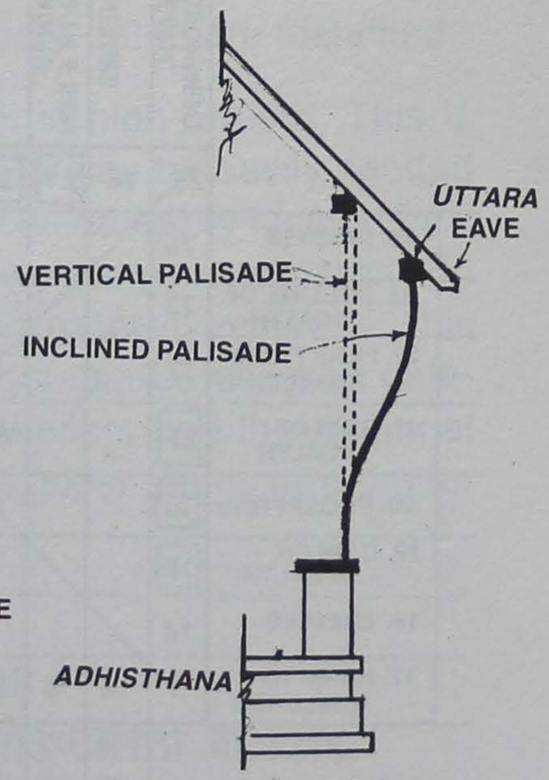


FIG. 07.08
INCLINED PALISADES

The platform (*vedi*) should be done here above the basement (with its height equal to) the bottom width of the pillar or one part of the 6, 7 or 8 parts of height of pillar or the height of *prati* or 1 1/2, 2 or 3 times that height. The wall should be constructed on all sides over this platform, with even numbers of posts and with *uttaras* of width equal to or half or three-fourth of the width of wooden posts.

Stanza - 19

पत्रमानवशतोऽङ्गुलवृद्धया वेदिकाविहितनिष्क्रमणं स्यात् ।
सार्धयुग्मदहनादिमितैस्तैरङ्गुलैर्विहितमुत्तरलम्बात् ।।

The outside offset of the *vedika* will be by increments of *angula*, in conformity with the *patramāna*. The outside projections from the vertical line of *uttara* are prescribed by 2 1/2, 3 etc. *angulas*.

Stanza -20

स्वद्रव्यैरेव वेदीरिह कतिचिदुशन्तीष्टकामृच्छिलाद्यै-
र्वृक्षैर्वा भिन्नजात्यैरपि च विरचिता दृश्यते सर्वगेहे ।
अन्तर्नाहेन योन्यन्वितभवनविधौ गर्भगेहोक्तनीत्या
द्वारं तत्पादुकोर्ध्वं न्यसतु पुनरधस्तात् प्रतेर्गर्तगेहे ।।

Here some persons say that *vedi* must be with the same materials. It is observed that it has been made with bricks, mud, stone and different types of timber for all houses. If the basement is lowered, the door should be placed above its *pāduka* or below its *prati* as for buildings for which the *yoni* is adjusted by the inside perimeter (*antarnāha*).

Commentary (Stanza 18, 19 and 20)

These four stanzas give details of the platform for seating (*vedika*) on both sides of the entrance and the constructions to be made above that in the gate-houses.

The platforms are to be constructed on both sides of the entrance gate-house leaving the opening for the access. It can be door of the constructed in brick, mud, stone or suitable timber. Some pratctitioners insist that the material used for the platform should be the same as that used for the door frame i.e. if the door frame is of stone, the plotform is to be of stone. Its height is prescribed to be equal to the bottom width of the pillar (viz. 1/6 to 1/11 of the height of pillar, vide stanza 24 of chapter 5), or equal to the height of the *prati* (viz. 1/5, 1/6 or 1/7 of the height of *adhiṣṭhāna,* vide stanzas 17, 18 and 19 of chapter. 5) or equal to 1 1/2, 2 or 3 times the height of the *prati.* The doors are placed above the *pāduka* so that the access way will be at the *pāduka* level.

Over the *vedika*, palisades of wood are constructed with vertical or inclined posts and horizontal runners. If they are vertical, the posts of the palisades will be fixed to the wall plate and, if inclined, to the eaves board. (**fig.07.08**). The *vedika* serves as resting places for way farers, guests etc. When the gate house is raised to an upper floors the room at the top serves as rest house for watchmen and guests or as the place where the accounts of the house hold are kept.

Stanza - 21

युग्मास्तुलाः स्तम्भलुपादर्धः स्युः
सर्वास्त्वयुग्माः खलु पङ्क्त्यस्ताः ।
नृगेहनिर्दिष्टकराधिकाश्चेद्
विनाशदास्ताः खलु पङ्क्तयः स्युः ।।

The beams, posts, rafters etc. are to in even number, but indeed all their gaps (spans) should be in odd number. If those gaps are greater than the *hasta* prescribed for that house, they will surely cause damage.

Commentary

The general rule for the the posts, beams and the rafters is that they should be in even number and their gap will naturally be in odd number. The spacing of rafters and posts should not be more than one *hasta* for safety and security.

FUNCTIONS OF THE *SALAS*

Stanza - 22

प्राचीनेऽग्निसमर्चनादिकमुदीचीने कुटुम्बादिकं
व्यत्यस्य प्रकरोतु वा द्वयमिदं याम्येऽतिथिप्रीणनम् ।
पाश्चात्त्ये धनसन्निधापनमदो द्वन्द्वं विपर्यस्य वा
शेषार्धे तु तयोस्तथा शयनविद्याभ्यासनाद्यं चरेत् ।।

Let the fire offering (*homa*) and worship (*arcana*) etc. be done in the eastern, the family room etc. in the northern or these two (can be) alternated. Do the reception of guests in the southern, keeping of wealth in the western or these two in the reverse order. Let the remaining part of these two (viz. southern and western *śāla*) be used for sleeping and study.

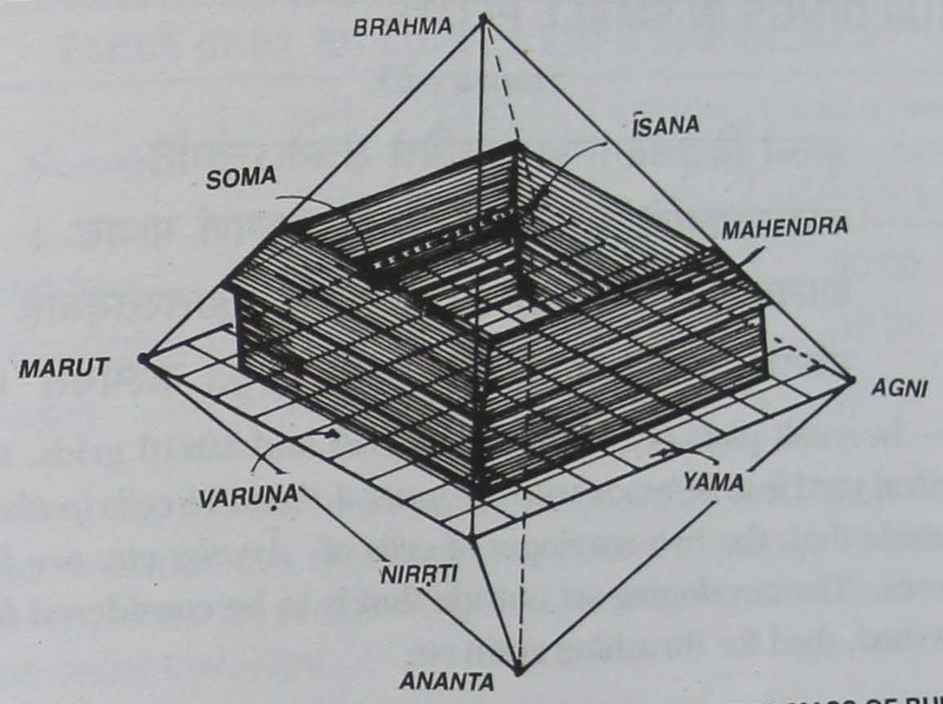
Commentary

The eastern house (*pūrvaśāla*) is considered to be having *sātwik* properties. Hence, worship, offerings, fire sacrifice etc. are done in this. Its presiding deity is *Mahendra* and it is facing in the direction of *Varuṇa.* During vedic times, *Varuṇa* was one of the most important object of worship. Therefore, the hall facing *Varuṇa* was considered good for all holy acts including feeding the guests. In *Mayamata,* eastern house is called *annālaya* (the house of food). (Ref.07.06). The northern house whose presiding deity is *Kubera,* the god of wealth, was called *sukhālaya.* (the house of happiness). This is, therefore, considered to be good for

family life. These two can be alternated. The western house is called *dhanālaya* (the house of wealth). Hence it is used for keeping wealth. The southern house is *dhānyālaya* (the house of grains). This is used for reception of guests. The space left in these two after meeting their normal uses, is used as bed rooms and also study.

In this connection, it is to be noted that *Vāstupuruṣa-sankalpa* can be used to serve as a graphic model for spatial planning of the functions. Typically the south west (*Nirṛti*) corner where the feet of the *Puruṣa* are positioned can be taken as the origin and the activities gain importance towards north and east. The south-east (*Agni*) corner and north-west (*Marut*) corner are spaces functionally more important than that in the south west (*Nirṛti*). Clearly the north-east (*Iśāna*) corner is the most important position of any room or building by this concept. The axis of *Vāstupuruṣa*, thus, contains the secret of organising the functional areas. The perpendicular axis connecting the south-east (*Agni*) and northwest (*Marut*) corners, further divides the *maṇḍala* into two portions. Of these the activities located in the upper limbs of the *Vāstupuruṣa* are taken as more sacred as compared to those located in the lower limbs. These concepts can be applied to the planning of different spaces in any building or land use zones in any settlement.

If the symbolism is extended to the third dimension, the maximum height that can be permitted to the building will be limited by the enveloping surface of the cosmic form (**fig.07.09**). For a building located in the *manuṣyavithi*, the ratio of height to width will be √2. For one located in the *Brahmavithi* , this will be just above 2. The five proportions of *śāntika, pauṣṭika, jayada, adbhuta and sarvakāmika* corresponding to the height to width ratios of 1 3/7, 1 1/2, 1 3/4, 2, 2 1/8 respectively recommended in *vastu* texts are directly derived within these limits.



GEOMETRIC REPRESENTATION OF COSMOS TO CONTROL MASS OF BUILDING

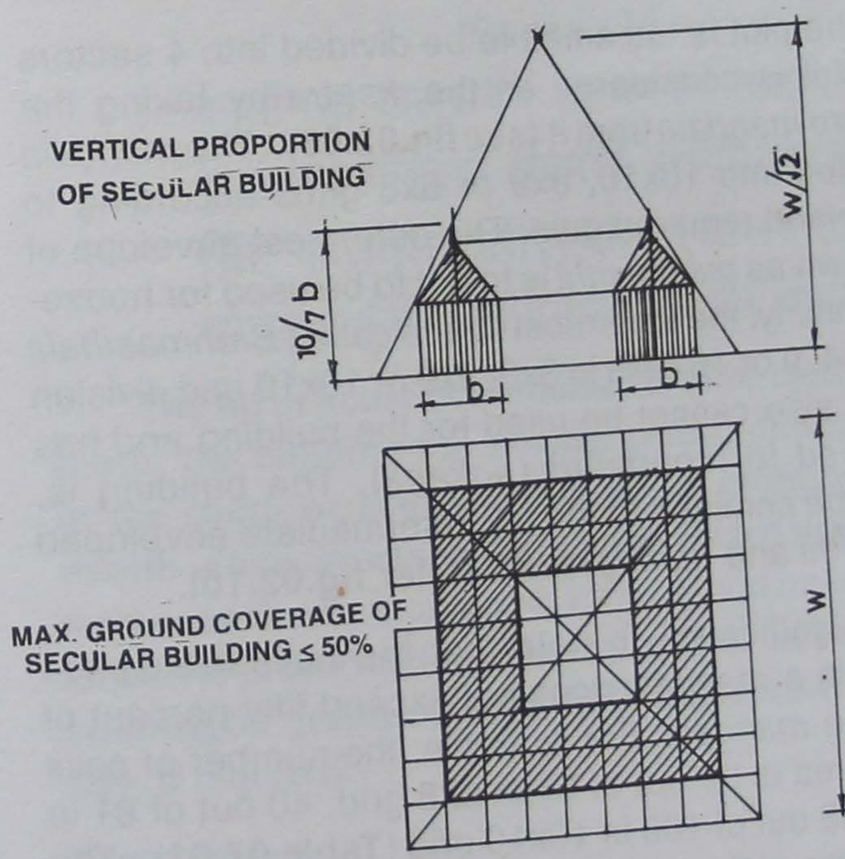


FIG. 07.09 GROUND COVERAGE & VERTICAL PROPORTIONS

BUILDINGS IN SMALL PLOTS

Stanza - 23

कृत्वा दिङ्नवनागवर्गपदभिन्ने क्षेत्रकेऽन्तर्गतै-
रष्ट्यङ्काब्धिमितैर्विधातृपदयुक्तं प्राङ्गणं मध्यत ।
शालाः पङ्क्तियुजार्यकादिकजुषस्तद्बाह्यतस्तद्बहि-
र्गोष्ठोलूखलवेश्मकादिविलसत्पङ्क्त्यावृतं कल्पयेत् ।।

In small plots (*kṣetraka*) of 8x8, 9x9 and 10x10 grids, the central yard is to be made with the inner 4, 9 and 16 cells (*padas*). Outside that, the two envelopes of cells of *Āryaka* etc. are for houses. The enveloping set outside that is to be considered for cowshed, shed for thrashing grain etc.

Commentary

When the plot is too small to be divided into 4 sectors the entire plot is considered as the *kṣetra* by taking the largest square *maṇḍala* from it (see **fig.02.06**). The *maṇḍala* is then divided into 10x10, 9x9 or 8x8 grids according to convenience and requirements. The outermost envelope of the cells known as *piśācavīthi* is to not to be used for house-building. Similarly, the innermost space called *Brahmasthala* consisting of 4, 9 or 16 cells in 8x8, 9x9 or 10x10 grid division respectively, also cannot be used for the building and has to be reserved for courtyard (*ankaṇa*). The building is, therefore, to be confined to the two intermediate enveloped called *devavīthi* and *manuṣyavīthi* (refer **fig.02.10**).

It is of significance to note that the buildable space (*gṛhavedika*) in a *maṇḍala* does not exceed fifty percent of the area of the *maṇḍala*. For example, the number of cells in buildable area is 32 out of 64 in 8x8 grid, 40 out of 81 in 9x9 grid and 48 out of 100 in 10x10 grid (**Table 07.01**). The ground coverage of the building, thus, does not exceed 50%, which is as per the present day building code.

TABLE 07.02 BUILDABLE AREA IN *MANDALA*

Mandala	Total No. of Cells	Cells in *Brahma-sthana*	Buildable Area	Buildable Area as percentage of total area
Manduka	8 x 8 = 64	4	32	50.00
Paramasayika	9 x 9 = 81	9	40	49.38
Asana	10x10=100	16	48	48.00

Though the main building should be restricted to the two intermediate envelopes, ancillary buildings like cow-sheds, shed for thrashing grains etc. can be constructed in the outer envelope.

LOCATION OF FARM HOUSE ETC.

Stanza - 24

कार्तान्त्यां खलसद्म धान्यभवनं तत्रापि वा नैर्ऋते
कुर्वीताथ धनालयं धनपतौ प्राच्यां तथापांपतौ ।
सिंहे वालितुलाकुलीरभवने धान्यालयोक्तेषु वा
धान्यागारविधिर्धनोदितपदे कुत्रापि चावश्यके ।।

The farm house (*kalasadma*) is to be constructed in the south, the building for storing grains (*dhvanyabhavanam*) in the south or south west and the building for keeping wealth (*dhanalaya*) should be constructed in the north, east, west or in the *rasis* of *simha, vrscika, tula* or *kataka* or in the locations prescribed for storing grains. In some places, the building for grains can be in the location prescribed for wealth also, if required.

Commentary

This prescribes that the farm house when the harvested stalks of grain are kept and the grain is extracted and dried,

is to be constructed in the south. The building for storing the grain is to be near the farm house in the south or south west. This corresponds to the location of *dhānyālaya* in the south in *Mayamata* **(fig.07.10)**. The building for costly things can be in all the four cardinal directions or in the *rasis* of *simha*, *tula*, *vṛścika* and *kaṭaka*. It may be noted that *Varāhamihira* prescribes that *dhanālaya* should be in the north only.

PRESCRIPTION FOR COW SHED

Stanza - 25

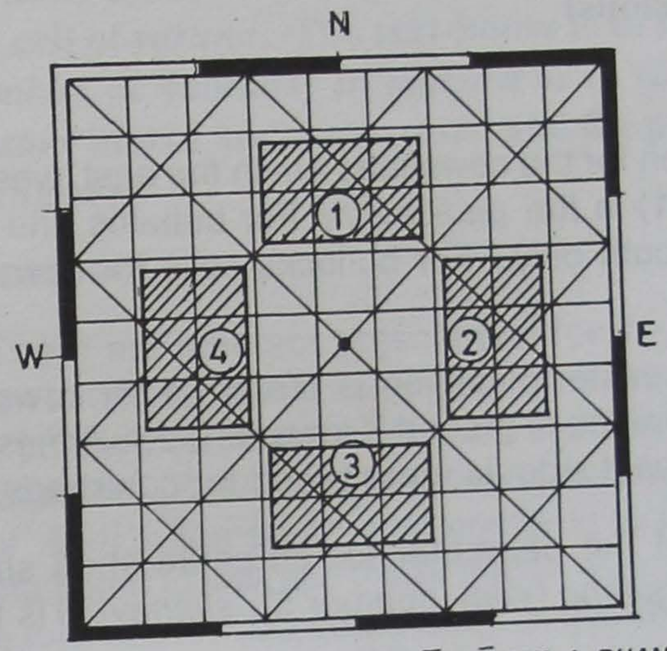
गोशालेन्द्रजलेशयोर्वितथपूषाभ्यन्तराले मता
पर्जन्यैन्द्रिपदे तथा कुसुमदन्तद्वारपालान्तरे ।
भृङ्गे शोषपदेऽथवात्र महिषागारं यमेऽप्युक्षशा-
लास्मिन् क्वाप्यथ वास्तुमर्मविलसच्छूलं समस्तं त्यजेत् ।।

The cowshed (should be constructed) in the cells of *Indra, Varuṇa, Vitatha, Parjanya, Jayanta, Púṣa* or in the cells of the *Puṣpadanta, Dvārapala, Bhṛnga* or *Soṣa*. Here, if (it is) the buffalo shed, (it should be) in the cells of *Yama*. The shed for bullock can be in this (south) or in all (prescribed for cows). All the *śālas* in *Vāstumarmas* should be avoided.

Stanza - 26

क्षेत्रस्य कोणगतरज्जुमतीत्य यानं
नेच्छन्ति केचन गवामखिलासु दिक्षु ।
मुख्यं वृषं न मृगराट्करणेषु सिंह-
व्याघ्रौ स्थिरं च करणं शुनि गर्दभाद्याः ।।

The movement of cattle crossing the diagonals going to the corners of the plot in all directions is not desirable. *Vṛṣa* is auspicious, *simha* is not. In *karaṇas, simha,*



1. SUKHĀLAYA, 2. ANNĀLAYA, 3. DHĀNYĀLAYA, 4. DHANĀLAYA

FIG. 07.10 USES OF MAIN HALLS (*MAYAMATA*)

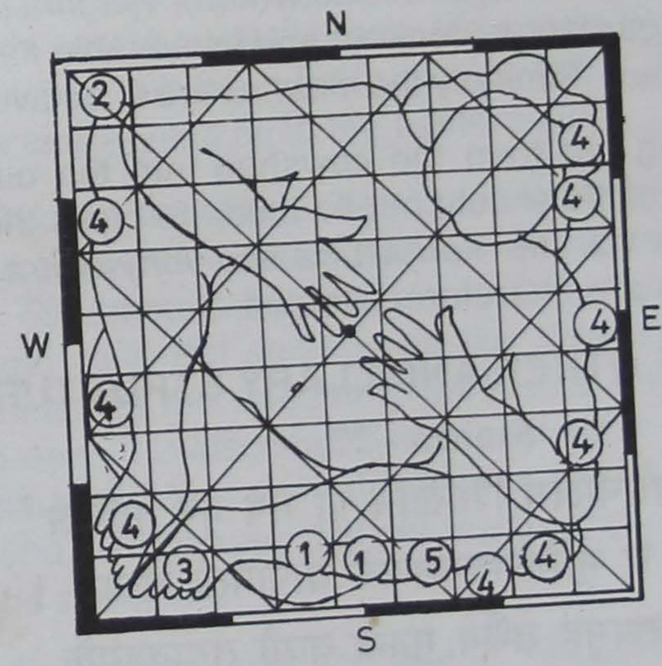


FIG. 07.11 ŁOCATION OF ANCILLARY FACILITIES

***vyāghra, viṣṭi, gardabha* and immovable (*sthira*) *karaṇas* (are not auspicious)**

Commentary

The location for the cowsheds are in the east, west and south (**fig.07.11**) in the *piśācavīthi*. For buffalos, the shed should be in south only. For bullocks cells for cowsheds can be used.

Generally, eastern location is preferred for cowsheds as the preferred slope of ground is towards east . *Arthasastra* prescribes the east side as most suited for cowsheds.

The *yoni* of the perimeter for all cattle shed should preferably be *vṛṣabha* (*yoni* number 5), *simhayoni* is to be avoided.

Karaṇa is an astrological factor related to the phase of the moon (*tithi*). The *karaṇas* of *simha* (lion), *vyāghra (tiger), viṣṭi* (bird) and *gardabha* (donkey) and immovable *karaṇas* are not auspicious. Similarly the *marmas* are to be avoided.

While going out from the cowshed into the outside compound, the cattle should not be made to cross the two main diagonally viz. the *karṇasūtra* and *mṛtyusūtra*. The corner locations are, therefore, avoided.

LOCATION OF OTHER ANCILLARY STRUCTURES

Stanza - 27

पर्जन्ये पचनालयं शिखिनि वा मेषे वृषे वानिले
तत्रैवापि च भुक्तिसद्ममकरे चापांपतौ चेष्यते ।
कुम्भे सौख्यगृहं तथैव मकरे वायौ तदावश्यके
कर्तव्यं वृषमेषयोरिदमथो वायौ तथोलूखलम् ।।

It is desirable to have the kitchen in the cells of *Parjanya, Śikhi* or *Vāyu* or in (the *rāśis* of) *meṣa* or *vṛṣa*.

The dining hall (is desirable) there itself or in *makara* or in the cell of *varuṇa*. The rest-house is to be constructed in *kumbha* or similarly in *makara* or in *vāyupada* and if necessary in *vṛṣa* and *meṣa* (*rāśis*) and the pounding house in *vāyupada*.

Commentary

There are different prescription for the location of the kitchen in different texts. The location is, in general, related to the position of fire in the *Vāstupuruṣamaṇḍala* (**fig.07.12**). *Bṛhatsamhita* (Ref:07.07) prescribes the kitchen to be in the cell of *Agni* in the south-east corner in *piśācavīthi*. It may also be taken to indicate the direction of south-east as *Agni* is the lord of the *vidik* south-east. In the latter case it need not be restricted to the *piśācavīthi* but can be even in the *devavithi* or *manuṣyavīthi*. *Mānasāra* (Ref:07.08) states that the kitchen can be in the north, north-east (*Īśāna*) and south of north-east in *parjanyapada*. *Mayamata* (Ref:07.09) states that kitchen can be in the *padas* of *Indra, Āditya, Satyaka, Bhṛśa* and *Āryaka* all in the eastern side.

But this text prescribes that the kitchen can be in the *padas* of *Śikhi* or in the *pada* of *Parjanya* (south of north east) *Śikhi* means *Agni* and hence this may indicate location is south-east. But some texts like *Bṛhatsamhita* show the north-east as the *pada* of *Śikhi*. Hence this can also mean north-east. It is also stated that it can be in the north west in the *pada* of *Vāyu* or in the east in the *rāśis* of *meṣa* and *vṛṣabha*. This means that generally east and north locations can be accepted.

As stated earlier, the feet of *Vāstupuruṣa* in the south west can be taken as the origin with importance of space increasing towards east and north. Accordingly, the most auspicious space will be the north-east where the head (*uttamānga*) of the *Vāstupuruṣa* is located. Cooking of food

is generally considered to be a very auspicious functions. Therefore, it is natural that the kitchen is located in the north-east or in the south-east (*Agni*) or north-west (*Vāyu*) or anywhere in the east (*meṣa* and *vṛṣabha*).

In all regions of India other than the west coast of *Gomantaka* and Kerala, kitchen is located in the south-east *Agnipada*. In the west-coast, the general direction of wind during most of the year is from the south-west and hence the location of kitchen is generally in the north-east (in the *padas* of *Īśāna* or *Parjanya*) so that the smoke from the kitchen will be swept away from the house. *Īśānapada* is also called *śikhipada*. *Śikhi* means burning fire. Hence the location of kitchen in the north east is justified.

For burning of fire, *vāyu* (air) is required. Therefore, the location of kitchen in the north-west in *vāyupada* also can be justified.

It is, therefore, to be deducted that the kitchen can be located in the south-east, east, north-east or north-west.

It is to be noted that the prescribed locations of kitchen are in the outer envelope of *piśācavīthi*, outside the main building. This is because the buildings in the earlier days had thatched roofs which are easily inflammable Location of kitchen outside the main building, therefore, ensures safety from fire and smoke.

The dinning hall should preferably be adjacent to the kitchen. Hence the locations for kitchen are suitable location for the dinning hall. It can also be in *makararāśi* (in the north) or in *varuṇapada* (in the west) if the kitchen is in the *vāyupada* in the northwest. Generally, the most preferred locations are east and north. *Mānasāra* prescribes south and south west for dinning hall (Ref.07.08). In stanza 22 of this chapter it was stated that *pūjas* and *homas* should be done in the eastern *śāla*. Because of this, the dinning hall is

generally in the north side in Kerala. In other parts of India, eastern location is preferred.

The rest houses outside the main building can be in the north or east or north-west. The shed for pounding of grains is prescribed to be in the north-west.

It is to be noted, that the locations prescribed in this stanza are all in the *piśācavīthi*, outside the main building.

LOCATION OF WELL

Stanza - 28

मीने कूपमतीव मुख्यमुदितं सर्वार्थपुष्टिप्रदं
मेषे चापि घटे च भूतिकृदिदं नक्रे वृषेऽर्थप्रदम् ।
आपे कूपमथापवत्सकपदे मुख्यं तथैवेन्द्रजि-
त्कोष्ठे दृष्टमपांपतौ तु शुभदं नारीक्षयं मारुते ।।

The well is said to be most auspicious in north-east (*mīnarāśi*). This will give all prosperity. In *meṣa* and *kumbha* also it is auspicious. In *makara* and *vṛṣabha* also it gives wealth. It is auspicious in the *padas* of *Āpa* and *Āpavatsa*. Similarly it is seen in the *pada* of *Indrajit*. It is auspicious in the *pada* of *Varuṇa*. If in the north-west, it is inauspicious for ladies.

Stanza - 29

कूपं शोभनमन्तरिक्षपदकेऽप्येवं तटाकं हितं
माहेन्द्रे च महीधरे च वरुणे सोमे शिवे मेषभे ।
वायौ वा नैर्ऋतौ च दृष्टमथवा स्नानादिपानादिषु
प्रायो नैकजलं (हितं?) नदीजलमृतेऽत्रान्यत् पृथक् कल्पयेत् ।।

The well is auspicious in the *pada* of *Antarīkṣa* Similarly, tank is desirable in the *padas* of *Mahendra*, *Mahīdhara*, *Varuṇa*, *Soma* and *Īśāna* and in *vṛṣabharāśi*.

It is seen in north-west and west. For bathing and drinking, unless it is river water, the same (source) is not (desirable). Hence (they are to be) separately provided.

Stanza - 30

आग्नेय्यां भवनस्य कूपखननं पूर्वं कृतं वा तथा
वापी दाहभयादिकं प्रकुरुते तद्वत् फलं दक्षिणे ।
ग्रामादेरपि दीर्घिकादि कतिचिन्नेच्छन्ति याम्ये तथै-
वारामो गृहसन्निधौ फणभृतां वासोऽपि नैवेष्यते ।।

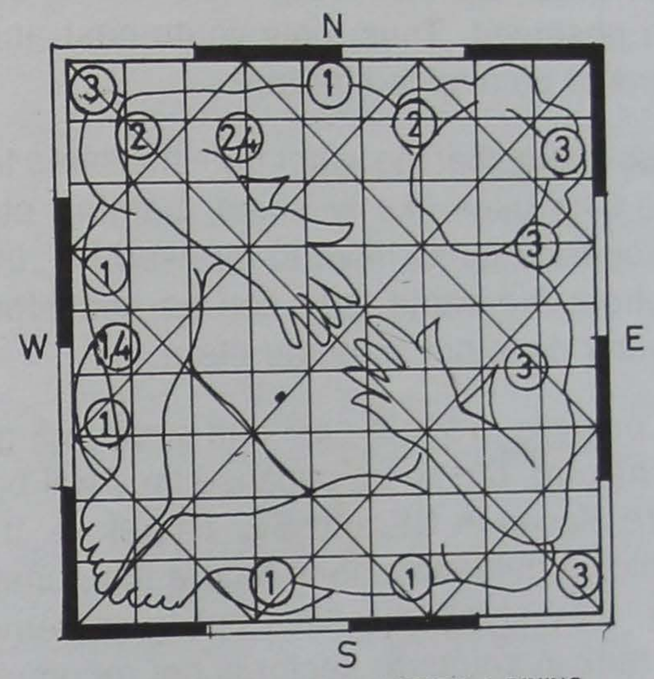
If well and similarly tank have been dug in the south-east (*agni*) of house earlier, it causes fear of fire hazard etc. On south side also similar effect is caused. In the south side of villages etc. tanks etc. are not desirable near the houses. Similarlly gardens and sacred groves are not desirable near the houses.

Commentary (Stanza 28, 29 and 30)

The best location for well is stated to be the north-east corner. This may be due the fact that the desirable slopes are towards north and east and the preferred location for the kitchen is in the north-east. The other recommended locations are marked in **fig. 07.13**. Locations in east, north east, north, north-west and west are recommended. The undesirable location are south-east, south and south-west.

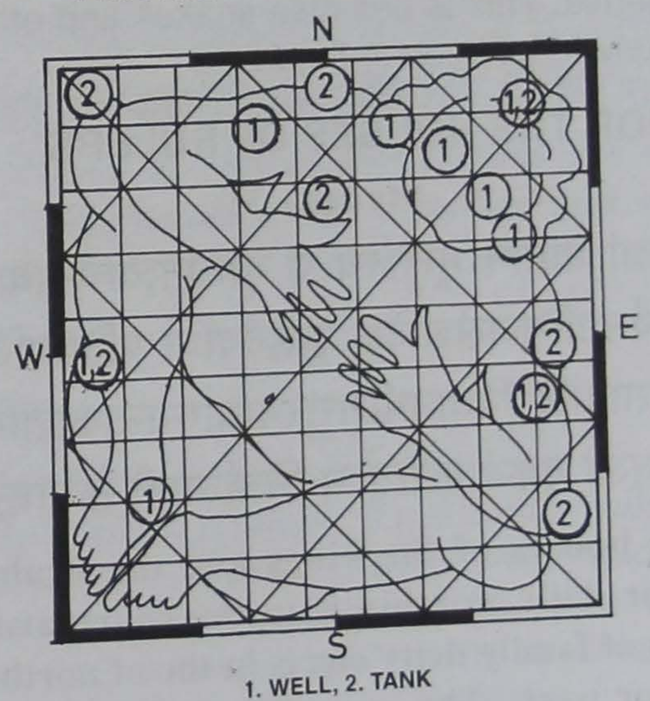
Mānasāra prescribes the *padas* of *Īśāna, Antarikṣa, Agni* and *Pūṣa* for well (Ref:07.10). *Bṛhatsamhita* prefers north and north-east. All other locations will bring bad effects (Ref.07.11).

Tank can be made in the *padas* of *Mahendṛa* (in the east, *Varuṇa* in the west, *Soma* in the north and *Śiva* in the north-east (all in outer envelope) or in the cell of *Mahīdhara* in the north in the intermediate envelope. It can also be in



1. WEALTH, 2. REST, 3. KITCHEN, 4. DINING

FIG. 07.12 LOCATION OF KITCHEN



1. WELL, 2. TANK

FIG. 07.13 LOCATION OF WELL & TANK

meṣa in the east. Tanks in south-west and north-west also have been observed. Thus, only south-east and east are the locations to be avoided for tanks.

It is also stated that the water from the same tank should not be used for uses like washing, bathing etc. and for drinking. Separate tanks have to be used for these uses. But water from the same river can be used for all uses, because water does not stagnate there.

Tanks or wells in south-east and south will give rise to fear of fire hazard. It may be because they will be far away from the fire places in NE and SE. Therefore, if there are wells or tanks in these locations before the construction of the houses, they should be filled up. In settlements also, location of tank in southern sector is not recommended.

Natural groves and sacred groves are also not desirable near the house. This is because snakes and other reptiles etc. are likely to be seen in these.

RULES FOR THE HOUSES OF RULERS

Stanza - 31

राज्ञां धामनि भूसुरस्य च गृहं नित्यार्चनायाङ्गणे
शर्वेन्द्राग्निजलेशदिक्षु कुलदैवार्चा प्रतिष्ठादि च ।
प्रासादादि विधानमीशसुरनाथाग्न्यन्तकाशागतं
केतूत्थं वृषजं करोतु च नैर्ऋत्यादौ क्रमाच्छ्रेयसे ।।

In the houses of the kings and the brahmins, the building for daily worship is in the courtyard, and the installation of family deity etc. is in the of north-east, east south-east or west. The proportioning of these buildings should be with *dhvajayoni* in north-east, east, south-east, south and in *vṛṣabhayoni* from south-west in order, for prosperity.

Commentary

For daily worship, a *pūjāgrha* can be made in the yard in the houses of rulers and *brahmins*. Hence the *anvaya* is "*Rajñam bhūsurasya ca dhāmani...*" It can also be "*Rajñam dhāmani bhūsurasya gṛham ca ...*", in which case, it can be interpreted to mean that in the palace complexes of kings, the house for the priest who performs the daily worship can be made in the *aṅkaṇa*. But the former meaning is more appropriate. While the daily *pūja* can be in the courtyard, the family deity is installed in north-east, east, south-east or west. *Dhvajayoni* perimeter is prescribed for the shrine rooms in the east of *yamasūtra* (south-north axis) and *vrsabha yoni* for those on the west side. These shrines are in the house complexes of nobles. Hence they will face of complex. The *yonis* are prescribed accordingly.

Stanza - 32

सेवितकुलदैवतधामैशनैर्ऋत्यादिके तु वृषजं स्यात् ।
गृहपुरपत्तननगरग्रामादावभिमुखा भवन्ति तदा ।।

The shrines of family deities that are worshiped should be in *dhvajayoni* in north-east etc. and *vṛṣabhayoni* in south-west etc. Then they will face the house, town, city, village etc.

Commentary

If a shrine is to house a family deity, it should face the house occupied by the family. If it is a shrine worshiped by the public, it should face the settlement which uses the shrine. The *yoni* should be appropriately fixed. The *yoni* for the shrines east of the *yamasūtra* will be *dhvaja* and that for the shrines in the west will be *vṛṣabha*.

Stanza - 33

निरङ्गसाङ्गादिविभिन्नगाहप्रतिष्ठिता याः प्रतिमास्तु तासाम् ।
चलाचलत्वोभयभेदतस्तत्क्रियावशाच्चापि भवेद् विशेषः ।।

Those deities that are installed in different shrines of *niranga* and *sânga* characteristic, will be specifically dealt with according to their characteristic of being movable and fixed and according to their rites.

Commentary

Shrines or *śrīkovils* or *vimānas* are of 2 types; *niranga* and *sānga*, The deities in *nirangaprāsādas* are movable (not fixed) and those in *sānga* shrines are fixed. Small shrines for movable idols like *sālagrāma* etc. are classified as niranga. Such *niranga* shrines can be built inside the houses complexes as stated earlier. *Sānga* shrines will have the *prākāras* (see **fig.03.07**) and hence require more space. They have to be built in spacious locations. The rites performed in there two types are necessarily different.

Stanza - 34

सौख्यार्थं धरणीभृतां मणिगृहं मित्रे विहारोऽनिले
व्यायामोऽर्गलके तथैव निर्ऋतौ स्नानादि पर्जन्यके ।
इन्द्रे तोयपतौ च भुक्तिनिलयं नृत्तादि गान्धर्वके
शस्त्राद्यं निर्ऋतौ गृहक्षतपदे प्राच्ये च शय्यागृहम् ।।

The pleasure - house for enjoyment of kings should be (in the *pada* of) *Mitra*, play-house in (the *pada* of) *Vāyu*, exercise is *Argala* and also in *Nirṛti*, bath-house etc. in *Parjanya*, dinning hall in *Indra* and *Varuṇa*, dance etc. in *Gandharva* weapon-house etc. is *Nirṛti*, sleeping house in the pada of *Gṛhakṣata* or in the east.

Commentary

The prescribed locations are shown in **fig.07.16**

Stanza - 35

दण्डान्तं समतीत्य वप्रमुदितं मृद्भिः शिलाद्यैस्तथा
श्रेष्ठं तत् परिखा तु मध्यममते शाखावृतिश्चाधमम् ।

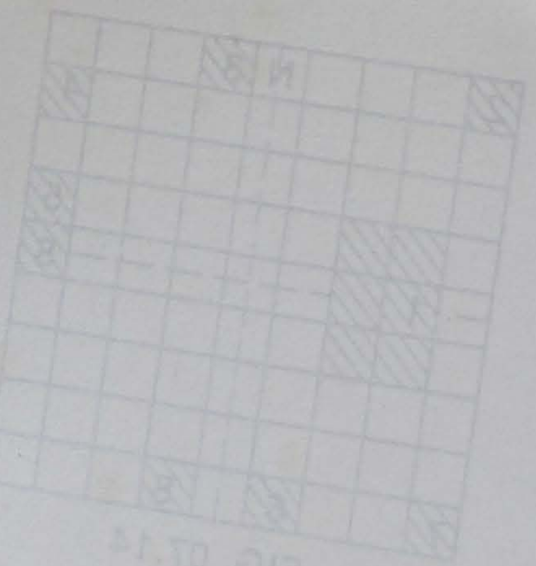
तत्पानादिषु कण्टकिद्रुमलता ग्राह्याश्च वेण्वादयः
कुर्याद् द्रव्यवशादिहैकमुदितान् वृक्षांश्च दिक्षु क्रमात् ।।

Compound wall at the boundary limit with mud or stone is said to be superior. Its encircling trench is medium. Then fencing with twigs etc. is interior. Its (that of fence) posts etc. (posts and intermediate covering) should be with branches of thorny trees, creapers and bamboo etc. Hence the choice is to be made according to availability of funds. The prescribed trees also are to be planted.

Commentary

The importance ascribed to defining the *mandala* is stressed here. In large plots, the *maṇḍala* taken for the anlysis is demarkated by low walls. Where existing buildings are found to be in inauspicious locations, *vāstumaṇḍala* can be redefined by this method to make it auspicious.

The boundary is to be fixed outside the *maṇḍala*. If compound wall is made with stone, mud etc., it is most ... If only a trench is dug at the boundary, it is ... resort. If fencing is adopted, ...hes of thorny ...gs, the ...nds. ...d as



...थेष्टम् ।

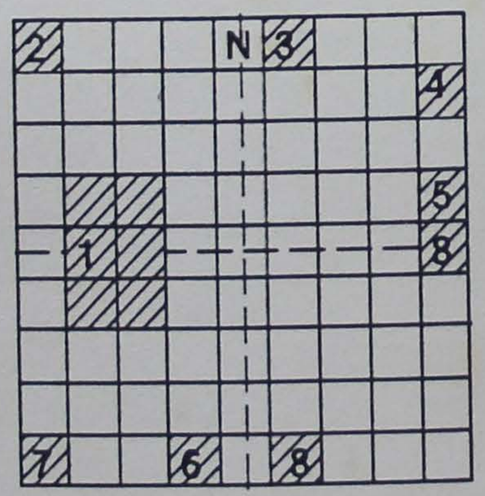
Those deities that are installed in different shrines of *niranga* and *sānga* characteristic, will be specifically dealt with according to their characteristic of being movable and fixed and according to their rites.

Commentary

Shrines or *śrīkovils* or *vimānas* are of 2 types; *niranga* and *sānga*, The deities in *nirangaprāsādas* are movable (not fixed) and those in *sānga* shrines are fixed. Small shrines for movable idols like *sālagrāma* etc. are classified as niranga. Such *niranga* shrines can be built inside the houses complexes as stated earlier. *Sānga* shrines will have the *prākāras* (see **fig.03.07**) and hence require more space. They have to be built in spacious locations. The rites performed in there two types are necessarily different.

Stanza - 34

सौख्यार्थं धरणीभृतां मणिगृहं मित्रे विहारोऽनिले
व्यायामोऽर्गलके तथैव निर्ऋतौ स्नानादि पर्जन्यके ।
इन्द्रे तोयपतौ च भुक्तिनिलयं नृत्तादि गान्धर्वके



1. Pleasure house
2. Play house
3. Gymnasium
4. Bath-house
5. Dining
6. Dance
7. Weapons
8. Rest house

FIG. 07.14

तत्पानादिषु कण्टकिद्रुमलता ग्राह्याश्च वेण्वादयः
कुर्याद् द्रव्यवशादिहैकमुदितान् वृक्षांश्च दिक्षु क्रमात् ।।

Compound wall at the boundary limit with mud or stone is said to be superior. Its encircling trench is medium. Then fencing with twigs etc. is interior. Its (that of fence) posts etc. (posts and intermediate covering) should be with branches of thorny trees, creapers and bamboo etc. Hence the choice is to be made according to availability of funds. The prescribed trees also are to be planted.

Commentary

The importance ascribed to defining the *mandala* is stressed here. In large plots, the *maṇḍala* taken for the anlysis is demarkated by low walls. Where existing buildings are found to be in inauspicious locations, *vāstumaṇḍala* can be redefined by this method to make it auspicious.

The boundary is to be fixed outside the *maṇḍala*. If compound wall is made with stone, mud etc., it is most satisfactory. If only a trench is dug at the boundary, it is secondary. Fencing is the last resort. If fencing is adopted, the intermediate posts should be with branches of thorny trees and bamboo and the covering with thorny twigs, creepers and bamboo. The type of the construction at the boundary is to be done according to the availability of funds. After securing the boundary, trees should be planted as recommended earlier is chapter 1.

ENTERING THE HOUSE

Stanza - 36

एवं निर्माप्य गेहं प्रथममिह वृतस्तन्त्रिवर्यस्तदन्ते
तत्कर्तॄन् शिल्पिनस्तान् वलयमणिलसत्कुण्डलाद्यैर्यथेष्टम् ।

सन्तोष्यापाद्य चैतत् स्वयमपि यजमानेन सम्यङ्मुहूर्ते
गत्वा तद्वास्तुपूजाद्यखिलशुभविधिं साधु कुर्वीत तस्मिन् ।।

After, constructing the house thus, the *ācaryā* who was chosen in the beginning should make the artisans engaged in the construction satisfied according to their desires by (offering) bangles, ear-rings studded with precious stones etc. Then he should receive the house himself and should perform all auspicious rites of *vāstupūja* etc. after entering the house with the owner at an auspicious time.

Commentary

In the first chapter it was mentioned that a person desirous of building a house should first accept a learned person as *ācārya* to guide all activities connected with the construction (ch.1 slokas 9&10). The *ācārya* helps the owner to select a suitable site and also a good *sthapati*. Then, after the construction is completed, the *ācārya* should satisfy himself that the construction has been done according to the prescriptions. He should then make the artisans engaged in the construction happy and satisfied by giving them gifts. Only after this, the *ācārya* should enter the house along with the owner and perform *vāstūpuja* and all other rites llike *Gaṇeśahoma* etc.

According to the text *Vāstuvidya*, the presentation of gifts to the artisans is after the *Vāstubali* (Ref.07.12).

Stanza - 37

कर्ता चाथ क्रियान्ते महितगुरुवरं भोजयित्वा यथेष्टं
गोभूम्याद्यैश्च दत्त्वा विधिवदवहितो दक्षिणां मुख्यरूपाम् ।
आज्ञामादाय तस्मान्निखिलमपि जनं प्रीणयन् भूरिदानैः
स्वीयैः सार्थं स्वगेहे सुचिरमधिवसेत् पूर्णकामः सुखेन ।।

Then; at the end of the rites, after feeding the revered *ācārya* and offering him cow, land etc. and the main *dakṣina* according to the prescriptions and taking his permission, the owner should please all persons with several gifts and live happily in the house, fully satisfied for a long time along with his family.

Commentary

This and the previous stanza specify that the owner should occupy the house only after propitiating the gods, the *ācārya* and all the artisans and workers associated with the constructions. *Mayamata* prescribes that entry to the house shall be only after all the works are over (Ref.07.13). *Bṛhatsamhita* also says that the deities should be worshiped and the house cleaned and decorated before the owner enters the house (Ref.07.14).

All these show the importance of the obligation of the owner to please all the gods, acaryas and workers before he enters the house. The blessings showered by the gods and men who are thus pleased are expected to provide prosperity to the occupants. Unless the owner pleases the *acarya* and workers, it is believed that he will be in debt (*ṛṇa*) and this will make his life miserable. Building a house is a noble act. The *puṇya* in doing the noble act rests with those who were engaged in the construction. By the offering gifts, the *puṇya* gets transferred from the *śilpins* to the owner. The entry to the house (*gṛhapraveśa*) becomes important owing to this symbolic act of taking possession of the *gṛha* from the *śilpin* to lead therein a prosperous and happily life.

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V.V.,XIII-15

07.02 मद्ध्यद्वारं तु देवानां द्विजानामवनीभृताम् ।
शेषाणामपी सर्वेषामुपमद्ध्यं विधियते ॥ M.M.XXX-43

07.03 द्वारोच्च शेषपञ्चांशे भवेदंशद्वयत्वथा ।
ऊर्द्धं त्रयोंशस्तत्रस्युः फलकाचत्रचित्रिता ॥ I.G.P.

07.04 आग्नेयं मन्दिरं द्वारं दक्षिणाभिमुखं स्मृतम् ।
प्रत्यङ्मुखं तु नैर्यत्यां वायवान्तदुदङ्मुखम् ।
ईशे तत् प्राङ्मुखं कुर्यात् तानि स्युः पादुकोपरि ॥
V.V.,XIII-20

07.05 नवगुणसूत्रविभक्तान्यष्टगुणेनाथवा चतुःषष्टेः ।
द्वाराणि यानि तेषामनलादीनां फलोपनयः॥

वधबन्धो रिपुवृद्धिः सुतधनलाभः समस्तगुणसन्पत् ।
पुत्रधनाप्तिवैरं सुतेन दोषाः स्त्रिया नैःस्वम् ॥
B.S. LVIII, 71-75

07.06 तस्मात् सर्वप्रयत्नेन सूत्रादीनि विवर्जयेत् ।
पूर्वादि मद्ध्यसूत्राणि चान्नं धान्यं धनं सुखम् ॥
इति नामानि तन्नाम्ना चत्वारि स्युर्गृहाणि च ॥
अन्नालयं धान्यालयं धनालयं सुखालयम् ॥
M.M., XXVII-18,19

07.07 ऐशान्यं देवगृहं महानसं चापि कार्यमाग्नेय्याम् ।
B.S., LVIII-118

07.08 उत्तरेशान पर्जन्ये सर्वेषां पचनालयम् ।
M.S., XXVI-13

07.09 सवित्राद्यन्तरीक्षान्ते सव्यञ्जनमहानसम् ।
वितथे पूष्णि सावित्रे भुक्ति गेहं मनोरमम् ॥
M.M., XXVII-118,119

07.10 अन्तरीक्षाग्नि पुषा च वर्णानां कूपयोग्यकम् ।
याम्ये च नैर्यते वापि सर्वेषां भोजनालयम् ॥
M.S., XXXVI-14

07.11 प्राच्यादिस्थे सलिले सुतहानिः शिखिभयं रिपुभयं च ।
स्त्रीकलहः स्त्रीदौष्ट्यं नैस्व्यं वित्तात्मजविवृद्धिः ॥
B.S. LVIII, 116

07.12 याथोक्तविधिना तत्र वास्तुकर्म समाप्य च ।
वासोभिर्बहुभिस्तत्र गेहमाच्छादयेत् पुनः ।
अथ कर्ता कर्मकारान् सम्यक् संपूजयेत् पुनः ॥
V.V.,XV-14

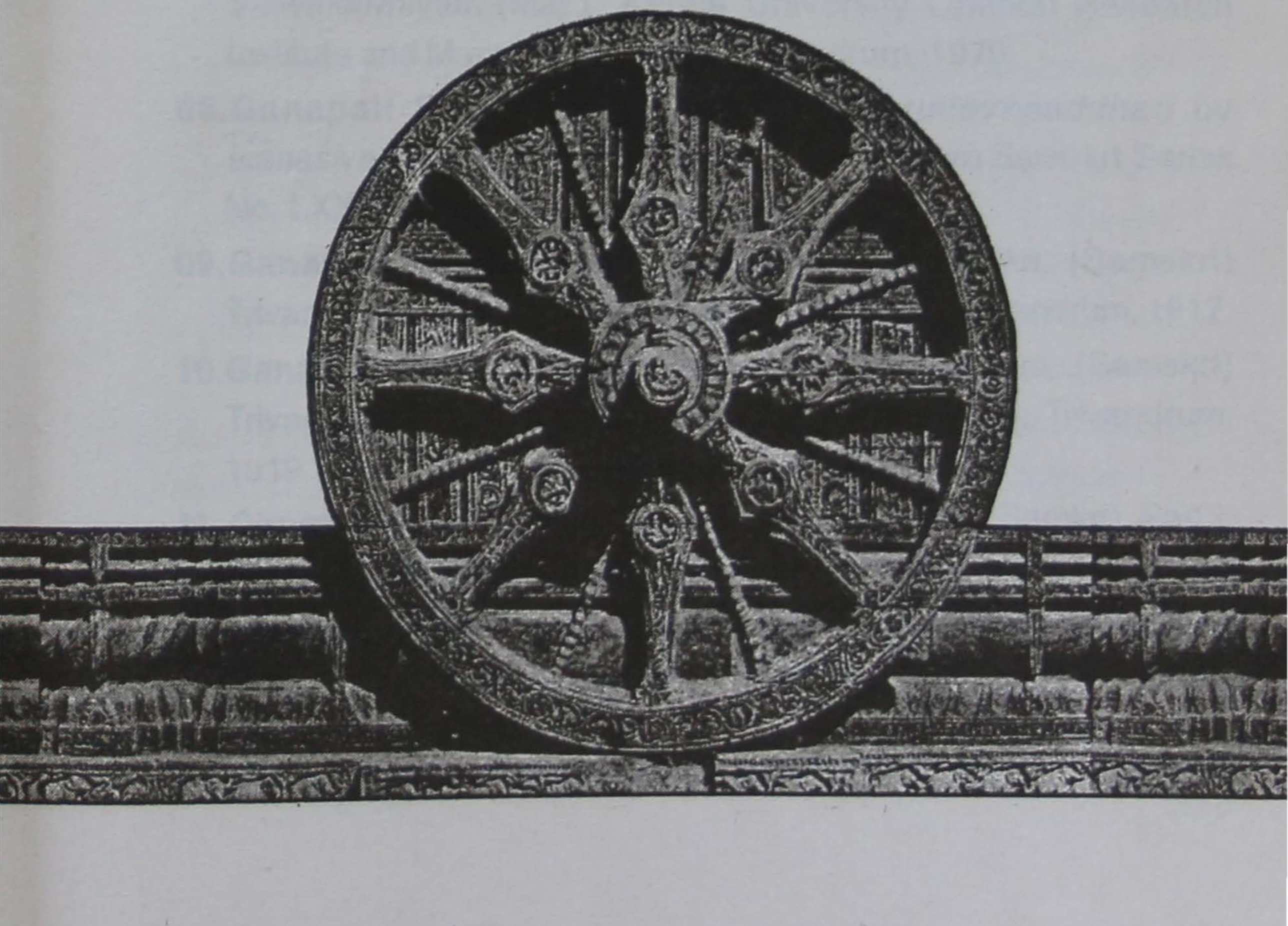
07.13 अथ निष्पन्न गृहं प्रविश्यतं त्वरितं न प्रविशेदनिष्ठितम् ।
यदि निष्पन्नमवेशितं चिरं सुरभूतादि गणाश्चरन्त्यलम् ।
अथ कर्मान्तमुपेत्य तद्गृहं शुभनक्षत्र तिथौ च वारके ।
शुभहोरा सुमुहूर्तकांशके करणे लग्नयुते विशेच्छुभम् ॥
M.M., XVIII-1,2

07.14 भूरिपुष्प विकरं सतोरणं तोयपूर्णकलशोपशोभितम् ।
धूपगन्धबलिपूजितामरं ब्राह्मणध्वनियुतं विशेद्गृहम् ॥
B.S., LVIII-125

APPENDICES

अनुबन्धा:

Reference; Trees Assigned to Birth stars; Botanical Names of Trees and Plants, Design Tables; Glossary



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APPENDIX - 2

TREES ASSIGNED TO BIRTH STARS

Star	Assigned Tree	
	Local name	Botanical name
1. *Aśwati*	*Kaññiram*	*Strychnos nux-vomica*
2. *Bharaṇi*	*Nelli*	*Emblica officinalis*
3. *Krttika*	*Atti*	*Ficus racemosa*
4. *Rohiṇi*	*Ñaval*	*Syzygium cumini*
5. *Mrgaśirsam*	*Karingáli*	*Acacia catechu*
6. *Ardra*	*Karimaram*	*Diospyros ebenum*
7. *Punarvasu*	*Illi*	*Bambusa vulgaris*
8. *Puṣam*	*Arayál*	*Ficus religiosa*
9. *Āśleṣam*	*Nāga*	*Mesua ferrea*
10. *Makam*	*Peral*	*Ficus bengalensis*
11. *Pūrvam*	*Camata*	*Butea frondosa*
12. *Uttaram*	*Itti*	*Ficus microcarpa*
13. *Hastam*	*Ampazham*	*Spondias pinnata*
14. *Citra*	*Kuvalam*	*Aegle marmelos*
15. *Swáti*	*Nīrmaruṭu*	*Terminalia arjuna*
16. *Viśakham*	*Vayyankatavu*	*Flacourtia jangomas*
17. *Anisam*	*Elaññi*	*Mimusops elengi*
18. *Ketta*	*Vetti*	*Aporusa lyndiana*
19. *Moolam*	*Kuntirikkum*	*Canarium strictum*
20. *Pooraṭam*	*Vanji*	*Salix tetrasperma*
21. *Uttraṭam*	*Plāvu*	*Artocarpus integrifolia*
22. *Tiruvonam*	*Erukku*	*Calotropis gigantia*
23. *Aviṭṭam*	*Muringa*	*Moringa oleifera*
24. *Cathayam*	*Kaṭampu*	*Anthocephalus chinensis*
25. *Puruṟuṭṭati*	*Aryaveppu*	*Azadirachta indiea*
26. *Uttraṭṭati*	*Māvu*	*Mangifera indica*
27. *Revati*	*Aṭṭilippa*	*Madhuca nerifolia*

APPENDIX - 3

BOTANICAL NAMES OF TREES AND PLANTS REFFERED TO IN THIS BOOK

Samkrt Name	Local Name	Botanical Name
Abhaya	*Kaṭukka* (Mal)	*Terminalia chebula*
Akṣadruma	*Rudrākṣa*	*Elaeocarpus sparicus*
Ākāsa	*Ama* (Mal)	*Arundo donax*
Amalaki	*Indian gooseberry*	*Phyllanthus embilica*
Aruskara	*Ceru* (Mal)	*Semecarpus anacardium*
Asana	*Venga* (Mal)	*Pterocarpus marsupium*
Aśoka	*Aśoka*	*Saraca asoca*
Aśwattha	*Peepal, Arayāl* (Mal)	*Ficus religiosa*
Bakula	*Elaññi* (M)	*Mimusops elengi*
Bilwa	*Kūvalam* (Mal)	*Aegle marmelos*
Campaka	*Campacam*	*Michelia champaca*
Candana	*Candana*	*Santalum album*
Cinca	*Tamarind,Imli, Puli* (Mal)	*Tamarindus indica*
Cūta	Mango-tree	*Mangifera indica*
Darbha	*Darbha*	*Desmostachya bipinnata*
Drona	*Tumpa* (Mal)	*Leucas aspera*
Dūrva	*Karuka* (Mal)	*Cynodon dactylon*
Hemadugdha	*Swarṇakṣīri, Ponnummat* (Mal)	*Argemone mexicana*
Jāti	*Jāti*	*Myristica fragrans*
Jaya }	*Munna* (Mal)	*Premna integrifolia*
Jayanti }	*Puḷa munna* (Mal)	*Prema serratifolia*
Jīvanti	*Aṭapatiyan*	*Holostemma ada-kodien*
Jīvaputra	*Putramjiva*	*Putran jiva roxburghii*
Kadali	*Kadali*	Plantain *Musa sp.*
Kaṇṭakidruma	*Vayyankata* (Mal)	*Flacourtia jangomas*

Kāraskara	*Kaññiram* (Mal)	*Strychnos nux-vomica*
Kera	Coconut	*Cocos nucifera*
Khadira	*Karingali* (Mal)	*Acacia catechu*
Kiṁśuka	*Murikku*	*Erythrina variegata*
Kuśa	*Kuśa*	*Desmostachya bipinnata*
Malli	*Mulla* (Mal)	Jasminum sambac
Nāga	*Nāgamaram* (Mal)	*Mesua nagassarium* *Mesua ferrea*
Nāgalata	*Betel*	*Piper betel*
Nimba	Neem, *Āryavepu* (Mal)	*Azadirachta indica*
Palaśa	*Plaśu* (Mal)	*Butea frondosa*
Panasa	Jack	*Artocarpus heterophyllus*
Plakṣa	*Itti*	Ficus *microcarpa*
Pīlu	*Uka* (Mal)	*Salvadora persica*
Piśācadruma-	*Papaya* (?)	*Carica papaya* (?)
Punnāga	*Punnā*	*Calophyilum inophyllum*
Pūga,	*Areca, Kramuka Kamuku* (Mal)	*Areca catechu*
Śāka	*Teak*	*Tectona grandis*
Śami	*Sami, Vanni* (Mal)	*Prosppis julisflora*
Saptacchada	*Elilampala* (Mal)	*Alstonia scholaris*
Śigru	*Moringa* (Mal)	*Moringa oleifera*
Śleṣmataka	*Naruvari* (Mal)	*Cordia dichotoma*
Snuhi	*Ilakkalli* (Mal)	*Euphorbia neriifolia*
Śrīvṛksa		*Gmelina arborea*
Śukataru	*Nenmenivaka* (Mal)	*Albizia*
Suradruma	*Deodar*	*Cedrus deodar*
Tāla	*Palm*	*Borassus flabellifer*
Tulasi	*Tulasi*	*Ocimum sanctum*
Udumbara	*Atti*	Ficus *racemosa*
Veṇu	*Mula*	*Bamboosa vulgaris*
Vibhītaki	*Tānni*	*Terminalia bellerica*
Vyadhighna	*Konna* (Mal)	*Cassia fistula*

APPENDIX - 4

DESIGN TABLES

01 THE PRIME DIMENSION

The prime dimension of *vāstu* can be its width, height, area or perimeter, according to different texts. Of these, the perimeter has come to be accepted as the prime dimension, because it can be directly measured for all shapes of *vāstumaṇḍala* and it incorporates other shape factors also depending on its form (*ākāra*). In traditional practice, design tables are prepared to obtain suitable perimeters based on the twin criteria of i) orientation (*yoni*) and ii) astrological properties defining their auspiciousness. But in modern practice, the design generally starts with the area. Hence it is convenient to link up the two methods, so that both practices can be mutually adapted.

02 ACCEPTABILITY CRITERIA FOR THE PERIMETERS

02.01 THE CRITERION OF ORIENTATION

The perimeter of a *vāstu* is chosen to satisfy its primary criterion of orientation. This is known as the canon of *yoni* as explained in chapter 3. According to this, perimeters expressed in the sub-unit of *pada*, when divided by 8, shall yield remainders of 1,3,5 and 7 for *vāstu* located to the east, south, west or north side respectively of the focal point of the *maṇḍala* viz. the *Brahmanābhi*. These remainders are called *yoni* numbers. The perimeters can, therefore, be conveniently put into 4 groups, each with a different *yoni* number. In effect, this is a system of normalising perimeters from the criterion of orientation. For example, a perimeter of 1 *vyāma* (equal to 8 *pada*) can be normalised to

i) 9 *pada* to give *yoni* number 1 (*dhwajayoni*)
ii) 11 pada to give *yoni* number 3 (*simhayoni*),
iii) 13 *pada* to yield *yoni* number 5 (*vṛṣabhayoni*) and
iv) 15 *pada* giving a remainder of 7 (*gajayoni*).

Similarly other *vyāma* values also can be normalised. By this process, 4 sets of perimeters giving the 4 characteristic *yoni* numbers can be generated (tables AP.01, AP.02, AP.03, AP.04).

02.02 ASTROLOGICAL CRITERIA

The auspiciousness or otherwise of the perimeter is traditionally determined from astrological computations. On this basis, perimeters are classified as most auspicious (*uttama*,U) moderately auspicious (*madhyama*, M) and less auspicious (*adhama*, A). Among the less auspicious perimeters, some are considered to be highly inauspicious (based on what is known as their "age") and are not recommended for constructions. Without going into their elaborate computations, the classification as given in classical computational tables are relied upon in preparing the 4 tables mentioned above.

03 ELEMENTS OF THE TABLES

In the tables, the first column refers to the serial order of the acceptable sets of perimeters avoiding the highly inauspicious perimeters. The second column gives the *vyāma* category. The third column gives the normalised perimeters in *pada* and the fourth and fifth columns give their equivalent values in traditional units (*hasta* and *angula*) and metric units. The characteristic of the perimeter is indicated in column 6. The side of the square having the given perimeter is noted in traditional units and metric units in columns 7 and 8 respectively. The maximum area resulting from the given perimeter will be that of this square and this area is given in column 9 in square meters.

It can be seen that the perimeters of the set 1 are the perimeters of small artefacts like platforms for jasmine plant, *pithas*, doors, windows, small rooms etc. The perimeters of the second set are those of medium sized rooms and small houses. The sets 3,4,5 and 6 give the perimeters of increasingly larger buildings. For example, the sixth set contains perimeters of large buildings from about 250m^2 to 330m^2. Beyond this, the perimeters are those of *prasadas* and building complexes. Thus, this

classification helps one to choose the perimeter suitable for all desired functions.

04 *PADAYONI* PRINCIPLE

It was mentioned in chapter 3 that *padayoni* principle gives a refined system for proportioning spaces. According to this principle, the width and the length of a rectangular space are chosen such that perimeters of the squares constructed on them also have to yield *yoni* numbers characteristic of the room. The *padayoni* principle has been applied for determining dimensions such as the width of staircase, the width of corridors, the length of steps and other features of a building which are specified by one lateral dimension alone. This principle can also be used for fixing the vertical elements like height of plinth, height of wall etc. For example, the width of a passage for a building of *dhwajayoni* category can be directly taken to be 150cm, 198cm etc. from column 8 of the table AP 01. The ruling perimeters of these *padayoni* widths considering squares of 150cm and 198cm which fall in the same *dhwajayoni* category will be 6.00 m and 7.92 m respectively as seen from column 5 of the table.

05 PROPORTIONING BY *PADAYONI* PRINCIPLES

For square rooms, for any given normalised perimeter given in columns 4 and 5, the side of the square is given in columns 7 and 8 in traditional and metric units respectively. For rectangular rooms, the width and length are decided by the following steps.

1. For the given perimeter, read the *padayoni* width from columns 7 and 8 of the table. For example, for a *dhwajayoni* perimeter of 19.44m (27H0A), the *padayoni* width is 4.86m(6H18A) (table AP01).
2. For obtaining the width of the room, 48cm or its multiples can be deducted from the *padayoni* width. An equal increment is added to the *padayoni* width to get the length. For example, for the above case of 19.44m perimeter, the width and length could be 4.38m and 5.34m or 3.90m and 5.82m. It may be noted that these values can be directly taken from both sides

of the *padayoni* width from the table.

3. From the chosen width and length, the area can be computed. For the selected examples the areas will be 23.4m^2 and 22.7m^2 respectively. These values can be seen to be less than the maximum area given for the chosen perimeter, namely 23.62m^2 in column 9. It can be seen that as the ratio of length to width increases, the enclosed area decreases i.e the space enclosure efficiency of the rectangle decreases by the shape factor. Therefore, it is evident that when the design starts from a given area, one should chose a perimeter corresponding to a higher value.

06 THE PROPORTIONING OF ROOMS OF GIVEN AREA

In modern practice, the area of the room is specified. Let the specified area be 22m^2. Let the room be in *simhayoni.* Start from 24.80m^2, column 9 of *vyama* category 10 of table AP-02. The corresponding *padayoni* width is 4.98m. We can have length and width equal to 5.46m and 4.5m (adding and substracting 48cm from *padayoni* width) or 5.94m and 4.02m (with 96cm increments). The respective areas will be 24.57m^2 for the first case and 23.88m^2 in the second case.

07 WIDTH AND LENGTH HAVING *PADAYONI* DIFFERENT FROM THAT OF THE ROOM

It has been shown that by substracting and adding 48cm or its multiples, the resulting width and length have the same *padayoni* as that of the room. This limits the choice of values for width and length. Hence some practitioners recommend that the increment may be 12cm instead of 48cm. This will still give *padayoni* values, but the *yoni* will be different from that of the room. For example, take the perimeter of room to be 27H in *dhwajayoni.* Its *padayoni* in *dhwaja* is 4.86m (table AP-01, set.2). With increments of 12cm, we get the following pairs of width and length:

4.74m and 4.98m in *gaja* and *simha* respectively;
4.62m and 5.10m both *vṛṣabha;*

TABLE AP01

DHWAJAYONI MEASUREMENTS FOR PLANNING AND DESIGN OF BUILDINGS

Set	*Vyāma* category	Normalised units in	Traditional units	Corresponding metric value in m	Remarks	Side of the square with the given perimeter		Area
		Pada	*Hasta -Angula*			H-A	m	m^2
1	2	3	4	5	6	7	8	9
	1	9	3-0	2.16	M	0-18	0.54	0.29
	2	17	5-16	4.08	U	1-10	1.02	1.04
1	3	25	8-8	6.00	U	2-2	1.50	2.25
	4	33	11-0	7.92	M	2-18	1.98	3.92
	5	41	13-16	9.84	A	3-10	2.46	6.05
	6	49	16-8	11.76	U	4-2	2.94	8.64
	7							
	8	65	21-16	15.60	M	5-10	3.90	15.21
	9	73	24-8	17.52	M	6-2	4.38	19.18
2	10	81	27-0	19.44	U	6-18	4.86	23.62
	11	89	29-16	21.36	U	7-10	5.34	28.52
	12	97	32-8	23.28	A	8-2	5.82	33.87
	13							
	14	113	37-16	27.12	U	9-10	6.78	45.96
	15	121	40-8	29.04	U	10-2	7.26	52.70
3	16	129	43-0	30.96	M	10-18	7.74	59.91
	17	137	45-16	32.88	U	11-10	8.22	67.57
	18	145	48-8	34.80	A	12-2	8.70	75.69
	19							
	20							
	21	169	56-8	40.56	U	14-2	10.14	102.82

	22	177	59-0	42.48	M	14-18	10.62	112.78
4	23	185	61-16	44.40	A	15-10	11.10	123.21
	24	193	64-8	46.32	M	16-2	11.58	134.10
	25	201	67-0	48.24	U	16-18	12.06	145.44
	26							
	27	217	72-8	52.08	M	18-02	13.02	169.52
	28	225	75-0	54.00	M	18-18	13.50	182.25
5	29	233	77-16	55.92	U	19-10	13.98	195.44
	30	241	80-8	57.84	U	20-02	14.46	209.09
	31	249	83-0	59.76	A	21-18	14.94	223.20
	32							
	33	265	88-8	63.60	M	22-2	15.90	252.81
	34	273	91-0	65.52	U	22-18	16.38	268.30
6	35	281	93-16	67.44	M	23-10	16.86	284.26
	36	289	96-8	69.36	A	24-2	17.34	300.68
	37	297	99-0	71.28	M	24-18	17.82	317.55
	38							
	39							
	40	321	107-0	77.04	U	26-18	19.26	370.95
	41	329	109-16	78.96	A	27-10	19.74	389.67
7	42	337	112-8	80.88	M	28-2	20.22	408.93
	43	345	115-0	82.80	A	28-18	20.70	428.49
	44	353	117-16	84.72	U	29-10	21.18	448:59
	45							
	46	369	123-0	88.56	U	30-18	22.14	490.18
	47	377	125-16	90.48	U	31-10	22.62	511.66
8	48	385	128-8	92.40	U	32-2	23.10	533.61
	49	393	131-0	94.32	M	32-18	23.58	556.02
	50	401	133-16	96.24	A	33-10	24.06	578.88

TABLE AP02

SIMHAYONI MEASUREMENTS FOR PLANNING AND DESIGN OF BUILDING

Set	*Vyāma* category	Normalised units in	Traditional units	Corresponding metric value in m	Remarks	Side of the square with the given perimeter		Area
		Pada	*Hasta -Angula*			H-A	m	m^2
1	2	3	4	5	6	7	8	9
	1	11	3-16	2.64	A	0-22	0.66	0.44
	2	19	6-8	4.56	A	1-14	1.14	1.30
1	3	27	9-0	6.48	M	2-6	1.62	2.62
	4	35	11-16	8.40	M	2-22	2.10	4.41
	5	43	14-8	10.32	M	3-14	2.58	6.66
	6							
	7							
	8	67	22-8	16.08	M	5-14	4.02	16.16
	9	75	25-0	18.00	U	6-6	4.50	20.25
2	10	83	27-16	19.92	A	6-22	4.98	24.80
	11	91	30-8	21.84	A	7-14	5.46	29.81
	12	99	33-0	23.76	U	8-6	5.94	35.28
	13							
	14	115	38-8	27.60	U	9-14	6.90	47.61
	15	123	41-0	29.52	A	10-6	7.38	54.46
3	16	131	43-16	31.44	A	10-22	7.86	61.78
	17	139	46-8	33.36	A	11-14	8.34	69.56
	18	147	49-0	35.28	U	12-6	8.82	77.79
	19							
	20	163	54-8	39.12	A	13-14	9.78	95.65
	21	171	57-0	41.04	U	14-6	10.2	105.27
4	22	179	59-16	42.96	M	14-22	10.74	115.35

	23	187	62-8	44.88	U	15-14	11.22	125.89
	24	195	65-0	46.80	A	16-6	11.70	136.89
	25							
	26							
	27	219	73-0	52.56	M	18-6	13.14	172.66
	28	227	75-16	54.48	U	18-22	13.62	185.50
5	29	235	78-8	56.40	A	19-14	14.10	198.81
	30	243	81-0	58.32	M	20-6	14.58	212.58
	31	251	83-16	60.24	U	20-22	15.06	226.80
	32							
	33	267	89-00	64.08	U	22-6	16.02	256.64
	34	275	91-16	66.00	A	22-22	16.50	272.25
6	35	283	94-8	67.92	U	23-14	16.98	288.32
	36	291	97-0	69.84	M	24-6	17.46	304.85
	37	299	99-16	71.76	U	24-22	17.94	321.84
	38							
	39	315	105-10	75.60	A	26-6	18.90	357.21
	40	323	107-16	77.52	M	26-22	19.38	375.58
7	41	331	110-8	79.44	M	27-14	19.86	394.42
	42	339	113-0	81.36	U	28-6	20.34	413.72
	43	347	115-16	83.28	U	28-22	20.82	433.47
	44							
	45							
	46	371	123-16	89.04	A	30-22	22.26	495.51
	47	379	126-08	90.96	U	31-14	22.74	517.12
8	48	387	129-0	92.88	M	32-6	23.22	539.17
	49	395	131-16	94.80	M	33-22	23.70	561.69
	50	403	134-8	96.72	A	34-14	24.18	584.67

TABLE AP03

VRSABHAYONI MEASUREMENTS FOR PLANNING AND DESIGN OF BUILDINGS

Set	*Vyāma* category	Normalised units in	Traditional units	Corresponding metric value in m	Remarks	Side of the square with the given perimeter		Area
		Pada	*Hasta -Angula*			H-A	m	m²
1	2	3	4	5	6	7	8	9
	1	13	4-8	3.12	M	1-2	0.78	0.61
	2	21	7-0	5.04	M	1-18	1.26	1.59
1	3	29	9-16	6.96	U	2-10	1.74	3.03
	4	37	12-8	8.88	A	3-2	2.22	4.93
	5	45	15-0	10.80	U	3-18	2.70	7.29
	6	53						
	7	61	20-8	14.64	U	5-2	3.66	13.40
	8	69	23-0	16.56	A	5-18	4.14	17.14
2	9	77	25-16	18.48	M	6-10	4.62	21.34
	10	85	28-8	20.40	M	7-2	5.10	26.01
	11	93	31-0	22.32	A	7-18	5.58	31.14
	12	101	33-16	24.24	U	8-10	6.06	36.72
	13							
	14	117	39-0	28.08	U	9-18	7.02	49.28
	15	125	41-16	30.00	A	10-10	7.50	56.25
3	16	133	44-8	31.92	A	11-2	7.98	63.68
	17	141	47-0	33.84	U	11-18	8.46	71.57
	18	149	49-16	35.76	A	12-10	8.94	79.92
	19							
	20	165	55-0	39.60	U	13-18	9.90	98.01
	21	173	57-16	41.52	U	14-10	10.38	107.74

4	22	181	60-8	43.44	A	15-02	10.86	117.94
	23	189	63-0	45.36	M	15-18	11.34	128.60
	24	197	65-16	47.28	U	16-10	11.82	139.71
	25							
	26	213	71-0	51.12	U	17-18	12.78	163.33
	27	221	73-16	53.04	A	18-10	13.26	175.83
5	28	229	76-8	54.96	U	19-2	13.74	188.79
	29	237	79-0	56.88	M	19-18	14.22	202.21
	30	245	81-16	58.80	A	20-10	14.70	216.09
	31	253	84-8	60.72	U	21-2	15.18	230.43
	32							
	33	269	89-16	64.56	U	22-10	16.14	260.50
	34	277	92-8	66.48	A	23-2	16.62	276.22
6	35	285	95-0	68.40	A	23-18	17.10	292.41
	36	293	97-16	70.32	A	24-10	17.58	309.06
	37	301	100-8	72.24	M	25-2	18.06	326.16
	38							
	39	317	105-16	76.08	M	26-10	19.02	361.76
	40	325	108-8	78.00	A	27-2	19.50	380.25
7	41	333	111-0	79.92	U	27-18	19.98	399.20
	42	341	113-16	81.84	U	28-10	20.46	418.61
	43	349	116-8	83.76	A	29-2	20.94	438.48
	44							
	45	365	121-16	87.60	M	30-10	21.90	479.61
	46	373	124-8	89.52	U	31-2	22.38	490.12
8	47	381	127-0	91.44	U	31-18	22.86	522.58
	48	389	129-16	93.36	A	32-10	23.34	544.76
	49	397	132-8	95.28	A	33-2	23.84	568.35
	50							

TABLE AP04

GAJAYONI MEASUREMENTS FOR PLANNING AND DESIGN OF BUILDINGS

Set	*Vyāma* category	Normalised units in	Traditional units	Corresponding metric value in m	Remarks	Side of the square with the given perimeter		Area
		Pada	*Hasta -Angula*			H-A	m	m²
1	2	3	4	5	6	7	8	9
	1	15	5-0	3.60	U	1-6	0.9	0.81
	2	23	7-16	5.52	A	1-22	1.38	1.90
1	3	31	10-8	7.44	M	2-14	1.86	3.46
	4	39	13-0	9.36	M	3-6	2.34	5.48
	5	47	15-16	11.28	M	3-22	2.82	7.95
	6							
	7	63	21-00	15.12	M	5-6	3.78	14.29
	8	71	23-16	17.04	U	5-22	4.26	18.15
2	9	79	26-8	18.96	A	6-14	4.74	22.47
	10	87	29-0	20.88	U	7-6	5.22	27.25
	11	95	31-16	22.80	A	7-22	5.70	32.49
	12							
	13							
	14	119	39-16	28.56	A	9-22	7.14	50.98
	15	127	42-8	30.48	M	10-14	7.62	58.06
3	16	135	45-0	32.40	A	11-6	8.10	65.61
	17	143	47-16	34.32	U	11-22	8.58	73.62
	18	151	50-8	36.24	M	12-14	9.06	82.08
	19							
	20	167	55-16	40.08	U	13-22	10.02	100.40
	21	175	58-8	42.00	U	14-14	10.50	110.25

4	22	183	61-0	43.92	M	15-06	10.98	120.56
	23	191	63-16	45.84	M	15-22	11.46	131.33
	24	199	66-8	47.76	A	16-14	11.94	142.56
	25							
	26	215	71-16	51.60	M	17-22	12.90	166.41
	27	223	74-8	53.52	A	18-14	13.38	179.02
5	28	231	77-0	55.44	U	19-6	13.86	192.10
	29	239	79-16	57.36	M	19-22	14.34	205.64
	30	247	82-8	59.28	M	20-14	14.82	219.63
	31							
	32							
	33	271	90-8	65.04	A	22-14	16.26	214.39
	34	279	93-0	66.96	M	23-6	16.74	280.23
6	35	287	95-16	68.88	U	23-22	17.22	296.53
	36	295	98-8	70.80	U	24-14	17.70	313.29
	37	303	101-0	72.72	A	25-6	18.18	330.51
	38							
	39	319	106-8	76.56	M	26-14	19.14	366.34
	40	327	109-0	78.48	U	27-6	19.62	384.94
7	41	335	111-16	80.40	A	27-22	20.10	401.01
	42	343	114-8	82.32	A	28-14	20.58	423.54
	43	351	117-0	84.24	M	29-6	21.06	443.52
	44							
	45	367	122.8	88.08	U	30-14	22.02	484.88
	46	375	125-0	90.00	A	31-6	22.50	506.25
8	47	383	127-16	91.92	A	31-22	22.98	528.08
	48	391	130-8	93.84	M	32-14	23.46	550.37
	49	399	133-0	95.76	A	33-6	23.96	574.08
	50							

4.50m and 5.22m in *simha* and *gaja* respectively; and 4.38 and 5.34m both *dhwaja.*

It can be seen that in this system, it is not insisted that the *padayoni* of width and length should belong to the same class as that of the room. This appears to be a compromise resulting in the loss of the refinement expected from the *padayoni* concept.

08 USE OF PROHIBITED *PADAYONI* VALUES FOR WIDTH AND LENGTH

It can be seen that when increments of 48cm are added to or deducted from the *padayoni* value for a chosen perimeter, the resulting width and length can fall under the prohibited *vyāma* category. For example, in the case of 27 *hasta* perimeter referred above, adding to and subtracting from the *padayoni* value of 4.86m 3 increments of 48cm, the length and width become 6.30m and 3.42m respectively. Though these values are acceptable according to *padayoni* principle, they are not desirable as they fall under the prohibited *vyāma* category. Here also, some practitioners adopt such values as a compromise. But this clearly violates refinement of astrological computation in the choice of the perimeter.

09 TABLES AS READY-RECKONERS

It can be seen that the tables serve as convenient and easy-to-use ready reckoners for design of *vāstus*. The proportioning of the rooms starting from perimeter and area is made easy by the table. The auspiciousness or otherwise of the chosen perimeter can also be easily found out from the table.

GLOSSARY

Note: The term, the page in which the term appears first and the technical meaning of the term in the context of this text appear in that order.

***Abdhyaśra* (46)** Square
***Ācārya* (10)** Learned preceptor; advisor to the owner and *sthapati* on matters relating to *vāstusthāpana.*
***Adhiṣṭhāna* (190)** Basement of a building
***Adhama* (93)** Least; minimum
***Adhomūla* (240)** Bottom down as opposed to *ūrdhwamūlam* bottom up (relates to placing of *kūṭam*)
***Āgama* (9)** Literature relating to the system of worshiping gods in iconic form; generally *agamas* refer to *Śaiva* worship, *samhita* to *Vaiṣnava* and *tantra* to *śakti* worships.
***Agni* (22)** Fire god; regent of south east direction; also manifested as *sikhi* in the north east direction
***Agra* (46)** Front; top
***Ajayuddhasandhi* (243)** Goat fight joint, similar to the scarfed joint
***Alinda* (150)** Corridor; verandah; passage.
***Alpakṣetra* (50)** Small plot generally of width less than 32 *hasta*..
***Angula* (39)** Linear measurement equal to 1/64 of *vyāma*; also equal to 8 *yava*; standard *angula* is 3cm.
***Aṇkaṇa* (61)** Courtyard. *Bāhyānkaṇa*: outer yard; *Madhyānkaṇa*: central yard; *Gartānkaṇa* : depressed yard
***Apidhāna* (264)** Top plank of the roof placed above the ridge to blind the joints with the rafter; also known as *avasānaphalaka.*
***Arama* (279)** vertical piece of the door latch through the cut of which the horizontal pieces called *argala* slide.
***Ārdhádhika* (142)** Ratios of length to width which are obtained by adding ½ to integers eg. 1½, 2 ½ etc.
***Ārūdhothara* (231)** Additional horizontal support for the rafters between wall plate and ridge; elevated *uttara,* similar to purlin.
***Avanata* (39)** A-shaped frame used for checking levels of ground or floors.
***Avayava* (67)** Limb; element
***Āya* (111)** Income; The first of the six canons known as *āyādi-sadvarga*; others being *vyaya* (expenditure), *nakṣatra* (star) *tithi* (phase of the moon) *vāra* (week), *vayas* (age).
***Āyāma* (53)** Elongation; the frontal elongation is called *mukha-yāma.*

***Ayana* (42)** The apparent movement of the sun from tropic of Capricorn to tropic of Cancer and back over one year; The former is *uttarāyana* (north ward movement) and the latter is *dakṣiṇāyana* (southerly movement).

***Bahupāmsu* (20)** Excess soil.
***Bālakūṭa* (246)** Additional, decorative pendent.
***Bhinna* (150)** Separate.
***Bhuja* (247)** Base of the triangle. *Koṭi* is the altitude of a right angled triangle. *Karṇa* is the hypotenuse..
***Bhūmi* (18)** Earth; land; one of the classifications of *vāstu*.
***Bindu* (255)** Point; a *maṇḍala* of 0 x 0 grid; also refered as *nābhi*, the focus of a *mandala*.
***Bhramaṇaka* (276)** : Pinion and socket hinge

***Caraṇa* (120)** Pillar
***Caturaśrīkaraṇa* (67)** Squaring the plot.
***Catuśśāla* (135)** A combination of four *ekaśālas* with or without the corner *śālas;* a structure with halls on four sides around a central courtyard.
***Citra* (8)** Painting; also used to denote all depictions including relief and sculpture.
***Cúli* (218)** Bressumer, or beam supported on columns.

***Daṇḍa* (96)** Linear measurement equal to 4 *hasta* or 96 *angula*; also called *puruṣadaṇḍa*; the unit or module in the proportional system of measurement; literally *danda* means a rod, similar to the ranging rod used in modern survey.
***Darśana* (14)**Philosophy.
***Dhanālaya* (296)** Treasury, store for valuables.
***Dhanurgraha* (89)** *Hasta* measure of length equal to 27 standard *uttamangula*.
***Dhanurmuṣti* (89)** *Hasta*,measure of length equal to 26 standard *uttamangula*.
***Dhānyabhavana* (292)** Barn.
***Dhvajarekha* (262)** Pitch line; reference line on a rafter.
***Dhyānaśloka* (7)** Meditational chanting generally depicting the characteristic features of the deity; basis for painting and sculpture.
***Dignirṇaya* (67)** Fixing the cardinal direction; see also *śankusthāpana*, *dik* (4 cardinal directions) *vidik* (corner directions).
***Dik* (46)** Cardinal directions - 4 in number; see *vidik* for other direction.

***Dīpamala* (196)** Rows of oil lamps fixed on the exterior of temple walls or on special wooden framed structure (*vilakkumāṭam*) beyond the wall.
***Dravyavijñāna* (8)** Knowledge of materials; material science.
***Druhiṇa* (8)** *Brahma*; supreme creator.
***Dviśāla* (135)** A combination of two *ekaśālas* -6 possibilities exist

***Ekaśāla* (135)** Unitary building, put up in any one cardinal direction with reference to the central point *Brahmanabhi* of a *vāstu*; it gets its name depending on its position in relation to this point eg. *pūrvaśāla, dakṣiṇaśāla, paścimaśāla* and *uttaraśāla* respectively located to the E, S, W, and N of this focus.

***Gala* (194)** Neck or recess in a basement; also refers to the recess above the *prastara* (entablature) of a building and the *śikhara* (roof) portion.
***Galamancaka* (204)** Specific pattern of moulding of basement with a neck (*gala*).
***Gamana* (52)** Shift; offset.
***Gaṇita* (8)** Square mandala of 19x19 grid; mathematics; computation.
***Garbhagṛha* (104)** The sanctum sanctorum; the womb chamber.
***Gopura* (196)** Gate, tower.
***Grāma* (102)** Village settlements; large *grāmas* are called *mahā-grāmas*; other types of rural settlements are *kheṭaka, kharvaṭaka*; smaller villages are also of *vidambaka,nigama*, and *agrahara* categories.
***Gṛhapreveśa* (18)** First entry into house..
***Guṇāmśa* (133)** Fraction; the rule according to which the semi-perimeter of a rectangle is divided by integers from 9 to 32 and 4 parts are taken for width and the rest for length.

***Harmya* (19)** Building; *harmyādivastu* means buildings for different activities
***Hasta* (20)** Anthropometric linear measurement equal to length of arm; the standard and most commonly used *hasta* is 24 *angula* and is called *kiṣku*; 8 measurements of *hastas* varying from 24 *angula* to 31 *angula* with variations of 1 *angula* are known by different names; the other words for *hasta* are *kara, bhuja, aratni, dormāna, kol* (Mal.)

***Iṣṭadīrgha* (61)** Desired length; selected length.

***Iṣṭadevata* (4)** Deity of one's choice.

***Jagati* (104)** The vertical part of basement above *pāduka*.
***Janaka* (160)** Creator or origin; that which is derived is *janya*.
***Jayanti* (226)** Cross beams.

***Kalasadma* (295)** Farm house.
***Kalari* (32)** Training place.
***Kāṇḍa* (207)** The shaft of the column; the portion between base and capital.
***Kapota* (226)** The projecting portion of entablature with an S shape.
***Karṇapramāṇa* (209)** *Pramāṇa* or reference measurement (module) equal to the length of diagonal.
***Karṇasūtra* (193)** Diagonal axis of a *mandala*; mainly refered for the line from S-W to N-E.
***Karṇavedha* (193)** The affliction of any reference line or part of the building with a diagonal in the *mandala*.
***Kavāta* (275)** Leaf of the door.
***Khaṇḍa* (49)** Sector.
***Kiṣku* (91)** Standard *hasta* equal to 24 *uttamangula;* 72 cm.
***Koṭi* (236)** Diagonal (oblique line); also the hip rafter.
***Kṣetra* (42)** Plot of land, *alpakṣetra* is small plot or small temple, *Kṣetravāstu* :architecture of temples.
***Kumuda* (194)** The part of the basement above *jagati* with octagonal or circular section; also water lily.
***Kūṭa* (239)** Pendant; solid wooden piece to which the top ends of all the rafters of a *koṣṭha* type of roof or the top ends of slanting rafters and the end of ridge piece of a *sabha* type of roof are connected.

***Lambam* (254)** Vertical; *lambarekha* vertical line.
***Lakṣmi* (273)** Goddess of wealth and prosperity.
***Lupa* (234)** Rafter; *koṭilupa* is hip rafter; *ṛjulupa* or *prakṛtilupa* is Straight rafter, *upakoṭilupa* is the inclined rafter other than hip rafter, also known as *vikṛtilupa*; *lupalamba* is drop of the rafter from the wall plate.

***Madhyaprarūddha* (150)** System of centre line measurement of *uttara*.
***Mallikākuttima* (194)** Platform for the jasmine plant.
***Māna* (86)** Measurement; specifically the horizontal measurement; *mana* is divided into *pramāṇa* the measurement of width, diameter etc. and *parimāṇa* the measurement of circumference or perimeter.
***Manangula* (95)** The standardised measure of *angula*, by equating

it to the grain size-6,7 or 8 in number denoting the minimum, median or maximum width, *adhama*, *madhyama* and *uttama*, *angulas* are obtained.
***Mancaka* (203)** Specific pattern of horizontal moulding of basement.
***Maṇḍala* (55)** Demarkated area; generally of circular shape but also used to describe any area defined by a perimeter, regular or irregular.
***Maṇḍapa* (104)** Pavilion.
***Mangalaphalaka* (273)** Ornamental decorative plank between the door head and wall plate.
***Manuṣyapramāṇa* (86)** Anthropometric standard; measurement system based on the size and proportions of human body.
***Marma* (70)** Intersection of orthogonal and diagonal lines of a grid; vulnerable point; nodes.
***Marmavedha* (70)** Intersection with vulnerable points,
***Māsūra* (191)** Synonym of *adhiṣṭhāna*.
***Mātrāngula* (87)** Measurement of *angula* related to the body measure, varies with ethnic groups.
***Muṣti* (97)** Fist, a measure of 3 *angulam*; also known as *parva*.

***Nādi* (70)** Orthogonal line in a *maṇḍala*; also refered as *sira*.
***Nādika* (128)** 1/60 of a day i.e. 24 minutes; also the distance that can be covered in 1 *nādika* by walking which is 1000 *daṇḍa*..
***Nagara* (102)** Town; capital towns are called *rajadhāni*, commercial forms are *pattaṇas*,harbour town are *droṇīmukha*. Forts are *durgas*.
***Nakṣatra* (27)** Star; any one of the 27 constellations in the sky.
***Nimitta* (15)** Cause; omen
***Nīvra* (259)** Eave; *nivraphalaka* is eave-reaper.

***Oma* (207)** Base or *pādapiṭha* of the column.

***Pada* (20)** Square cell, also cell of any shape in a *maṇḍala* *Padavinyāsa* is analysis by dividing the area into cells by means of grids; linear measurement equal to 8 *angula* or 1/8 of *vyāma*.
***Pādadevatas* (74)** The deities presiding over the cells of a *mandala*; ; there are 45 *padadevatas* inside the *maṇḍala* and 8 outside.
***Pādādhika* (142)** Ratios of length to width which are obtained by adding ¼ to integers eg. 1¼, 2¼ etc.
***Pādamana* (207)** The height between the top of foundation to the bottom of wall plate.

***Padayoni* (121)** A rule for proportioning rectangle, or determining the right dimension of linear elements to satisfy the *yoni* rule.
***Pādona* (142)** Ratios of length to width which are obtained by subtracting ¼ from integers above 1, eg. 1¾, 2¾....
***Pāduka* (195)** Ground course; the lowest course of the basement.
***Pakṣa* (39)** 15 days denoting the lunar phases of waxing and waning of moon; waxing phase is *śuklapakṣa* and waning phase is *kṛṣṇapaksa.*
***Pancaprākāra* (104)** The five defined boundaries of a temple;
***Paramāṇu* (86)** The smallest linear measurement equal to the diameter of the minute aerosol seen in a dark room when sun's rays creep into it through crevices; 8^{-6} of 1*angula.*
***Paramaśāyimaṇḍala* (138)** Square mandala of 9 x 9 grid divisions.
***Parva* (200)** Linear measurement equal to 3 *angula*; 1/8 part of *Hasta,* also known as *muṣti.*
***Paryantasūtra* (133)** Bounding Perimeters.
***Patramāna* (168)** The horizontal distance from outside of *uttara* to the outside of the basement; offset of plinth from the plane of *uttara.*
***Paṭṭa* (219)** belt; also *paṭṭi.*
***Pīṭha* (102)** seat; elevated square seat; also a square maṇḍala of 3 x 3 grid.
***Potika* (207)** Same as *bodhika*, decorated bracket of pillar.
***Prācya* (89)** *Hasta* measure of length equal to 28 standard *uttamāngula.*
***Prajāpatya* (87)** *Hasta* measure of length equal to 25 standard *uttamāngula.*
***Prākāra* (104)** Boundary; boundary wall classically 5 in number viz- *antarmaṇḍala, antahāra, madhyahāra, bahyahāra, and maryāda.* starting from the inner altar line to outer wall of temple; same as *pancaprākāra* or *pancakoṣṭhi;* in *Vaiṣnavism,* the *prákáras* are 7 with *madhyamaryāda* and *mahāmaryāda* added.
***Prakīrṇa* (89)** *Hasta* measure of length equal to 31 standard *uttamāngula.*
***Prāsāda* (64)** That which is pleasing; large buildings like temple, palaces etc; the word is also used to denote the *vimāna* of temple. *Alpaprāsāda* : small temple with width of *garbhagṛha* not exceeding 15 *Hasta.*
***Prāsādavāstu* (190)** Temples, palaces or any symbolic building; literally means a *vāstu* (artefact) which pleases the mind of the on-looker or user.
***Prati* (204)** Stereobate, the topmost course of a plinth.

***Puccha* (45)** Tail, rear.
***Puruṣānjali* (147)** Reach of standard *puruṣa*; 10 *pada*; 80 *angula.*

***Rajju* (46)** Rope; also diagonal in *maṇḍala.*
***Raṇdhra* (239)** Hole, mortice
***Rāśi* (75)** Stellar constellation; 12 numbers from Aries (*meṣa*), to Pisces (*mīna*).

***Śāla* (54)** Rectangular hall with gable roof.
***Samatata* (142)** A rectangle with length equal to an integer multiple of its width.
***Samhita* (9)** Compilation (e.g. *Bṛhtsamhita*); a generic name for *Vaiṣṇava ágamas.*
***Samīkaraṇa* (40)** Levelling operation.
***Sandhipala* (276)** Reaper placed to conceal the gaps between the door panels;
***Śanku* (39)** Gnomon; pole; *Śankusthāpana*; fixing gnomon for marking the centre of the *vāstu* and /or finding the cardinal directions.
***Śāntikarma* (71)** The traditional rites to propitiate the deities in a *maṇḍala*; also refered to as *vāstupūja.*
***Sargaprakriya* (15)** Job of creation
***Śayana* (19)** Literally means a couch or bed stead, but is used to denote all furniture.
***Śilpaśāstra* (8)** Science of sculpture; iconography
***Śilpin* (14)** Building craftsmen generally divided into 4 divisions; *sthapati, sūtragrāhi, vardhaki* and *takṣaka.*
***Śliṣta* (150)** Combined.
***Sthāpaka* (93)** One who establishes or builds. *Sthāpana* is the act of building.
***Sthapati* (11)** The architect-engineer or master builder occupying the highest position among the 4 divisions of *śilpins*; one who is empowered to design and build a *vāstu* (*sthāpanārhaḥ sthapatiḥ*).
***Sthapatyaveda* (8)** *Upaveda* of *Atharvaveda* dealing with building science.
***Sūtra* (13)** Thread line; *sūtravistára* is thickness of line; *sūtra* also means formula, theory etc.
***Sūtragrāhi* (12)** One of the four tiers of *śilpins*; superviser of works; literally means 'one who holds the thread' (for measurement).

***Takṣaka* (12)** One of the 4 divisions of *śilpins* who shapes the building components; literally *takṣaka* means 'one who reduces'.
***Tāla* (98)** Palm of the hand; modular unit of dimension in

iconography in terms of face length which is equal to length of palm; *tālamāna* is the proportionate system of measurement using *tāla* as a module.

***Tantra* (8)** Ritualistic practice generally related to worship of *śakti*; applied knowledge.

***Tejas* (3)** *Lustre*; splendour, energy.

***Tila* (86)** The diameter of the til oil seed; 1/64 of *angula*; 0.47mm.

***Tiryak* (222)** Cross wise (placing of members).

***Triśāla* (135)** A combination of 3 *ekaśālas*.

***Tulāpāda* (226)** Projecting end of joist.

***Upānaha* (190)** Course below the *pāduka*; the top most levelling course of foundation.

***Upapīṭha* (191)** Course or platform below the basement.

***Ūrdhvapaṭṭi* (274)** Lintel; plank kept above the door frame to support the masonry portion above it.

***Uttama* (93)** Best; maximum.

***Uttamānga* (300)** Head;

***Uttara* (122)** North; also wall plate, categorised as *khaṇḍottara*, *pattrottara*, *rūpottara*; *kshudrottara* is purlin supporting the roof and bearing on the *uttara*; *ankaṇottara* is purlin at the eave.

***Utthāna* (76)** Face up position

***Vaideha* (89)** *Hasta* measure of length equal to 29 standard *uttamāngula*.

***Vaipulya* (89)** *Hasta* measurement of length equal to 30 standard *uttamānagula*.

***Vājana* (204)** Fillet; projection from the vertical plane; wing-like treatment on basement, walls or roof elements;derived from *vāji*, meaning horse.

***Valabhi* (226)** Decorative moulding for beams, door frames etc.

***Vamśa* (237)** ridge to which all rafters join; literally mean clan; also called *agradhāni*.

***Vardhaki* (12)** One of the 4 divisions of *śilpins* who assembles the different building components; literally *vardhaki* means 'one who increases or joins'.

***Varṇa* (11)** Class of people, the four classes being *brāhmaṇa*, *kṣatriya*, *vaiśya* and *śūdra;* also colour.

***Vāstu* (10)** Dwelling place; derived from the *Samskṛt* word *vas* meaning "to dwell".

***Vāstumaṇḍala* (46)** Specified region for the planning of building and other artefacts.

***Vāstupuruṣa* (15)** The mythological being which is believed to

occupy all *Vāstumaṇḍala*. The symbolic figure of a man overlaid or depicted on *vāstu*.

***Vāstupuruṣamaṇḍala* (77)** The *Vāstumaṇḍala* with the figure of *Vāstupuruṣa* superimposed on it indicating the position of *padadevatas*.

***Vāstuśāstra* (3)** The prescriptions for building; generally, the term is used to denote traditional Indian building technology.

***Vāstuvidya* (8)** The knowledge of building science; the term is used to denote tradtional Indian architecture.

***Vāstusthāpana* (12)** Design and construction of *vāstu*.

***Vāyu* (22)** God of wind; regent of norht-west direction, also called *anala*.

***Vedha* (54)** Intersection;affliction.

***Vedi* (289)** Platform.

***Vidik* (21)** Corner direction, generally inclined at 45° to the cardinal directions: Analysis is taken up to 32 divisions of a circle.

***Vimâna* (104)** Structure of the sanctum sanctorum; vehicle used for the procession of deities; literally menas that which is measured proportiontely.

***Viṣkambha* (232)** Intermediate beam in a roof section; *viṣkambhapāda* is the strut supporting *viṣkambha*.

***Vitânarekha* (242)** horizantal line, used to denote the sloping width of a rafter.

***Vīthi* (20)** path; enveloping shell; *vāstumaṇḍala* is generally divided into 4 *vīthis* but in an 18 x 18 grid, 9 *vīthis* are given as in *Manuṣyâlayacandrika*. *Vīthivinayasa*, analysis of *maṇḍala* by enveloping regions.

***Vṛkṣa* (25)** Tree; in general terms it is used to include all plants; classified traditionally into *antassāra*, (hard core inside), *sarvasāra* (hard wood thoughout), *bahissāra* (hard wood outside) and *nissāra* (hard wood nowhere).

***Vyāma* (87)** Anthropometric measure between the tips of the middle fingers with hands outstretched to two sides; 8 *pada* or 64 *angula*.

***Yajamāna* (11)** Owner of building; patron; one who leads *yajna*.

***Yāna* (19)** Vehicle used for travel.

***Yava* (86)** Grain of barley; a linear measurement equal to 1/8 of *angula*, approximately 3.75 mm; *yavodara* is width of *yava*.

***Yojana* (101)** Linear measurement equal to 1000 *rajju* or 8000 *danda*.

***Yoni* (106)** Architectural formula for orientation; literally yoni means 'origin'.

VĀSTUVIDYĀPRATIṢṬHĀNAM

(Regd. under the Societies Registration Act XXI of 1860 Reg. No. 558/1193, Kozhikode)

MAIN OBJECTIVE

1. To provide for and promote the study and research of *Vāstuvidya*, the traditional architecture of India and its allied fields, with special reference to Kerala.
2. To execute programmes for education and training including awareness courses, seminars, symposia, workshops, conferences on building sciences, rural and urban planning and related subjects.
3. To train craftsmen in the application of the principles and paractices of *Vāstuvidya*.
4. To arrange ofr publication of monographs, journals, reading materials, reference books.
5. To take up design and construction of different kinds of Vastu as part of research on *Vāstuvidya*.
6. To institue fellowships, studentships etc. for pursuing research on *Vāstuvidya*.
7. To co-operate with other organisations including Universitites, Govt. agencies in promoting and achieving the objectives mentioned above.

FIELDS OF ACTIVITIES

1. Conducting research in *Vāstuvidya* and related subjects and publishing research documents, monographs, reference books, instruction aids, periodicals etc.
2.. Arranging and conducting awareness courses, workships, seminars, symposia, long term courses etc. on building construction and rural and urban planning.
3. Designing and executing training programmes with aview to help the technicians in gaining theoretical and practical knowledge on building science in general and *Vāstuvidya* in particular.
4. Analysing and evaluating the principles processes and practices of *Vāstuvidya* using scientific methology and integrate them with the developments in engineering science and material science.
5. Undertaking the construction of different types of *Vāstu* as part of the research.
6. Organising training centres, library and museum.